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OF THE
GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL,
MADE

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UNDER THE DIRECTION OF

BRIG. AND BVT. MAJOR GENERAL A. A. HUMPHREYS,
CHIEF OF ENGINEERS

BY

CLARENCE KING,
U. S. GEOLOGIST.



VOLUME IV.

UNITED STATES GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL.
CLARENCE KING, GEOLOGIST-IN-CHARGE.

PART I.
PALÆONTOLOGY.

BY
F. B. MEEK.

PART II.
PALÆONTOLOGY.

BY
JAMES HALL AND R. P. WHITFIELD.

PART III.
ORNITHOLOGY.

BY
ROBERT RIDGWAY.

SUBMITTED TO THE CHIEF OF ENGINEERS AND PUBLISHED BY ORDER OF THE SECRETARY OF
WAR UNDER AUTHORITY OF CONGRESS.

ILLUSTRATED BY XXIV PLATES.

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The plates accompanying this volume were engraved and printed by JULIUS BIEN, of New York. The original drawings for Part I were executed by H. W. ELLIOTT, of Washington; those of Part II, by H. M. MARTIN, of Albany.

PART I.

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OFFICE OF THE U. S. GEOLOGICAL EXPLORATION
OF THE FORTIETH PARALLEL,
New York, April, 1877.

GENERAL: Herewith I have the honor to transmit Volume IV of the Reports of this Exploration, composed of Memoirs on Palæontology, by Messrs. F. B. Meek, James Hall and R. P. Whitfield; also on Ornithology, by Robert Ridgway.

Very respectfully, your obedient servant,

CLARENCE KING,

Geologist-in-charge.

Brig. Gen. A. A. HUMPHREYS,

Chief of Engineers U. S. Army,

Washington, D. C.

UNITED STATES GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL.
CLARENCE KING, GEOLOGIST-IN-CHARGE.

PART I.

PALÆONTOLOGY.

BY

F. B. MEEK.

INTRODUCTORY REMARKS.

This being a strictly palæontological report, any extended remarks on the geological formations from which the fossils described were obtained are not expected, and would be out of place here. A few words, however, respecting some points on which the specimens investigated throw more or less light, seem to be necessary to a clear understanding of the palæontology itself.

Before proceeding further, however, it is proper to state here, that, in order to give as full and complete an account of the palæontology as possible of the district explored, some collections brought from the same region more than ten years since, by Col. J. H. Simpson, of the United States Topographical Engineers, while conducting a Government expedition through the same country, have also been included. In 1860, the writer published, in the Proceedings of the Philadelphia Academy of Natural Sciences, brief preliminary descriptions of the new species of fossils contained in Colonel Simpson's collection, and soon after prepared, for that gentleman's report, more extended descriptions and figures of the same. Unfortunately, however, Congress failed to make the necessary appropriation to publish Colonel Simpson's report. Consequently, the large amount of important information contained in the same remains unpublished; and, as it is now extremely improbable that his report will ever be printed,* at any rate with the accompanying illustrations, it has been thought desirable that we should give here descriptions and figures of the new fossils of his collection, now in the

* Since this was written and revised, Colonel Simpson's report has been published.

museum of the Smithsonian Institution. In doing this, however, he has been duly credited as the discoverer of each species, and the original types have generally been figured, even where specimens of the same forms are contained in Mr. King's collections; though figures of the latter have also been given, where better specimens than those first found have been obtained.

The fossils here reported on, evidently came from the following geological formations, viz., Lower Silurian, Devonian, Carboniferous, Triassic, Jurassic, Cretaceous, and Tertiary. The small number of Lower Silurian forms are represented on the upper part of plate 1. Two of the Trilobites, from Antelope Springs, House Mountains, belong, one to the genus *Conocoryphe*, and the other to the genus *Paradoxides*, or some allied group. They are decidedly Primordial types, and show that rocks belonging to this ancient period occur at that locality.*

The other Silurian forms merely consist of small univalve shells that came from a gray, granular limestone on the summit of Ute Peak, Wasatch Range, Utah. One of these is a small *Ophileta*, scarcely distinguishable from *O. complanata* of Vanuxem, first described from the Calciferous sand-rock of New York. The other two are lenticular, or much depressed forms, with an angular periphery and a large umbilicus, and evidently belong to the same formation, being nearly allied to forms found in beds of the age of the Calciferous period, in Minnesota, Wisconsin, and Texas. From the affinities of these fossils, we can therefore scarcely entertain any doubts that the rock from which they were obtained belongs to the Calciferous epoch.

The Devonian forms in these collections are more numerous than the Silurian. They are illustrated on the lower part of plate 1, and on plate 2, and the upper part of plate 3. Those on plate 1, with the exception of a small *Proetus*, to be mentioned further on, came from a light-colored argillaceous limestone about three miles south of Piñon Pass, Piñon Range, Nevada, and consist of a small subglobose, undetermined species of *Favosites*, *Atrypa reticularis*, a new *Spirifer*, a bivalve of doubtful genus, and fragments of a *Dalmanites*. It is possible that the last-mentioned fossil may be an Upper Silurian species, as Mr. King found it in the lowest bed exposed at the locality, and it seems to be quite as nearly allied (so far as its charac-

* See Proceed. Acad. Nat. Sci. Philad., Ap. 1870, p. 56.

ters can be made out from the imperfect specimens) to Upper Silurian as to Devonian types. The *Spirifer*, however, is *very* closely allied to forms found in the Upper Helderberg (Devonian) limestones, at the Falls of the Ohio; while the specimens of *Atrypa reticularis* belong to a variety very common in rocks of that age in the vicinity of Louisville, Ky., and in the neighboring portions of Indiana. It is also worthy of note, that these fossils were found quite abundant, weathered out of the matrix, and that they are silicified and in all respects similar, in their state of preservation, to the Upper Helderberg fossils, so common in the Western States mentioned above. From these facts, it is highly probable that these Piñon Range fossils came from a rock belonging to about that horizon.

The other Devonian fossils, figured on plates 2 and 3, came from an entirely distinct rock from those mentioned above, and are more than usually interesting, because they were found, with a few exceptions, in the formation containing the rich silver-mines of the White Pine Mining District, Nevada. They were all found in a dark-colored or grayish matrix, entirely different from that containing the Piñon Station fossils mentioned above. Those from the White Pine District consist of several species of Corals, Brachiopods, and two species of *Orthoceras*. Among the Corals, there are species that seem to be undistinguishable from the European Devonian forms *Acervularia pentagona* and *Smithia Hennahii*. The other Corals are an apparently new *Alveolites* and a *Diphyphyllum*.* The Brachiopods consist of a small *Productus*, at least allied to the Devonian species *P. subaculeatus*, *Atrypa reticularis*, a small *Hemipronites*, apparently undistinguishable from a New York Hamilton Group species, and several small *Spirifers*, some of which resemble Hamilton Group forms.

The presence of the genera *Productus* and *Smithia* would alone be a strong argument, in the present state of palæontological science, against the supposition that these silver-bearing beds might belong to the Silurian, to say nothing of the specific affinities of these and the associated fossils; while the occurrence in the same beds of *Atrypa reticularis*, and the *Acervularia*, *Smithia*, and *Ptychophyllum*, with the specific affinities of the other fossils,

* The little *Favosites* and *Cyathophyllum*, represented by figures 2 and 3 of plate 2, are from a different horizon in Arizona.

furnish even a stronger argument against the conclusion that this formation might belong to the Carboniferous. Hence we cannot doubt that these beds belong to the Devonian, and probably to about the horizon of the Hamilton Group of the New York series.* Indeed, in 1860, on nearly the same evidence, this formation, at localities a little farther north, was referred by the writer to the Devonian, from the examination of specimens brought from there by Colonel Simpson; though at that time this rock was not known to contain silver-mines.†

The little *Proetus*, illustrated by fig. 10 on plate 1, probably also came from near the same horizon as the Devonian fossils mentioned above, as it is contained in a similar matrix quite unlike that containing the Piñon Range fossils.

On the lower part of plate 3, a few fossils are figured together in a separate division, because they are of a somewhat doubtful nature. They are also from the White Pine District, and came from beds known to hold a position between well-marked Carboniferous and Devonian rocks. All of them, excepting the *Spirifer*, came from a black bituminous shale, associated with some more or less arenaceous beds, beneath well-marked Carboniferous limestones. The *Aviculopecten* (fig. 10) is very closely allied to some western Carboniferous forms; and the little shell represented by fig. 8 also resembles Carboniferous species believed to be at least nearly related to *Posidonomya*. The Brachiopod represented by fig. 9, however, is remarkably like Devonian species of *Leiorhynchus*, and hence would favor the opinion that this shale is Devonian. The *Spirifer* represented by fig. 11 seems to belong to the common and widely-distributed Carboniferous species *S. cuspidatus*, and came from a gray, subcrystalline, cherty limestone, above the above-mentioned black slate, and was associated with some large Crinoid columns, casts of an *Orthis*, like *O. resupinata* or *O. Michelini*, and imperfect specimens of a smaller *Spirifer*, apparently like the Devonian species *S.*

* These remarks on the Devonian age of the White Pine silver-bearing rocks were quoted by Mr. Arnold Hague, in the Mining Report of Mr. King's Survey, 416, (issued in 1870.) It is to be regretted, however, that, owing to the fact that Mr. Hague did not see the proof, several annoying typographical errors, in the names of the fossils mentioned, were not corrected.—F. B. M., Sept. 29, 1874.

† See Proceed. Acad. Nat. Sci. Philad., 1860, XII.

gregarius. The evidence to be drawn from these few fossils would therefore seem to be somewhat conflicting in regard to the exact age of these black shales and cherty limestones; but the first more probably belongs to the Devonian and the latter to the Carboniferous.

Of all the collections that have yet been brought from this region, the decidedly Carboniferous types are far more numerous than those from any of the other formations. This will be more readily understood when it is remembered that we have illustrated on the accompanying seventeen plates, all of the known species of every age of which there are specimens accessible, while the Carboniferous forms alone occupy plates 4, 5, 6, 7, 8, and 9, with the exception of one *Goniatite*, of apparently the same age, from New Mexico. These fossils consist almost exclusively of Corals and Brachiopods, and seem to have been obtained from two distinct rocks; that is, the Corals, with a few exceptions, together with an *Orthis*, a *Hemipronites*,* and *Productus semistriatus*, figured on plate 7, as well as a distorted specimen of *Productus punctatus*, and others of *Fusulina*, not in a condition to be figured, came from a dark-gray and deep bluish-gray limestone, while the other specimens came from a light yellowish-gray limestone. So far as has yet been ascertained from all of the explorers of Utah and Nevada, these two rocks have nowhere been observed to occur together at the same localities. That they belong to different horizons in the Carboniferous series of this region, however, seems to be evident, not only from their different lithological characters, but also from the fact that they contain mainly distinct groups of fossils. The specimens from the dark-colored beds came from Piñon and Diamond Mountains, Nevada, Long's and Boxelder Peaks, Strong's Knob, etc., Utah; while those from the light-colored beds are marked, north of Moleen Peak, Egan and Mahogany Ranges, Ruby Group, south of Railroad Cañon, White Pine Mountains, and various localities in the White Pine District.

From the fact that almost none of the peculiarly characteristic Coal-Measure species of the Mississippi Valley have been identified among the species from the dark-colored limestones mentioned above, while there are,

* Imperfect specimens of this species were also brought from the light-colored beds at Fossil Hill, White Pine.

among the specimens from that rock, fragments of an *Archimedes*, together with imperfect specimens of *Spiriferina spinosa*,* (both Lower Carboniferous types), it is very probable that this rock belongs to the Lower Carboniferous series. This view also receives some support from the presence, in these dark beds, of a species of *Lithostroton*, a genus very abundantly represented by one or two species in the Lower Carboniferous, but unknown in the Coal-Measures of the Mississippi Valley.

When we turn our attention to the fossils from the light-yellowish Carboniferous limestones of Nevada, however, at the localities mentioned, we find among them forms undistinguishable from *Athyris subtilita*, *Spirifer cameratus*, *Productus Prattenianus*, and *Spiriferina Kentuckensis*;* none of which are certainly known from any horizon below the Coal-Measures of the Mississippi Valley. Hence it is more probable that these lighter-colored Carboniferous limestones belong to the horizon of the Coal-Measures; though I believe no beds of coal have yet been found associated with them.

Perhaps of all the collections of fossils that have yet come to us from the Far West, there are none more interesting than those from the Upper Trias of West Humboldt Range. The specimens from this formation in the collections under consideration are illustrated on plates 10 and 11, and will be seen to consist of a few bivalves and some ten or twelve species of *Cephalopoda*. The occurrence of this formation in that region was first made known by Prof. J. D. Whitney and Mr. Gabb, of the California Geological Survey, in the reports of which several of the species here figured were illustrated and described along with others.

It is a remarkable fact that there should be at these distant western localities an immense series of deposits, containing so exact a representation of the very peculiar fauna of the Upper Trias of Europe, as exhibited in the St. Cassian, Aussee, and Hallstadt deposits. For instance, there are, among the collections that have been by different parties found in these beds, the following peculiar genera, especially characteristic of the rocks of this age in Europe, viz., *Halobia*, *Monotis*, *Cassianella*,† *Trachyceras*, *Archestes*, *Clido-*

* The specimens of these species in the collection, although recognizable, are not in a condition to be figured.

† Mr. Gabb has described a species of this genus in the American Journal of Conchology from this formation in Nevada.

nites, etc., directly associated with the more ancient genus *Orthoceras*. There have also been found in these beds the following *species*, closely allied to, or possibly in some cases identical with, *Halobia Lommelei*, *Monotis Salinarius*, *Ceratites Haidingerii*, *Archestes Ausseearius*, etc. There are likewise known from this formation various other types of the *Ammonitidæ*, which, like those found at the same horizon in Europe, are not true Ammonites, nor Ceratites, nor yet Goniatites, as these genera have been restricted by late authors, but new generic types, sometimes intermediate in their characters between the typical forms of the above-mentioned genera.

It is evident, from the collections that have been already obtained from this formation, that a rich harvest of new and interesting forms awaits the collector who can visit this region under circumstances favorable to its thorough exploration.

The species in the collection believed to be of Jurassic age are illustrated on plate 12. The specimens of *Belemnites* came from the West Humboldt Range, Nevada; while all of the others were collected four or five hundred miles further eastward, at Weber Cañon, Wasatch Range, Utah, from apparently about the same horizon. It is barely possible that a few of the West Humboldt species that have been supposed to be of Triassic age may belong more properly to the Jurassic (Lias), as there seems to be a great development of these rocks there, without a strongly-marked division, so far as lithological characters are concerned, if we can judge by the matrix of the specimens. At any rate, the specimens of *Belemnites* from there are contained in an apparently undistinguishable matrix from that of the *Orthoceras* and other Triassic forms; while Mr. Gabb has described from that region an Ammonite (specimens of which I have seen in a similar matrix) that seems scarcely distinguishable from the European low Liassic species *A. bisulcatus*.

The species figured on the lower half of plate 12, from Weber Cañon, have been placed together in a separate division, because some doubts at one time existed in regard to the stratigraphical position of the bed from which they were obtained.*

* Since this was written and the plates arranged, Mr. King informs me that he has found this rock to be, as I had from the first believed, of Carboniferous age.—F. B. M., Nov. 29, 1874.

The Cretaceous fossils of the collection, as will be seen by plates 13, 14, and 15, are all merely casts of bivalves, excepting two species of *Gastropoda*. Exclusive of the two species of large *Inoceramus*, represented by fig. 3 of plate 13, and fig. 4 of plate 14, which came from a different horizon near the eastern base of the Rocky Mountains, they are all from a light-yellowish sandstone, containing beds and seams of brown coal, at various localities in the region of Coalville and Bear River, Utah. The specimens yet obtained are in a bad state of preservation; but, as far as can be determined, they appear to be very nearly if not quite all distinct from the Cretaceous species yet known from the Upper Missouri country.

Taken collectively, this group of fossils presents much the general *facies* of the fauna of the series in California, referred by Professor Whitney to the upper part of the Cretaceous of that State, under the name Tejon Group. Yet, after careful comparisons with the figures and descriptions in the California reports, I am not fully satisfied that any of the species are positively the same; though in some instances they may at least safely be regarded as closely-allied representative forms. With the exception of the two or three species of *Inoceramus*, the genus *Gyrodes*, and perhaps *Anchura*, they present, so far as their characters can be made out from the specimens yet brought in, just such a group of forms as might be, with almost equal propriety, referred either to the Cretaceous or to the Tertiary.* The presence of the genera mentioned, however, would, in the present state of palæontological science, exclude them from the Tertiary and place them in the Cretaceous. The fact, too, that they are all marine types, while all of those yet collected in this great internal region of the continent, from well-defined Tertiary beds, are terrestrial, or fresh- and brackish-water types, would confirm the other evidence that these light-colored coal-bearing sandstones of the region of Coalville and Bear River really belong to the Cretaceous. Indeed, I arrived at this conclusion in 1860, while investigating Colonel Simpson's collections from this formation.† The fact, however, that all the collections yet brought in from this formation contain

* Since this was written, Dr. Hayden's party have also brought in, from these Coalville beds, other decidedly Cretaceous types of fossils.

† See Proceed. Acad. Nat. Sci. Philad., Ap. 1860, p. 126.

no *Ammonites*, *Scaphites*, *Baculites*, *Hamites*, *Turritiles*, *Helicoceras*, or any of the numerous other types generally believed to have died out at the close of the Cretaceous period (excepting the very few forms already mentioned), would appear to indicate that this formation was deposited at near the close of the physical conditions most favorable to the existence of types of life peculiar to the Cretaceous epoch; and hence that it belongs to some of the latest, if not to *the* latest, deposits of that period.*

The fossils from the Bear River fresh- or brackish-water strata, and those from later and undoubted Tertiary beds, have been illustrated together on plates 16 and 17. The species from these different horizons might more appropriately have been separated on distinct plates; but this could not well be done without arranging the figures on three plates; while there are not quite enough of them to be so distributed. Those from the oldest upheaved brackish-water beds associated with the light-colored marine Cretaceous sandstone already mentioned, at the Bear River locality, are *Unio priscus*, *U. belliplicatus*, and *Corbicula Durkeei* of plate 16; and *Corbula Engelmanni*, *C. pyriformis*, *Limnæa nitida*, *Rhytiphorus priscus*, *Campe-loma (Melantho) occidentalis?*, *C. macrospira*, *Viviparus Conradi*, and *Pyr-gulifera humerosa* of plate 17.

This formation seems, at Bear River, to be associated with the Cretaceous sandstone of that region in such a manner as to give the impression that it probably immediately succeeded the latter in point of time. It is evident, however, from the striking contrast in the fossils characterizing the two formations, that marked physical changes had taken place here between the deposition of the last of the undoubted Cretaceous sandstones and the commencement of what appears to be the oldest Tertiary, since nearly or quite all the fossils found in the former are marine types, while those of the latter are fresh- and brackish-water, or, in some few instances, perhaps terrestrial forms. This strongly-marked change in the fossils in passing from the Cretaceous sandstone below into the fresh- and brackish-water beds apparently above, and the close affinities of most of the species in the latter

* Later personal examinations of these beds at Coalville, and the equivalent marine Cretaceous strata at Bear River, as stated in Dr. Hayden's Report of 1872, have satisfied me that this formation, at the former locality, represents probably nearly the whole of the Upper Missouri Cretaceous series.—F. B. M., Nov., 1874.

either to foreign Lower Tertiary species or to living forms, are the grounds upon which Dr. Engelmann and the writer, in 1860, referred these estuary-beds to the Lower Tertiary.

One of the species found in the Cretaceous sandstones at Coalville, Utah, certainly agrees very closely with *Corbula pyriformis* from the later estuary beds at Bear River, as may be seen by comparing fig. 2, plate 14, with fig. 2 *a*, plate 17. As the specimen from the sandstone, however, is a mere cast, it is not possible to make a very satisfactory comparison. It is also worthy of note here that there certainly is a species in the latest Cretaceous beds of California (*Corbula alaformis* of Gabb) that agrees very nearly with our *C. pyriformis* from the Bear River estuary beds. Indeed, I find very little in the figure or description of the California species to distinguish it from some specimens of *C. pyriformis* var. *concentrica*. Most of the specimens of *C. pyriformis* are more coarsely and more irregularly ribbed and furrowed than is shown in Mr. Gabb's figure; but the specimens vary much in this character, some of them being nearly smooth, as in fig. 2 *a*, plate 17, while others are regularly ribbed, as in fig. 2, or irregularly so, as in fig. 2 *a*, and there are all conceivable intermediate gradations. As Mr. Gabb, however, only figures one specimen, it is not possible to make an entirely satisfactory comparison; though his species is most probably distinct from ours.

This similarity of a few of the forms in the upper coal-bearing Cretaceous beds in Utah, Wyoming, and California, with species in the estuary-beds in the Bear River country, and the general conformability of these formations, together with their association at the same localities, and the non-conformability of the estuary-beds with the later Tertiary, might suggest the inquiry, whether we ought not to carry up the line between the Tertiary and Cretaceous here, so as to include the estuary-deposits in the latter.

This suggestion would certainly appear to receive some support, from the fact that some of the vertebrate fossils collected by Dr. Hayden, apparently from equivalent estuary-beds at the mouth of Judith River, on the Upper Missouri, were regarded by Dr. Leidy as belonging to Cretaceous types. Supposing that the change from marine to fresh- and brackish-water

conditions in this region had taken place a little before, instead of exactly at, the close of the Cretaceous period, this change alone would be amply sufficient to account for the destruction of the marine Cretaceous forms. Still, this would not account for the paucity of strictly Cretaceous types here through a considerable thickness of marine sandstones below, nor for the striking Tertiary and more modern affinities of several of the forms in the estuary-beds above.*

While willing to admit that facts may yet be discovered showing that some of the brackish-water beds so widely distributed in this internal region of the continent belong more properly to the Cretaceous than to the Tertiary, I still think, from all the light we now have on the subject, that the Bear and Judith River fresh- and brackish-water deposits represent the oldest Eocene Lignites of the Paris basin. At least, if they are Cretaceous, there is little or nothing in the *molluscan* remains yet obtained from them to support such a conclusion. †

The probability is, as I have elsewhere remarked, that, as the continent was rising, toward the close of the Cretaceous epoch, the Rocky Mountains, in part at least, existed as islands in the Cretaceous Sea. Still later, as the process of elevation continued, considerable areas that had been occupied by the sea became at first partly isolated, so as to form bodies of brackish water, that gradually became fresh-water lakes, as further elevation completely isolated them from the influx of the sea. In the deposits formed in these waters, we might naturally expect to find, at the base, brackish-water types, and, further up, wholly fresh-water forms, just as is the case in the beds referred to the Tertiary in that region.

Whether this change from marine to fresh-water conditions was exactly contemporaneous with the close of the Cretaceous, and the introduction of the Tertiary epochs elsewhere, perhaps we shall never know; but that it

* For instance, compare *Corbicula Durkeei* (fig. 6 a-g, plate 16) with *C. antiqua*, Ferrussac, and *C. Forbesii*, Deshayes, from the Lower Lignites of the Paris basin, as well as *Pyrgulifera humerosa* (figs. 19 and 19 a, plate 17) with the so-called *Melania armata* of Matheron, from the same horizon at the mouth of the Rhone.

† These remarks were written in 1870; since that time, however, additional facts have come to light, as already suggested, rather favoring the conclusion that these Bear River estuary-beds may belong to the latest Cretaceous.—F. B. M., Nov., 1874.

corresponded in the sequence of geological changes here to that event seems probable.

In the vicinity of Fort Bridger, Tertiary deposits exist, apparently of later date than the Bear River beds that have furnished the fossils mentioned above. So far as yet known, these Fort Bridger beds contain only fresh-water and perhaps terrestrial fossils. From this formation, the following species, figured on plate 17, were collected, mainly by Colonel Simpson's party, viz., *Limnæa similis*, *L. vetusta*, *Goniobasis Simpsoni*, *Planorbis spectabilis*, and *P. spectabilis*, var. *Utahensis*; also *Unio Haydeni*, figured on plate 16. So far as known, all the species from this formation are distinct from those found in the Bear River deposits; and only one species, *Planorbis spectabilis*, is very nearly related to any species found on the upper branches of the Missouri.

A few fossils in the collection, from the region of Fossil Hill, Kawsoh Mountains, Nevada, show that there is there an exceedingly interesting Tertiary formation. These fossils are in a beautiful state of preservation, and contained in a white, soft limestone, or indurated marl. Not a single one of the species yet known from this formation is identical with any of those hitherto discovered in any of the other Far-Western Tertiary deposits.* They are all fresh-water forms, and consist of the following species, viz., *Sphærium Idahoense* and *S. rugosum*, figured on plate 16, and *Carinifex Tryoni*, *C. Binneyi*, *Goniobasis sculptilis*, *G. subsculptilis*, and *Ancylus undulatus*, figured on plate 17. The species all being new, and the rock not having been seen connected with any of the other Tertiary formations of that region, we have no means of determining its exact position in the Tertiary series; though it is probably more recent than either of the other formations from which fossils are figured and described in this report. It will probably yield a large number of new and interesting fossils to whoever may be able to explore it thoroughly.

As it has been thought desirable to give as full and complete an

* At the time of writing the above, I had overlooked the possible identity of the species I have described under the name *Goniobasis sculptilis* with *Melania Taylora*, Gabb, described in vol. II, p. 13, Palæont. California, from apparently the same formation in Idaho.—F. B. M., Nov., 1874.

account as possible of the palæontology of the country explored, in a number of instances species have been figured and described even where the specimens are not in a condition to give any clew to their generic characters. This has been done, because, notwithstanding the imperfection of the specimens, they can readily be identified as characteristic forms of the several respective rocks. Hence, as future explorers, under more favorable circumstances, obtain more extensive collections, it will certainly be found necessary in perhaps not a few instances, to modify the nomenclature here provisionally adopted. In all these doubtful cases, however, the doubts in regard to their generic or specific affinities have been fully indicated, either by the use of a query-mark or in words. In some other cases, fossils have been figured, and, as far as possible, described, where the species could not be certainly identified with known forms, nor yet satisfactorily determined to be new. In such instances, they are merely given as undetermined forms, without having any specific name appended.

In closing these remarks, I take pleasure in acknowledging my obligations to Professor Henry for the use of rooms, books, and specimens, as well as for other facilities at the Smithsonian Institution, while preparing this report.

SMITHSONIAN INSTITUTION,

Washington City, D. C., August 2, 1870.

DESCRIPTIONS OF FOSSILS.

SILURIAN SPECIES.

MOLLUSCA.

GASTEROPODA.

SOLARIIDÆ.

? Genus OPHILETA, Vanuxem.

OPHILETA COMPLANATA, *var. NANA*.

Plate 1, figs. 1, 1 a, 1 b.

Ophileta complanata, Vanuxem (1842), Report Third Geol. Dist. N. Y., 36, fig. 2.—

Hall (1847), Palæont. N. Y., I, pl. ii, fig. 2, and pl. iii, fig. 6.

Ophileta complanata var. nana, Meek (1870), Hayden's Prelim. Report of the U. S. Geol. Survey of the Territories, 295.

Shell compressed-planorbicular, both sides slightly concave; volutions about six, very narrow, and increasing very gradually in size, flattened and slightly oblique on the outer side, and presenting a quadrangular transverse section, with upper and lower surfaces somewhat converging inward from the angle on each side of the periphery.

Greatest diameter, 0.30 inch; thickness or height, 0.06 inch; diameter of last volution, measuring in the direction of the plane of the shell, 0.05 inch.

As Vanuxem's species was not fully described or well figured, it is scarcely possible to be positively sure that our shell might not be only a closely-allied species, without direct comparison with authentic examples

of the New York form. Our specimens are scarcely one-half as large as Vanuxem's figure; but we are not sure that they are entire. The shell, however, certainly agrees very closely with *O. complanata* in proportions and the exceedingly narrow character of its volutions. Still, as it seems to have nearly the same number of whorls in less than half the diameter of *O. complanata*, it may be a distinct smaller species. If so, it may be called *O. nana*.

Locality and position.—Ute Peak, south of Muddy Creek, a tributary of Bear River, Utah; from a gray, granular limestone of Lower Silurian age, and probably belonging to the epoch of the Calciferous Group of the New York series.

Genus RAPHISTOMA, Hall.

RAPHISTOMA ? ROTULIFORMIS, Meek.

Plate 1, figs. 2, 2 a, 2 b.

Euomphalus (*Raphistoma* ?) *rotuliformis*, Meek (1870), *Proceed. Acad. Nat. Sci. Philad.*, 61; and (1872) *Hayden's Ann. Rep. Geol. Survey of the Territories*, 464.

Shell small, sublenticular, or more than twice and a half as wide as high, with the periphery sharply angular, and the much-depressed spire a little more prominent than the convexity of the last turn below the angular periphery; umbilicus very wide, deep, and depressed-conical; volutions six or seven, exceedingly narrow, and increasing very gradually in size, all obliquely flattened, or sometimes slightly concave on the upper slope, which is nearly coincident with that of the spire, and with the under side sloping downward and inward (being nearly one-third wider than the upper surface) to the umbilicus, around which they are rather distinctly angular; aperture obliquely-rhombic. Surface unknown.

Breadth, 0.32 inch; height, 0.12 inch; breadth of last turn on the upper slope, 0.15 inch; on the under slope, 0.18 inch; breadth of aperture, 0.09 inch; height of aperture, 0.07 inch.

This species is evidently nearly allied to *Euomphalus polygyratus*, Roemer, from the Lower Silurian rocks of San Saba, Texas (see Kreid. von Texas, tab. xi, figs. 4 a, b). It differs, however, in being much smaller, its greatest diameter being less than one-fourth that of Roemer's species,

although it shows nearly the same number of volutions. Its volutions are also proportionally more convex below, and slope more abruptly into the umbilicus.

Locality and position.—Same as last.

RAPHISTOMA ? TROCHISCUS, Meek.

Plate 1, figs. 3, 3 *a*, and 3 *b*.

Euomphalus (*Raphistoma* ?) *trochiscus*, Meek (1870), Proceed. Acad. Nat. Sci. Philad., 61; and (1872) in Hayden's Ann. Rep. Geol. Survey of the Territories, 464.

Shell sublenticular, about twice and a half as wide as high; spire much depressed, or but little higher (measuring from the horizon of the sharply angular periphery) than the convexity of the last turn below the same; umbilicus wide, deep, and depressed-conical; volutions four and a half to five, increasing gradually in size, all obliquely flattened (or sometimes slightly concave) above, nearly on a line with the slope of the spire, and sloping downward and inward below to the umbilicus, into which the curve is so abrupt as to form an obtuse angle around its margin; aperture wider than high, and rhombic-subtrigonal in outline. Surface unknown.

Breadth, 0.40 inch; height, 0.15 inch; breadth of last turn, 0.12 inch; breadth of umbilicus, about 0.25 inch.

This is similar in general appearance to the last species, but may be readily distinguished by its less numerous whorls, which increase more rapidly in size. It is much more nearly allied to a form now before me in masses of chert, from the west side of Lake Pepin, in Minnesota, found in beds of about the age of the Calciferous sand-rock of the New York series. The latter, however, attains a much larger size; some of the specimens being an inch in diameter, with about six volutions. The Minnesota form is also more sharply angular on the periphery, and has the upper side of the volutions distinctly more concave, and the spire more depressed.*

Locality and position.—Same as last.

* In the Proceedings of the Philadelphia Academy for 1870, cited above (p. 62), I have proposed the name *E. Pepinensis* for this Minnesota species.

ARTICULATA.

CRUSTACEA.

PARADOXIDÆ.

Genus CONOCORYPHE, Corda.

CONOCORYPHE (PTYCHOPARIA) KINGII, Meek.

Plate 1, fig. 4.

Conocoryphe (*Conocephalites*) *Kingii*, Meek (1870), Proceed. Acad. Nat. Sci. Philad., 63.
Conocoryphe (*Ptychoparia*) *Kingii*, Meek (1872), Hayden's Ann. Report U. S. Geol.
Survey of the Territories, 487.—White (1876), Palæont. of Lieut. Wheeler's
Survey, 40, pl. ii, figs. 2 *a b, c*.

Entire form ovate and much depressed, with breadth equaling about two-thirds the whole length. Cephalic shield semicircular, or a little wider than long, with the anterior and antero-lateral borders regularly rounded in outline, and provided with a narrow, slightly-defined, marginal rim; posterior margin nearly straight, with the lateral angles terminating in abruptly-pointed extremities, so short as scarcely to project as far backward as the posterior margin of the second thoracic segment. Glabella depressed nearly even with the cheeks, about two-thirds as long as the entire head, and between one-third and one-fourth the breadth of the same behind, but narrowing forward to its subtruncated anterior end, and separated from the cheeks on each side and in front by a shallow furrow; occipital furrow moderately well defined, and continued as rather deep broad furrows along the posterior margins of the cheeks out nearly to the points where the facial sutures cut the margin; lateral furrows not clearly defined in the specimens, but apparently consisting of four pairs. Facial sutures directed at first, for a short distance, forward from the inner anterior end of each eye, then curving gracefully outward as they extend forward, until near the anterior margin of the head, where they are a little wider apart than the distance between the eyes, but again curving rather abruptly inward, so as to reach the anterior margin nearly on a line with each eye; posteriorly these sutures extend at first outward nearly at right angles to the longitudinal axis, from the posterior end of each eye, and then curve gracefully backward, so as to intersect

the posterior margin between one-fourth and one-third the distance from the lateral angles inward toward the glabella. Eyes rather depressed, slightly arched outward, separated from each other by a space somewhat less than half the entire breadth of the head, and placed less than their own length in advance of the posterior margin, and about once and a half their length behind the front margin of the head; visual surfaces narrow, and not showing any lenses under a good magnifier.

Thorax with its length bearing the proportions to that of the head of 79 to 52, and to its own breadth of 79 to 107, being very slightly wider near the middle than in front, and narrowing posteriorly, with gently convex lateral margins, from behind the middle to the pygidium. Axial lobe depressed, narrow, or only about two-thirds the breadth of each lateral lobe at its anterior end, and narrowing regularly with straight sides posteriorly; segments thirteen, nearly or quite straight, and each with some appearance of a small node or prominence at each end.* Lateral lobes depressed or nearly flat; pleuræ almost transverse, or arching slightly backward to near the extremities, which are abruptly pointed; each with a well-defined furrow, which commences small near the anterior inner end, and widens and deepens for about half-way out, and then narrows and becomes more shallow, so as to die out before reaching the lateral extremities.

Pygidium subsemicircular, being rounded posteriorly, with a narrow, slightly-flattened border, and somewhat rounded anterior lateral extremities; length bearing to that of the thorax the proportions of 30 to 79, and to that of the head of 30 to 52, with a breadth of not quite two-thirds that of the head; axial lobe equaling more than two-thirds the length, narrow, depressed, and showing more or less distinctly about five segments; lateral lobes much depressed, nearly twice as wide at the anterior end as the middle one, each with about three segments, which curve a little backward, and become obsolete before passing upon the narrow, smooth border; segments each provided with a comparatively large longitudinal furrow, corresponding to those on the pleuræ.

* In the specimens, these little prominences seem to be so very obscure as to leave doubts of their real existence as nodes. They are *much* too distinctly defined in our figure.

Entire surface apparently smooth, excepting fine radiating striæ on the anterior and lateral portions of the cephalic shield, that are scarcely visible without the aid of a magnifier.

Whole length, 1.60 inches; breadth of thorax, 1.07 inches; of cephalic shield (somewhat flattened by pressure), about 1.12 inches; length of thorax, 0.70 inch; length of pygidium, 0.30 inch; breadth of same, 0.60 inch.

Of this fine Trilobite, three entire specimens and a part of another were obtained. They are, however, all merely sharply-defined natural casts, formed by the deposition of a crust of arragonite in the original moulds left by the fossil in some kind of a matrix. The specimens were evidently somewhat flattened by pressure before or at the time they left their impressions in the rock. This compression has obscured the lateral furrows of the glabella; but most of the other characters of the upper side of the fossil are clearly seen, even to the facial sutures, and the faintly-marked radiating striæ around the front and lateral margins of the cheeks.

The genus *Conocephalites* (or more properly *Conocoryphe*, for a strict application of the rules of priority would, I should think, require that the latter name should be adopted for the genus to which they were both applied) is so nearly allied to *Olenus* that it may not be always easy to distinguish the two types without seeing the hypostoma, and hence it is possible that the form under consideration may be more properly an *Olenus*. As it has more the regular oval outline of the former, and less pointed and produced pleuræ than the latter, while it shows clearly the fine radiating striæ around the anterior and lateral margins of the head, so often seen in *Conocoryphe*, it more probably belongs to that genus. It is worthy of note, however, that all of the specimens seem to be much more depressed or flattened than any of the species yet described of that genus, while only one of them shows any traces of the slender ridge usually seen passing from the anterior end of each eye to the front extremity of the glabella; and in this one, the ridge is so faintly marked as to leave doubts whether or not it is natural.

The slight differences between some of the details of the type specimen illustrated on our plate, and those figured by Dr. White, are either sexual, or due to accidental causes. The most obvious of these differences

is the greater length of the posterior lateral spines of the cephalic shield in Dr. White's specimens, which difference is probably sexual; while the others seem to be mainly due to the accidental flattening of our specimen.

Locality and position.—Antelope Springs, House Range, Utah; Lower Silurian, and probably, judging from the known position of the genus *Conocephalites* in the rocks of this country and Europe, from the Primordial Zone.

Genus PARADOXIDES, Brongniart.

PARADOXIDES? NEVADENSIS, Meek.

Plate 1, fig. 5.

Paradoxides? Nevadensis, Meek (1870), Proceed. Acad. Nat. Sci. Philad., 62.

The only specimen of this Trilobite obtained consists of a natural cast, formed by a moderately thick crust of arragonite, deposited in a natural mould, or impression, of a part of the thorax and the pygidium, with the free borders of the latter broken away. Its rather large size, much depressed form, spiniferous pleuræ, and general physiognomy, as far as seen, at once recall to the mind the well-known genus *Paradoxides*. A closer inspection, however, shows its pygidium to be proportionally larger than we see in the known species of that genus, with possibly the exception of *P. Forschhammeri* of Angelin.

Of the thorax, eight of the posterior segments are preserved. These show the axial lobe to be much depressed, and about as wide as the lateral ones, exclusive of the free recurved points of the pleuræ. The segments of the axial lobe are defined by a broad, rounded furrow, or depression, across the anterior side of each, and have much the general appearance of those of some species of *Paradoxides*, being a little thickened, squarely truncated, and slightly curved forward at the ends. But they differ in showing distinct remains of a mesial spine, or tubercle, on each, and in having an obscure, oblique furrow, or depression, on each side, passing outward and backward from the broad, anterior, transverse furrow to the posterior lateral angles, so as partly to isolate the slightly-thickened and truncated extremities of each. The lateral lobes are nearly flat, and composed of pleuræ that extend straight outward at right angles to the axis, to their free extremities, which are

abruptly contracted (almost entirely on the posterior side) into slender, rounded, very sharp spines, which curve backward and outward. Each of the pleuræ is also provided with a broad, rather deep, flattened furrow, which commences near the inner end, and extends straight outward for some distance, with parallel sides, but gradually tapers, mainly on the anterior side, to a lanceolate point, before reaching the free extremities. These furrows have not the obliquity usually seen in those of *Paradoxides*, but run parallel to the direction of the pleuræ, so as to leave a slender straight ridge of equal size along the anterior and posterior margin of each rib.

The pygidium, exclusive of the portions of the free border broken away, has a nearly semicircular outline, being about twice as wide as long, while it is as much flattened as the thorax. The part remaining equals in length the five thoracic segments next in advance of it. Its mesial lobe is much depressed, and about three-fourths as wide anteriorly as the breadth of that of the thorax at its widest part seen. Posteriorly it tapers moderately, and extends nearly the entire length of the pygidium, as seen with the free border broken away. It is evident, however, that the flattened border projected more or less behind its termination. It shows distinctly five segments, with indications of about two others at the posterior end. The lateral lobes have each three segments, the anterior one being extended out nearly parallel to those of the thorax, while the others are directed more obliquely backward, and rapidly widen outward. Like the pleuræ, they have each a broad, flattened furrow; that of the anterior one being nearly parallel to those of the pleuræ, while those of the other two are directed more obliquely backward, particularly the posterior one, which is almost parallel to the longitudinal axis of the body. These furrows are so deep and broad as to give the three segments of each lateral lobe the appearance of six irregular ridges; the irregularity being produced by the posterior two furrows, instead of passing along the middle of each segment, being curved backward so as to divide it very unequally, leaving the anterior part much the broader. No fine surface-markings are preserved on the specimen.

Entire length of the imperfect specimen, nearly 3 inches, of which the remaining 8 thoracic segments form 1.70 inches; breadth of the thorax, exclusive of the free spiniferous ends of the pleuræ, 2.05 inches, and, including

the projecting ends of the pleuræ, 2.40 inches; length of what remains of the pygidium, 1.03 inches; breadth of the same, about 1.80 inches.

Supposing it to be a true *Paradoxides*, with not less than sixteen thoracic segments, the entire specimen, when complete, could not have been far from six inches in length. It can hardly be a true *Paradoxides*, however.

It is possible I should call this species *Olenus* or *Parabolina Nevadensis*; but its large size seems to be an objection to placing it in any section of either of these groups. In the possession of a node, or spine, on each of the thoracic segments, as well as in the direction of the posterior segments of the lateral lobes of the pygidium, it agrees with the type of *Parabolina*; but, unfortunately, the specimen is not in a condition to show whether or not these segments of the pygidium terminated in produced marginal spines, while the furrows of its pleuræ have not the obliquity of those seen in that type, but agree more nearly with those of some species of *Conocoryphe*. The comparatively large size of its pygidium, and the nodes, or spines, on its thoracic segments, as well as the nature of the furrows of the pleuræ, are rather against its reference to *Paradoxides*, and lead me to think that it may belong to an undescribed genus; if so, it might be called *Olenoides*.

Locality and position.—Same as last.

DEVONIAN SPECIES.

RADIATA.

POLYPI.

FAVOSITIDÆ.

Genus ALVEOLITES, Lamarck.

ALVEOLITES MULTILAMELLA, Meek.

Plate 2, figs. 7, 7 a, and 7 b.

Corallum massive, apparently hemispherical, or subglobose. Calices very small, or uniformly only about three-hundredths of an inch in their greater diameter, and about half as much in their smaller diameter; as

seen in transverse sections, subtrigonal or subrhombic, and separated by walls equalling their smaller diameter in thickness; apparently not very oblique at their terminations to the general surface, and showing (at least in sections) a small tooth-like projection at the middle of the outer wall. Longitudinal sections showing the tabulæ to be numerous, extremely thin, and not always exactly transverse or parallel to each other, but nearly so, and arranged somewhat regularly at intervals of only one-hundredth of an inch apart. Mural pores comparatively rather large, and regularly arranged, so that six of them may be counted in a space of one-tenth of an inch.

In the size and form of its calices, as well as in its massive growth, this species is nearly allied to a coral described by the writer (under the name *A. vallorum*), found by Mr. Kennicott at "the Ramparts" on Mackenzie River, near Fort Good Hope, Arctic America (see Trans. Chicago Acad. Sci., I, 86, pl. xi, fig. 9). It differs, however, in having its calices slightly larger, and not ranging near so obliquely to the general surface; the tubes formed by their continuous growth being much straighter, and more nearly parallel with each other, or only slightly radiating, instead of being very oblique and curving about in all directions. Whether or not it agrees with the Arctic species in the arrangement of its numerous transverse septa or diaphragms and its mural pores, I have been unable to determine; these parts not having been seen in that coral.

Compared with European species, it seems to be in some respects allied to *A. suborbicularis*, Lamarck, from the Devonian rocks of France, and *A. reticulatus*, Steininger, from rocks of the same age in France and Germany. From the first, it differs in its massive instead of encrusting mode of growth, as well as in its thicker walls between the calices, which latter are also smaller; while its tabulæ are much more numerous and more crowded. Its calices are a size larger than those of *A. reticulatus*, and separated by thinner walls, they also seem to be less oblique.

Locality and position.—Argyle Hill, White Pine District, Nevada; Devonian.

ALVEOLITES (undt. sp.)

From near the same locality, there is, in the collection, from the Devo-

nian of the White Pine District, an imperfect specimen of an *Alveolites*, that grew in an irregular, rather thin, foliated form, with exceedingly oblique calices, of somewhat larger size and narrower form than the foregoing. This, I think, belongs to another species; but the specimen is scarcely in a condition to admit of its being figured and described.

Genus FAVOSITES, Lamarck.

FAVOSITES (undt. sp.).

Plate 1, fig. 6.

Corallum small, subglobose or ovoid, often growing attached to shells. Corallites rather small, and very unequal in size and form, in consequence of the rapid growth of young ones between the corners of the old, so as to give the latter a polygonal or nearly circular outline, while the much smaller young often appear at the surface with a trigonal or quadrangular form, all rapidly radiating in all directions. Tabulæ passing straight across at intervals nearly equaling the diameter of the larger corallites. (Septa and mural pores unknown.)

Diameter of corallum, about 1.50 inches; of the largest corallites, about 0.08 inch.

The specimens of this little coral have all the cavities solidly filled with silicious matter, so that it is scarcely possible to make out very clearly its more important specific characters. It may be a new species; but, in a genus like this, the species of which are often so difficult to distinguish, even from the very best preserved specimens, it would be folly to attempt to identify our coral with any of the known species, or to name and describe it as new, without better specimens for comparison.

Locality and position.—Three miles south of Piñon Pass, Piñon Range, Nevada; Lower Devonian or Upper Silurian. Found associated with *Spirifer Piñonensis*, *Atrypa reticularis*, *Edmondia? Piñonensis*, and fragments of a *Dalmanites*.

FAVOSITES POLYMORPHA, Goldf. ?, var.

Plate 2, fig. 3.

Calamopora polymorpha, Goldf. (1826), Petrif. Germ., I, 79, tab. 27.*

Of this coral, I have seen but the single fragment figured, and this is

* For synonymy, see Edwards and Haime's Monograph of Fossil Corals.

not in a very good condition for examination. As nearly as its characters can be made out, it seems to belong to one of the varieties or species usually referred to *F. polymorpha* of Goldfuss. Without more and better specimens, however, it would scarcely be possible to determine its specific relations with exactness.

Locality and position.—Rio Verde, Arizona; found by Dr. Palmer associated with *Cyathophyllum Palmeri*.

Genus SYRINGOPORA, Goldfuss.

SYRINGOPORA (undt. sp.).

Corallites very slender or only about 0.06 inch in diameter; generally separated by spaces from one to three or four times their own diameter; usually nearly straight, but sometimes more or less flexuous; surface with small transverse wrinkles; connecting tubes distantly separated; (interior unknown).

In its general appearance, this coral rather closely resembles *S. perelegans*, Billings (Canadian Journal, March, 1859, fig. 19), and it may possibly belong to that species. As I only know it, however, from imperfect specimens, and there are doubtless many closely-allied species of this genus in the rocks of this country, I do not feel warranted in identifying it with that described by Mr. Billings, or in naming it as a new species. Its corallites are certainly more widely separated than in Mr. Billings's typical specimens, and, although this is to a considerable extent a variable character, I am rather inclined to regard it as a distinct species.

Locality and position.—Babylon Hill, White Pine Mining District; Devonian.

CYATHOPHYLLIDÆ.

Genus PTYCHOPHYLLUM, E. & H.

PTYCHOPHYLLUM? INFUNDIBULUM, Meek.

Plate 2, figs. 1, 1 a, 1 b.

Corallum subturbinate, or possibly becoming more or less cylindrical with age; central fossula moderately deep, truncato-obconic, about one-third the breadth of the entire corallum; rays stout, about fifty, generally

rather arcuate, or sometimes nearly straight along most of their length, every alternate one (or sometimes more) extending in nearly or quite to the middle, where they become tortuous, and apparently form a small, false columella; transverse plates stout, sometimes dividing, sloping a little from near the fossula to their free margins, which are subcrenate, while within they curve abruptly downward around the fossula. Transverse sections showing what appear to be a few dissepiments, arching strongly outward between the septa; but these may be oblique sections of the divisions of the infundebuliform plates. Vertical section showing a small prominence at the bottom of the central fossula, and under the fossula a few thin dissepiments passing transversely or curving a little upward as they approach what appears like a slender central columella.

Breadth, nearly two inches; height, somewhat less than one inch.

The specimens of this coral in the collection are very imperfect, and leave some doubts in regard to its true relations. Possibly I should call it *Chonophyllum infundibulum*, to which genus I was at first inclined to refer it. On making vertical sections of one of the specimens, however, I have found some appearances of a small, false columella. If these appearances are not deceptive, it would fall into the genus *Ptychophyllum*; but, if there was no columella, it would have to be referred to the genus *Chonophyllum*. Its septa, however, are much less numerous than those of any of the described species of the former genus; while it has also a smaller number than in any of the latter known to me, and likewise has a differently-formed calice.

Locality and position.—Treasure Hill, White Pine Mining District, Nevada; from the silver-bearing Devonian rocks of that region.

Genus DIPHYPHYLLUM, Lonsdale.

DIPHYPHYLLUM FASCICULUM, Meek.

Plate 2, figs. 4, 4 a, 4 b.

Corallum growing in tufts; corallites slender, elongated, cylindrical, moderately flexuous, and often adhering or growing together where brought into contact by the flexures, or sometimes by short, irregular, transverse processes; gemmation lateral; epitheca thin, and easily removed by weath-

ering, so as to expose the edges of the septa, thus presenting a distinctly striated appearance; surface more or less wrinkled transversely, but not very strongly so; septa from about thirty-six to forty, every alternate one of which is slightly thinner than the others, and generally terminates at, or a little within, the thin wall of the outer vesicular zone, while the others continue straight inward, and terminate abruptly a little before reaching the middle. Vertical section showing the narrow central space not occupied by the septa to be crossed by transverse plates, which seem to curve downward, and sometimes to divide all around the central transversely septate space, so as to form a kind of narrow, undefined inner vesicular area. Outside of this, there is a well-defined, very narrow, outer, vesicular zone, separated from the inner by a distinct, very thin wall, and occupied by only a single series of vesicles, the dissepiments between which range obliquely outward and upward. (Calices unknown.)

Entire size of corallum unknown; diameters of corallites, from 0.16 to 0.20 inch; spaces between the corallites rarely greater than the diameter of the latter, and generally less.

This coral seems to present essentially the structure of the genus *Diphyphyllum* of Lonsdale, particularly as illustrated by Professor McCoy in his figures of his *D. latiseptum* (Brit. Pal. Foss., pl. 3 c, fig. 10.) Specifically, however, it differs materially from that form in having more slender corallites, and a much narrower, outer, vesicular zone, as well as a proportionally wider middle area occupied by the broad tabulæ.

I am aware that Edwards and Haime have expressed the opinion, in their valuable Monograph of the Fossil Corals (p. 446), that the specimens on which Lonsdale's genus *Diphyphyllum* was founded, and those of another species described by McCoy, are probably only examples of *Lithostrotion*, in which the columella had accidentally been dissolved out during the process of fossilization. If this is so, the name of the species here under consideration would probably become *Diplophyllum fasciculum*, as it seems to present very nearly the structure of that genus as proposed by Professor Hall, who, however, has since expressed doubts whether or not his genus is distinct from *Diphyphyllum* of Lonsdale.

Whatever may be the real structure of Lonsdale's typical specimens of

Diphyphyllum, it seems to me that there can be no reasonable doubt in regard to the coral under consideration having no traces of a columella. It is true that fossil corals, in different states of preservation, sometimes do present quite deceptive appearances in their internal structure; but, from the examination of ground sections in various directions through the corallites, as well as from broken specimens, showing the interior more or less distinctly, I think I cannot be mistaken in the conclusion that this coral has not the characters of *Lithostrotion*, and agrees with Lonsdale's genus.

Locality and position.—Argyle and Treasure Hills, White Pine Mining District, Nevada; Devonian.

Genus ACERVULARIA, Schweigger.

ACERVULARIA PENTAGONA, Goldfuss (sp.).

Plate 2, figs. 5, 5 a.

Cyathophyllum pentagonum, Goldf. (1826), Petref. Germ., I, 60, tab. 19, fig. 3.—Morven (1832), Descr. Corall. Belg., 56.

Favastrea pentagona, de Blainville (1830), Dict. Sci. Nat., LX, 340; Mann. d'Actin., 375.

Astrea pentagona, Lonsdale (1840), Geol. Trans., 2d ser., V, pl. 57, fig. 1.—Phillips (1841), Palæozoic Fossils, II, pl. 6, fig. 15.

Acervularia pentagona, Michelin (1845), Icon., 180, pl. 49, fig. 1.—McCoy (1851), Brit. Palæozoic Foss., 19.—Edwards and Haime (1851), Polyp. Terr. Paléoz., 418; and Brit. Foss. Corals, 238, pl. 53, figs. 5, 5 a, 5 b.—Pietet, Traité de Paléont., pl. 108, fig. 3.—Milne-Edwards, Hist. des Corall., III, 410.

Acervularia ananas, Michelin (1845), Icon., pl. 47, fig. 1.

Lithostrotion pentagonum, d'Orbigny (1850), Prodr. de Paléont., I, 106.

Corallum astreiform. Corallites comparatively small, and of rather uniform size, generally hexagonal or pentagonal; septa eighteen to twenty-four, rather strong, nearly straight, half of them terminating at the inner wall, while the others continue in nearly to the center; outer walls very thin, minutely zigzag; inner walls moderately defined around the calices, which are of medium depth, and generally rather more than one-third as wide as the corallites. Dissepiments, as seen between the walls in vertical sections, very thin, rather closely arranged, and at some points slightly waved.

Entire breadth of corallum unknown; breadth of an imperfect mass of same, 2.80 inches; breadth of corallites, about 0.18 inch; breadth of calices, about 0.07 inch.

The specimen referred to the above species seems to agree well with the published figures and descriptions of that form. Its outer walls, as seen in transverse sections, are perhaps a little thinner, and its septa slightly more rigid or less curved, than represented in Edwards and Haime's enlarged figure of Goldfuss' species; but, unless better specimens than that I have seen might reveal some other characters than those observed, I cannot see how it can be separated from the European form.

It has much smaller corallites than any other species of the genus known to me from American rocks.

Locality and position.—Treasure Hill, Nevada; silver-bearing Devonian beds.

Genus SMITHIA, E. & H.

SMITHIA HENNACHI, Lonsdale (sp.).

Plate 2, fig. 6, 6 a.

Astræa Hennachii (pars), Lonsd. (1840), in Sedgwick and Murchison, Geol. Trans., 3d ser., V, 697, pl. 58, fig. 3.—Phillips (1841), Palæozoic Foss., 12, pl. 6, fig. 16.

Cyathophyllum Hennachii, Bronn (1848), Index Palæont., I, 368.

Lithostrotion Hennachii and *Actinocyathus Hennachii*, d'Orbigny (1850), Prodr. de Paléont., I, 106 and 107.

Phillipsastrea Hennachii (pars), d'Orbigny (1850), ib., 107.

Smithia Hennachii, Edwards and Haime (1851), Polyp. Foss. des Terr. Paléoz., 421; Brit. Foss., Corals, 240, pl. 54, fig. 4.—Edwards (1860), Hist. Corall., III, 413.

Arachnophyllum Hennachii, McCoy (1851), Brit. Palæoz. Foss., 72.

Acervularia seriaca, Quenstedt (1852), Handb. der Petref., 664, pl. 60, fig. 3.

Corallum apparently subhemispherical in general form. Mural circles from twice to about four times their own diameter apart, but irregularly arranged; as seen in a transverse section, moderately well defined. Septa twenty-three to twenty-six, very thin excepting near the mural circles, where they are somewhat thickened, and every alternate one terminates, while the others continue straight inward nearly to the center; all more extended, straighter, and more directly confluent in one direction (usually outward toward the periphery of the corallum) than transversely to the same; in which latter direction they are variously curved, or more or less abruptly geniculated. Vertical section showing the vesicular dissepiments between the septa to be very thin, nearly horizontal, and rather closely arranged.

Greatest transverse diameter of corallum, 4 inches or more; diameter of mural circles, about 0.10 inch; number of vesicular dissepiments seen between two of the septa, in a space of 0.10 inch of vertical section, 8.

It is possible that a very critical comparison of good specimens might show some differences in the details of structure by which this coral could be separated from the European *Smithia Hennahii*; but I have failed to detect any characters, either mentioned in the descriptions or illustrated in the most reliable published figures of that species, by which our specimens can be distinguished. Every word in Edwards and Haime's description of *S. Hennahii*, as they restrict the species, would apply equally well to the specimens under consideration, so far as their structure can be made out.

Locality and position.—Babylon Hill, White Pine Mining District, from the silver-bearing rock; Devonian.

Genus CYATHOPHYLLUM, Goldfuss.

CYATHOPHYLLUM PALMERI, Meek.

Plate 2, fig. 2.

Corallum composite, astreiform, growing in irregular masses three to four or more inches in diameter, with the corallites radiating in all directions from near the base of attachment. Corallites very unequal in size, and usually pentagonal or hexagonal in form, with rather deep calices in the middle; separated by nearly straight, moderately-projecting walls, excepting where a young corallite protrudes a little beyond the others, when it is sometimes surrounded by a nearly circular wall. Gemmation both calicular and interstitial; in the former case, the young corallites often growing up directly in the middle of the calices of the old, and soon expanding so as to take the place of the latter. Septa twenty-eight to thirty-four, well developed, slightly denticulated, thicker, and most prominent for about half-way inward, where every alternate one thins off to nothing, while the others continue on very thin to the center, where they form, without twisting, a small projection in the bottom of each calice. Vesicular dissepiments very thin, rather closely arranged, and not continued in farther than the ends of the shorter septa.

Breadth of the whole corallum, 4 or more inches; height, about 2.50

inches; breadth of the largest corallites, about 0.40 inch; but the average size not more than one-half to two-thirds as much.

At a first glance, this coral recalls such forms as *Cyathophyllum quadrigemmatum*, Goldfuss, as represented by figs. 6 *b* and 6 *c*, plate xviii, of his Petref. Germ. A moment's comparison, however, shows that it is very distinct. In the first place, its corallites are more compactly crowded together, and more strongly radiating, in consequence of the more rapid growth of intermediate young corallites, thus leaving no space for any of them to grow out free from the others. In a few instances, where a young corallite grew more rapidly than the others, it became free, and assumed a round or oval outline; but this form seems never to have been continued for more than very short distance before the rapid expansion of the young brought them into contact laterally, when they assumed angular outlines like the old ones, thus covered and hidden from view. The form of the calices in the species under consideration is also quite different, being very shallow or nearly flat for about half-way in from the walls, and then dropping in almost vertically; while, in *C. quadrigemmatum*, they slope abruptly inward from the walls. The latter likewise has about forty-six nearly equal septa to each corallite.

It is probably more nearly allied to *C. Sedgwicki*, Edwards and Haime (see British Foss. Corals, pl. lii, figs. 3, 3 *a*), but it differs in having constantly a smaller number of septa, which are all thicker at their outer ends, and taper inward, instead of being all thinner there, with the longer series becoming thickened about half-way in, and then thinning inward.

The young corallites growing up within the old often give the coral the appearance of an *Acervularia*; but a moment's examination shows that these inner circles are young corallites, and not inner walls.

The specific name is given in honor of Dr. E. Palmer, who discovered and brought in the only specimens I have ever seen. They are all silicified, so as to prevent the possibility of ascertaining the internal structure by sections of the corallites.

Locality and position.—Rio Verde, Arizona; from its affinities, it is believed to be of Devonian age.

MOLLUSCA.
BRACHIOPODA.
STROPHOMENIDÆ.

Genus HEMIPRONITES, Pander.

HEMIPRONITES CHEMUNGENSIS var. ARCTOSTRIATA, Conrad (sp.).

Plate 3, fig. 2.

Strophomena Chemungensis, Conrad (1843), Jour. Acad. Nat. Sci. Philad., VIII, 257, pl. 14, fig. 12.

Orthisina arctostriata, Hall (1861), Thirteenth Report Regents Univ. N. Y. on State Cab. N. H., 80; and (1862) Fifteenth do., 185 and 186, figs. 1 and 2.

Streptorhynchus arctostriatus, Hall (1863), Sixteenth Report Regents Univ. N. Y. on State Cab. N. H., 62.

Streptorhynchus Chemungensis var. *arctostriata*, Hall (1867), Palæont. N. Y., IV, 71.*

Shell small, nearly semicircular, rather depressed; hinge very nearly or quite equaling the greatest breadth; lateral extremities about rectangular; anterior and lateral margins forming together a semicircular curve. Ventral valve most convex at the beak, which is only moderately prominent, and a little distorted, but not arched, and seems in the figured specimen to have been broken at the apex in becoming detached from some body to which it had grown; area comparatively low, nearly flat, and very slightly inclined forward, or ranging nearly at right angles to the plane of the valves; pseudo-deltidium triangular and a little convex; surface marked by small radiating striæ. Dorsal valve unknown.

Length, 0.31 inch; breadth, 0.45 inch; convexity of ventral valve, 0.12 inch.

So far as can be determined from a single specimen of a ventral valve,

* Professor Hall's latest conclusion on this point is, that Conrad's *Strophomena Chemungensis*, published in 1843, includes, either as varieties or individual modifications of form, etc., all of the following proposed species, viz., *Strophomena bifurcata*, Hall, 1843; *S. arctostriata*, Hall, 1843; *S. pectinacea*, Hall, 1843; *Orthis perversa*, Hall, 1847; *Orthisina arctostriata*, Hall, 1860; *O. alternata*, Hall, 1860; and *Orthis inequalis* and *O. parvis*, Hall, 1858; as well as *Streptorhynchus pandora*, Billings, 1860. The names *S. pandora*, *S. arctostriata*, *S. perversa*, and *S. pectinacea*, he retains for varieties of Mr. Conrad's species (see Palæont. N. Y., IV, 67-73).

with the shell mostly exfoliated, this form seems to agree well with the above-cited New York species, as may be seen by comparing our figure with fig. 2, pl. 9, of the 4th vol. N. Y. Palæontology. It is quite possible, however, that a direct comparison with New York specimens might show it to be distinct. I do not feel justifiable, however, without a good series of specimens from the two distantly-separated localities for comparison, in running the risk of further complicating the synonymy of a species that has already received so many names, and consequently prefer to refer it to the New York species, instead of attempting to name it as new.

Locality and position.—Colonel Simpson's collection, latitude $39^{\circ} 30'$ N., longitude $115^{\circ} 36'$ W.; from dark Devonian limestone.

PRODUCTIDÆ.

Genus PRODUCTUS, Sowerby.

PRODUCTUS SUBACULEATUS, Murchison ?.

Plate 3, figs. 7, 7 a, 7 b.

Productus subaculeatus, Murchison (1840), Bull. Soc. Geol. Fr., XI, 255, pl. ii, fig. 9.—De Verneuil (in part) (1845), Geol. Russ. and the Ural Mts., II, 282, pl. xvi, fig. 9.—De Koninck (1847), Mém. Soc. Roy. Liège, IV, 249, pl. xiv, fig. 4; and Monogr. Prod. and Chon., 142, pl. xvi, fig. 4.—De Vern. (1847), Bull.—Soc. Géol. Fr., 2d ser., IV, 705, pl. lx.—Schnurr (1853), in Dunker and von Meyer's Palæout., II, 228, pl. xliii, fig. 4 a.—Davidson (1853), Quart. Jour. Geol. Soc., 336, pl. xv, fig. 12.—Sandberger (1855), Die Brach. Reinisch. Schicht. Nassau, 75, pl. xxxiv, fig. 17.—Davidson (1865), Monogr. Brit. Devon. Foss., 99, pl. xx, parts 1-2.—Meek (1876), Col. Simpson's Report Expl. across the Great Basin of Utah, 345, pl. i, figs. 3 a, b, c.

Leptaena fragaria, Sowerby (1840), Trans. Geol. Soc. Lond., 2 ser., V, 704, pl. lvi, fig. 5.—Phillips (1841), Pal. Foss., 59, pl. xxv, fig. 100.

Leptaena (Strophalosia) subaculeata, McCoy (1852), Brit. Pal. Foss., 388.

Comp. *P. Shumardianus* var. *pyxidatus*, Hall (1858), Iowa Report, I, part 2, 498 and 499.

Shell small, thin, truncato-subhemispherical; hinge equaling or less than the greatest breadth; ears small, nearly rectangular, or somewhat rounded; lateral margins rounding to the front, which is regularly rounded in outline. Ventral valve moderately convex, the greatest convexity being near the middle, without any traces of a mesial sinus; beak not very prominent, incurved, though without distinctly passing within the hinge-margin;

surface with small, obscure, concentric wrinkles and striae of growth (strongest on the ears and sides of the umbonal region), and scattering spine-bases, apparently most numerous on the ears. Dorsal valve somewhat more than semicircular in outline, rather distinctly concave, the greatest concavity being in the central and anterior regions, marked with small, rather regular, concentric wrinkles and striae of growth, with scattering pits corresponding to the positions of the spines of the other valve.

Length, 0.50 inch; breadth, 0.57 inch; convexity, 0.25 inch.

In regard to this little shell, I can only say that it seems to be so nearly like European forms referred by good authorities to *P. subaculeatus* that I have not been able, from the imperfect specimens yet brought in, to be quite sure that it is distinct. It is certainly nearly allied to that species, if not the same. As near as can be determined, however, from mere internal casts, it would seem not to have had such distinct tubercles at the bases of the spines as we see represented in most of the published figures of Murchison's species; though in this respect it appears not to differ from the Russian specimens referred by De Verneuil to *P. subaculeatus*. Still it differs from these and the specimens figured by others, in having more distinct concentric wrinkles, particularly on the dorsal valve. I expect it is probably only a representative species, but have not the necessary specimens to determine the question at present.

In general appearance, and the absence of any traces of longitudinal striae, it resembles *P. pyxidatus* of Hall, but differs in being more convex, more symmetrical, and in having smaller ears and stronger concentric wrinkles, particularly on the dorsal valve.*

Locality and position.—From the dark, silver-bearing limestone, containing Devonian fossils, in White Pine District, Nevada. Colonel Simpson also brought specimens of it from the same rock at latitude 39° 30' N., longitude 115° 36' W., in 1860.

* Nothing short of a direct comparison of a good series of authentic European and American specimens can decidedly settle the exact relations of this shell to *P. subaculeatus*, as well as to several forms described by Professor Hall under the names *P. pyxidatus*, *P. Shumardianus*, *P. spinulocostatus*, *P. concentricus*, etc. Professor Hall seems now to think these probably all varieties of the one species *P. Shumardianus*; while European authorities most generally refer all such shells to *P. subaculeatus*.

RHYNCHONELLIDÆ.

? Genus ATRYPA, Dalman.

ATRYPA RETICULARIS, Linnæus (sp.).

Plate 1, figs. 7 and 7 a; and Plate 3, figs. 6 ? and 6 a.

Anomites reticularis, Linnæus (1767), Syst. Nat., XII, ed., 1152.—Wahlenb. (1821), Nov. Act. Soc. Upsal., VIII, 65.

Terebratulula pectinata, Bruguière (1789), Hist. Nat. Vers. Test. Encyc. Méth., 242, fig. 4.

Terebratulites priscus, Schlot. (1820), Petref., 262; Nacht., pl. xvii, fig. 2, and pl. xx, fig. 4.

Terebratulites explanatus, Schlot. (1820), Nacht., pl. xviii, fig. 2.

Terebratulula affinis, Sowerby (1822), Min. Conch., IV, 324, fig. 2.

Atrypa reticularis, Dalman (1827), Vet. Akad. Verhandl., 127, pl. iv, fig.*

Of this widely-distributed form, there are numerous specimens in the collection from several localities, presenting all the characters of the species, with the limits usually assigned it. As it is too well known to require a detailed description, I would merely remark that the specimens from Piñon Station are larger and more robust than any of the others from the other localities, and closely resemble, not only in form and surface-markings, but in their state of preservation (being silicified), the numerous examples found in the Upper Helderberg limestones near Louisville, Kentucky. They were also found associated with a *Spirifer*, very closely allied to one of the Louisville species of that horizon.

The other specimens, from the silver-bearing, dark-colored limestone at Treasure Hill, White Pine District, and other localities, are all of smaller size, and not silicified. Some of these are finely striated, as represented by our fig. 6 a of plate 3, while others have the surface more coarsely striated or costated, as represented by fig. 6 of the same plate, and thus more nearly approach *A. aspera*, Schlotheim (sp.), to which possibly they might with more propriety be referred.† As there are, however, among the specimens

* For the long list of additional synonyms of this species, as most generally understood, see Mr. Davidson's Monograph British Silurian Brachiopoda, 130.

† Some reliable authorities believe that, even after separating *A. aspera* and some other forms often included as varieties, this name is made to include several distinct species. Never having made an especial study of the group, however, I have here included provisionally a few forms that a strict classification might possibly require should be separated under some of the published names.

intermediate gradations in this character, I have preferred to regard those showing this difference as more probably mere varieties of the variable species *reticularis*. The question in regard to the specific identity or difference of such shells is one respecting which authors may well differ without quarreling.

Locality and position.—Piñon Station, Treasure Hill, White Pine District; Roberts's Creek; and near Warm Springs, Upper Humboldt Range, Nevada. Colonel Simpson also brought specimens, including both the finely and more coarsely costated varieties, from latitude 39° 30' N., longitude 115° 26' W

SPIRIFERIDÆ.

GENUS SPIRIFER, Sowerby.

SPIRIFER UTAHENSIS, Meek.

Plate 3, figs. 1, 1 a, 1 b, 1 c, 1 d, 1 e.

Spirifera Norwoodi, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 308 (not *S. Norwoodi*, Hall).

Spirifera Utahensis, Meek (1860), note appended to extra copies of above-cited paper.

Spirifera Utahensis, Meek (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 345, pl. 1, figs. 4 a, b, c.

Shell rather small, very inequivalve, distinctly convex, or sometimes subpyramidal, with (as seen from above or below) its general outline forming rather more than a semicircle; length about one-half to two-thirds the greatest breadth; lateral extremities somewhat obtusely angular; anterior and antero-lateral margins forming together about a semicircular outline. Ventral valve elevated at the umbo, and sloping off abruptly to the front and lateral margins, with usually a slightly convex outline, especially on the anterior slope, sometimes with one of the lateral slopes concave in outline posteriorly; mesial sinus shallow, rather narrow, rounded within, and extended to the apex of the beak; beak elevated, abruptly pointed, and slightly arched; area high, or with height equaling about half its breadth, triangular, and continued to the extremities of the hinge, with well-defined or angular, lateral slopes, ranging at about right angles to the plane of the shell, and usually a little arched; foramen proportionally very narrow, or sometimes twice as high as wide. Dorsal valve much depressed, or but

moderately and evenly convex; beak very small, or little distinct from the cardinal margin, and somewhat incurved; area merely linear; mesial fold much depressed, being scarcely so defined as to correspond to the sinus of the other valve in size, and becoming nearly or quite obsolete before reaching the beak. Surface of each valve marked by about thirty to forty small, generally simple, radiating costæ, or striæ, about eight to ten of which occupy the mesial sinus, and about as many the mesial fold, where they sometimes bifurcate.

Length of a medium-sized specimen, measuring from the umbo of the ventral valve to the front, 0.57 inch; from the umbo of dorsal valve to the front, 0.49 inch; convexity of the two valves, 0.40 inch; breadth of a large specimen, 0.90 inch; length of ventral valve from beak to front, 0.77 inch; height of area, 0.38 inch.

This species is related to *S. Archiaci* of Murchison, from the Upper Devonian rocks of Russia, but differs in having the dorsal valve less convex and its mesial fold more depressed, while the foramen of its ventral valve is proportionally much narrower in all of our specimens. I have likewise been unable to see any traces of the fine surface-granulations observed on that species, though the specimens are scarcely in a condition to have preserved such fine surface-markings, if they ever existed. In general form, as well as in its high, large area, it has more the aspect of a *Cyrtia* or *Cyrtina* than of a *Trigonotreta*; but as none of the specimens show any indications of the foramen being closed by a false deltidium, or of a punctate structure, I have preferred to refer it provisionally to the typical section of the genus *Spirifer*.

Professor Hall and Mr. Whitfield have described, in the Twenty-third Report of the Regents on the New York State Cabinet, Natural History, 238, pl. 11, figs. 21-24, a species very similar to this, from the Hamilton Group of Iowa. Their figures represent their shell as having a somewhat higher and slightly less arch area, as well as a proportionally wider foramen; but, in nearly every other character, it certainly agrees very closely with the species here described.

Locality and position.—Longitude $115^{\circ} 26'$ W.; latitude $39^{\circ} 30'$ N., from a dark limestone of Devonian age; Colonel Simpson's collection.

Mr. Hague also found it with other Devonian fossils, at Fossil Hill, White Pine District, Nevada, in the silver-bearing Devonian beds; the formation being the same at these two localities.

SPIRIFER ENGELMANNI, Meek.

Plate 3, figs. 3, 3 *a*, 3 *b*, 3 *c* (and 3 *d*, 3 *e*, 3 *f*?).

Spirifera Engelmanni, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 308.

Spirifer Engelmanni, Meek (1876), Col. Simpson's Report Expl. across the Great Basin of Utah, 346, pl. 1, figs. 1 *a*, *b*, *c* (not *S. Engelmanni*, Meek and Worthen).

Shell rather small, somewhat gibbous, subsemicircular, or approaching subtrigonal in general form, with the greatest breadth on the hinge-line; lateral extremities rather acutely angular; anterior lateral margins with outline usually straightened and converging rapidly from the lateral extremities to the middle of the front. Ventral valve more convex than the other, its greatest prominence being at or near the beak, which is abruptly pointed and more or less incurved; area generally rather high, well defined, and standing nearly at right angles to the plane of the valves, but always arching backward with the beak; foramen higher than wide; mesial sinus narrow and shallow, but extending to the apex of the beak, smoothly rounded within, and bounded on each side by a plication that is a little more prominent than any of the others; lateral slopes each occupied by about seven to ten simple costæ. Dorsal valve moderately convex, the greatest convexity being near the middle; mesial fold narrow, flattened, or more or less rounded, and, like the sinus of the other valve, without costæ or plications; lateral slopes with costæ as in the other valve; beak scarcely distinct from the cardinal margin. Fine surface-markings and internal characters unknown. Figs. 3, 3 *a*, 3 *b*, and 3 *c* represent the type, while the others are only referred doubtfully to this species.

Length, 0.57 inch; breadth, about 0.82 inch; convexity, about 0.50 inch.

Specimens of this species with an elevated beak and area have much the general appearance of the last, and, when not well preserved, might be confounded with it by a careless observer. The two species, however, are very distinct, and may be readily separated by the larger costæ of the form under consideration, which also differs in never having any costæ occupying the mesial fold and sinus.

In naming a *Spirifer* after my friend Henry Engelmann, esq., in the Illinois Geological Report (vol. 3, p. 398), I had forgotten that the above-named species had been previously dedicated to the same gentleman. This renders it necessary to find another name for the Illinois species. I would therefore propose to designate it as *Spirifer Wortheni*.

Locality and position.—Same as last.

SPIRIFER (TRIGONOTRETA) ARGENTARIUS, Meek.

Plate 3, figs. 4, 4 a, and 4 b.

Shell rather small, moderately convex, wider than long, and having a general subsemicircular or subtrigonal outline, with the greatest breadth on the hinge-line; lateral extremities acutely angular; valves nearly equally convex. Ventral valve with the greatest convexity between the middle and the umbo; beak strongly incurved; area rather low, with nearly parallel sides near the break, but somewhat abruptly narrowed at the lateral extremities, though continued the entire length of the hinge; foramen wider than high; mesial sinus shallow and narrow, but well defined by the marginal rib on each side extending quite to the beak, and without costæ; lateral slopes each occupied by from twelve to fourteen simple radiating costæ, which diminish very gradually in size toward the lateral extremities. Dorsal valve most convex near the middle; beak rather distinctly incurved; mesial fold corresponding in size to the sinus of the other valve, being rather low, and flattened on top along its whole length, with a more or less defined furrow along its middle; lateral slopes costate, as in the other valve. Surface of both valves marked with very fine, regular, undulating lines of growth, most distinct between the costæ.

Length, 0.55 inch; breadth, 0.80 inch; convexity, 0.44 inch.

It is hardly possible that this can be a variety of the last; at least, with the means of comparison now available, it certainly seems to be quite distinct. It is true I have only two specimens of this form, but of the other we have a sufficient number of individuals, all agreeing with each other, and differing from this to such an extent as to render it very improbable that there may be connecting forms. On comparison, this species will be seen to differ very decidedly in having a *much* narrower (lower) and more

arcuate area, with nearly parallel margins. The beak of its ventral valve is also distinctly more incurved, as is that of its dorsal valve. It is likewise more nearly equi-valve, has rather smaller and more numerous costæ, while its mesial fold differs in being depressed and furrowed along its top, instead of rounded.

Locality and position.—Treasure Hill, White Pine District, Nevada; from the dark Devonian limestone in which the White Pine Silver Mines occur.

SPIRIFER (TRIGONOTRETA) STRIGOSUS, Meek.

Plate 3, figs. 5, 5 a, 5 b.

Spirifera macra, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 309 (not Hall, 1856).

Spirifera strigosa, Meek (1860), to extra copies of the above cited paper.

Spirifer strigosus, Meek (1876), in Col. Simpson's Report Expl. across the Great Basin of Utah, 347., pl. 1, figs. 5, a, b, c, d.*

Shell rather under medium size, moderately convex, subtrigonal, or approaching subsemicircular, with the greatest breadth on the hinge-line; lateral extremities generally more or less acutely angular; lateral margins converging to the prominent, subangular middle of the front, with a somewhat straightened or convex outline. Dorsal valve convex in the middle, and compressed toward the lateral extremities; mesial fold narrow, rather prominent, and sometimes subangular near the front, continued to the beak. Ventral valve scarcely more convex than the dorsal, most gibbous in the umbonal region, with convex lateral slopes; beak moderately prominent, and distinctly incurved; area rather narrow, well defined, and narrowing off laterally, so as not quite to reach the extremities of the hinge, arched, and directed obliquely backward with the beak, rather distinctly striated vertically; mesial sinus corresponding in size to the fold of the other valve, the margins of both being usually a little produced in front, so as to impart an angularity to the outline of the middle of the anterior margin. Surface of each valve ornamented with from twenty to about twenty-six radiating costæ (counting at the free margins), some of which are simple, while others bifurcate. Of these costæ, about six or seven usually occupy the mesial fold and sinus. Two or three of those within each margin of

* I add references to Capt. Simpson's report here, in reading the proofs, that report having been published since the revision of this.

the sinus usually coalesce with the two marginal ones, which also generally each give off a lateral rib on the outer side; costæ of the mesial fold more or less bifurcating, while those of the lateral slopes of both valves are more frequently simple, but sometimes divided. (Finer surface-markings unknown.)

Length, 0.63 inch; breadth, 1.18 inch; convexity, 0.57 inch.

The type-specimens of this species were brought by Colonel Simpson's party, along with well-marked Devonian fossils, from near White Pine, Nevada. They evidently came from a dark, argillaceous limestone, exactly like that from which the Devonian types were obtained; yet the species so nearly resembles a form from a similar rock of the Carboniferous series farther eastward, that I have sometimes feared that possibly these specimens might have been found in the latter, and accidentally packed up along with the Devonian specimens. This suggestion receives at least some support from the fact that no such shell occurs among Mr. King's or any other collections I have yet seen from any of the Devonian rocks of the Far West. The Carboniferous shell alluded to above, resembling this species, I have been inclined to identify with *S. Rocky-montana*, of Marcou; but still it seems to shade off into forms even more nearly like *S. opimus*, such as that represented by fig. 6 on our plate 9.

On the other hand, however, there certainly are Devonian species very closely resembling that here under consideration; such, for instance, as *S. Orestes* of Hall and Whitfield, described from Devonian rocks in Iowa, regarded by those authors as most probably of the age of the Chemung Group of the New York series.* This Iowa shell so nearly resembles ours, especially when ventral views are compared, that I was at first inclined to believe them identical; but, on comparing the opposite view and profile, it will be seen that *S. Orestes* has its ventral beak more prominent and less incurved, and the cardinal area higher, with a broader fissure. Still shells much more unlike are regarded by high European authorities as being mere varieties of one species in some cases.

Locality and position.—Brought in along with Devonian fossils from a

* For figure and description of *S. Orestes*, see 23d Report of the Regents of the Univ. N. Y. on the State Cab. N. H., 237, pl. 11, figs. 16–20.

locality in Nevada, at latitude $39^{\circ} 32'$ N., longitude $115^{\circ} 36'$ W.; Colonel Simpson's collection.

SPIRIFER (TRIGONOTRETA) PIÑONENSIS, Meek.

Plate 1, figs. 9, 9 a, 9 b.

Spirifer (Trigonotreta) Piñonensis, Meek (1870), Proceed. Acad. Nat. Sci. Philad., 60.

Shell attaining about a medium size, somewhat wider than long, varying from transversely-suboval to a nearly semicircular general outline, rather gibbous in adult examples; cardinal margin nearly or quite equaling the greatest breadth, and terminating in rectangular or rather more obtuse extremities; lateral margins rounding to the front, which is sometimes rounded, sometimes slightly sinuous, or in other examples more prominent and subangular in the middle. Ventral valve generally rather more gibbous than the other, its greatest convexity being in the umbonal region, from which it rounds off evenly toward the front and lateral margins as well as to the beak, which projects beyond that of the other valve, and is rather distinctly incurved; cardinal area of moderate height, narrowed to the lateral extremities, more or less inclined backward, and strongly arched with the beak; foramen having nearly the form of an equilateral triangle, and provided with slightly-raised, sharp, lateral margins; mesial sinus shallow, rounded, smooth, and of moderate breadth, narrowed regularly, and well defined to the apex of the beak. Dorsal valve generally more than semicircular, most convex in the central and anterior regions; beak projecting little beyond the cardinal margin, and with the narrow area incurved; mesial ridge depressed, smooth, and faintly furrowed along the middle, corresponding in outline to the form of the sinus in the other valve. Surface of each valve ornamented by from eleven to about fourteen simple, regular, rounded, radiating plications on each side of the mesial fold and sinus, and also showing, under a magnifier, minute, regular, crowded, radiating striæ, crossed near the front by stronger undulating lines of growth.

Length of a medium-sized specimen, 0.92 inch; breadth of the same, 1.20 inches; convexity, 0.72 inch.

This species seems to be more nearly related to *S. Oweni*, Hall, from the Upper Helderberg rocks at the Falls of the Ohio, than to any other known

to me. On comparison, however, with good specimens of that shell, from the original locality, it is found to differ in having a narrower area, which, with the beak of its ventral valve, is constantly more arched. Its plications are also larger and proportionally less numerous. There are in the collection large numbers of this shell in a good state of preservation, showing the characters mentioned to be quite constant.

Locality and position.—Three miles south of Piñon Pass, Piñon Range, Nevada; Devonian, probably of the age of the Upper Helderberg limestones of New York.

LAMELLIBRANCHIATA.

ANATINIDÆ.

Genus EDMONDIA, De Koninck.

EDMONDIA ? PIÑONENSIS, Meek.

Plate 1, figs. 8, 8 a.

Shell transversely-ovate, wider anteriorly than behind, rather gibbous in adult examples, most convex in the central and anterior central regions; anterior margin rounded from below the beaks into the base; posterior end narrow, most projecting near the base, where it seems to be very narrowly rounded in outline; dorsal border slightly highest a little behind the beaks, from near which point it slopes off more or less rapidly, with a convex outline, to the posterior basal extremity; beaks rather depressed, moderately convex, and placed about one-fourth the entire length of the valves behind the anterior margin; anterior muscular impressions shallow, elongate-subovate, and placed near the margin, with its longer axis ranging nearly vertically; posterior so faintly marked as not to be apparent on internal casts. Surface of casts smooth, or only showing obscure traces of concentric marks of growth, with a shallow, narrow furrow, and some appearances of an obscure ridge, extending for a short distance obliquely upward and forward from near the posterior basal margin toward the umbones. Hinge unknown.

Length, 1.33 inches; height, 0.95 inch; convexity, about 0.60 inch.

At the same time that this species is here referred provisionally to the

genus *Edmondia*, I am by no means sure that I would not be nearer correct to call it *Palæoneilo Piñonensis*, since it has much the general appearance, and some indications of the oblique posterior basal sulcus, or slight concavity, of some species of the latter genus. Still, as it shows no traces of hinge-crenulations in any of the casts contained in the collection, while some of them seem to show some appearance of an impression near the hinge such as might have been made by a thin cartilage-process like that seen in each valve of *Edmondia*, I have concluded to place it, for the present, doubtfully in that genus. It may be found, however, when its generic characters can be made out from better specimens, to belong to an undescribed genus.

Locality and position.—Three miles south of Piñon Pass, Piñon Range, Central Nevada; from a limestone containing *Atrypa reticularis*, *Spirifer Piñonensis*, a small *Favosites*, and an *Avicula* or *Pterinea*, and believed to belong to the Lower Devonian.

CEPHALOPODA.

ORTHOCERATITIDÆ.

Genus ORTHOCERAS, Auct.

ORTHOCERAS KINGII, Meek.

Plate 2, fig. 8.

Shell attaining a rather large size, conical in general form, rather rapidly tapering; section circular or a little oval; septa numerous and closely arranged, the distance between being uniform, or very nearly so, without regard to the increase in the size of the shell from the smaller to the larger end; all deeply concave. (Surface and siphuncle unknown.)

Entire length unknown; length of a specimen imperfect at both ends and septate throughout, 5.25 inches; greatest diameter of same at the larger end, about 3.20 inches; of smaller end, 2 inches; distance between the septa throughout, 0.23 inch.

The specimen of this species is quite imperfect; but it seems desirable to call attention to it as one of the fossils characterizing the silver-bearing rocks of the White Pine District. It may be compared with such forms as

O. prosperum and *O. discors* of Barrande, though it tapers more gradually than either of these.

The specific name is given in honor of Clarence King, esq., the geologist in charge of the United States Geological Survey, by which the fossils here described were discovered.

ORTHOCERAS (undt. sp.).

Plate 2, fig. 9.

This is a mere fragment, consisting of a cast of most of the non-septate part of the shell. It shows scarcely any taper from the anterior to the posterior end, and presents a slightly oval section; while its rounded posterior end shows that the septa were rather deeply concave, and the siphuncle nearly or quite central. If new, it may be called *O. parallelum*.

Locality and position.—Babylon Hill, White Pine Mining District, Nevada; Devonian.

ARTICULATA.

CRUSTACEA.

PHACOPSIDÆ.

Genus DALMANITES, Auct.

DALMANITES (undt. sp.).

Plate 1, figs. 11 and 11 a.

Of this Trilobite, there are, in the collection, only a few imperfect moulds and casts of the pygidium. These show this part to have been subtrigonal in general form, with the posterior extremity rather acutely pointed, and extended, in some cases, even farther back than indicated by the dotted lines in fig. 11 a. It seems to be rather depressed, with the mesial lobe narrower than the lateral, and provided with about fifteen segments, with space enough at the posterior end for two or three more. The lateral lobes have each about thirteen segments, which extend out nearly at right angles from the mesial lobe anteriorly (excepting at their curved outer ends), and become gradually more oblique posteriorly. They extend nearly to the border, and only show the faintest traces of a mesial linear

furrow along some of the anterior ones. The surface is nearly smooth, or only has a few very small granules near the lateral margins.

I place this species along with the Devonian fossils only because it came from the same locality (and the specimens are in the same kind of matrix) as that from which the other forms, apparently of Devonian age, figured on the same plate, were obtained. In some of its characters, so far as known, it resembles Upper Silurian forms quite as much as, or even more than, Devonian; and, as Mr. King informs me that it came from the lowest bed at the locality, it may possibly belong to the Upper Silurian.

Locality.—Three miles south of Piñon Pass, Piñon Range, Nevada.

PROETIDÆ.

Genus PROETUS, Steininger.

PROETUS (PHÆTON) DENTICULATUS, Meek.

Plate 1, figs. 10, 10 *a*, and 10 *b*.

I have only seen fragments of this species, consisting of the pygidium, the glabella, and detached thoracic segments. As these parts have not been seen united, of course it is *possible* that they may belong to more than one type; and, to prevent confusion, if this should be found to be the case, the pygidium, represented by fig. 10 *a*, is regarded as belonging to the typical form of the species. From the manner in which these different parts occur associated together, however, it is quite probable that they all belong to the same species.

The pygidium is transversely subelliptic, and is nearly twice as wide as long, with a moderate convexity. Its mesial lobe is about as wide anteriorly as each lateral lobe (exclusive of their lateral spine-like projections), and more prominent than the latter, with three or four segments. The lateral lobes are rather depressed, and show about four segments each; these segments are not well defined, but have each a distinct mesial furrow, extending out to the margin, where each segment terminates in a short spine, directed backward; while there are two other smaller spine-like projections just behind the posterior end of the mesial lobe; thus making ten of these projecting points to the whole of the free posterior and lateral

margins. The surface shows a finely granular appearance under a magnifier.

The thoracic segments seen lying in the same fragment of rock indicate a rather distinct convexity for the thorax, with a rounded, moderately prominent, mesial lobe, about two-thirds as wide as the lateral lobes (see fig. 10 *b* of plate 1).

The glabella (fig. 10) found with the other specimens has a somewhat oblong outline, being longer than wide, with nearly parallel sides, and a more or less rounded anterior end; it shows two very faint lateral furrows on each side, and a strong neck-furrow passing entirely across behind. It retains the palpebral lobes on each side, and these indicate rather large eyes, of lunate form, and rather more than half as long as the glabella, exclusive of the neck-segment. They seem to have been located rather near the glabella on each side, and less than their own length in advance of the posterior margin of the cheeks. The surface appears to be rather more coarsely granular than that of the pygidium.

I know of no very closely allied species.

Locality and position.—The typical and only known specimens of this species were brought by Colonel Simpson from the west side of Steptoe Valley, Nevada; and, although not found associated with other fossils, they are believed to belong to the Devonian epoch.

CARBONIFEROUS SPECIES.

RADIATA.

POLYPI.

FAVOSITIDÆ.

Genus SYRINGOPORA, Goldfuss.

SYRINGOPORA (undt. sp.).

Plate 6, figs. 2, 2 *a*.

Corallites nearly parallel or moderately radiating, regularly arranged at distances of about once to nearly twice their own diameter apart, gener-

ally nearly straight or somewhat flexuous; connecting tubes of about half the diameter of the corallites, arranged in vertical rows, but usually alternating on opposite sides, separated by spaces varying from about once to twice the diameter of the corallites; epitheca thick and showing small wrinkles of growth; septa unknown; infundibuliform tabulæ, as seen in vertical sections, closely and regularly arranged.

Length of corallites unknown; diameter of same, 0.08 inch, separated from each other by spaces varying from 0.08 to 0.15 inch.

This species is related to *S. geniculata*, Phillips, and *S. ramulosa* and *reticulata* of Goldfuss, and may be a variety of one of these forms. After repeated very careful comparisons, however, with the published figures and descriptions of those species, I am left in doubt in regard to the propriety of referring it to either of them. Its corallites are slightly more slender than in *S. geniculata*, as represented by fig. 2, plate 46, of Edwards and Haime's Monograph of the British Fossil Corals, and decidedly less closely crowded together than represented by their fig. 2 *a* of the same plate. They agree almost exactly in size, however, with their fig. 4 of the plate cited, which they think probably represents a variety of *S. geniculata*. Still the connecting tubes are rather more closely arranged than in either of these figures, and the corallites are rather more widely separated. In the distances between its corallites, it agrees more nearly with *S. ramulosa*; but its corallites are a size smaller, and generally less flexuous. In the arrangement and general appearance of its tabulæ, as seen in vertical sections, it closely resembles Goldfuss' figure, but much less nearly that published by Edwards and Haime.

Compared with *S. reticulata*, its corallites are found to be a size larger, less closely arranged, and a little more flexuous, with more closely approximated connecting tubes. I suspect that it will be found to be a new species, or a marked variety of one of the above-mentioned forms, in either of which cases it might be called *S. occidentalis*.

Locality and position.—Southwest of Bald Mountain, Uinta Range, and at Morgan Peak, Wasatch Range, Utah; in a dark Carboniferous limestone.

CYATHOPHYLLIDÆ.

Genus ZAPHIRENTIS, Rafinesque and Clifford.

ZAPHIRENTIS EXCENTRICA, Meek.

Plate 4, figs. 1, 1 *a*, 1 *b*, 1 *c*, 1 *d*.

Corallum obliquely subturbinate, moderately curved, very rapidly expanding. Calice apparently shallow, nearly circular, and (at least in the type-specimen) remarkably eccentric on the dorsal or convex side. Septa thin, straight or somewhat curved, about 160 in a specimen 2.50 inches in diameter; every alternate one continued some distance inward, but not reaching the middle, there being a rather broad, smooth, flat space left in the bottom of the calice; while those on each side of the fossula converge so as to intersect it before reaching the margin of the smooth central area; secondary series of septa extending but a short distance inward between the others; all of both series on the dorsal or convex side, as seen in weathered specimens, divaricating upward from a line along the middle on the exterior surface. Fossula well developed, and situated on the dorsal side, but extending inward to the margin of the flattened bottom of the calice. Outer vesicular area, as seen in a vertical section from the outer to the inner side of the curve through the fossula, comparatively narrow on the dorsal side, but very wide on the inner side, where it is occupied by numerous unequal, rather small, vesicles, ranging obliquely outward and upward within, but curving out horizontally, or even declining a little toward the exterior; tabulæ, as seen in the vertical section mentioned above, very thin, closely arranged, numerous, and passing horizontally across from the wide vesicular area, on the inner or concave side of the curve, nearly to the dorsal side, thus occupying more than half the entire breadth of the corallum; somewhat divided above, but becoming more simple, straighter, and much more crowded farther down.

Length of entire corallum, measuring along the outer side of the curve, about 5 inches; greatest diameter, 2.50 to 3 inches.

The only specimens of this species in the collection are so much weathered that the epitheca, and at places a portion of the outer vesicles, as well as the margins of the calice, have been removed. Sections of it, however,

both horizontal and vertical, show its internal structure very clearly. In its short, rapidly-expanding form, as well as in the divaricating arrangement of its septa along the middle of its dorsal side, and in the position of its fossula, it nearly resembles the form I have referred to *Z. multilamella*. From that species, however, it is readily distinguished by having its septa much more closely crowded, and particularly by having a very wide space within occupied by nearly straight, crowded tabulæ.

I know of no described species, either American or foreign, with which it is liable to be confounded.

Locality and position.—Boxelder Peak, Wasatch Range, Utah; Carboniferous limestone.

ZAPHRENTIS ? MULTILAMELLA, Hall ?.

Plate 6, figs. 4, 4 a, 4 b.

Zaphrentis ? multilamella, Hall (1852), Stansbury's Report Explorations of Great Salt Lake Valley, 408, pl. i, fig. 2.

Corallum subturbinate, slightly curved, rapidly expanding; calice circular, of moderate depth; septa thin, about 150 to 160 in specimens measuring one and three-fourths to two inches in diameter, alternately longer and shorter, the latter extending one-third to one-half way inward, and the longer apparently reaching the middle of the calice; fossula narrow, deep, and extending inward from the convex side of the corallum nearly to the middle; outer vesicular zone apparently less than half the semi-diameter; vesicles somewhat elongated, and arranged obliquely outward and upward; those of the inner area formed by the complex nature of the tabulæ, arranged more or less obliquely upward and inward. Epitheca thin, and usually destroyed on weathered specimens, showing obscure septal costæ, with small wrinkles and low undulations of growth; costæ, and, in weathered specimens, the edges of the septa, divaricating upward at acute angles along an imaginary line up the middle of the convex side coincident with the fossula.

Length, measuring along the outer side of the curve, about 3 inches; breadth, 2 inches.

Professor Hall's figure of his *Z. multilamella* shows little more than its general form, and that it has a moderately deep calice; while his description

is so brief as to give but a very limited idea of the characters of the coral. It is therefore with considerable doubt that I refer the form under consideration to his species. The fact, however, that it came from the same formation and the same region of country, and possesses all of the few characters mentioned in his description, leads me to think that it may be the same. Still, in order to give those who may not have access to Stansbury's report the means of making the comparison for themselves, I quote below Professor Hall's description:

"Coral free, turbinate, somewhat rapidly expanding; cells deep; lamellæ numerous, thin; outer portion cellular."

He does not mention the *number* of septa (lamellæ); but from his statement that they are "numerous", and the fact that they are indicated at one point of the margin of the calice, in his figure, as being very closely arranged and thin, they may be as numerous as in our specimens. That from which his figure was drawn was split longitudinally very nearly through the middle, and apparently exactly coincident with one of the septa on each side, so as to show little or nothing of the structure within. It evidently had the margins of the calice less worn away than our specimens, which makes the cavity in ours look more shallow.

From the appearance of a false columella, or portuberance, in the bottom of the calice, I am not sure that this coral would not be more correctly called *Clisiophyllum multilamella*. If I am not mistaken, however, in its apparent possession of a septal fossula, it could hardly be properly placed in the genus *Clisiophyllum*.

Locality and position.—The typical specimens of *Z. multilamella* came from Cloth Cap and Flat Rock, Great Salt Lake. Those here referred to that species came from Strong's Knob, on an island in the Great Salt Lake, from a dark-colored Carboniferous limestone.

ZAPHRENTIS? STANSBURI, Hall?

Plate 6, figs. 3, 3 a, 3 b, 3 c.

Zaphrentis Stansburii, Hall (1852), Stansbury's Report of Explorations Great Salt Lake Valley, 408, pl. i, figs. 3 a, b (not Marcou, N. Am. Geol., vii, fig. 7).

Corallum conical, slightly curved; epitheca thin, with moderately distinct septal costæ, and small, irregular wrinkles of growth; calice circular

or nearly so, rather deep, with steeply-sloping sides, and a somewhat irregularly-flattened bottom, showing some appearances, as seen in sections, of a low mesial prominence and other inequalities; septa very thin, about 150 in a specimen measuring one inch and a half in diameter, generally nearly straight, every alternate one terminating about half-way in, while most the others continue to the middle, where they are sometimes slightly bent. Outer vesicular zone occupying from one-third to one-half the space between the wall and the middle below the bottom of the calice, occupied by numerous vesicles, which, as seen in vertical sections, are generally very narrow, and more or less elongated, with their longer axes ranging obliquely upward and outward. Inner area occupied by numerous, somewhat larger, vesicles, which, as seen in vertical sections, have a general transverse arrangement, but arch upward all around a little within the lateral margins of the area, and then bend downward, and again upward as they approach the middle. Septal fossula, as seen in transverse sections below the bottom of the calice, narrow, and extending about one-half to three-fourths of the way inward from the side of the greater curve, as seen in fig. 3 *b*.

Length of the largest specimen seen, about 4 inches; greatest diameter of the calice, 1.80 inches; number of septa in one-tenth of an inch, at their outer ends, about 3 to 3½.

It is only provisionally that I have referred this coral to the species described by Professor Hall. It certainly presents no characters inconsistent with his description, as far as that goes,* and agrees with his figure, excepting in having, in a larger specimen, nearly double the number of septa. This latter character, however, would separate it specifically, if the figure of *Z. Stansburii* is correct in that particular. It is certainly very distinct from the species referred, by Professor Marcou, to *Z. Stansburii*, in his North American Geology; the specimen there represented having only about sixty *thick* septa, not alternately shorter and longer. It will also be observed that Professor Marcou's figure likewise differs in this respect

*"Turbinate, free, or attached only by a pedicel, nearly straight, or but slightly curved; cup rather deep; margin (when entire) thin; lamellæ numerous, thin; intermediate ones extending from the margin one-third to one-half the semi-diameter; fossett distinct."—(Hall, Stansbury's Report.)

(though less decidedly so) from Professor Hall's, which certainly has the septa more crowded, thinner, and (as also stated in the description) alternately longer and shorter.

It will be seen from the description that this coral agrees rather closely in many of its characters with the last; so closely, indeed, that I have been much inclined to think it might be only a more slender variety of the same. Still, its longer, more attenuated form, and very nearly equally numerous septa, in rather decidedly smaller specimens, as well as the apparently different form of the bottom of its calice (see fig. 3 *c*,) and the direction of the vesicles formed by the complex tabulæ, if not deceptive, and constant, would certainly be of at least specific importance.

It is worthy of note, as already suggested with regard to the last, that longitudinal sections of both of these forms (but more particularly that of the last) show that the tabulæ curve upward so as to form a kind of false columella seen projecting upward in the middle of the bottom of the calice (see fig. 4 *b*), more nearly as in *Clisiophyllum* and *Lonsdalia* than I have ever yet observed in *Zaphrentis*. Still, they seem to differ from those types in the possession of a septal fossula, very clearly seen, at least in the species here under consideration; while neither of them presents a fasciculate, composite, or astreiform mode of growth, or shows any traces of well-defined inner walls, as in *Lonsdalia*.

I greatly regret having no opportunity to compare these and other far-western fossils with the original types of species briefly described, and not fully illustrated, many years back, in Frémont's, Stansbury's, and other Government reports, and can therefore only say that I have earnestly endeavored, to the best of my ability, to identify the described forms from the published figures and descriptions.

Locality and position.—Boxelder and Logan's Peaks, Wasatch Range, Utah, in a dark bluish-gray Carboniferous limestone. Professor Hall's specimens of *Z. Stansburii* came from the same horizon, on Stansbury's Island, Cloth Cap, and Flat Rock Point, Great Salt Lake. Dr. Hayden's party have also found this fossil quite abundant in the same kind of dark limestone on the divide between Ross Fork and Lincoln Valley, and at other localities in Idaho.

Genus CAMPOPHYLLUM, E. & H.

CAMPOPHYLLUM (undt. sp.).

Plate 5, figs. 2, 2a, 2b.

Corallum cylindrical, more or less elongated, nearly straight or somewhat curved, with ridges or irregularities of growth. Calice unknown; septa about eighty, very thin, every alternate one extending in about half-way to the middle, while the intermediate ones are much shorter; outer vesicular zone narrow, or only extending in about half as far as the longer costæ, occupied by numerous vesicles, which, as seen in vertical sections, range obliquely outward and upward; tabulæ thin, occupying a very wide space, passing horizontally across, but curving a little downward at their outer margins, and sometimes dividing and intersecting each other as they pass across. Epitheca thin, and, at least in weathered examples, marked by distinct septal costæ.

Length unknown; diameter, 1.60 inches.

The only specimen of this species I have seen is a fragment about five inches in length, and imperfect at both ends. It is much weathered, the epitheca being entirely removed, excepting on a few spots, and the calice broken away. I am somewhat inclined to believe that it may be the same species figured by Dr. Owen, from the Upper Coal-Measures on the Missouri River, under the name *Cyathophyllum vermiculare*, Goldfuss? (see plate iv, fig. 2, of his report of his Geological Survey of Iowa, Wisconsin, and Minnesota). The specimen is straighter than the Missouri River form usually is, and seems not to have had such strong wrinkles of growth; but it is so much weathered that the wrinkles might have been obliterated in that way. As nearly as can be determined by broken sections, both longitudinal and transverse, it seems to agree quite closely, in its internal structure, with specimens of the form figured by Dr. Owen, now before me from the original locality. In making the comparison, however, it should be understood that Dr. Owen's figures give no idea of the true appearance and number of the septa, or of the costæ.

The coral figured by Dr. Owen is a true *Campophyllum*, and, as he proposed to call it *Cyathophyllum torquium* in case it should be found to be distinct from Goldfuss' species, its name becomes *Campophyllum torquium*.

Fig. 1 of plate 5 represents another coral from the Carboniferous limestone of Piñon Mountains, with rather more closely arranged septa. It may be a *Zaphrentis* or a *Campophyllum*. Only undeterminable fragments of it have been seen.

Locality and position.—Diamond Range, near Newark; Carboniferous.

Genus LITHOSTROTION, Fleming.

LITHOSTROTION WHITNEYI, Meek.

Plate 6, figs. 1, 1 a, 1 b, 1 c.

Lithostrotion Whitneyi, Meek. (M. S.), White (1875), Palæont. of Lieut. Wheeler's Report, 103, pl. VI, figs. 1 a, b, c.

Corallum dendroid or growing in irregular, loosely-aggregated tufts. Corallites cylindrical, of unequal size, and separated by very unequal spaces, often widely divergent, and generally a little flexuous, sometimes slightly adherent where in contact; young branches rather strongly diverging from the larger at their origin, but soon curving so as to become more nearly parallel; epitheca well developed, and only showing faintly-marked septal costæ, and moderately distinct wrinkles of growth. Calices rather deep, nearly or quite circular, with a prominent, strongly-compressed columella rising in the middle; principal series of septa twenty-four to about thirty-three, extending inward, sometimes nearly to the columella, but often only as raised lines on the upper sides of the tabulæ along the inner half, though in other examples apparently becoming obsolete within, so as to leave a comparatively large space of the tabulæ smooth around the columella; secondary series of septa alternating with the others (with which they agree in number), and very short, or not extending inward beyond the very narrow outer vesicular zone. Outer zone well defined, and so narrow as to be occupied by scarcely more than a single series of small vesicles that range very obliquely outward and upward. Tabulæ of inner area very thin, rather closely arranged, and curving strongly upward around the columella, then extending at first nearly horizontally outward, and occasionally dividing as they slope or curve a little downward in approaching the outer zone.

Diameter of the largest corallites, 0.30 to 0.40 inch; of the smallest,

about 0.20 inch; number of costæ at the outer wall of one of the larger corallites, about six in 0.10 inch.

On first examining this coral, I was rather inclined to think it might be the same as a form described by me in the first volume of the California Report (plate 1, fig. 4) doubtfully as a variety of *L. mammillare*. On comparison, however, its corallites are found not only to be more irregular in size and more divergent, but to present important internal differences. In the first place, they have a more solid and well-defined columella, with the tabulæ of the inner area differently arranged. The most important difference, however, is to be observed in the comparative breadth of the outer vesicular zone, which is very much narrower in the species under consideration, and only occupied by one or two ranges of vesicles, instead of three or four; and these vesicles, as seen in longitudinal sections, are directed more obliquely upward (fig. 1 c, pl. 6).

Among the described European species, it seems to be most nearly represented by *L. Martini*, Edwards and Haime (see Brit. Mountain Limestone Corals, xl, figs. 2 a-g), and *L. Phillipsi*, E. & H. (ib., xxxix, figs. 3, 3 a). From the first of these, however, it differs not only in having the corallites less uniform in size, and often more divergent, but in having the tabulæ of its inner area, as seen in vertical sections, frequently divided instead of simple, and its outer vesicular zone proportionally narrower, while its secondary septa, as seen in transverse sections, and particularly in the calices, are proportionally shorter. It also differs from *L. Phillipsi* in the inequality and more irregular arrangement and greater divergence of its corallites, which are likewise less flexuous, and want the peculiar coalescent character so characteristic of that species. The *L. Phillipsi* probably also shows corresponding internal differences; but, as I have seen no figures or descriptions of its internal characters, I have no means of making farther comparisons.

The specific name of this coral is given in honor of Prof. J. D. Whitney, State geologist of California.

Locality and position.—From the dark bluish-gray Carboniferous limestone at Boxelder Peak, Wasatch Range, Utah.

Genus CYATHOPHYLLUM, Goldfuss.

CYATHOPHYLLUM (CAMPOPHYLLUM ?) NEVADENSE, Meek.

Plate 5, figs. 3, 3 a, 3 b.

Corallum attaining a rather large size, elongate-conical, and more or less curved; calice apparently circular, and very deep, with nearly vertical sides, and a flat bottom; septa about 100, every alternate one of which extends inward more than half-way to the middle, while those of the intermediate series extend in only one-third to one-half as far as the others; tabulæ very wide, somewhat irregular, and generally curving downward around their outer margins; outer vesicular zone, as seen in vertical sections, occupied by comparatively large vesicles, that range nearly vertically, or with only a slight outward inclination. (Surface unknown)

Length of a weathered specimen not quite entire at either end (measuring around the outer side of the curve), 5.70 inches; diameter at larger end, about 2.30 inches.

The only specimen of this species in the collection is so much weathered that it retains none of the epitheca, while the margins of its calice are quite imperfect. Without seeing better specimens, it is difficult to determine whether it is a *Cyathophyllum*, a *Campophyllum*, or a *Zaphrentis*. The transverse section (fig. 3 b) seems to show some indications of a fossula in the arrangement of the septa, as represented in the upper part of the figure. If this is really a fossula, the species may have to be called *Zaphrentis Nevadensis*.

Locality and position.—Boxelder Peak, Wasatch Range, Utah; Carboniferous.

CYATHOPHYLLUM SUBCÆSPITOSUM, Meek.

Plate 5, figs. 4, 4 a, 4 b.

Corallum subfasciculate, with gemmation lateral; corallites few, the young starting by slender stems rather low on the sides of the old, and growing up more or less nearly parallel with the latter, but apparently without again uniting or branching above, where they soon nearly or quite equal the size of the old; all subcylindrical above their tapering bases, and more or less flexuous, with a few swellings and smaller wrinkles of growth; epitheca of moderate thickness, and scarcely showing septal costæ.

Septa from about fifty-six to seventy, all very thin in the outer vesicular zone, but (as seen in transverse sections) with the principal series thicker within, and continued nearly (or apparently in part) quite to the middle, while those of the intermediate shorter ones do not extend inward beyond the narrow vesicular zone; vertical sections showing the vesicular zone to extend only from one-fourth to one-third of the way to the middle, and to be occupied by a few rows of unequal vesicles, ranging outward and upward. Tabulæ, as seen in the section last above mentioned, numerous, occupying a very wide space, equaling more than two-thirds of the entire breadth of the corallum, passing nearly straight across, or merely curving downward a little at their lateral margins, somewhat irregularly arranged, and, in part, more or less divided.

Entire length of corallites unknown; diameter of largest seen, 0.62 inch.

One of the most marked features of this coral is the great breadth of the tabulæ compared with the narrow, outer, vesicular zone. This character, and the fact that in some transversely-broken sections the septa do not reach the middle, at first caused me to suspect that it might be a branching *Campophyllum*. It is true, the species of that genus hitherto known are simple; but, as suggested by Edwards and Haime, there may be branching species yet unknown. On grinding a transverse section, however, I find that the larger septa all extend farther inward than is usual in *Campophyllum*, while some of them seem to extend quite inward to the center (see fig. 4 a). I am therefore led to refer it to the genus *Cyathophyllum*.

Specifically, it does not appear, when all its characters are taken into consideration, to be nearly allied to any of the described species with which I am acquainted. In the size of its corallites, and apparently in their mode of growth, as well as in the great breadth of its tabulæ, it is very similar to *C. pseudo-vermiculare* of McCoy (Brit. Pal. Foss., pl. 3 c, fig. 8); but it has a much larger number of septa, which pass farther inward, while its outer vesicular zone is decidedly more complex.

Locality and position.—Near Swansea, White Pine District; Carboniferous.

MOLLUSCA.
BRACHIOPODA.
STROPHOMENIDÆ.

Genus HEMIPRONITES, Pander.

HEMIPRONITES CRENISTRIA, Phillips (sp.).

Plate 7, fig. 2.

- Spirifer crenistria*, Phillips (1836), Geol. Yorks., II, 216, pl. ix, fig. 6.
Spirifer senilis, Phillips (1836), ib., fig. 5.
Leptaena anomala, Sowerby (1840), Min. Conch., VII, 9, pl. 615, fig. 1 *b* (not 1 *a*, *d*, *c*).
Orthis umbraculum, Portlock (1843), Geol. Lond., 456, pl. 37, fig. 5.—De Koninck (1843),
 An. Foss. Carb. Belg., 222, pl. xiii, figs. 4–7 (not von Buch).
Orthis Bechei, McCoy (1844), Synop. Carb. Foss. Ireland, pl. xxii, fig. 3.
Orthis comata, McCoy (1844), ib., fig. 5.
Orthis caduca, McCoy (1844), ib., fig. 6.
Orthotetes radians, Fischer (1850), Bull. Soc. Imp. Mosc., XXIII, pl. 9, fig. 3.*
Leptaena crenistria, McCoy (1855), Brit. Pal. Foss., 450.
Leptaena senilis, McCoy (1855), ib., 452.
 ? *Orthis Keokuk*, Hall (1858), Iowa Report, I, part ii, 640, pl. xix, figs. 5 *a*, *b*.
 ? *Orthis robusta*, Hall (1858), ib., 713, pl. xxviii, figs. 5, *a*, *b*, *c*.
Streptorhynchus crenistria, Davidson (1860), Mon. Scottish Carb. Brach., 32, pl. i,
 figs. 16–22; and in Mon. Brit. Carb. Brach. (1861), 124, pl. xxvi, fig. 1, pl.
 xxvi, figs. 1–5, and pl. xxx, figs. 14–16.
 ? *Streptorhynchus Hallianus* and *S. Tapajotensis*, Derby (1874), Bull. Cornell Univ., I,
 35 and 37, pl. v.

The specimens that I have here referred to the above-named widely-distributed and well-known species, seem to agree in all their external characters with the published figures and descriptions of that form as given by the most reliable European authorities. None of them, however, show the interior, and they are all in a bad state of preservation.

Locality and position.—Light-colored limestone, Fossil Hill, White Pine District; White Pine County, twenty-five miles northeast of Hamilton; and Railroad Cañon, Diamond Mountains. The specimen figured was brought by Colonel Simpson from a dark limestone near Camp Floyd. All Carboniferous.

* The name *Orthotetes* was first proposed by Fischer in 1829; but as he neither then, nor at any subsequent time, named, described, figured, or cited any type (until 1850), his genus cannot be regarded as antedating *Hemipronites*, Pander, 1830.

Genus ORTHIS, Dalman.

ORTHIS MICHELINI, L'Eveillé, var.

Plate 7, figs. 1, 1 a, 1 b, 1 c.

- Terebratula Michelini*, L'Eveillé (1835), Mém. Soc. Géol. France, II, 39, pl. ii, figs. 14-17.
Orthis Michelini, De Koninck (1843), An. Foss. Carb. Belg., 228, pl. xiii, figs. 8 and 10 c, d.—De Verneuil and De Keyserling (1845), Géol. Russ., II, 185, pl. xii, fig. 7.—Semenow (1854), Foss. Schles. Kolenk., tab. iii, fig. 11.—McCoy (1854), Brit. Pal. Foss., 448, tab. iii, fig. 11.—Davidson (1860), Scottish Carb. Brach., 30, pl. i, figs. 7-10; and again (1861), Brit. Carb. Brach., 132, pl. xxx, figs. 6-12.
Terebratula filiaris, Phillips (1836), Geol. Yorks., II, 220, pl. xi, fig. 3.
Orthis divaricata, McCoy (1854), Synop. Carb. Foss. Ireland, pl. xx, fig. 17.
Orthis circularis, McCoy (1854), ib., fig. 17.
Orthis Michelini var. *Burlingtonensis*, Hall (1858), Iowa Report, I, part ii, 596, pl. xii, fig. 4.
 Compare *Orthis Penniana*, Derby (1874), Bulletin Cornell University, I, No. 2, 26.

Shell rather gibbous, both valves being convex, but the ventral less so than the dorsal, longitudinally oblong or subquadrate in outline, with breadth nearly as great posteriorly as in front; lateral margins nearly straight and parallel, anterior lateral rounding more or less abruptly into the front, which is rounded, somewhat straightened, or very faintly sinuous near the middle; hinge-line very short, or less than one-third the breadth of the valves. Dorsal valve distinctly and generally evenly convex; beak slightly prominent, and only a little incurved; area small, very moderately arched. Ventral valve moderately convex all over, excepting near the front, where it is depressed so as to form a broad, shallow, undefined, mesial sinus; beak projecting little beyond that of the other valve, and arched but not strongly incurved; area very small, well defined, inclined, and arching more or less backward; foramen moderate, but nearly or quite closed by the cardinal process of the other valve. Surface of both valves ornamented by numerous, crowded, even, more or less dichotomous, radiating striæ, that arch outward on the posterior lateral regions, and are crossed toward the front and lateral margins by rather distinct marks of growth. (Internal characters unknown.)

Length of largest specimen seen, 1.54 inches; breadth, 1.32 inches; convexity, 0.95 inch.

I have long been much perplexed in regard to the proper disposition

of this shell. It has much the general aspect of *O. Michelini*, but differs rather decidedly from any authentic variety of that species figured in foreign works in its longitudinally oblong outline, straight and parallel lateral margins, and greater convexity, especially that of its ventral valve, which in *O. Michelini* is most generally flat, or even a little concave, around the anterior region. Its area is also proportionally smaller than in *O. Michelini*. In some respects, it agrees more nearly with a South American form described by Professor Derby under the name *O. Penniana*, already cited. Still, it differs quite strongly in its oblong or quadrate form (produced by the straightness and parallel outline of its lateral margins, which cause the breadth of its valves to be almost exactly as great posteriorly as toward the front); while *O. Penniana* is decidedly wider anteriorly than behind, almost exactly as in the typical form of *Michelini*. If *O. Penniana* of Derby is really specifically distinct from *O. Michelini*, which I am rather inclined to doubt, then our shell might with more propriety be arranged as a variety of the same than of *O. Michelini*, unless it may present some internal differences. If distinct from the above-mentioned forms, either specifically or as a variety, it may be designated by the name *Nevadensis*.

Locality and position.—From the Carboniferous limestones of White Pine County, Nevada, twenty-five miles east of Hamilton, on the Egan Road; also, at Railroad Cañon, Diamond Mountains. Colonel Simpson also brought it from the pass between Desert and Pleasant Valleys.

PRODUCTIDÆ.

Genus *PRODUCTUS*, Sowerby.

PRODUCTUS NEVADENSIS, Meek.

Plate 8, figs. 2, 2 a, 2 b, 2 c, 2 d, 2 e.

Shell of medium size, with a general elongate-subovate form, as seen in adult examples, which are much produced anteriorly; hinge less than the greatest breadth. Ventral valve very gibbous, strongly arched, the curve regularly increasing from the produced front to the beak, provided with a rather deep mesial sinus, which extends from near the beak to the front; gibbous central region comparatively narrow, and, on each side of the sinus, rounded and falling off laterally very abruptly, especially to the ears; beak

rather narrow, distinctly incurved, so as to pass within the hinge-line; ears small, nearly rectangular; lateral margins sometimes faintly sinuous near the ears, and rounded to the front, which is rounded or a little sinuous in outline at the middle, as seen from above; surface ornamented by rather broad, regularly-arranged, concentric undulations, which become obsolete on the umbonal region, and more strongly defined and wider anteriorly, while on the umbonal portion there are numerous minute, slightly-elongated prominences, arranged in quincunx, which probably bore minute spines; farther forward the little spine-bases are arranged in concentric bands, mainly in the furrows between the concentric undulations; spines apparently all small, short, and inclined forward, or more or less depressed; interior with the scars of the cardinal muscles narrow, nearly parallel, deeply striated, and very profoundly impressed, so as to form on internal casts two very prominent, parallel ridges, between which are seen the distinctly-corrugated scars of the adductor muscles. Dorsal valve flattened, concave over the whole visceral region, excepting a slight mesial ridge corresponding to the sinus of the other valve, and marked by numerous small, regular, concentric wrinkles, with many little projecting points that seem to have borne small spines, especially toward the anterior and lateral margins. Interior unknown.

Length of one of the largest specimens, measuring over the curve of the ventral valve from the beak to the front, 4.30 inches; breadth, 1.76 inches; convexity, 1.30 inches.

For about ten years past I have, at different times, had under consideration specimens of this *Productus*, without being able to identify it with any of the described species. I have had no difficulty in separating it from all of other known forms from the Far-West, and have always found it to be quite constant in its characters. In young examples, it is much like *P. Nebrascensis* of Owen;* though in adult specimens, it is found not only to attain a much larger size, but to be proportionally greatly more produced in front, as well as much more gibbous; while it evidently did not possess

* Not as represented by Dr. Owen's figure given under that name, on plate v of his Wisconsin, Iowa, and Minnesota Report, however, which figure certainly does not represent the species *described* under that name by Dr. Owen, as may be seen by reading his description, and as I know from examining his type-specimens.

two sets of spines as in the *P. Nebrascensis*, on which the larger spines were long, strong, and erect. On Dr. Owen's species, the little tubercles, or prominences supporting the spines, are also so much elongated as often almost to present the appearance of little costæ (especially on internal casts broken from a limestone matrix), which is not the case with the species under consideration. I have now before me many specimens of *P. Nebrascensis*, some of which were collected from the original locality, in Nebraska, while others came from the same horizon in Kansas, Iowa, and Illinois, and none of these attain more than half the size of the species here described, nor are any of them but slightly more than hemispherical; while they are all proportionally broader across the umbonal region of the ventral valve. In no instance have I ever seen a specimen of that species so greatly produced in front as we see in this. The most marked differences, however, are to be observed in the internal casts of these two shells, that of *P. Nebrascensis* scarcely showing any traces of the muscular scars.

Among foreign species, our shell is perhaps most nearly represented by some of the narrow, elongated varieties of *P. scabriculus*, *P. pustulosus*, or *P. punctatus*; but it seems to me to differ too decidedly and constantly from these to render any detailed comparison necessary. Nevertheless, I expect to see it (as is too often hastily done in similar cases) arranged by some authorities as a synonym of one, or alternately of each, of the above-mentioned species. I am aware that our fig. 2 *b*, for instance, presents much the appearance of some varieties of *P. punctatus*, because it is not placed in a posture to show the greatly-produced anterior, as shown in fig. 2 *e*, nor the strong distant concentric ridges as seen in fig. 2. These, however, are not the only differences; for our shell is *constantly* much narrower than the usual form of *P. punctatus*, while its umbonal region has a much more squarish appearance, if I may so term it, owing to the sudden and vertical descent of its sides to the ears. Again, it will be seen to present strongly-marked differences in the form and relative sizes of the muscular scars in the ventral valve, by comparing our fig. 2 *c* with fig. 17 of plate xlv of Mr. Davidson's Monograph of the British Carboniferous Brachiopoda. Equally good distinguishing characters can be pointed out between it and the other species mentioned.

Locality and position.—West side of Buell Valley; Summit Spring Pass; Ruby Valley; White Pine Mountains and other localities in Nevada: from a light-colored limestone believed to belong to the upper part of the Carboniferous series of that region.

PRODUCTUS (undt. sp.)

Plate 7, figs. 6, 6 a, 6 b.

Compare *Productus Ivesii*, Newberry (1861), Ives' Report on the Colorado, 122, pl. ii, figs. 1-8; also *Productus Calhounianus*, Swallow (1858), Trans. Acad. Sci. St. Louis, I, 180.

Shell attaining a large size, longer (measuring over the curve of the ventral valve) than wide; hinge apparently not quite equaling the greatest breadth. Ventral valve very gibbous, much produced anteriorly, very strongly arched, and provided with a deep, wide mesial sinus that extends from the umbonal region to the produced front, to which it gives an emarginated appearance as seen from above; most gibbous portion on each side of the sinus, comparatively narrow, with abruptly descending lateral slopes, which converge rather gradually to the beak; ears apparently nearly rectangular, arched, and wrinkled; surface ornamented by medium-sized, well-defined, occasionally bifurcating costæ, that bear numerous, more or less alternately-arranged little nodes, each of which was the base of a slender spine sometimes apparently attaining a length of nearly three-quarters of an inch; beak comparatively small at the apex, incurved so as to pass within the hinge-line, and, together with the adjacent umbonal region, crossed by small concentric wrinkles, which become stronger on the ears; lines of growth very fine and regular. Dorsal valve somewhat flattened or a little concave in the visceral region, and abruptly curved parallel to the other in front, provided with a mesial ridge corresponding to the sinus of the other valve; surface ornamented with costæ similar to those of the other valve, and crossed on the visceral region by small, regular concentric wrinkles; cardinal edge strengthened within by a strong marginal ridge on each side of the short, recurved cardinal process, from the base of which there extends forward a small mesial ridge, which is bifid at its connection with the process.

Length of one of the largest specimens, measuring over the curve of the

ventral valve, about 4.90 inches; breadth of the gibbous part of umbonal region, exclusive of the ears, about 2.50 inches.

Of this *Productus*, there are six or eight specimens in the collection from various localities, but unfortunately they are all more or less mutilated or distorted. After numerous careful comparisons, I have been unable to arrive at any very satisfactory conclusions in regard to its specific relations. At a first glance, it reminds one of some of the larger coarsely-costated varieties of *P. semireticulatus*. It evidently differs, however, in several respects from that species; being not only more coarsely costated, and more deeply sulcated, but it likewise differs in having numerous little spines scattered over the whole of the ventral valve; while the mesial internal ridge of its dorsal valve (see fig. 6 b) differs in being bifid as in *P. scabriculus*. In most of its external characters at least, excepting its narrower form, it seems to agree pretty well with the description of a form described by Professor Swallow, from the Upper Coal-Measures of Kansas, under the name *P. Calhounianus* var. *Kansasensis*; and yet it appears to be specifically distinct from the Kansas specimens that I have always identified with the form described by Professor Swallow, as well as from all of the others I have ever seen from the same localities as those named by him. It appears also to be related to *P. Ivesii* of Dr. Newberry, from Arizona, but is more produced anteriorly; and, so far as I have been able to see from examinations of the interior of the dorsal valve of that form, its mesial ridge is not divided as in this shell, which is also narrower in the umbonal region.

I suspect that it will be found to be an unnamed species; but, without better specimens for comparison, I hardly feel justifiable in naming it as a new species. If distinct from all the allied forms, it might be called *P. longus*.

Locality and position.—Fossil Hill, White Pine Mountains; Railroad Cañon, Diamond Mountains; West of San Francisco Mountain, etc.

PRODUCTUS SEMIRETICULATUS, Martin.

Plate 7, fig. 5.

- Anomites semireticulatus*, Martin (1709), Petref. Derb., 7, tab. xxxii, figs. 1 and 2, and tab. xxxiii, fig. 4.
- Anomites productus*, ib., 9, tab. xxii, figs. 1, 2, and 3.
- Productus Scoticus*, Sowerby (1814), Min. Conch., I, 158, tab. lxix, fig. 3.
- Productus Martini*, Sowerby (1821), ib., IV, 15, pl. 317, figs. 2-4.—De Koninck (1843), An. Foss. Carb. Belg., 160, pl. vii, fig. 2.—Phillips (in part, 1836), Geol. Yorks., II, 213, pl. vii, fig. 2.—McCoy (in part, 1844).—Brit. Pal. Foss., 467 and 471.
- Productus antiquatus*, Sowerby (1821), Min. Conch., II, 15, pl. 317, figs. 1, 5, and 6.—Phillips (part, 1836), II, 213, pl. vi, fig. 2.
- Productus concinnus*, Sowerby (1821), Min. Conch., IV, 16, pl. 318, fig. 1.
- Productus pugilis*, Phillips (1836), Geol. Yorks., II, viii, fig. 6.
- Leptæna antiquata*, Fischer (1837), Oryc. du Gouv. de Mosc., 142, pl. 26, figs. 4 and 5.
- Leptæna tubulifera*, Fischer, ib., pl. xxvi, fig. 1 (not Deshayes).
- Productus Inca*, d'Orbigny (1844), Paléont. Am. Mérid., 51, pl. iv, figs. 1, 2, and 3.
- Productus flexistriata*, McCoy (1844), Synop. Carb. Foss. Ireland, pl. xvii, fig. 1.
- Productus semireticulatus*, De Koninck (1847), Monogr. Chonetes et Prod., pl. viii, fig. 1, pl. ix, fig. 1, pl. x, fig. 1.—Davidson (1860), Monogr. Scottish Carb. Brach., pl. iv, figs. 1-5, 7, and 12; and of numerous other authors.

The collection contains, from several localities, specimens that seem to me to belong to the above-mentioned well-known and widely-distributed species. At least so far as their characters can be made out from the collections yet obtained for study, no reliable distinctions have been observed.

Locality and position.—Railroad Cañon, Diamond Mountains; Fossil Hill, White Pine Mountains, Nevada.

PRODUCTUS COSTATUS, Sowerby ??, var.

Plate 7, figs. 4 and 4 a, b.

- Productus costatus*, Sowerby (1827), Mineral Conch., VI, 115, pl. 560, fig. 1.—De Verneuil (1845), Palæont. Russia and the Ural Mts., 268, pl. xv, figs. 13 a, b.—De Koninck (1847), Mon. Prod., 92, pl. viii, fig. 3,* pl. x, fig. 3, and pl. xviii, figs. 3 a, b.—Davidson (1860), Mon. Scottish Brach., 44, pl. ii, figs. 22-24; and of various other authors.
- Productus sulcatus*, Sowerby (1822), Mineral Conch., IV, 17, pl. 319, fig. 2.
- Producta costata (et sulcata)*, Phillips (1836), Geol. Yorks., 213, pl. vii, fig. 2.
- Productus costellatus*, McCoy (1844), Synopsis Carb. Foss. Ireland, pl. xx, fig. 15.
- Productus Portlockianus*, Norwood and Pratten (1854), Jour. Acad. Nat. Sci. Philad., III, 15, pl. 1, figs. 9 a, b, c.

* This figure of De Koninck's was drawn from an American specimen found at Saint Louis, Missouri.

Producta costata, McCoy (1855), Brit. Pal. Foss., 460.

Producta Flemingi var. *sulcata*, McCoy, ib., 461.

Productus costatus, Meek (1872), Palæont. E. Nebraska, in Hayden's Report U. S. Geol. Survey Nebraska, 159, pl. vi, figs. 6 *a*, *b*.

Shell rather under medium size, about as long as wide, measuring direct from the beak to the front, but longer than wide, measuring over the curve of the ventral valve; very gibbous, and strongly incurved, the curvature increasing little from the front to the beak, and sometimes describing nearly two-thirds of an entire volution on the ventral surface; hinge-line about equaling the greatest breadth of the valves. Ventral valve very gibbous, with a well-defined mesial sinus extending from the umbonal region to the front; ears small, nearly rectangular, and rather distinctly arched; lateral slopes rounding off nearly vertically to the ears; beak gibbous, and strongly incurved, but scarcely passing within the hinge-margin; surface ornamented with moderate-sized longitudinal costæ, which sometimes become a little irregular in size on the anterior and anterior lateral slopes by some of them bifurcating, or, in other cases, by two of them coalescing to form a larger and slightly more prominent one, generally at the origin of a spine. Small concentric wrinkles also give the visceral region a more or less reticulated appearance, while the bases of rather stout spines are seen scattered over the anterior and lateral slopes (generally on the larger costæ) as well as on the ears, or sometimes in a row along the sulcus or concavity between each ear and the very abrupt swell of the umbo. Dorsal valve flattened-concave in the visceral region, where it is marked by obscure costæ and small concentric wrinkles; interior with a slender mesial ridge, most sharply elevated near the middle, and having the muscular scars prominent and near the beak; reniform scars obscure, directed outward and a little forward from the anterior side of the muscular scars.

Length of a medium-sized specimen, measuring direct from the beak to the front, 1.21 inches; measuring over the curve of the ventral valve, about 2.20 inches; breadth, 1.25 inches.

It is with considerable doubt that I have ventured to refer this shell to the variable species *P. costatus*, though it seems to be the form that has generally been identified with that species in our Coal-Measures and the Lower Carboniferous rocks of the Mississippi Valley. Although these American

specimens agree pretty closely with certain forms usually regarded in Europe as being only varieties of *P. costatus*, they *never* possess the very large costæ and the strong oblique lateral ridge near each ear, seen in the typical variety of that species. Indeed, I have never seen any American shell presenting the characters of the typical *P. costatus*, or nearly approaching it. It is therefore only because the best European authorities include in that species shells with very much smaller costæ, and the lateral ridges nearly or quite obsolete (such as that represented by figs. 6 and 6 *a* on plate 4 of Mr. Davidson's Monograph of the Carboniferous Brachiopoda of Scotland, first referred by Mr. Davidson to *P. semireticulatus*, but afterward considered by him to be a variety of *P. costatus*), that we have in this country referred such forms as that under consideration, even provisionally, to *P. costatus*. Generally, our specimens resemble quite closely *P. sulcatus* of Sowerby; and if it were not for the fact that nearly all European authorities who have investigated the Carboniferous *Brachiopoda* agree in viewing the form on which Sowerby proposed to found that name as only a variety of *P. costatus*, I should scarcely hesitate to retain the name *P. sulcatus* for our shell. Our specimens, however, are generally more gibbous and more strongly arched than the European varieties of *P. costatus* with equally small costæ. In most cases, they look much like small examples of *P. semireticulatus*; and, indeed, Mr. Davidson thought that specimens apparently of this shell sent by me to him from the Coal-Measures of Nebraska more probably belonged to that species than to *P. costatus*; yet the fact that we find these shells throughout wide areas of country here ranging through a considerable thickness of strata, and often directly associated in the same beds with well-marked examples of *P. semireticulatus* of the usual size and form, and still never attaining more than half the adult size of that species, while they are always proportionally narrower across the umbonal region, and more gibbous and more produced, seems to be an objection to the conclusion that they belong to the same species; especially as these smaller shells are evidently, as may be seen by their much-produced, strongly-arched form, adult specimens. On the other hand, the fact that they vary comparatively little in their characters, wherever we find them, and *never* nearly approach the typical forms of *P. costatus*, would seem to be an equally good reason for

regarding them as belonging to a distinct species from that form also. Until we can have an opportunity to arrive at a more satisfactory conclusion on these points from the study of more extensive collections, I would therefore refer this form provisionally to *P. costatus*, but at the same time express the belief that it does not belong to the same species as the typical *P. costatus* of the Old World.

Locality and position.—Railroad Cañon, Diamond Mountains; Fossil Hill, White Pine Mountain; and Moleen Peak, Nevada.

PRODUCTUS PRATTENIANUS, Norwood.

Plate 7, fig. 7.

Productus cora, Owen (1852), Geol. Report Wisconsin, Iowa, and Minn., 103 and 136, pl. v, fig. 1.—Marcou (1858), Geol. N. Am., 45, pl. vii, figs. 4, 4 a.

Productus semireticulatus, Hall (1852), Stansbury's Report Salt Lake Exp., 411, pl. iii, figs. 3, 5, and 5 a, b (not Martin, sp.).

Productus Prattenianus, Norwood (1854), Jour. Acad. Nat. Sci. Philad. (2d ser.), III, p. 17, pl. 1, figs. 10 a, b, c, d.

Productus Flemingii, Geinitz (1866), Carbonf. und Dyas in Nebraska, 52, taf. iv, figs. 1, 2, 3 (not Sowerby).

Compare *P. cora*, d'Orbigny (1843), Paléont. Voy. Am. Mérid., III, 55, pl. v, figs. 8, 9.

This is a common shell in the Coal-Measures of the Mississippi Valley, through the whole thickness of which it ranges, if not into the Lower Carboniferous. It is generally about as wide as long, by direct measurement from beak to front; though in some examples the anterior margin is more produced. The hinge-line usually equals the greatest breadth; while the ears are large, rectangular, and marked with a few large wrinkles that extend a little upon the sides of the umbo, but never cross over it, the visceral region of the ventral valve being nearly always without traces of these wrinkles. It is very gibbous, strongly-arched in the umbonal region, and without any indications of a mesial sinus, though it is sometimes a little flattened in the middle, with the lateral slopes rounding down abruptly on each side. The beak is often narrowed and distinctly incurved. The surface is ornamented by fine, regular, longitudinal striæ, which increase by intercalation, or sometimes by division; while over the whole of the ventral valve are distant, but regularly scattered, a few large spine-bases, at each of which the striæ are often interrupted, sometimes three or four of them termi-

nating at a spine-base, or three or four originating on the lower side, where only one is continued above the same. The spines are large, erect, and apparently long, and occur on the ears as well as over the other parts of the valve, there being sometimes a row of them along the hinge-margin of each ear. The dorsal valve is flattened, and generally provided with concentric wrinkles on the visceral portion.

Although this species is quite common, it is rarely found with the ears and free margins unbroken. In most cases, only the umbonal and most gibbous parts of the ventral valve are preserved when the specimens are broken from a limestone matrix; while, owing to the thinness of the shell, specimens in shale are usually crushed or much distorted. It seems to be much like forms identified in Europe with *P. cora*, d'Orbigny, to which it has been by some referred in this country. It certainly differs from d'Orbigny's figures of that species, however, in having its ventral valve more gibbous, with more nearly rectangular and larger ears, with large strong wrinkles; while its spines were certainly much larger and longer than represented by d'Orbigny. If his figure represents a specimen with the free margins and the edges of the ears broken away, and the *short*, pointed spines shown along the hinge are wrongly drawn, then his species may be identical with our shell; but otherwise it seems to me to be quite distinct. Prof. De Koninck, however, who has seen d'Orbigny's original specimens, thinks they are certainly not distinct from the European forms referred to *P. cora*, some of which are much more like our shell than the South American typical form would appear to be from d'Orbigny's figure.

As in other species of the genus, the striæ of this shell vary somewhat in size, though much less than is usual in most other species. On measurement, I find that from three to five of them may be counted in a space of one-tenth of an inch in the specimens under consideration.

Locality and position.—Fossil Hill, White Pine District; Railroad Cañon, Diamond Mountains, Nevada: Carboniferous.

PRODUCTUS SEMISTRIATUS, Meek.

Plate 7, figs. 8, 8 a.

Productus semistriatus, Meek (1860), Proceed. Acad. Nat. Sci., XII, 309; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 347, pl. I, figs. 7 a, b. Compare *Productus Chandlessii*, Derby (1874), Bull. Cornell Univ., I, 51, pl. iv, figs. 1-16, and pl. vi, fig. 1.

Shell rather under medium size, very gibbous, greatest breadth on the hinge-line, which is nearly twice the length, measuring from the beak direct to the anterior slope, but only a little more than half as great as the length of the ventral valve, measuring over its curve. Ventral valve extremely convex, strongly arched, and much produced in front, sometimes provided with a very shallow mesial sinus; beak gibbous and distinctly incurved, so as to pass within the cardinal margin; ears triangular, strongly vaulted, and abruptly separated from the vertical sides of the gibbous umbonal region by a rounded, undefined sulcus, which is continued from the beak to the lateral margins, to the outline of which it imparts a more or less sinuous character in front of each ear; surface of the visceral region marked by small concentric wrinkles extending upon the ears, and crossed by numerous rather fine longitudinal striæ, or costæ, that become suddenly obsolete on all of the anterior and lateral slopes from above (behind) the middle: these parts of the surface being merely marked with obscure lines of growth and strong, regularly-scattered spine-bases, from each of which there is sometimes a very obscure, undefined ridge extending downward to or toward the free margin. Similar spine-bases are also seen over other parts of the surface, including the ears; though they nowhere arise from tubercles. Dorsal valve unknown.

Length, measuring direct from the umbo to the anterior slope, 0.83 inch; measuring over the curve of the ventral valve from the beak to the anterior margin, 2.25 inches; breadth to the extremities of the ears, about 1.34 inches; breadth of most gibbous part of umbonal region, 0.90 inch; number of longitudinal striæ on the posterior half of the ventral valve, in the space of 0.10 inch, 3.

This seems to be a well-marked species, which is peculiar in having well-defined longitudinal striæ and moderately distinct transverse wrinkles

on the gibbous visceral region of the ventral valve, and no traces whatever of either on the anterior and lateral slopes, composing more than half of the entire surface. The ventral valve is very gibbous, distinctly arched, and much produced; the elevated umbonal region being comparatively narrow, with vertical sides, and but a faint indication of a mesial sinus. The spines seem to have been stout, erect, and to have arisen very abruptly from the surface, without being connected with tubercles.

In several respects, the South American shell described by Professor Derby, under the name *Productus Chandlessii*, in the Bulletin of Cornell University, already cited, would seem, as nearly as can be determined from his figures and description, to be closely allied to the species here under consideration; but, without specimens for comparison, I am not prepared to express a decided opinion respecting the relations of the two shells.

Locality and position.—The type-specimens of this species were brought by Colonel Simpson from a locality southeast of the Great Salt Lake, Utah (latitude $40^{\circ} 22' N.$, longitude $111^{\circ} 38' W.$), where they were found in a black bituminous limestone of Carboniferous age.

PRODUCTUS SUBHORRIDUS, Meek.

Plate 7, figs. 3, 3 a, 3 b.

Shell small, or of moderate size, generally much produced, longitudinally oblong-suboval, the length being distinctly greater than its breadth; hinge-line about equaling the greatest breadth. Ventral valve very gibbous, especially in the umbonal region, with a deep mesial sinus extending from near the umbo to the front, very strongly arched, the curve increasing from the front to the beak, which is distinctly incurved, but scarcely passes the hinge-margin; ears small, nearly rectangular, arched, and standing out nearly at right angles to the abrupt sides of the umbo; surface smooth, excepting sometimes broad, obscure, obsolescent longitudinal ridges on the anterior and lateral slopes, and strong spine-bases, rather thickly scattered over the whole, including the ears; spines strong, erect, and long. Dorsal valve and interior unknown.

Breadth of a medium-sized specimen, 0.85 inch; length of the same, measuring direct, 1.03 inches; measuring over the curve of the ventral valve, 2.06 inches.

In its smooth surface, deep mesial sinus, and strong spines, this species resembles the narrowest varieties of *Productus horridus* of Sowerby. Its uniform adult size, however, from widely-separated localities, and through a great thickness of strata, is less than half that of the average size of *P. horridus*; while it is greatly more produced and elongated in proportion to breadth, and has a proportionally shorter hinge and smaller ears. All its associate fossils in the same beds are also decidedly Carboniferous forms, while *P. horridus* is a Permian species.

In some respects, this shell resembles a form described by Professor Swallow, from the Coal-Measures of Kansas, under the name *P. costatoides*. It attains a larger size, however, and is more produced anteriorly; while it wants the well-defined costæ of that shell, being almost entirely smooth, excepting the spine-bases, and the faintest possible traces of a few broad, undefined ridges, sometimes seen descending the anterior slope. It never shows the faintest indications of concentric ridges, or furrows, on the visceral region, or any other part of the surface.

Locality and position.—Light-colored Carboniferous limestone of Wasatch Mountains; Hamilton Butte, Ruby Group; Mahogany Peak, Egan Mountains, and north slope of Moleen Peak, Elko Range, west side of Long Valley, Ruby Group.

PRODUCTUS MULTISTRIATUS, Meek.

Plate 8, figs. 3, 3 a, 3 b, 3 c, 3 d, 3 e.

Productus multistriatus, Meek (1860), Proceed. Acad. Nat. Sci. Philad., July, 309; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 350, pl. 1, figs. 8 a, b.

Shell of about medium size, much produced; length of entire specimens greater than the breadth, even by direct measurement from the umbo to the produced front, and proportionally still longer, measuring over the curve of the ventral valve; ears of moderate, or rather large size, somewhat triangular, strongly vaulted, and defined by a sinuosity of each lateral margin, which generally makes them less than rectangular at the extremities; lateral margins rounding anteriorly from the sinuosity in advance of each ear, to the front, which is distinctly sinuous in outline at the middle. Ventral valve extremely gibbous, very strongly arched, and provided with a profound mesial sinus, which extends from near the umbo to the front;

umbonal region, behind the most gibbous part, depressed-convex, and without traces of transverse wrinkles; beak incurved, but not passing far within the hinge-line; most convex portion on each side of the mesial sinus prominently rounded, with very abrupt lateral slopes. Ventral valve deeply concave, but more or less flattened in the visceral region, where there commences a broad mesial ridge, corresponding to the sinus of the other valve, while a low prominence extends out from near the umbo to the sinuous part of each lateral margin in front of each ear, internally showing a sudden geniculation around the front and lateral margins, nearly at right angles to the more or less flattened visceral region; muscular and reniform scars unknown. Surface of both valves ornamented by numerous fine, regular, rather obscure, longitudinal costæ, or striæ, apparently generally destitute of spines, though sometimes a few very scattering large spine-bases are seen on the anterior slope of the dorsal valve, as well as on the ears of the same, where they, on some specimens, form a row along the hinge-margin.

Greatest length, measuring from the most gibbous part of the umbonal region to the front, about 1.90 inches; from the strongly-incurved beak to the front, 1.15 inches; breadth, to the extremities of the ears, 1.64 inches; convexity of the ventral valve, 1 inch; number of surface striæ in 0.10 of an inch, 3 or 4.

Of this species, there are some fifteen or twenty specimens before me, in various states of preservation, all of which are remarkably uniform in nearly all their characters. Its most marked features are its very gibbous form, deep mesial sinus, dividing the ventral valve into two prominently-rounded lobes, its somewhat depressed umbonal region without any traces of transverse wrinkles, and its fine, even striæ, with only a very few scattering, large spine-bases, sometimes seen on the anterior slope, and near the hinge-margin of the ears. The sudden geniculation of the dorsal valve around the anterior and lateral margins of the flattened visceral region, is also so strongly marked as to give the internal view of this valve much the form of *Strophomena rhomboidalis* (see fig. 3 e), excepting that it wants the concentric wrinkles of that shell. Although there are specimens in the collection showing this character very satisfactorily, unfortunately none of them

are in a condition to show the muscular or reniform impressions, nor very clearly the form of the cardinal process.

Generally, on somewhat worn specimens, the fine striæ are so nearly obsolete that the surface presents the appearance, at a first glance, of being entirely smooth; but even these specimens nearly always show remains of the striæ on the more protected parts, while, where the surface is well preserved, they are always seen distinctly defined on all parts.

I am not acquainted with any other species nearly enough allied to this to render a comparison necessary.

Locality and position.—The original type-specimens of this species were brought by Colonel Simpson's party from latitude $39^{\circ} 51' N.$, longitude $115^{\circ} 10' W.$, near the center of the eastern margin of Nevada. Those in Mr. King's collection came from further west, in the Ruby Group, and Mahogany Peak, Egan Range; the matrix being, in all cases, a light-colored limestone. I have never seen it from any other localities, and know of no nearly allied form in the rocks of the Mississippi Valley. Its associates are always well-marked Carboniferous types.

PRODUCTUS LONGISPINUS, Sowerby.

Plate 8, figs. 4, 4 a.

Productus longispinus, Sowerby (1814), Min. Conch., I, 154, pl. lxxviii, fig. 1.—De Koninck (1847), Descrip. An. Foss. Carb. Belg., 187, pl. xii, figs. 11 a, b, and pl. xii bis, fig. 2.—Davidson (1853), Introd. Brit. Foss. Brach., pl. ix, fig. 221; also (1860), Monogr. Scottish Carb. Brach., pl. ii, figs. 10–19; and (1861) Brit. Carb. Brach., 154, pl. xxxv, figs. 5–17.

Productus Flemingii, Sowerby (1814), Min. Conch., I, 154, pl. 68, fig. 2.—De Koninck (1847), Monogr. Prod., pl. x, fig. 2.—McCoy (1855), Brit. Pal. Foss., 461.

Productus spinosus, Sowerby (1814), Min. Conch., I, 157, pl. 69, fig. 2.

Productus lobatus, Sowerby (1821), ib., IV, 16, pl. 318, figs. 2–6.—Von Buch (1841), Ver. Königl. Akad. Wiss., Theil I, 32, pl. ii, fig. 17.—De Verneuil (1845), Geol. Russ. and Ural Mts., II, 266, pl. xvi, fig. 3, and pl. xviii, fig. 8.

Productus elegans, Davereux (1833), Const. Géol. de la Prov. de Liège, 272.

Producta setosa, Phillips (1836), Geol. Yorks., II, 214, pl. viii, figs. 9 and 17.

Productus Capacii, d'Orbigny (1843), Paléont. Voy. Am. Mérid., 50, pl. iii, figs. 24–26.

Productus tuberosus, De Keyserling (1846), Petschora Land, 208, pl. iv, fig. 6.

Productus Wabashensis, Norwood and Pratten (1854), Jour. Acad. Nat. Sci. Philad., III, pl. i, fig. 6.

?*Productus splendens*, ib., pl. i, fig. 5.

The specimens of the little shell that I have, with doubt, referred to the above species, are not in a very good state of preservation; but, as far as their characters can be made out, they seem to agree at least with forms

regarded by reliable authorities as being varieties of Sowerby's species. The best specimen in the collection is represented by the figs. 4, 4 *a*, on plate 8. This is more gibbous in the umbonal region, and has larger costæ than the most characteristic examples of *P. longispinus*, while it shows no traces of the mesial sinus usually seen in the same. In these respects, however, it agrees more nearly with a form illustrated as a variety of that species by Mr. Davidson's figs. 19, 19 *a*, plate xxxv, of his Monogr. Brit. Carb. Brach. It is true that it does not show the angular projection of the anterior margin seen in Mr. Davidson's figure, but its anterior margin is broken. Some of the other more imperfect specimens, however, show the usual mesial sinus, and the smaller costæ, exactly as in characteristic examples of *P. longispinus*. Generally, the surface is exfoliated, and the spines broken away; but, in a few instances, some remaining traces of their bases can be seen, while fragments of comparatively stout spines, like those of Sowerby's species, occur closely associated in the same matrix.

Locality and position.—Fossil Hill, White Pine District, Nevada; in light-colored Carboniferous limestone.

RHYNCHONELLIDÆ.

Genus LEIORHYNCHUS, Hall.

LEIORHYNCHUS QUADRICOSTATUS, Vanuxem ? (sp.).

Plate 3, figs. 9, 9 *a*, 9 *b*.

Orthis quadricostatus, Vanux. (1842), Geol. Rep. Third Dist. N. Y., 186.

Leiorhynchus quadricostatus, Hall (1843), Regent's Thirteenth Rep., 86; and Pal. N. Y. iv, 357.

Shell trigonal-subovate, or subcircular, very thin, and apparently compressed; posterior lateral margins somewhat straightened, and diverging from the beaks at about a right angle; anterior lateral margins rounding to the front, which is generally a little protuberant in the middle, but sometimes rounded, or even faintly sinuous in outline. Dorsal valve apparently more convex than the other, and provided with a depressed mesial fold, which extends little farther than the middle, and bears four, or rarely five, low, rounded costæ, which do not reach the umbonal region; lateral surfaces smooth, or only showing very faint traces of a few undefined radiating costæ. Ventral valve with a shallow mesial sinus, corresponding to the fold of the other valve, and bearing three, or rarely four, obscure costæ, while

very faint traces of a few similar costæ are sometimes seen on each side of the sinus. Surface of both valves marked by fine lines, and more or less stronger sulcations of growth, which undulate gracefully in crossing the costæ.

Length, 1 inch; breadth, 0.93 inch; convexity unknown. One proportionally broader specimen measures 0.93 inch in length and 1.06 inches in breadth.

The specimens of this shell in the collections studied by me are merely distorted casts with portions of the shell attached. These so nearly resemble *Leiorhynchus multicosatus*, Hall (supposed by Professor Hall to be probably only a variety of *L. quadricostatus*, Vanuxem, sp., from the Hamilton Group, N. Y.), that I had called attention to the close similarity. On comparison, however, with the figures and descriptions of the N. Y. shell, I thought them most probably distinct, and had proposed, in manuscript, a new name for them. Since then Professor Hall and Mr. Whitfield, who have investigated Mr. King's later collections, have referred this shell to *L. quadricostatus*, Vanuxem (see Am. Jour. Sci., XI, 475, June, 1875). As they have had the advantage of making direct comparisons with authentic New York specimens of Vanuxem's species, which I had no opportunity to do, it is presumable that they are more apt to be correct. Consequently, as these pages are passing through the press, I have withdrawn my proposed name; and, as it has never been published with a description, it need not be cited in synonymy.

The group *Leiorhynchus* seems to be, so far as yet known, distinguished from the older types of *Rhynchonella* more by the obscurity and obsolescent character of its plications, and other superficial characters, than by any observed fundamental differences of the muscular or other internal peculiarities. The known New York species are found only in the Hamilton and Chemung Groups of the Devonian.

Locality and position.—White Pine Mountains, Nevada; where it occurs in a dark shale. If a true *Leiorhynchus*, and especially if identical specifically with the New York shell referred to, the black shale from which it was obtained, would be almost certainly, as I had suspected, Devonian, and not Carboniferous.

SPIRIFERIDÆ.

Genus *ATHYRIS*, McCoy.*ATHYRIS*? *PERSINUATA*, Meek.

Plate 9, figs. 4, 4 a, 4 b.

Shell subtrigonal, very gibbous, somewhat longer than wide; lateral margins rounded in outline; front prominent in the middle; connecting margins of the valves, on each side of the beaks, broadly and deeply sinuous (see fig. 4 b.) Dorsal valve much more convex than the other, its greatest convexity being at the middle of the front, where it is elevated in the form of a very prominent, rounded, mesial fold, which projects somewhat forward, and scarcely extends back to the middle; lateral slopes rounding abruptly downward, and considerably produced, so as to meet the margins of the other valve nearly at right angles; beak strongly incurved. Ventral valve moderately convex in the umbonal region, and depressed in front into a broad, rounded, or somewhat flattened and profound mesial sinus, which causes the anterior margin to project obliquely forward and upward as a linguiform extension filling a corresponding sinus in the margin of the other valve, which it intersects at less than a right angle; beak unknown. Surface of both valves apparently nearly smooth, excepting rather distinct, subimbricating marks of growth near the anterior and lateral margins.

Length, about 1.28 inches; breadth, 1.16 inches; convexity, 0.98 inch.

Although I have seen no entire specimens of this shell, those I have had an opportunity to examine seem to differ so widely, not only from all the other forms in the collection, but from any described species of which I have seen figures or specimens, that there appears to be little, if any, reason to doubt that it is a new species. At a first glance, its extremely elevated fold and deep sinus remind one of *Rhynchonella acuminata*; but, on closer inspection, this fold is seen to be merely rounded, instead of angular, or divided into several smaller ridges, as we see in that shell. I am in some little doubt, however, whether or not it is really a true *Athyris*, since none of the specimens show the beak of the ventral valve, or, very clearly, any of the internal characters. One internal cast of the dorsal valve shows that it has a mesial ridge, or low septum, in the umbo, much as we often

see in *Rhynchonella*; but some scars of the adductor muscles seen near the middle of the valve seem to be more like those of *Athyris*. If a *Rhynchonella*, it would, of course, belong to the section of the genus including *R. acuminata*.

Locality and position.—Light-colored Carboniferous limestone of White Pine Mountains, Nevada.

ATHYRIS ROISSYI, l'Eveillé (sp.).

Plate 9, figs. 3, 3 a, 3 b.

Spirifer de Roissyi, l'Eveillé (1835), Mém. Soc. Géol. France, II, 39, pl. ii, figs. 18–20.

Spirifer glabristriatus, Phillips (1836), Geol. Yorks., II, 220, pl. x, fig. 19.

Spirifer fimbriatus, Phillips, ib., 220.

Terebratula Roissyi, De Verneuil (1840), Bull. Soc. Géol. France, XI, 259, pl. iii, figs. 1 b, c, d (not 1 a and e).—De Koninck (1843), An. Foss. Carb. Belg., 300, pl. xxi, fig. 1 (not pl. xx, fig. 1).

Athyris depressa, McCoy (1844), Synop. Carb. Foss. Ireland, 147, pl. xviii, fig. 7.

Athyris de Roissyi, McCoy (1855), Brit. Pal. Foss., 433.

Athyris glabristriata, McCoy, ib., 434.

Athyris Roysii, Davidson (1860), Monogr. Carb. Brach. Scotland, 16, pl. i, fig. 12; and (1861) Brit. Carb. Brach., 84, pl. xviii, figs. 1–11.

? *Athyris sublamellosa*, Hall (1858), Iowa Report, II, part 2, 702, pl. xxvii, figs. 1 a, b, c.

There are among the collections before me a number of specimens, some of which agree very closely with *A. Roissyi* in form, size, and general appearance; but, as none of them show the fringed lamellæ of growth so characteristic of l'Eveillé's species, it is with considerable doubt that I have identified them with that widely-distributed Carboniferous form. Still, as the peculiar surface-markings are said not to be always preserved in specimens of *A. Roissyi*, it is quite possible that they may have originally existed in our specimens, which came from a limestone matrix. They all show rather distinct, subimbricating marks of growth, but without traces of projecting fimbriated lamellæ. Some of the larger specimens have exactly the transversely-oval form and well-defined mesial sinus seen in mature, wide individuals of *A. Roissyi*; while other smaller individuals are proportionally narrower, with a much more prominent beak, and more rapidly-sloping posterior lateral margins, thus passing by easy gradations into forms that it is difficult to separate from *A. subtilita*, Hall, especially in specimens that have the surface-markings not well preserved. The adult specimens all show the sinus of the ventral valve terminating in a rounded marginal

projection, fitting into a corresponding sinuosity in the front of the other valve, just as we see in *A. Roissyi*; but the sinus in all of them becomes a narrow, very shallow sulcus, at a short distance from the front, instead of being broadly rounded or somewhat flattened, as we usually see in large examples of l'Eveillé's species.

Locality and position.—From the light-colored Carboniferous limestones of Ruby Group; also, from same in Wachoe Mountains; Mahogany Peak; Egan Range, Nevada.

ATHYRIS SUBTILITA, Hall.

Plate 8, figs. 6, 6 a.

Spirifer Roissyi, d'Orbigny (1843), Voy. dans Amér. Mérid., 46, pl. iii, figs. 17 and 19, (by error marked *Terebratula Peruviana* on the plate; not *Athyris Roissyi*, l'Eveillé, sp.).

Terebratula subtilita, Hall (1852), Stansbury's Report Salt Lake Exp., 409, pl. 4, figs. 1 and 2; and again (1858) in Iowa Geol. Report, I, part ii, 714.—Marcon (1858), Geol. N. Am., 52, pl. vi, figs. 9 a, b, c, d, e, f.

Athyris differentis, McChesney (1860), Descriptions New Palæozoic Fossils, 47.

Athyris subtilita, Davidson (1861), Brit. Carb. Brach., 86, pl. i, figs. 21–22, and pl. xvii, figs. 8–10.—Salter (1861), Quart. Jour. Geol. Soc., XVII, pl. iv, figs. 4 a, b.—Meek (1876), in Col. Simpson's Report Expl. across the Great Basin of Utah, 350, pl. 2, figs. 4 a, b.

Compare *Terebratula argentea*, Shephard (1838), Am. Jour. Sci. and Arts, XXXIV, 152, fig. 8; also, *Athyris subquadrata*, Hall (1858), Iowa Report, I, part ii, 703, pl. 27, figs. 2 a, b, c, d.

Of this very common species, there are in the collection from several localities in Nevada well-marked and characteristic examples, agreeing in all respects with those found in the Coal-Measures of the Mississippi Valley, from Kansas and Nebraska to Texas, as well as westward to New Mexico, and eastward to Ohio. If *Athyris subquadrata*, Hall, is really identical with this species, which it certainly *very* closely resembles, then it must be common both to the Upper and Lower Carboniferous in the West; but if that is a distinct species, *A. subtilita* would seem to be confined, so far as known, to the Coal-Measures in the Mississippi Valley; though the English specimens referred to *A. subtilita* by Mr. Davidson came from the Lower Carboniferous.

Mr. Salter identified with this species a South American shell from the Andes, and also a form described from there by d'Orbigny, and referred by him to *Athyris Roissyi*: and, from the figures given by these authors, as well

as from the other fossils found in the same beds, I can scarcely doubt that this South American shell is really identical with *A. subtilita*.*

Although the figure given in the Journal of Science by Shephard, of the shell described by him in 1838 under the name *Terebratula argentea*, does not resemble adult forms of *A. subtilita*, I have long suspected that it represents an immature example of this species, as no other similar form is known among all the numerous specimens from our western Coal-Measures. If it should be found to be the same, Shephard's specific name would have to stand, as it has priority of date.

Locality and position.—Ruby Group; Moleen Peak; near Humboldt River, and other Nevada localities, in a light-colored limestone.

Genus SPIRIFERINA, d'Orbigny.

SPIRIFERINA (undt. sp.).

Plate 8, figs. 5, 5 a, 5 b.

Compare *Spirifer octoplicatus*, Sowerby (1827), Min. Conch., V, 120, pl. 562, figs. 2, 3, and 4 (= *Spiriferina cristata* var. *octoplicata* of Davidson and others).

Shell rather small, very gibbous, about equivalve, subtrigonal or rhombic-subquadrangular in general outline; hinge-line apparently equaling the greatest breadth. Ventral valve most convex in the umbonal region; beak incurved and projecting backward; mesial sinus narrow, well defined, somewhat flattened, and, without costæ within, continued to the point of the beak, and having its anterior margin produced forward in the form of a somewhat angular projection fitting into a corresponding sinus in the margin of the other valve; lateral slopes with each five to six elevated, simple, narrowly-rounded, or subangular costæ of the same size as the deep depressions between; cardinal area of moderate height, with well-defined margins that slope from the beak apparently to the lateral extremities of the hinge, rather strongly arched, and inclined obliquely backward. Dorsal valve with a narrow, very prominent, subangular, simple mesial fold, most elevated at or near the front, but continued to the beak, and projecting forward so as to give a rather acutely angular character to the outline of anterior margin;

* Since this was written, Professor Derby, of Cornell University, has identified *A. subtilita* from Brazil (see Bull. Cornell University, I, No. 2, 7.)

beak rather distinctly incurved and but very little projecting; lateral slopes costate as in the other valve. Surface of both valves with a few rather strong zigzag marks of growth, most distinct near the deeply interlocking, angular serratures of the anterior lateral margins, showing very clearly, under a common single lens, the rather large punctures regularly arranged in quincunx.

Length, measuring from the most prominent part of the ventral umbo to the front of the mesial fold of the dorsal valve, 0.82 inch; breadth, about 0.93 inch; convexity, 0.68 inch.

This shell seems to be related to a common form in our western Coal-Measures, generally known in this country by Dr. Shumard's name *S. Kentuckensis* (but supposed by Mr. Davidson not to differ from *S. octoplicata* of Sowerby), though it is probably distinct from Dr. Shumard's species. Without more and better specimens for comparison, however, I scarcely feel warranted in regarding it as new. The only individual of it in the collection has the lateral extremities broken away, but it is evidently a larger and more robust and more gibbous shell than any specimens of the form described by Dr. Shumard that I have seen, and differs both from that and the European typical *S. octoplicata* in having its mesial fold *much* more elevated, and projecting forward so as to impart a very distinctly angular outline to the middle of the anterior margin. Should other specimens show these characters to be constant, I should think it entitled to a distinct name, either as a species or as a variety, and would in that case propose to call it *S. gonionota*, in allusion to its high angular mesial fold.

Locality and position.—Light-colored limestone of Carboniferous age at Railroad Cañon, Diamond Mountains, Nevada.

SPIRIFERINA PULCHRA, Meek.

Plate 8, figs. 11 *a, b, c, d, e*; and pl. 12, figs. 12, 12 *a, b, c, d* ?.

Spirifera pulchra, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 310; and (1876) in Col. Simpson's Report of Expl. across the Great Basin of Utah, 352, pl. 2, figs. 1 *a* and 1 *b*.

Spiriferina pulchra, Meek (1865), Palæont. Upper Missouri, 19.

Shell of about medium size, transverse, rather compressed, or sometimes gibbous; breadth from twice to about three times the length; lateral

extremities more or less acutely angular; valves nearly equally convex, the dorsal being generally most convex in front, and the ventral in the umbonal region. Dorsal valve with its beak not very prominent or strongly incurved in the type-specimens, in which the area is rather narrow, well defined, narrowed to the lateral extremities, and a little arched and inclined backward over the hinge; foramen triangular, slightly higher than wide, and provided with a distinct marginal furrow on each side; mesial sinus rather narrow, well defined, smoothly rounded within, and commencing at the apex of the beak, from which it widens and deepens gradually to the front; lateral slopes on each side of the sinus ornamented by from nine to twelve or thirteen simple, prominent, rather acutely-rounded costæ. Ventral valve with a narrow, well-developed cardinal area, which generally tapers to the hinge-line before reaching the lateral extremities, and, with the short beak, arches rather strongly inward; mesial elevation simple, narrow, rounded, and continued to the beak; lateral slopes with their simple costæ corresponding in number and arrangement to those of the other valve. Surface of both valves with small, somewhat obscure, subimbricating lines of growth, which are rather distinctly arched in crossing the costæ, fold and sinus, showing the punctate structure very clearly under a common single pocket-magnifier.

Length (of one of the more compressed specimens), 0.95 inch; breadth of the same, about 1.76 inches; convexity, 0.52 inch.

Most of the typical specimens of this species are rather compressed, and have the lateral extremities extended and acutely pointed. Other specimens, however, from the same rock at localities a little farther north, found associated with the same group of fossils, are more gibbous, and have slightly smaller and a little more crowded costæ, with a somewhat higher and more arched area and beak. As the latter, however, vary somewhat in these respects, and agree exactly in all other known characters with the more compressed typical examples, I have not been willing to separate them.

Although not unlike some of the described species of *Spirifer* (*Trigonotreta*), I am not acquainted with any described species of *Spiriferina* so near this as to render a comparison necessary. It certainly belongs to

the latter group, being beautifully punctate, as can be readily seen with a common single lens, the punctures being so large as even to give the whole surface of internal casts a beautiful granular appearance; while casts of the rostral cavity of the ventral valve show a deep mesial slit, left by a well-defined mesial septum, as seen in fig. 1 *c* of plate 8.

Locality and position.—The typical specimens were brought by Colonel Simpson from a locality in Nevada, at latitude 40° N., longitude $115^{\circ} 20'$ W.; the other more gibbous specimens in the collections under consideration came from White Pine County, twenty-five miles northeast of Hamilton, Ruby Group, Nevada: all from light-colored Carboniferous limestone.

A number of other specimens in the collection, from a light-grayish limestone at the mouth of Weber Cañon (see pl. 12, figs. 12, 12 *a*, 12 *b*, 12 *c*, 12 *d*), agree, so far as can be seen, in all respects with this species. Some of them are compressed like the typical specimens, while others are more gibbous, and agree exactly with those from the Ruby Group.

Genus SPIRIFER, Sowerby.

SPIRIFER CUSPIDATUS, Martin? (sp.).

Plate 3, figs. 11, 11 *a*.

Anomites cuspidatus, Martin (1796), Trans. Linn. Soc., IV, 44, pl. iii, figs. 1–6.

Conchylolithus (Anomites) cuspidatus, Martin (1809), Petref. Derb., I, 10, pl. 46, fig. 34, and pl. 47, fig. 5.

Spirifer cuspidatus, Sowerby (1816), Min. Conch., II, tab. 120, figs. 1–3; and of numerous later authors.

Delthyris cuspidatus, Keiferst. (1824), Naturges. des Erdk., II, 611.

Cyrtia simplex, McCoy (1844), Synop. Carb. Foss. Ireland (not of Phillips).

Cyrtia cuspidata, McCoy (1855), Brit. Pal. Foss., 466.

Of the form I have referred with doubt to the above-mentioned species, there is but one distorted specimen and a part of another in the collection. It seems to have had, before distortion, exactly the form, size, and surface-characters of a medium-sized individual of *S. cuspidatus*, excepting that its high area is arched a little backward, instead of being merely vertical or slightly arched forward, as seems to be generally the case with *S. cuspidatus*. As this, however, is doubtless a more or less variable character, unless known to be constant in a large number of specimens, and to be accom-

panied by some other differences, it would be unsafe to view our shell as belonging to a distinct species; though it is barely possible that it may prove to be such. One of the specimens shows that it has the transverse septum and the split tube between the dental laminæ, now known to exist in *S. cuspidatus*. I have not been able yet to see evidences of the shell being punctate, though I have not given it a thorough examination, and believe that it will be found to possess that character also.

Locality and position.—White Pine Mountains, Treasure Hill, Nevada; exact position not known, but it is believed to have come from a gray semi-crystalline limestone holding a position between well-marked Carboniferous and Devonian rocks, and probably belonging to the former epoch.

SPIRIFER (TRIGONOTRETA) OPIMUS, Hall ?.

Plate 9, fig. 6.

Spirifer opimus, Hall (1858), Geol. Report of Iowa, I, part ii, 711, pl. xxviii, figs. 1 *a*, *b*.
Spirifer subventricosus, McChesney (1860), Descriptions New Palæozoic Fossils, etc., 44; and Trans. Chicago Acad., I, pl. i, fig. 4.
 Compare *Spirifer bisulcatus*, Sowerby (1825), Min. Conch., V, 152, pl. 494, figs. 1 and 2; also *S. Rocky-montana*, Marcou (1858), N. Am. Geol., 50, pl. vii, figs. 4, 4 *a-e*; *S. Keokuk*, Hall, var. (1858), Iowa Report, I, pl. xx, and pl. xxv, and *S. increbescens*, Hall, ib., pl. xxvii, figs. 6 *a-i*; also *S. Keokuk*, var. *Shelbyensis*, Swallow (1867), Trans. St. Louis Acad., II.

Shell attaining nearly a medium size, moderately gibbous, subequivalve; hinge about equaling the greatest breadth; lateral extremities subrectangular, slightly rounded, or more or less than rectangular; front having a general subsemicircular outline, sometimes a little projecting in the middle. Ventral valve most convex in the umbonal region; beak rather pointed and distinctly incurved; area of moderate height, strongly striated vertically, and arched with the beak; mesial sinus narrow, rather shallow, and narrowing gradually to the apex of the beak, occupied by generally four costæ, a little smaller than those on each side, with which the lateral ones usually coalesce before reaching the umbo; lateral slopes each occupied by from eleven to thirteen, most generally simple, but sometimes in part bifurcating costæ, crossed on well-preserved specimens by moderately distinct, undulating marks of growth. Dorsal valve most convex near the middle; beak strongly incurved; mesial fold corresponding in size and form with

the sinus of the other valve, and, as well as the lateral margins, costated in the same way.

Length, 1 inch; breadth, about 1.30 inches.

I am not entirely satisfied that this shell is identical with *S. opimus*, Hall; though, so far as the specimens afford the means of comparison, it seems to present no constant essential differences. Professor Hall's figure in the Iowa report represents a short gibbous form of the shell with a rather high area; but collections from the Coal-Measures of the Western States show the shell to vary much in these characters. In fact, it is very questionable whether there are any reliable specific differences between *S. opimus* and *S. Keokuk* (including both Professor Hall's varieties of the latter) and *S. subventricosus*, McChesney. Again, some varieties of these shells *very* nearly resemble certain forms of *S. increbescens*, Hall; while several of the most distinguished European authorities consider the last-mentioned form itself identical with *S. bisulcatus*, Sowerby, an opinion in which I am much inclined to concur. It will also be noticed that our figure represents a shell almost exactly agreeing with some varieties of *S. bisulcatus*, as may be seen by comparing it with the variety of that species illustrated by fig. 8, plate vii, of Mr. Davidson's Monograph of British Carboniferous Brachipoda. *S. bisulcatus*, seems to be, from the published illustrations, a variable form; and, according to the limits assigned it by European authors, might, so far as can be determined from comparison of external characters, take in all of the proposed species and varieties mentioned above. Dr. White considers *S. opimus*, Hall, and *S. Rocky-montana*, Marcou, identical, which may or may not be so; but however this may be, there is about as good reason for viewing all of the shells here mentioned as varieties of *S. bisulcatus*, Sowerby.

As I have not the necessary specimens at hand to attempt the solution of the question in regard to the relations of these American forms to each other and to *S. bisulcatus*, I have merely referred our shell to *S. opimus*, Hall, provisionally, for the present.

Locality and position.—Six miles south of Promontory Station, Promontory Mountains, Railroad Cañon, Moleen Peak; Mount Nebo, in Utah, and at longitude $111^{\circ} 38' W.$, latitude $40^{\circ} 22' N.$; generally found in a

dark-colored limestone. There are specimens in the collection, however, from Fossil Hill, White Pine District, apparently belonging to this species, in a lighter-colored matrix. Everywhere in Carboniferous beds; and either the same or a closely-allied species occurs in the Coal-Measures of Illinois.

SPIRIFER (TRIGONOTRETA) SCOBINA, Meek.

Plate 9, figs. 1, 1 a, 1 b, 1 c, 1 d.

Spirifera scobina, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 310.

Spirifer (*Spiriferina*?) *scobina*, Meek (1876), in Col. Simpson's Report Expl. across the Great Basin of Utah, 351, pl. ii, figs. 5 a, b, c.

Shell attaining a moderately large size, truncato-subcircular, or approaching subpentagonal, rather gibbous, and more or less nearly equi-valve, with length and breadth scarcely differing; hinge-line about equaling, or a little less than the greatest breadth, and generally intersecting the lateral margins at rather obtuse angles; outline of front rounded, a little straightened, or probably sometimes slightly sinuous at the middle; lateral margins rounding to the front. Ventral valve generally a little more convex than the other; beak not very prominent, but strongly incurved; area well defined, of moderate breadth (height), and continued to the extremities of the hinge, more or less arched and directed a little obliquely backward; foramen wider than high; mesial sinus narrow and very shallow, but usually continued nearly to the beak, occupied at the front by about five smaller plications than those on the lateral slopes, the outer ones usually coalescing with the larger marginal one on each side before reaching the beak; lateral slopes each occupied by about eight rather depressed costæ, which are wider than the furrows between them, and sometimes, though rarely, bifurcate. Dorsal valve with beak strongly incurved; mesial fold scarcely defined, excepting at the front, where it is flat, and ornamented by about six much depressed costæ, which coalesce so as to reduce the number to three before reaching the beak; lateral slopes each occupied by about eight to ten rather broader, depressed, and sometimes bifurcating costæ, as in the other valve. Surface of both valves, when well preserved, showing very fine, obscure, crowded, and undulating striæ of growth, and everywhere covered with closely and very regularly arranged granules, not generally readily seen without the aid of a magnifier.

Length, 1.90 inches; breadth, 2 inches; convexity, 1.30 inches.

This fine species may be compared with *S. bisulcatus* of Sowerby, some varieties of which (especially those with broad depressed costæ) it more or less nearly resembles. It seems, however, to be always longer in proportion to breadth, and is much less variable in form. The most reliable difference observable, however, is the beautifully-granulated surface of our species. I know of no nearly similar American shell with which it is necessary to compare it.

Locality and position.—Light-colored Carboniferous limestone, at latitude 40° N., longitude 115° 20' W.; Colonel Simpson's collections.

SPIRIFER (TRIGONOTRETA) CAMERATUS, Morton.

Plate 9, figs. 2, 2 a.

Spirifer cameratus, Morton (1836), Am. Jour. Sci. and Arts, XXIX, 150, pl. 2, fig. 3.—Hall (1856), Pacific R. R. Report, III, 102, pl. 2, figs. 9, 12, and 13; and (1858) in Iowa Geological Report, I, part ii, 709, pl. xxviii, fig. 2.—Meek (1876), in Col. Simpson's Report Expl. across the Great Basin of Utah, 353, pl. ii, figs. 3 a, b.

Spirifer Meusebachanus, Roemer (1852), Kreid. von Texas, 88, pl. 11, figs. 7 a, b, c.

Spirifer triplicatus, Hall (1852), Stansbury's Report of Salt Lake Expl. Expedition, 410, pl. 2, fig. 5 (by error pl. 4).

? *Spirifer fasciger*, Owen (1852), Report Wisconsin Iowa and Minnesota, pl. 5, fig. 4 (Keyserling? (1846).)

Spirifer striatus var. *triplicatus*, Marcon (1858), Geol. N. Am., 49, pl. vii, fig. 3.

Spirifer cameratus var. *Kansasensis*, Swallow (1867), Trans. Saint Louis Acad. Sci., II.

? *Spirifera camerata*, Derby (1874), Bull. Cornell Univ., I, No. ii, 13, pl. i, figs. 1-9, and 14.

The specimens that I have referred to this common species are all more or less broken or distorted; but, so far as their characters can be made out, they seem to agree so nearly with characteristic examples of Morton's species from the Coal-Measures of the Mississippi Valley, that I have scarcely any doubts of their identity. They all have the peculiar fasciculated character of the costæ, so characteristic of *S. cameratus*, more or less marked, while in some of them it is well defined. They seem to have the mesial fold somewhat less prominent, and the lateral slopes less compressed than we usually see in *S. cameratus*; but these are more or less variable characters in that species.

Locality and position.—Light-colored Carboniferous limestone, at Fos-

sil Hill, White Pine District; also from same in the Ruby Group, Nevada. Colonel Simpson likewise brought specimens of it from latitude $39^{\circ} 33' N$, longitude $115^{\circ} 12' W.$, where it seems to be quite abundant in the same limestone.

LAMELLIBRANCHIATA.

PTERIIDÆ.

? Genus POSIDONOMYA, Bronn.

POSIDONOMYA ? FRAGOSA, Meek.

Plate 3, figs. 8, 8 a.

Shell subovate, compressed, more or less oblique, very thin and fragile; hinge short and apparently varying much in its obliquity to the longer axis of the valves; beaks apparently nearly terminal; posterior basal margin rounded. Surface with irregular concentric undulations and striæ, usually most distinct on the central region, where they are often crossed by faintly-defined radiating costæ, which sometimes extend nearly to the posterior basal margin.

Length of one of the largest specimens seen, measuring obliquely in the direction of the longer axis of the valves, 1.1⁰ inches; breadth at right angles to the same, about 0.80 inch.

As the specimens of this shell in the collection (or at least all that remains of the shell) are extremely thin and fragile, and flattened between the laminæ of the shale, as well as otherwise distorted, it is quite probable that it may be found necessary to modify some of the characters given in the above diagnosis of the species. Until better specimens can be obtained for examination, its generic affinities must also remain doubtful, though I am inclined to think it belongs to some genus at least allied to *Posidonomya* of Bronn, and including a species I have described from the Coal-Measures of Ohio under the name *Posidonomya fracta*; which latter also occurs in the Coal-Measures of Illinois.

[As these pages are going through the press, I observe that Professor Hall and Mr. Whitfield, who have prepared a supplementary report on Mr. King's later collections, have referred this shell to *Lunulicardium* of Münster (see Am. Jour. Sci. and Arts, vol. XI, p. 479, where the name is,

by a typographical error, printed *Linulicardia*). As stated in the foregoing remarks, the specimens examined by me are flattened between the laminae of shale, and therefore in a very unfavorable condition for satisfactory generic determination. I have not seen them since writing the foregoing description, six years back; and the old work in which Münster described the genus *Lunulicardium* is one of the very few publications of the kind that I have never yet been able to consult. If I am correctly informed, the hinge of *Lunulicardium* is unknown, and it is very improbable that any specimens of the shell here under consideration showing the hinge have yet been found. From the impressions of its general physiognomy, however, left on my mind, it would seem to differ much from the general external characters of *Lunulicardium excrescens*, Münster, which is the species generally figured as an illustrative example of the genus. That it is certainly a *Posidonomya*, however, I have never asserted.]

Locality and position.—White Pine Mountains near Hamilton, Nevada; from a black laminated shale of Devonian or Carboniferous age.

Genus AVICULOPECTEN, McCoy.

AVICULOPECTEN CATACTUS, Meek.

Plate 3, figs. 10, 10 a (and 10 b ?).

Shell rather under medium size, much compressed, very thin and having scarcely any degree of obliquity—exclusive of the ears, subovate in outline; hinge-margin less than the greatest breadth; posterior and anterior margins rounding into the regularly-rounded base. Left valve compressed-convex; ears nearly flat; the posterior one not distinctly separated from the swell of the umbo, about as long as the margin below, from which it is separated by a broad, more or less rounded, moderately deep sinus, which imparts a rather acute angularity to its posterior extremity; anterior ear a little declining, with its anterior margin slightly convex in outline, but terminating nearly in a right angle above, and defined below by a rather shallow, obtusely angular sinus; beak slightly nearer the anterior side, projecting a little above the hinge, and incurved, but not oblique. Right valve nearly flat, and having the same general outline as the other, excepting that its beak is much less distinct from the hinge-margin, and the sinus

under the anterior ear is very deep, sharply defined, narrow, and directed obliquely backward toward the beak. Surface of left valve ornamented by small, generally simple, depressed, radiating costæ, between each two of which there is one, or on some parts two or three, smaller linear ribs, that usually die out before reaching the beaks; while small concentric wrinkles are also usually more or less defined on the body-portion of the valve, so as to impart a faintly tubercular appearance to the costæ at the points where they cross; radiating costæ on the ears, merely small raised lines, rather distantly separated, and crossed at regular intervals by little sharply-elevated lines, parallel to the free borders, so as to produce a more or less cancellated style of ornamentation. Surface of right valve (fig. 10 *b*) with radiating costæ (excepting one separating the posterior ear from the body of the valve, and those on the anterior ear, which are larger than the others) all small, and of nearly uniform size. Lines of growth very minute and obscure on both valves; though the right valve has some strong concentric furrows.

Height of one of the largest specimens, 0.88 inch; breadth of the same, 0.89 inch; length of hinge-line, 0.64 inch.

This species is evidently allied to *Aviculopecten occidentalis* (= *Pecten occidentalis*, Shumard, = *P. Cleavelandicus*, Swallow), a very common and widely-distributed species in the Coal-Measures of the Mississippi Valley. It is a much thinner and more compressed shell, however, and always without any traces of the subimbricating concentric lamellæ of growth, generally seen on well-preserved left valves of that species, and sometimes even rising as little vaulted scales on the costæ, especially on those of the anterior ear and near it. From *A. Lyelli* of Dawson, described from the Lower Carboniferous rocks of Nova Scotia (which I am much inclined to think not distinct from *A. occidentalis*, Shumard), it differs in the same characters distinguishing it from the latter. Compared with *A. rectilaterarius* of Cox (sp.), it will be seen to differ not only in its deeply sinuous posterior margin, and the consequent acutely angular character of its posterior ear, but in having two sets of costæ; that is, a larger and a smaller set, generally alternating. It is probably most nearly allied to *A. Coxanus*, Meek and Worthen, from the Coal-Measures of Illinois; with which

it agrees in its extreme thinness as well as in general appearance. It, however, attains a larger size, and has proportionally larger costæ; while its surface does not show, under a magnifier, the fine, regular, and distinct striæ of growth seen on that species.

Among foreign species, it seems to be most nearly represented by *Aviculopecten papyraceus*, Sowerby (sp.); which, however, is a much larger, more oblique shell, with very differently formed ears, as illustrated by Sowerby. In the form of its posterior ear, as well as in some other characters, it agrees more nearly with a shell from the Coal-Measures of Belgium, figured by Professor De Koninck (An. Fos. Belg., plate v, figs. 6 *a*, *b*), and by him referred to *A. papyraceus*, Sowerby; though it differs materially in other respects. If the figures published by Sowerby and De Koninck, of the forms illustrated by them under the name *Avicula papyracea*, are exactly correct, I should think they represent two distinct species. At least, none of our analogous species in this country present, among hundreds of individuals, such marked differences as are seen between their published figures.

Locality and position.—From a black bituminous shale at Hamilton, White Pine Mountains, Nevada; of Devonian or Carboniferous age.

AVICULOPECTEN UTAHENSIS, Meek.

Plate 9, figs. 7, 7 *a*, 7 *b* (and 7 *c*, *d*?).

Pecten Utahensis, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 310.

Aviculopecten Utahensis, Meek (1876), in Col. Simpson's Report Expl. across the Great Basin of Utah, 354, pl. i, figs. 9 *a*, 9 *b*.

Shell of about medium size, suborbicular, compressed, thin, not oblique; hinge-line straight, equaling about one-half to two-thirds the antero-posterior diameter of the valves; pallial margin regularly rounded. Left valve compressed, or moderately convex; ears rather small, flattened so as to be more or less distinct from the slight convexity of the umbo, each separated from the margin by a shallow, obtusely angular notch, of which the one under the anterior ear is rather more distinctly defined; anterior ear nearly rectangular at the extremity, with a slightly convex anterior margin; posterior ear generally more obliquely truncated; beak small, rather compressed, not projecting above the hinge, and placed at or slightly in advance of the middle of the cardinal margin, with its lateral slopes diverging at an

angle of about 95° ; surface ornamented by rather obscure, unequal, radiating costæ, and numerous, very regular, extremely fine, concentric striæ, scarcely visible without the aid of a magnifier; costæ not defined on the ears, or usually on the adjacent lateral margins, and most frequently arranged with from one to three smaller ones between each two of the largest, the middle one of the three smaller being sometimes a little larger than the smallest one on each side. Right valve as convex as the other, or sometimes more compressed, but without traces of radiating costæ or striæ; ears of the same size, and nearly of the same form as in the other valve, excepting that the anterior one is defined by a deeper marginal notch.

Length, or antero-posterior diameter of a large specimen, 1.70 inches; height of the same, 1.73 inches; convexity of left valve, 0.25 inch.

I am not *positively* sure that the two valves described above belong to the same species, not having seen them in any instance united. The fact, however, that they occur together in the same matrix, and have the same form, and do not differ very greatly in size, while the smooth specimens are all right valves, and the costated ones left valves, leaves little room for doubting that they are the opposite valves of the same species. The most obvious characters of this shell are its nearly circular form, subequal ears, and the very fine, regular, concentric striæ, and unequal radiating costæ of its left valve. I know of no other species nearly enough allied to render a comparison necessary.

The form to which the costate valves belong may be considered the type of the species, in case the smooth valves should prove to belong to a different shell.

Locality and position.—In light-colored Carboniferous limestone, at latitude $39^{\circ} 33' N.$, longitude $115^{\circ} 12' W.$; Colonel Simpson's collection.

AVICULOPECTEN OCCIDANEUS, Meek.

Plate 12, figs. 13, 13 a, 13 b.

Shell small, usually very little oblique, broad ovate-suborbicular in outline exclusive of the ears; hinge shorter than the antero-posterior diameter; pallial margin more or less regularly rounded, but generally a little more prominent behind the middle than before. Left valve moderately convex;

beak pointed, convex, nearly central, projecting slightly beyond the hinge-margin, and somewhat incurved; ears nearly equal, compressed; the anterior one, which is nearly rectangular at the extremity, generally separated from the swell of the umbo by a broad, rather deeper concavity, which is continued to the margin, to which it imparts a slight sinuosity under the ear; posterior ear a little larger than the other, but not extending back as far as the margin of the valve below, in some examples apparently less than rectangular at the extremity, and in others more, in consequence of the more or less sinuous character of the margin. Surface ornamented by small, raised, simple, radiating costæ, or striæ, about every fourth to every seventh one of which (especially on the body-part) is a little larger and more prominent than the others; while those on the ears, particularly on the anterior one, are all smaller, though they are generally well defined on both ears; a few very small, irregular, concentric marks of growth may also sometimes be seen crossing the surface of the body-part of the valve. Right valve not certainly known.

Height of one of the medium-sized specimens of a left valve, 0.44 inch; breadth, 0.37 inch; convexity, 0.10 inch.

I am not sure that I have seen any right valves of this species. There are among the specimens some imperfect examples that would seem, from the direction of the very slight obliquity, to be right valves. But owing to the fact that they are generally quite as convex as others that are certainly left valves, and have exactly the same surface-markings, while the ears, as nearly as their form can be made out, would also indicate that they are left valves somewhat distorted so as to change their slight obliquity, I am led to regard them as such. The most characteristic features of the species are its rather small size, nearly equal ears, and small radiating costæ, always increasing by intercalation, with every fourth, fifth, sixth, or seventh one on the body of the valves (at least the left one) a little larger and more prominent than the others.

The reason why this and some other Carboniferous and possibly some Jurassic forms are figured together on the lower half of plate 12 is elsewhere explained. (See note on explanations of plate 12.)

Locality and position.—Weber Cañon, Wasatch Range; Upper Coal-Measure limestone.

CEPHALOPODA.

GONIATITIDÆ.

Genus GONIATITES, De Haan.

GONIATITES GONIOLOBUS, Meek.

Plate 9, figs. 5, 5 a, 5 b.

Shell distinctly discoid, with (in internal casts) a narrowly-rounded periphery; volutions compressed laterally, with slightly convex sides, the greatest convexity being a little within the middle; about twice as wide in the dorso-ventral diameter as at right angles to the same; each turn embracing all the others, so as to leave only a very small umbilicus, showing none of the inner volutions. Septa closely and very regularly arranged, but nowhere in contact or lapping upon each other; siphonal lobe (generally called the dorsal lobe) very large, and profoundly divided into two large, elongated, acutely-pointed terminal branches, which lap so far over each side of the volutions as to appear each like a large lateral lobe; while between these there is a third minute central projection; first lateral sinus very deep, elongate-conical, very acutely angular at the extremity, and arched or obliquely curved toward the umbilical side; second lateral lobe of much the same form as the divisions of the siphonal lobe, but a little shorter; second lateral sinus wider than the lateral lobe, but more shallow, and merely forming a broad forward arch to the umbilicus. Surface of internal cast without nodes, costæ, or angles.

Greatest diameter of a specimen, with the body-chamber broken away, 3.07 inches; convexity, 0.87 inch; breadth of outer volution, measuring in the direction of the plane of the shell, 1.72 inches.

Excepting in being more compressed, with a more narrowly rounded periphery, this species has much the general appearance externally of *G. rotatorius*, De Koninck. Its septa are more closely approximated, however, and differ remarkably in having the siphonal lobe so enormously developed, and so wide and deeply divided as to lap over on the sides far enough to cause its large, acutely-pointed terminal branch on each side, to appear, in a side-view, like a first lateral lobe; while the first lateral lobe is thus, as it were, crowded much farther inward, and appears like a second lateral lobe.

From this structure, each side of the fossil looks very much as if there were two large, sharply-angular lateral lobes, where there is really only one.*

The only specimen of this species I have seen belongs to the Museum of the General Land-Office at Washington. It is an internal cast, composed of a deep brownish-red oxyd of iron, but shows all the characters of the species, excepting the surface-markings (if there were any), very clearly.

Locality and position.—It is only known that the specimen came from New Mexico. From its affinities, it would seem to be of Carboniferous age.

UPPER TRIASSIC SPECIES.

MOLLUSCA.

BRACHIOPODA.

DISCINIDÆ.

Genus DISCINA, Lamarck.

DISCINA, sp. undetermined.

Plate 10, figs. 3, 3a.

I only know this shell from two specimens of the under valve, and these show only the inner side. They have a subcircular or broad subovate outline, being slightly narrower posteriorly than in front. The anterior

* The contrast in the structure of the septa of the typical *Goniatites*, such as *G. sphaericus*, De Haan, and the species here described, with their deep, acutely angular lateral lobes, and those older species, such as *G. expansus* or *Marsellensis*, Vanuxem, with the septa making merely a broad backward curve across each side, without any lateral lobes, is very striking. It may therefore be convenient to separate these more simple types (the *Nautilini* of authors) as a distinct subgenus on this structure of the septa and other characters. I would therefore propose for this group the subgeneric name *Agoniatites*, with *Goniatites* [*Agoniatites*] *expansus*, or *Marsellensis*, of Vanuxem, as the type. It is probable, however, that there are, among the known species with this simple structure of the septa, forms that might be properly separated from the group including *G. expansus* on other characters, as that species presents some striking peculiarities in its development, the young having its periphery rounded with a double groove and a ridge between, and the sides marked with arching undulations, while in the adult, the undulations become obsolete, and the periphery flattened, with distinct angles. *G. Bohemicus* of Barrande belongs to this group.

central region is concave on the inside, and the posterior convex and pierced by the fissure, which is rather short, with its inner end about equidistant from the posterior margin and from the middle of the valve; though its inner end terminates at the center of growth, as may be seen by the concentric arrangement of the fine obscure striæ of growth observable on the interior.

Antero-posterior diameter, 0.62 inch; breadth, 0.58 inch.

The species of this genus are so difficult to distinguish without a good series of specimens, that I have been unable to satisfy myself that this is new, or to identify it with any known species, and therefore merely give a figure of it, as one of the forms found in the rocks at the locality mentioned below. If new, however, it may be called *D. Utahensis*.

Locality and position.—Weber Cañon, Wasatch Range; Triassic.

LAMELLIBRANCHIATA.

PTERIIDÆ.

Genus HALOBIA, Bronn.

HALOBIA (DAONELLA) LOMMELI, Wissmann.

Plate 10, fig 5.

- Halobia Lommeli*, Wissmann (1841), Beitr. Petref., IV. Heft, 22, tab. 16, fig. 11.—
 Horness (1855), Dansk. Kais. Akad. Wissensch., IX, 52, taf. ii, fig. 17.—
 Zittel, Fossile Moll. und Echinodermen aus Neu-Seeland, 27, taf. vi, figs.
 1 a, b, c.—Stoliczka (1866), Mem. Geol. Survey India, V, 44.
Avicula pectiniformis, Catullo (1847), Prodr. Pal. Alpi Ven., 73, pl. i, figs. 1, 2, 3.
Posidonomya Lommeli, d'Orbigny (1849), Prodr. de Paléont. Stratigr. Univ., I, 201.
 ? *Halobia ? dubia*, Gabb (1864), Geol. Survey California, I (Palæont.), 30, pl. 5, figs.
 28 a, b.
Daonella dubia, Mojsisovics (1874), Ueber die Trasch. Pelicyp.-Gatt. Daonella und
Halobia, 22.

Shell truncato-subcircular, very much compressed, and very slightly oblique, nearly or quite equivalve, and but slightly inequilateral, the anterior side being a little shorter than the other; hinge somewhat shorter than the valves; anterior and posterior margins intersecting the hinge at obtuse angles, the latter more obliquely than the other, both rounding into the more or less regularly rounded base; posterior basal margin more prominent than the anterior; beaks very small and inconspicuous, with their

small abruptly-pointed apices scarcely projecting above the hinge and turned slightly forward. Surface marked off, as it were, into more or less wide, irregular, flat radiating costæ, by much narrower or merely linear furrows, the ribs themselves being sometimes also more or less subdivided by much finer furrows; ribs often obsolete near the hinge, both before and behind the beaks, but sometimes one or both of these spaces are occupied by fine irregular costæ; a few very faint concentric marks of growth also usually occur near the beaks.

Length of large specimens, apparently about 2.30 inches; height, about 1.60 inches.

Although this shell seems to have been quite abundant, none of the specimens contained in the collection show the entire outline, though its general form can be pretty nearly inferred from the faint undulations of growth. It is possible that a comparison of specimens might show this shell to be distinct, but I have been unable to find any greater differences, even in the most unimportant details, between these specimens and the figures of the European form, than I observe among the specimens themselves, and between the figures of *H. Lommeli*, published by different authors.

I see Professor Mojsisovics refers *Halobia Lommeli* of Wissmann, and *H. dubia*, Gabb, to his newly-proposed genus *Daonella*. I am not very well acquainted with the type-species of Bronn's genus *Halobia*; his figured specimen, as well as those illustrated by Professor Mojsisovics, being quite imperfect. If I can be permitted to judge, however, from the figures of several other species referred to *Halobia* and *Daonella* by Professor Mojsisovics, there would seem to be such a series of intermediate gradations between these two groups as to leave the impression that they are hardly more than subgenerically distinct, if even that. The only difference seems to be that in the typical species of *Daonella* (*D. Moussoni*) the lateral margins round into the straight dorsal border, while in the species referred by Professor Mojsisovics to *Halobia*, they meet the straight dorsal edge at more or less obtuse angles; and on the anterior side the cardinal margin is compressed, or has an oblique furrow, indicating a slight tendency to form an obscure anterior auricle, defined by the faintest possible indication of a marginal sinus. With these exceptions, the diagnoses of the two groups are precisely the same.

Locality and position.—West of New Pass Mines, Desatoya Mountains, Cottonwood Cañon, West Humboldt Range, Nevada.

LUCINIDÆ.

Genus SPHÆRA, Sowerby.

SPHÆRA WHITNEYI, Meek.

Plate 10, figs. 4, 4 *a*, 4 *b*, 4 *c*.

Shell subcircular, almost exactly equilateral, rather convex, basal, anterior, and posterior margins forming together a regular semicircular curve; dorsal margin somewhat straightened and nearly horizontal, or apparently sometimes sloping slightly from the beaks, rounding rather abruptly into the anterior and less distinctly so into the posterior margins; beaks rather depressed, or moderately prominent, obtuse, nearly central, and without visible general obliquity, but with the incurved immediate points directed a little obliquely forward; surface only showing obscure lines of growth.

Length of largest specimen seen, 1.65 inches; height, 1.54 inches; convexity, 0.86 inch.

None of the specimens of this shell give any clew to the nature of its hinge or interior; but, from its general external characters, I am led to refer it to *Sphæra*, though I am aware that it might, so far as can be seen, with almost equal propriety be referred to *Unicardium*, or any one of several other genera. Some varieties of it resemble *Lucina anceps* of Laube (see Fauna der Sch. von St. Cassian, taf. xv, figs. 4, 4 *a*); but it is evidently not a *Lucina*. It also differs in attaining a much larger size, and in wanting the peculiar sinuous character of the anterior ventral margin, so distinctly marked in Laube's shell.

It is possible that our largest specimen represented by fig. 4 *c* may be a distinct species from the smaller typical forms represented by figs. 4 and 4 *a*.

Locality and position.—Buena Vista Cañon, West Humboldt Range, Nevada; Upper Trias.

MYTILIDÆ.

? Genus MODIOMORPHA, H. & W.

MODIOMORPHA ? OVATA, Meek.

Plate 10, figs. 1 and 1 a.

Shell obliquely ovate, much compressed; posterior side wider than the anterior, and broadly rounded in outline; anterior margin narrowly rounded above and sloping backward below; base prominently rounded behind the middle, rounding regularly into the posterior outline, and sloping up anteriorly from behind the middle, with some appearance of being slightly gaping in advance of the middle; cardinal border shorter than the valves, and passing, by more or less gradual curves, into the anterior and posterior margins, ranging obliquely to the longer axis of the shell; beaks depressed nearly upon a line with the hinge-margin before and behind them, compressed and located about one-third the length of the valves from the anterior extremity. Surface showing only moderately distinct concentric lines, with sometimes very obscure undulations of growth. (Hinge and interior unknown.)

The specimens of this shell in the collection are all right valves, and have the anterior ventral margin bent inward a little, so that if the other valve presented the same character the lower margin, somewhat in front of the middle, must have been more or less gaping. Without seeing its hinge and interior, we can only guess at its affinities. In general appearance, it reminds one of some of the broad compressed species of *Modiolopsis* from the Silurian; but it is apparently as nearly like some of the species included in the new Devonian and Carboniferous genus *Modiomorpha*. That it really belongs to either of these genera, however, is at least improbable, and the chances are in favor of the conclusion that it will be found to belong to an undescribed genus. If so, I would propose for it the name *Modiolina*.

Locality and position.—North fork of Buena Vista Cañon, West Humboldt Range; Upper Trias.

MODIOMORPHA ? LATA, Meek.

Plate 10, fig. 2.

Shell transversely ovate, moderately convex in the central and umbonal regions, and compressed behind; posterior side distinctly wider than the

anterior, rather broadly and regularly rounded in outline; base semi-ovate, being more prominent behind, where it rounds up regularly into the posterior margin, while it is somewhat straightened and sloping up gradually forward; anterior end short, and truncated a little obliquely forward above from the beaks to the anterior basal extremity, which is abruptly rounded or subangular in outline; hinge-margin straight, about half as long as the shell, and rounding into the posterior margin behind, but not extending forward beyond the beaks, which are slightly tumid, obtuse, depressed, and located only about one-fifth the length of the shell from the anterior extremity. Surface showing obscure lines of growth. (Hinge and anterior unknown.)

Length, 1.30 inches; height, 0.95 inch; convexity (of left valve only), 0.20 inch.

Judging from external appearances only, this shell seems to be congeneric with the last; but, as nothing is known of the nature of its hinge and internal characters, I am equally in the dark in regard to its affinities. As it resembles some of the forms included in the genera *Modiomorpha*, I have referred it provisionally to that group, until its generic characters can be determined. It is a more convex shell than the last, and also differs in having its anterior end obliquely truncated above, instead of being extended, rounded, and compressed in front of the beaks.

Locality and position.—Same as last.

CEPHALOPODA.

ORTHOCERATITIDÆ.

Genus ORTHOCERAS, Auct.

ORTHOCERAS BLAKEI, Gabb ?.

Plate 10, fig. 11.

Orthoceras Blakei, Gabb (1864), Geol. Survey of California, I (Palæont.), 19, fig. 1.

The specimens here referred doubtfully to the above species consist merely of two fragments, one of which seems to have belonged toward the posterior part of the shell, though not showing the septa, and the other is a part of the body-chamber. The first is gradually tapering, with a circular

section, and the other seems to have been almost exactly cylindrical, and is somewhat compressed, though evidently by accidental pressure. It also shows some appearances of a slight constriction at the aperture, and has, in the cast, a raised line along the ventral side, as we often see in palæozoic species. As there are no appearances of septa, I have sometimes suspected that it may possibly be the cast of a Belemnite; but it seems not to be.

Not having had an opportunity to compare good specimens of *O. Blakei* with European species from the same horizon, I have formed no opinion in regard to its relations to the latter, and merely refer the form under consideration doubtfully to Mr. Gabb's species, because it came from the same region and the same geological position; while the specimens present no characters inconsistent with the conclusion that they belong to the species described by Mr. Gabb.

Locality and position.—Ridge above Cottonwood Cañon, West Humboldt Range; Upper Trias.

AMMONITOID FORMS OF THE UPPER TRIAS OF NEVADA.

In examining the shells of the above-mentioned types, in Mr. King's collection from the Upper Trias, or possibly in part from the Lower Lias of Nevada, it soon became evident that none of them would fall properly into the genus *Ammonites* as the latest methods of classification will require that group to be restricted. It was also equally manifest that the same principles of generic limitation would require the establishment of new genera for the reception of some of the species. Having neither the necessary material at hand, nor the time nor inclination, merely for the classification of a few species, to enter upon the study and revision of the whole group of Triassic and Liassic Ammonitoid types, I proposed, after separating and writing out full descriptions of the species, to send the specimens to Professor Hyatt (who has long made an especial study of these older forms of this great group of extinct Molluscs), with the view of having them compared with the splendid series of European forms in the Cambridge Museum of Comparative Zoölogy; the understanding being that he should name and describe the new genera, and that I should describe the species and refer

them to the same. To this Professor Hyatt kindly assented, and I now give his descriptions of the new genera, and remarks on some of the species; placing his initials (A. H.), wherever quotations are made from his manuscript.

I should remark, however, that I had already identified among the specimens, the following genera, viz., *Trachyceras*, *Clydonites*, and *Arcestes*, and referred the species to forms figured and described by Mr. Gabb in the Palæontology of California, ranging them under the above-mentioned genera.

It would be superfluous for me to attempt the expression here of any opinion of my own in regard to the propriety of the subdivision of the old genus *Ammonites* into such a great number of genera, and even families, as is done in the new classifications, since I have never made an especial study of this extensive group of shells with the view of forming an opinion on this point. I can therefore only say that Professor Hyatt's conclusions have not been lightly adopted; but that he has, on the contrary, devoted much time and patient research to the study of one of the most extensive and complete collections of this group of shells in the world.

It may be proper for me to explain here some differences of terminology that will be observed in Professor Hyatt's and my own descriptions and remarks. For instance, he very properly describes the external margin, or outer side of the volutions in the Ammonitoid types, as the *abdomen*, and the inner as the *dorsum*; while I have used the term *periphery* for the former, and *umbilical* or *inner side* for the latter. His method has the advantage of properly expressing the true relations of the animal and its shell; though I have rather preferred the terms I have used, because they avoid the perplexing confusion of ideas liable to arise in the minds of those who have become familiar with the (until recently) prevalent method of describing the outer side as the *dorsal*, and the inner as the *ventral*, as we see in nearly all the published works on such shells. Again, in the same way, he terms the outer lobe of each septum the *abdominal lobe*; while I have for the same used the term *siphonal lobe*, already in use by some European authors. The lateral lobes and intervening sinuses of the septa I have merely numbered consecutively *first*, *second*, *third*, and so on, from the outer one inward, instead of using

von Buch's terms *superior-lateral*, *lateral*, *inferior-lateral*, and *auxiliary lobes* and *saddles*. The former method seems to me more simple, and enables one to refer very precisely and directly to any particular lobe or sinus, whether there be few or many. For the ridges crossing the volutions, Professor Hyatt uses the term *pilæ*; while I have used for the same the old term *costæ*.

I am not, however, objecting to Professor Hyatt's terminology, which is very good, but merely explaining the different terms we have here and elsewhere used for the same parts of the shell.

"CLYDONITIDÆ.*

"Genus COROCERAS, Hyatt.

"(κρόρυς, a helmet; κέρας, a horn.)

"*Ammonites*, *Goniatites*, *Aganides*, &c. (sp.), of several authors, but not as those genera are now restricted.

"*Clydonites* (pars), Hauer (1860), Sitzungsab. der Kais. Akad. Wiss., XLI, 122.—Laube (1869), Fauna St. Cass., 14.

"This genus comprises the following species, viz., *Clydonites delphinocephalus*, *C. ellipticus*, Hauer, and *C. nautilinus* and *C. monilis*, Laube; the latter being viewed as the type. These species all have numerous lobes and cells, with smooth sutures, and a large abdominal lobe; the latter being very broad and prominent. They are pileately ribbed and very involute; the umbilicus nearly covered. The mouth is more or less hooded or constricted. These are the only members of the group that can be satisfactorily characterized. The remaining species originally included in *Clydonites* are very distinct from the typical forms and from each other, and may be arranged into the following groups:

"1.—*Clydonites geniculatus*, *C. glaucus*, and *C. Eryx*, Hauer, with *C. Wissmanni*, of the same author.

"These have a similarly short clumpy abdominal lobe, with a minute siphonal cell; but otherwise they are entirely different. The whorls of the first, however, are short, with gibbous sides, subangular at the edge of the abdomen; the second, high and crowded. Those of *C. glacialis*, on the

* Professor Hyatt proposes this new family for the reception of his above described genus *Coroceras* and *Clydonites*, Hauer, with probably other genera not contained in the Nevada collections. In the same way he proposes other new families farther on.

other hand, are very flat and compressed. The lateral lobes and cells would pass for those of a typical *Clydonites*; but the latter are larger and more numerous. In both, however, the superior lateral lobes are the deepest.

“2.—*Clydonites quadrangularis* and *C. costatus*, Hauer.

“These have septa quite similar, but there is no agreement of form, the former having involuted, squarely-shaped, rapidly-increasing whorls, and the latter abdominally-depressed, non-involute, gibbous-sided, keeled whorls.

“3.—*Clydonites spinescens* and *C. armatus*, Hauer.

“These are very distinct species, the septa differing considerably, and the forms and pilæ more.

“4.—*Clydonites decoratus*, Hauer, the first species mentioned by him, and here viewed as the type of that genus, is decidedly unique in the group; the rows of tubercles on the abdomen are exceptional, although the septa, if correctly drawn, are similar to those of *C. spinescens*.

“5.—*Clydonites Fresei*, Laube, has very singular septa, quite similar to those of *Ammonites Klipteinianus*. The smoothness, stoutness, and involution of the whorls, however, in the latter are very different from the pileated non-involute whorls of the former.

“The want of proper classification and arrangement which is thus shown to exist in this natural series was very plainly perceived by its describer, who asserts that it contains different types, and is capable of division into different families.

“The confusion introduced into nomenclature of the Ammonites by von Buch, who, as a geologist, did not recognize the necessity of giving a fixed value to the names of groups, is here repeated; and the *families* are considered less comprehensive than the *genera*.

“So little is known of the septa of the American specimens that their place among the *Clydonitidæ* appears to be doubtful, though the few lateral lobes figured in the California Geological Report seem to show that they belong to this division.”—(A. H.)

Genus CLYDONITES, Hauer.

CLYDONITES LÆVIDORSATUS, Hauer (sp.).

Plate 10, fig. 7.

Ammonites lævidorsatus, Hauer (1860), Sitzungsab. K. Akad. Wien, pl. 3, figs. 9 and 10 b.
Goniatites lævidorsatus, Gabb (1864), Geol. Survey of California (Palæont.), I, 21, pl. 3, figs. 6, 7.

Shell compressed-discoidal, with a very wide, exceedingly shallow umbilicus; periphery more or less narrowly rounded; volutions numerous, very slender, increasing very gradually in size, and each one enveloping about one-third to one-half of the next within; aperture as determined by sections of the volutions, emarginate-subelliptic, being more or less emarginated on the inner side for the reception of the outer side of the next turn within. Surface nearly smooth, or only obscurely ribbed in some specimens, but more generally ornamented with rather strong, regular costæ on each side, that usually curve rather strongly forward as they approach the periphery, upon which they become obsolete.

Greatest diameter of one of the largest specimens, 2.70 inches; convexity, about 0.60 inch.

I have seen no specimens of this species showing either the siphuncle or the septa, and it seems that none of those seen by Professor Hauer were in a condition to show the nature of the septa. Mr. Gabb, however, describes them as being each "composed of a dorsal and two lateral lobes, which, with the saddles, are all nearly rounded undulations". From this character of the septa and the general form of the shell, taken in connection with the age of the formation in which it occurs, it is far more probable that the "gullet" of its siphuncle will be found to agree with that of Professor Hauer's genus *Clydonites* than with that of *Goniatites*.

As remarked by Mr. Gabb, this shell varies considerably in its surface-characters, some individuals being nearly smooth, while others have the costæ of the sides well developed. There are also some differences in the size and the arrangement of the costæ, which are sometimes proportionally wider and more widely separated than in other examples, while the periphery is more narrowly rounded in some individuals than in others.

I have had no opportunity to compare this shell with typical foreign

examples of the species *C. lævidorsatus*, but merely follow Mr. Gabb in referring it to that form from the general resemblance to Professor Hauer's figures.

After I had written the above, and referred this species to *C. lævidorsatus*, Hauer, Professor Hyatt sent me the following remarks in regard to this species, which are worthy of quotation here, because they were drawn up by him after making direct comparison with authentic European specimens of Dr. Hauer's species:

"Gabb's figures and descriptions agree well with the Nevada specimens in the collection, and his figure of the septa shows that the species probably belongs to *Clydonites*. The agreement with Hauer's figure is not so exact on account of the want of due exactness by which the pilæ are made to cross the abdomen in his figure, whereas in the specimens it is a characteristic of late production.

"Gabb especially states that in none of the specimens examined by him did the pilæ cross the abdomen. Hauer alludes to the need of a strong side-light, in order to detect them in his specimens. This is by no means the case with the two full-grown Nevada specimens under consideration, the abdominal pilæ being very prominent in both. The young correspond to the description alluded to in the California Report, which seems to have been taken from a young specimen. The first of the adult stage of development corresponds to Hauer's description, and a further development of the abdominal pilæ introduces the full-grown adult. All of these stages are easily traceable; and the one very large specimen mentioned in the California Report belonging to this species which did not have the abdominal pilæ must have been an old specimen. In that case, it would have lost these characteristics in the regular course of senile degeneration."—(A. H.)

Locality and position.—Buena Vista Cañon, North Fork, Humboldt Range, Nevada; Upper Trias (St. Cassian beds).

"TRACHYCERATIDÆ.

"Genus GYMNOTOCERAS, Hyatt.

"(γυμνός, naked; νῶτος, back; κερας, a horn.)

"The development of *Ammonites Blakei*, Gabb, and the characters of its abdomen, separate it at once most decidedly from any species of *Tra-*

chyceras. The development generally of a keel, or, in some varieties, of a raised abdomen, over which the pilæ do not pass, shows that this is a different genus, characterized by a different mode of development. The septa are quite similar to those of *Trachyceras*; but it is very evident that in the *Trachyceratidæ* the septa cannot be looked to for generic differences. Great differences also occur in the amount of involution of the different species, and in the development of their external characters. This is shown by contrasting the species *Blakei*, *Trachyceras brevidorsatum*, or *T. Brotheus*, with the type of the genus *T. aon*.

"The forms and characteristics of the young in these three species could hardly be more different, and yet their septa are very similar. Possibly a closer study of the lobes will bring out corresponding differences; but at present it is safer to rely upon the development of external features in this family."—(A. H.)

GYMNOTOCERAS ROTELLIFORME, Meek.

Plate 10, figs. 9 and 9 a.

Shell discoid-lenticular, with periphery subangular, or very narrowly rounded; convexity only about one-fourth the greatest breadth; umbilicus very small, or scarcely more than two-fifths the breadth of the outer volution, with its nearly vertical walls meeting the lateral surface of the volution so as to form a subangular margin; whorls laterally compressed, with greatest convexity within the middle of the sides, thence converging outward with gentle convexity toward the periphery, all increasing gradually in convexity and more rapidly in breadth; each inner turn almost completely embraced in a profound sinus or concavity of the inner side of the succeeding larger one. Surface in the young ornamented with small, slightly flexuous costæ scarcely distinct from the lines of growth, but becoming apparently most defined in young shells about one inch in diameter, after which further increase in size rendered them very obscure, broader, and more distant, until they gradually died out, leaving the sides smooth, or nearly so, in a specimen two inches broad; costæ and lines of growth curving strongly forward as they approach the periphery, which the former do not cross or reach. Septa with four lateral lobes on each side, decreasing rapidly in size from the largest or first one (which is oblong, and, like the second and third,

merely digitate), to the fourth, which is very small, and nearly or quite simple; first sinus between the siphonal and first lateral lobe smaller, but of the same form as the latter, and merely obtusely serrated, while the succeeding sinuses decrease rapidly in size inward, and become more nearly simple; siphonal lobe shorter than the first lateral, but of about the same breadth, with a short, spreading, digitate, terminal, lateral branch on each side, and a few small lateral serratures along the lateral margins.

Greatest breadth of a specimen apparently, retaining most of the outer volution, 2.34 inches; convexity of same, about 0.55 inch.

In form, this shell agrees pretty nearly with some varieties of *G. Blakei*, Gabb (sp.); but it differs in being more compressed, particularly toward the periphery, which is thus made narrower, and in its more deeply embracing volutions, and consequent narrower umbilicus. Its costæ are also, apparently at all ages, excepting, perhaps, in the very young specimens, much more obscurely defined. So far as the details of the lobes and intermediate sinuses of its septa can be made out from the specimens, they seem to agree exactly with those of *G. Blakei*. I had selected for it the name *rotelliformis*, and written out a full description, with remarks on its points of difference from, and agreement with, *G. Blakei*, but was not fully satisfied whether it should be included provisionally as a marked variety of that species, or separated entirely as a distinct species. As Professor Hyatt confirms the latter conclusion, I have decided to place it apart as a different species. Professor Hyatt sent the following note respecting its relations to *G. Blakei*:

"This seems a distinct species from *G. Blakei*. The latter develops from the young, in which the pilæ are distinct, and the abdomen invariably keeled at one stage; whereas similar pilæ and a keel are only occasionally and faintly shown in the shell under consideration. The young are more distinctly pileated than the adults, and are somewhat like the young of *G. Blakei* at certain stages of growth. A close comparison, however, shows them to be flatter, and nearly the whole of each whorl is concealed by the involution of the shell, whereas *G. Blakei* has a more open umbilicus at the same age. The same remarks apply equally well to the figure of *G. Blakei* in the Palæontology of California.

"The general development and characteristics of the septa of this species,

however, resemble those of *G. Blakei*. The abdomen of the latter, however, is at first rounded, then more acute, or with a raised keel-line, and finally this disappears in a flattened abdomen."—(A. H.)

Locality and position.—Buena Vista Cañon, West Humboldt Range, Nevada; Trias.

GYMNOTOCERAS BLAKEI, Gabb (sp.).

Plate 10, figs. 10, 10 a, 10 b, 10 c; and pl. 11, figs. 6, 6 a.

Ammonites Blakei, Gabb (1864), Geol. Survey of California (Palæont.), I, 24, pl. 4, figs. 14–15.

Shell more or less compressed-discoidal, with periphery rather narrowly rounded, or subangular, in consequence of a narrow, obscure, smooth, welt-like ridge, usually seen along its middle, being sometimes more prominent in the more compressed specimens; umbilicus moderately deep, and equaling generally a little more than one-fifth the breadth; volutions six or more, more or less compressed laterally, particularly in adult specimens, but usually more rounded in the young; each enveloping one-half to three-fourths of the next within, rounding to the periphery, and truncated, or, in adult specimens, even a little overhanging around the umbilicus; aperture, as determined by sections of the volutions, subcordate, or, in compressed specimens, subhastate, with the sinus on the inner side rather deeply defined. Surface ornamented by generally distinctly-defined costæ, which, in most cases, increase by bifurcating (usually at a slightly pinched-up prominence on the larger specimens) between the umbilicus and the middle, or in part by the intercalation of others between; all curving strongly forward as they approach the periphery, where they become obsolete before reaching the faintly-marked central ridge.

Septa with siphonal lobe rather short, or about as wide as long, and divided at the extremity into two short, digitate, terminal branches, above which there are two or three very small lateral serratures. First lateral lobe, longer than the siphonal, and provided with two short, digitate terminal divisions, with some very small lateral notches above. Second lateral lobe considerably smaller than the first, but not differing very materially in other respects. Third lateral lobe still smaller than the second, and merely provided with two or three minute notches at the end; between

the latter and the suture, in the vertical wall of the umbilicus, there are two other minute, apparently simple lobes. First lateral sinus (saddle) a little wider than the siphonal, which it exceeds in length on its inner side, rounded at the end, and slightly serrated on the margins; second lateral sinus much like the first, excepting that its outer side is the longer. The other sinuses are very small, and apparently nearly simple.

Greatest diameter of the largest specimen seen, 2.20 inches; convexity, 0.70 inch. Some of the specimens are proportionally more compressed.

This is one of the most common species found in the Nevada St. Casian beds. It seems to vary considerably in form, as well as in surface-marking; the majority of the specimens before me, however, are less compressed, and more obtuse on the periphery, than the typical specimen figured by Mr. Gabb. A few of the others, however, seem to agree more nearly with his figure, while there are so many gradations between these and the less compressed form that I am inclined to regard the whole as belonging to one species.

Mr. Gabb mentions seeing a specimen from near Star City, which he supposed belonged to this species, that was nearly six inches in diameter, and had a row of large nodes around the middle of the whorls. Adopting the conclusion that this really belongs to the species under consideration, the numerous specimens before me would seem to be all young shells, or the inner volutions of large ones, as none of them are more than two and a half inches in diameter, or show the large lateral nodes mentioned by Mr. Gabb. It is true none of them are entirely complete; but if the shell had ever attained so large a size as six inches in diameter at the locality where our specimens were obtained, there would probably have been some fragments of these large individuals brought in with the others.

As remarked by Mr. Gabb, this shell (that is the variety figured by him) resembles *Ammonites*, or more properly, I should think, *Ceratites scaphitiformis* of Hauer; but it has the peripheral ridge decidedly less prominent, and shows differences in the nature of the costæ, and particularly in the septa; which latter, in Professor Hauer's species, seem to me to present more nearly the characters of *Ceratites*.

The foregoing description and remarks were written out by me entirely

from such specimens as those represented by our figs. 10, 10 *a*, and 10 *b* on plate 10; my impression at that time being that the peculiar forms, such as that illustrated by figs. 5 and 5 *a* of plate 11, belong to an allied but distinct species, differing in the development of lateral nodes, the flattening of the periphery, and the singular elliptic or scaphitoid general outline in the adult. For this form I had proposed the specific name *scaphitoides* (*Gymnot. scaphitoides*, as the nomenclature here adopted would require). I had noticed, however, the similarity of its inner volutions to those of *G. Blakei*, and had considered the question of its possible identity with that species. But the fact that there are some ten or eleven specimens in the collection, all showing the form and flattened periphery seen in fig. 5, plate 11, while none of those that I referred to *G. Blakei*, even of equal size (as that from which were drawn figs. 10 and 10 *a* on plate 10), show any traces of the lateral nodes, flattening of the periphery, or elliptic general outline, I was led to think the former could hardly belong to *G. Blakei*.

Professor Hyatt, however, after studying the specimens carefully, arrived at the conclusion that these scaphitoid specimens with lateral nodes and flattened periphery only represent a more advanced stage in the development of *G. Blakei*. Consequently, I now yield my opinion to his greater experience and advantages in tracing the different phases of development in this order of shells, and adopt his conclusion. I prefer, however, to allow my description of *G. Blakei* to stand as originally written, and to quote below Professor Hyatt's remarks rather than rewrite my own.

The following are Professor Hyatt's notes on *G. Blakei*, and its variations and development:

"This species is smooth for the first three or four volutions. Then the pilæ begin to appear as lateral folds. During the next volution, the abdomen is smooth and broad; the whole form and mode of involution resembling *Lytoceras fimbriatum*. After this, a low, broad keel arises [see fig. 10 *a*, pl. 10], and the increase in bulk is exceedingly rapid. Intermediate pilæ [costæ] are added by folds of the shell near the abdomen on the sixth or seventh volution [see fig. 10, pl. 10]. These soon coalesce with the longer pilæ, and form more or less prominent and subsequently a tubercular junction. On the eighth or ninth whorl, the broad keel disappears, and the pilæ are wholly

forked instead of single, the tubercles at the junction very large, and the abdomen gibbous, but smooth [see figs. 6 *a*, pl. 11]. The terminations of the pilæ are at the edge of the abdomen at this stage, and show obtuse tubercles, whereas in the young they are continued over the edge of the abdomen to the base of the keel. This is the normal succession of these characters, but variations are remarkable. Besides the earlier attainment of the tubercle-shaped pilæ, there are those which never have them at all, and one specimen which becomes wholly smooth on the eighth or ninth whorl.

“Some specimens are also much flatter than others, and often the lines of growth are so decided where they cross the siphon that at first sight they may be mistaken for the pilæ themselves, but a closer examination shows that they subdivide the pilæ. These more decided striæ evidently indicate arrests of growth, and are outlines of the transient mouth. If so, there was a periodical pause in the building-up of the shell, as each pair of pilæ were about half completed.

“Another variation occurs either through compression or subsequent elliptical growth, such as is described by Barrande in *Goniatites fecundus*. By one of these means, probably the former, in eleven specimens, a *Scaphites*-like shell is produced [fig. 6, pl. 11], with broad flattened abdomen [fig. 6 *a*, same plate] and exceedingly prominent tubercles. So similar is this malformation, that I at first considered it a true Scaphitoid, bearing to *Scaphites* a relation similar to that of *Bactrites* to *Baculites*.

“There is, however, not one specimen of the eleven examined which is not more or less twisted laterally by compression.”—(A. H.)

Locality and position.—Cottonwood Cañon, West Humboldt Range, Nevada; Upper Trias.

Genus TRACHYCERAS, Laube.

TRACHYCERAS WHITNEYI, Gabb (sp.).

Plate 11, figs. 3, 3 *a*.

Ammonites Whitneyi, Gabb (1864), Geol. Survey of California (Palæont.), I, 23, pl. 4, figs. 11 and 12.

Shell attaining a rather large size for a species of this group, discoid

in form, with the peripheral channel of somewhat variable depth, but usually well-defined; volutions about five, more or less flattened on the sides, rounding off a little to the periphery, and abruptly truncated, or even overhanging on the umbilical side, each enveloping about half of the next one within; umbilicus rather shallow, or of moderate depth, and less than one-third the diameter of the shell. Surface ornamented by a variable number of costæ, which curve forward as they approach the periphery, often bifurcating once or twice in crossing the sides, and also increasing by the intercalation of shorter ones between, while they usually bear on each side about four or five rows of small nodes, the most prominent of which are generally those along the margins of the peripheral furrow, and around the edge of the umbilicus; the outer rows being slightly compressed, and more or less oblique, while those on the sides of the volutions are apparently sometimes obsolescent. (Septa not observed.)

Greatest diameter of the largest specimen seen (which is imperfect), about 4 inches; convexity, 1.20 inches; diameter of umbilicus, about 1.15 inches.

The specimen from which the foregoing description and our figures were prepared, agrees much better with Mr. Gabb's fig. 12 than with his fig. 11. He was probably right, however, in including both of his figured specimens as varieties of one species, though I have not seen a series connecting the two forms. Taking the specimen represented by his fig. 12 as the typical example of the species, our shell may safely be called *T. Whitneyi*.

Among foreign species, this may be compared with *T. Archelaus*, Laube (Fauna der Sch. von St. Cassian, 5. Abth., pl. xl, fig. 1); but it differs in having its costæ more frequently bifurcating, with fewer nodes, none of which seem to be developed into spines, as in Laube's species.

After I had written the foregoing, Professor Hyatt sent me the following note respecting it:

"This species is very distinct* on account of its coarse prominent nodes and pilæ, the number of the latter, and the young, which are not unlike the young of *Gymnotoceras Blakei*. The pilæ of the young shell in

*He means distinct from *T. Judicarium*; he concurred in the opinion that it is the *T. Whitneyi*, Gabb (sp.).

T. Judicarium are finer, and the abdominal channel appears at a much earlier period of the shell's growth. The abdominal channel in this species, and others of the same genus, is preceded by a stage in which the abdomen is flat, more nearly as in the adult *G. Blakei*."—(A. H.)

Locality and position.—Cottonwood Cañon, West Humboldt Range, Nevada; Trias.

TRACHYCERAS JUDICARICUM, Mojsisovics.

Plate 11, figs. 1, 1 a.

Trachyceras Judicarium, Mojsisov. (1869), Jahrb. Geol. Reich., Wien, 133, pl. 3, fig. 4.

The specimens ranged under the above name agree so nearly with the smaller examples of *T. Whitneyi*, Gabb, that I had only separated them as a variety of that species. Professor Hyatt, however, whose facilities for making critical comparisons of this group of fossils with European forms are far superior to my own, thinks it identical with the above-mentioned foreign species. As may be seen by our figure, it seems to differ from *T. Whitneyi* chiefly in its proportionally smaller and more crowded costæ and nodes. Mr. Hyatt sent me the following note in regard to its relations to Mojsisovics' species:

"The only difference noticeable in Mojsisovics' description is that the pilæ are continuous across the abdomen, whereas in this specimen the abdominal channel is smooth. This, however, if of any more than individual value, is probably a local variation."—(A. H.)

Locality and position.—Same as last.

TRACHYCERAS JUDICARICUM, var. SUBASPERUM.

Plate 11, figs. 2, 2 a, and 2 b.

This shell agrees with the last in form, proportions, and the smallness of its costæ, but differs rather decidedly, both from that shell and *T. Whitneyi*, in having its costæ almost entirely obsolete around the middle of each side, and only a single row of rather distant prominent nodes there. It shows, however, a tendency to develop a small row around the umbilicus on each side, as in those forms, and has the usual row of oblique nodes on each side of the mesial furrow of the periphery, with another row a little farther in. At least this is the character of the single specimen of this kind in the collection, as may be seen by our figures of it on plate 11.

The specimen does not give a very clear idea of the details of the septa; but, as nearly as they can be made out, they seem to present the following characters: siphonal lobe narrow, oblong, and apparently merely provided with two small, short, simple, terminal divisions, as in *T. Whitneyi*. The sinus on each side of this is smoothly rounded, and about as wide as long, while the first lateral lobe is smaller, and also shorter than the siphonal lobe, and armed with a few digitations at the end. Between the latter and the umbilicus, there are two shallow, smoothly-rounded sinuses, and two small lobes, the first of which seems to be digitate at the end and the other smooth.

Locality and position.—Same as last.

“ARCESTIDÆ.

“Genus ARCESTES, Suess.

“*Ammonites* (sp.), Munster, Klipstein, Hauer, Giebel, Quenstedt, and others; not Brug. as restricted.

“*Arcestes*, Suess (1865), Akad. d. Wissensch., LII, 76.

“The genus *Arcestes* of Suess, like *Phylloceras* and *Lytoceras* of the same author, is a well-defined generic group. I have been justly criticised by Dr. Laube for unintentionally omitting, in my preliminary essay on the ‘Fossil Cephalopods of the Museum of Comparative Zoölogy’ at Cambridge, to give credit to Prof. Edward Suess for having been the first to suggest, in any published communication, that the Ammonites were susceptible of generic subdivision. I was, however, unacquainted at that time with Professor Suess’s results, and therefore must still continue to attribute, so far as I am concerned, the credit of the idea to Professor Agassiz, who gave me the information long before Professor Suess had published his paper.*

“Other criticisms with which I have been favored will be best answered by the memoirs now in course of publication at the Museum of Comparative

* It is well known to the writer, and many others in this country, that Professor Hyatt had long been at work on his subdivisions of the Ammonites before the publication of Professor Suess’ paper; though no one will pretend to question the fact that Professor Suess’ conclusions were independently formed, and have priority of publication.—F. B. M.

Zoölogy. I will take this opportunity, however, to say that there were peculiarities in my attempt to frame a new classification for the Ammonites which have passed unnoticed. The species were arranged in series whose affinities and genetic connections were successively traced, just as any zoölogist would trace the same relations among any disorderly mass of animals. The usual palæontological style of making genera, as if families and larger groups had no 'raison d'être', and the genera themselves no interdependent affinities, was carefully avoided. Another peculiarity was that two of my much abused genera precisely agreed with two of those so well described in the justly-admired work of Professor Suess; and as the thirty others described independently by me were founded upon precisely the same set of differences, I find myself unable to appreciate criticisms which 'blow hot and cold' upon the same subject, according to the man, and not the man's work."—(A. H.)

ARCESTES? PERPLANUS, Meek.

Plate 11, figs. 7 and 7 a.

Shell strongly compressed, or nearly flattened-subdiscoidal, the lateral compression making the periphery so narrow as to appear almost subangular; umbilicus very shallow, and equaling about one-fourth the greatest diameter of the shell; volutions five or more, nearly flat on each side, increasing gradually in size, and each enveloping about two-thirds of the next within; aperture, as determined from a section of the whorls, very narrow at right angles to the plane of the shell, and profoundly sinuous on the inner side for the reception of the next turn within. Surface without nodes, costæ, or (on casts) visible remains of striae. (Septa unknown.)

Greatest diameter of the largest specimen seen, 2 inches; convexity of same, 0.30 inch.

This species is chiefly distinguished by its remarkably compressed form. The only two specimens of it seen are also very slightly elliptical in outline. This latter character, however, may be due to accidental distortion; but as a similar irregularity of form exists in a number of specimens of another associated shell, and the same want of symmetry has been noticed by Professor Hauer in species from rocks of the same age in the Alps, and by Dr. Stoliczka in the Himalaya Mountains, under circumstances leading to the

conclusion that it was not due to accidental distortion, it may be natural in the form under consideration.

It is quite similar, even in its elliptic form, to a compressed variety of *A. Batteni*, Stoliczka (Mem. Geol. Survey of India, V, plate vi, figs. 1 and 1 a), figured by Dr. Stoliczka, from rocks of the same age in India. It is even more strongly compressed, however, and has a proportionally smaller umbilicus. Although it *may* possibly belong to the same species, it is far more probable that it does not. Until its septa can be seen, of course its generic relations must remain doubtful. It is not a true Ammonite, however, as the genus is restricted by the latest investigators of the fossil *Cephalopoda*, but may be placed provisionally in the genus *Arcestes* until its true relations can be determined from specimens showing the septa.

Some months after writing the above, I received the following note in regard to it from Professor Hyatt:

"This species seems to be very closely allied to *Arcestes Daonicus*, Mojs. (Jahrb. Geol. Reichsan., Wien, XIX, 136, 1869). It is smooth and has no keel, but is simply subangular on the abdomen, and has no knots on the sides, as described in *A. Daonicus*. There are certain resemblances to *Ammonites glaucus* which need comparison, and, when the septa are known, they may prove more important than would appear to be the case."—(A. H.)*

Locality and position.—Buena Vista Cañon, South Fork, West Humboldt Range; Upper Trias (St. Cassian beds).

ARCESTES GABBI, Meek.

Plate 10, figs. 6, 6 a, and 6 b.

Arcestes Ausseanus, Gabb (1864), Palæont. Cal., I, 25, pl. 3, figs. 16 and 17 (not of Hauer.)

Shell compressed-subglobose, being rounded on the periphery and convex enough on the sides to present an elliptic profile view; volutions increasing gradually in size, each so profoundly enveloping all of those within as to leave only a very contracted, deep, almost cylindrical umbil-

* On comparison with Laube's figures of *Amm. glaucus*, Munster, our shell is seen to be very similar in form, but its volutions are more embracing and more rapidly expand, while its umbilicus is consequently proportionally smaller. Of course the septa as figured by Dr. Laube, unless made out from a very young shell, would show *Amm. glaucus* to be very distinct from *Ammonites* proper.

icus; aperture, as determined from transverse sections of the volutions, compressed, crescent-shaped, being very profoundly sinuous on the inner side for the reception of the involuted turns; internal cast generally showing four subequidistant, transverse furrows to each turn, left by a thickening of the lip within at four regular periods of cessation in the growth of the shell to each volution; each of these furrows, or constrictions, bends a little backward in starting from the umbilicus, and then passes nearly straight, or with a slight backward or forward curve over the periphery. Surface generally appearing almost smooth, or only showing obscure lines of growth, with apparently sometimes the faintest possible traces of longitudinal striæ on the rounded periphery.

Septa, as made out by Mr. Gabb in the California Report (none of those I have seen show the septa), with siphonal lobe narrow-oblong, being about twice as long as wide, deeply divided into two slender, nearly parallel, bifid, and digitate terminal branches, with two or three smaller lateral branchlets on each side; first lateral lobe a little shorter than the siphonal lobe, and trifid at the extremity, with two or three lateral branchlets on each side; second lateral lobe slightly shorter than the first lateral, and similar, excepting that it is bipartite at the extremity, with the terminal divisions bifid; third lateral lobe projecting a little beyond the second, and divided more nearly like the first lateral, but otherwise somewhat smaller. Between this and the umbilicus there are two much smaller lobes, the first of which is two or three times as large as the second, and more distinctly tridigitate at the extremity. First lateral sinus smaller than the siphonal lobe, longer than wide, and tripartite at the extremity, with short lateral branchlets; second lateral sinus of much the same size and form as the first, while the three succeeding sinuses diminish rather rapidly in size toward the umbilicus, and show a more or less distinct tendency to develop similar divisions to those of the others.

Greatest diameter, 2.25 inches; convexity, 1.35 inches.

Although I thought, from sketches of this shell sent to me some years back for comparison by Mr. Gabb, that it probably could not be properly separated from *A. Ausseanus* of Hauer, a careful examination of a series of specimens reveals some differences that lead me to conclude that it is more probably only

a closely-allied representative species.* In the first place, as was noticed by Mr. Gabb, it is distinctly more compressed laterally than Professor Hauer's figures of *A. Ausseeanus*, and also differs in having the greatest convexity of the sides of its volutions much nearer the umbilicus. I am aware that these are characters in which the Ammonitoid types vary considerably, but the fact that the Nevada specimens are very constant in these characters, while there are also differences in the details of the lobes and sinuses of the septa, as made out by Professor Hauer and Mr. Gabb, leads me to suspect that still other differences would be observed if we had the means of comparing perfect specimens from the two widely-separated localities. The differences in the septa alluded to consist in the more conical form of all the lateral lobes and sinuses of the Hallstadt specimens; which also have, according to Professor Hauer's figure, the second lateral lobe distinctly tripartite, instead of bifid at the end, as represented by Mr. Gabb. There are likewise other differences in the details of the lobes and saddles, but these might be merely individual peculiarities. I lay no stress on the appearances of very faint traces of longitudinal striæ seen on some of our specimens, because others show no indications of them.

In form, and some of the characters of its septa, our shell is decidedly nearer like *Arcestes Barrandei* of Laube (Fauna der Schiebt. von St. Cassian, pl. xliii, fig. 2) than it is like the typical *A. Ausseeanus*, though it differs in having the periphery more broadly rounded, and its sides less convex in the umbilical region, while in the form and proportions of the lobes and sinuses there are differences of perhaps more importance.

Some time after the foregoing description and remarks were written, Professor Hyatt sent me the following note in regard to this species:

"It is very distinct in form from *A. Ausseeanus*, Hauer; witness its greater lateral compression, the scaphitoid or elliptical mode of growth, which is habitual; and the fact that while the adults are so different, the young are similar in their forms to the adults of *A. Ausseeanus*. I think it to be new."—(A. H.)

Locality and position.—West Humboldt Range, near Cottonwood Cañon, Nevada (St. Cassian formation).

* I had at first only separated this form here as a variety of *A. Ausseeanus*; but, with the concurrence of Professor Hyatt, I now view it as a distinct species.

"PHYSANOIDÆ.

"Genus ACROCHORDICERAS, Hyatt.

"(ἀκροχορδών, a wart; κερας, a horn.)

"This genus is closely allied to *Lytoceras* and *Phylloceras*, Suess, and *Haploceras* of Zittel, combining characteristics which are found in all of these, besides having peculiar characters of its own, and a different development. The extent of involution is comparable with that of *Haploceras*, but the whorl itself is about intermediate between the extreme roundness of *Lytoceras*, and the more flattened sides of *Phylloceras*.

"Its peculiar characteristics consist in having large lateral tubercles and abdominal pilæ, which are united as they near the tubercles. The smooth zone along the center of the abdomen in the young is also probably of generic value."—(A. II.)

ACROCHORDICERAS HYATTI, Meek.

Plate 11, figs. 5 and 5 a.

Shell discoid, with the periphery rounded; volutions rounded or very nearly so, and increasing gradually in size, with each of the inner ones about three-fourths embraced by the succeeding larger—all, so far as known, rounded on the outer side; umbilicus more than half as wide as the dorso-ventral diameter of the outer volution, rather deep, and exposing about one-fourth the breadth of each inner whorl. Surface at first in the young shell nearly or quite smooth, then ornamented with small, regular, straight, moderately distinct costæ, that seem not to cross the periphery, and die out before reaching the umbilical side, while at a later stage of growth they become quite strongly developed, especially in crossing the periphery, on which are intercalated occasional intermediate ones of equal size. These coalesce with the others on the sides of the volutions, and give origin at the points of junction to prominent nodes arranged at regularly-increasing intervals, so as to form a single row near or within the middle of each side. Protected parts also show rather distinct lines of growth, running parallel to the costæ, which latter are slightly sigmoid on the sides of the larger volutions, but pass straight across the periphery.

Greatest breadth of an imperfect entirely septate specimen, 2.82 inches; convexity of same, exclusive of the nodes, 1.15 inches

No entire specimens of this shell have yet been found; consequently we cannot be quite sure whether or not the periphery continues to be rounded and costate on the outer volution of large mature specimens, though it probably is at least rounded and less strongly costate. One distorted specimen shows that near the broken larger end of the outer volution, the costæ become less prominent and more distant, with an intermediate one between each two of the larger, the intercalated ones extending inward but a short distance from the periphery, and dying out without coalescing with the others. This part of the outer turn seems also to be nearly without lateral nodes, which, however, are well developed on the inner turns of the same specimen, where they are seen on the inner volutions just within the inner margin of the umbilicus. None of the specimens are in a condition to exhibit very clearly the details of the septa; but the one represented by our fig. 5 *a*, plate 11, shows that there are three lateral lobes on each side, the first or outer one being about one-third longer and wider than the second, with, like the latter, a few short branches or mere digitations at the end. The third or inner lobe is much smaller than the second, placed close in at the inner margin of the whorls, and apparently provided with a few short digitations.

The position of the lateral nodes, it will be observed, varies somewhat in different individuals; those on the specimen represented by fig. 4 being placed nearly out at the middle of the volutions, while on that shown by fig. 4 *a* they seem to be located farther inward. This, however, is probably, at least in part, due to the oblique distortion of this specimen.

In relation to this species, Professor Hyatt sent the following note:

“The development of this species is altogether anomalous. The whorls were evidently cylindrical and smooth for a considerable time; the increase in size being at first very slow. Large tubercles appear while the sides are still comparatively smooth in one specimen, though in another they have become completely plicated. These tubercles are from the first very prominent. Soon after the introduction of these and the pilæ, the increase in size becomes much more rapid. The resemblance of the young to *Lytoceras* is very close

at first, and the general form always remains similar. The septa are, however, very distinct; the lobes and cells, so far as they could be traced, having much more simple outlines. The pilæ do not extend across the abdemen at first, but leave a smooth band in the center. This is broken up on what is supposed to be the fifth volution by the extension of the pilæ across the abdomen."—(A. H.)

Locality and position.—New Pass, Desatoya Mountains, Nevada; Trias.

The following two types Professor Hyatt views as representing two undescribed genera, in regard to the family relations of which he has expressed no opinion. His attention was called to them after he had sent on his paper on the others; and in returning the specimens, he also sent the notes quoted below respecting them. These notes he seemed rather to regard as suggestions than as full descriptions, as he stated that I might as well go on and name and describe them myself. It seemed more proper, however, as he had investigated the whole, that these also should stand in his name. Consequently, I have selected the names, and take the liberty to insert them here on his authority, quoting his notes in regard to them.

Genus EUTOMOCERAS, Hyatt.

εὐ (augm. part.); *τομός*, sharp; *κέρας*, a horn.

"This is a well-marked type, characterized by its lenticular form, narrow umbilicus, apparently at all ages very sharp abdominal keel, without furrows or lateral ridges, and small regular arched pilæ on middle-sized specimens, growing wider, more irregular, less distinct, and developing small lateral nodes on the adult, with both nodes and pilæ becoming obsolete on the larger part of the body-volution."—(A. H.)

EUTOMOCERAS LAUBEI, Meek.

Plate 10, figs. 8 and 8 a.

Shell compressed-lenticular, with the periphery very acutely carinated; umbilicus small, or scarcely more than one-sixth the greatest diameter of the shell. Volutions much compressed laterally, with the sides gradually

converging, and slightly convex in outline, to the acutely angular periphery, on each side of which there is a very shallow undefined concavity that can hardly be called a channel, while on the inner side they are abruptly truncated or inflected, and gathered into little subnodose wrinkles at the umbilicus; each turn enveloping about four-fifths of the next one within. Aperture, as determined by transverse sections of the volutions, compressed-subhastate, being acutely angular at the outer end, and profoundly notched on the inner side, for the reception of the next turn within. Surface ornamented, in young shells of one and a half inches in diameter, by small regular costæ, that bifurcate at or near the little prominences or wrinkles at the margin of the umbilicus, after which they cross the sides and curve very strongly forward as they approach the periphery, where they become merely obsolescent lines, that are continued some distance forward almost parallel to the carina; thus indicating the probable presence of a narrow prolongation of the outer side of the lip at the aperture. A few very small, pimple-like nodes are also scattered over the inner half of the volutions at this stage of the shell's growth, while, as it increased in size, the costæ become less strongly defined and the little nodes more numerous; but farther around toward the aperture both nodes and costæ gradually fade away, until it is probable that in large shells, a part, or possibly the whole, of the surface becomes nearly or quite smooth. (Septa unknown.)

Greatest diameter of a specimen incomplete at the aperture, 1.40 inches; convexity, about 0.65 inch.

This shell has an unusually acute, unserrated, peripheral keel, which, so far as the specimen shows, seems to retain its sharpness both in the young and in the adult. The concavity on each side of this keel is very shallow, and merely so directed as to contribute to the thinness of the knife-like carina, rather than to impart any tendency to divide off another keel or even obtuse ridge on either side. The little pimple-like prominences on the sides of the volutions are almost entirely on the inner half, mainly on the little costæ, and are irregularly scattered, so as to show little or no tendency to arrange themselves in spiral rows. The obscure wrinkles or little prominences around the small umbilicus give it a somewhat puckered appearance.

This shell differs from all of the compressed, sharply-keeled ammonitoid forms known to me, with a small umbilicus and curved costæ, in the presence of the numerous little irregularly-arranged pimple-like nodes. As the specimen shows no traces of the septa, it is not possible to determine which of the numerous proposed groups it most nearly approaches in its internal characters.

The specific name is given in honor of Dr. Gustav C. Laube, of Vienna, the author of the beautiful Monograph of the St. Cassian Fossils.

Locality and position.—Same as last.

Genus EUDISCOCERAS, Hyatt.

εὖ (augm. part.); *δίσκος*, a quoit; *κέρας*, a horn.

“This type is distinguished by its discoid form, open umbilicus, and an abdominal keel, bordered by furrows and ridges, the latter being interrupted or tubercular; the young with comparatively large pilæ, growing smaller and more flexuous in the adult, and finally fading away in the larger half of the body-volution.”—(A. H.)

EUDISCOCERAS GABBI, Meek.

Plate 11, figs. 3 and 3 a.

Shell compressed-discoidal, with the periphery narrowly truncated, and having a narrow, very obscure, smooth ridge along the middle; umbilicus shallow, equaling about two-thirds the breadth of the outer turn; volutions flattened on the sides, and abruptly truncated around the umbilicus on the inner side, each embracing apparently about two-thirds of the next within. Surface with moderate-sized, rather distinct, bifurcating costæ on the sides of the volutions in young shells. As the shell advanced in growth, the costæ became smaller and more crowded, being merely coarsely linear on the outer turns, where they curve first a little backward at the umbilicus, then arch gently forward as they cross the middle of the sides, beyond which they usually curve a little backward, and then very slightly forward, as they abruptly terminate, so as to leave a narrow, smooth space between their outer ends and the narrow periphery. Around each margin of the latter there is also a row of compressed nodes arranged with their longer

axes nearly parallel to the keel of the periphery, or with but a slight obliquity, those on the opposite sides often alternating. (Septa unknown.)

Greatest diameter, 1.96 inches; breadth of umbilicus, 0.50 inch; convexity, 0.47 inch.

This form is quite unlike any of its associates, being rather peculiar in the nature of its small flexuous costæ, and the presence of a row of elongated nodes around each margin of its very narrowly truncated and keeled periphery, the nodes being arranged with their longer diameters nearly parallel to the curve of the truncated margin itself, and so disposed that those on opposite sides alternate. The ridge along the middle of its periphery is narrow, smooth, and not so defined as to be separated from the row of compressed nodes on each side by a very deep furrow.

This shell seems to be related to the St. Cassian species *Ammonites Corvarensis*, Laube, as represented by a side-view on plate xl, fig. 3, of Professor Laube's Monograph of the St. Cassian Fossils, especially in form and the nature of compressed nodes around each side of its periphery. It differs, however, in having a proportionally wider umbilicus and well-defined costæ on the sides of its volutions.

Whether Professor Laube's species has a central peripheral ridge or carina, such as is seen in our shell, cannot be determined from his figure, giving a side-view only, and he says nothing in his description on this point, doubtless because his specimen does not show the outer margin of the volutions: nor have we yet the means of making comparisons of the septa of our species with that described by Professor Laube.

The specific name of this shell is given in honor of William M. Gabb, esq., late of the California Geological Survey, and now in charge of a geological survey of Santo Domingo.

Locality and position.—Cottonwood Cañon, West Humboldt Range, Nevada; Upper Trias.

JURASSIC SPECIES.

MOLLUSCA.

LAMELLIBRANCHIATA.

LIMIDÆ.

Genus LIMA, Bruguière.

LIMA (LIMATULA) ERECTA, Meek.

Plate 12, fig. 2.

Shell, exclusive of the small ears, vertically narrow-elliptic, or about once and a half as high as the antero-posterior diameter, moderately convex, and not in the slightest degree oblique; hinge shorter than the breadth of the shell, and ranging at right angles to the vertical diameter of the valves; ears small, compressed, almost exactly equal, and obtusely angular; beaks small, nearly exactly central, and slightly incurved without any apparent obliquity. Surface marked with fine radiating lines, which seem to show some tendency to gather into a few distant larger costæ, near the narrowly-rounded basal margin; a few obscure undulations of growth are also seen crossing the striæ.

Greatest vertical diameter, 0.72 inch; breadth, or anterior-posterior diameter, 0.50 inch; convexity of one valve, about 0.10 inch.

I only know this species from a single specimen, showing none of its internal characters; and, owing to the fact that it is not in the slightest degree oblique, it is impossible to determine whether it is a right or a left valve. It is remarkable for its narrow form, equal ears, and want of obliquity. Owing to the fineness of its striæ, and the fact that they are obsolete from a little below the middle to the beak, I have been unable to see whether or not they are divaricating along the middle, as in some species of *Limatula*, though they seem not to be so from their direction below.

Locality and position.—New Pass, Desatoya Mountains, Nevada; apparently from the horizon of the Lower Lias.

PINNIDÆ.

Genus PINNA, Linnæus.

PINNA KINGII, Meek.

Plate 12, figs. 9, 9 a.

Shell attaining about a medium size, very thin, elongate-subtrigonal in general outline, apparently slightly arcuate, rather convex, with a more or less defined angle extending along the middle of each valve, so as to give the transverse section, especially at almost any point between the middle and the beaks, a rhombic subquadrangular outline, becoming more compressed posteriorly; upper and lower margins converging rather rapidly to the beaks, the first being very nearly straight, and the latter slightly convex; posterior extremity a little obliquely truncated, but rounding into the base below; valves flattened from the mesial angle to the upper and lower margins. Surface marked by fine lines of growth running parallel to the posterior and lower margins, and showing a tendency to gather into little wrinkles, particularly near the latter; while above the lateral angle they are crossed by about ten to twelve obscure radiating costæ, most distinctly defined near the beaks, and gradually becoming obsolete near the middle.

Apparently attaining a length of about 4 inches, with a height at the posterior end of about 1.90 inches; convexity, 0.85 inch.

The only specimen of this species contained in the collection is in an imperfect condition, though sufficiently well preserved to show its form and surface-markings, as well as its remarkable thinness. In form and size, it seems to have been much like *P. cancellata* of Bean (Morris and Lycett's Monogr. Moll. Great Oölite, tab. xiii, fig. 20 *a b*), from which it differs in having a mesial angle along each valve, and in having its radiating costæ obsolete on the posterior part of the valves. These costæ likewise differ in being merely obscure ridges on our shell, about as wide as the furrows between, instead of mere "knotted lines". It is, however, about as nearly allied to some imperfectly-known Carboniferous species of the Mississippi Valley.

Locality and position.—Weber Cañon, Wasatch Range; possibly Jurassic; though it may be Carboniferous, as it was found loose, and rocks be-

longing to both of these ages occur there. As elsewhere explained, the fossils on the lower half of this plate were figured together, because some doubts at first existed in regard to the exact horizons of the beds from which they came. Some of them are certainly Carboniferous; while others are more like Jurassic forms.

MYTILIDÆ.

Genus VOLSELLA, Scopoli.

VOLSELLA SCALPRUM, var. ISONEMA.

Plate 12, figs. 4, 4 a.

Modiola scalprum, Sowerby (1821), Min. Conch., III, 87, pl. 248, fig. 2.

Mytilus scalprum, Goldf. (1833), Petref. Germ., II, 174, tab. 130, fig. 9.

Shell attaining a moderate size, extremely thin, transversely elongated, or about twice and a half as long as high, gibbous along the umbonal slopes, and rather distinctly arcuated; hinge-line apparently nearly half the length of the valves, passing gradually into the slope of the posterior dorsal curve; posterior margin curving obliquely backward and downward to the rather narrowly-rounded posterior basal extremity; pallial margin broadly sinuous or arched, so as to be nearly parallel to the dorsal and posterior dorsal outline; anterior margin rounding up to the beaks, which are much depressed, extremely oblique, very slightly projecting, somewhat compressed, and placed nearly over the anterior end; umbonal slopes very prominently rounded, so as to form an oblique ridge, extending from near the beaks to the posterior basal extremity; above and behind this ridge, the surface is slightly convex, while the flanks below it are more or less concave. Surface ornamented with very fine and perfectly regular concentric lines.

Length, 1.95 inches; height, 0.77 inch; convexity, about 0.60 inch.

This shell agrees so very nearly in form and general appearance with *Modiola scalprum* of Sowerby, and especially with a form referred by Goldfuss and others to that species (see Petref. Germ., plate 130, fig. 9), that I am left in doubt whether it is not a mere variety of the same. It agrees less nearly with Sowerby's original figure, but his illustrations are not usually so accurate as those published by Goldfuss; while the figure referred to in the work of the latter author is, I believe, generally regarded as repre-

senting Sowerby's species. In one important character, however, our shell certainly differs, at least from the figures published by both of the above-mentioned authors; that is, in the great regularity of its concentric striae. If I knew their figures to be exactly correct in this respect, I should not hesitate to regard our shell as belonging to a distinct species; but, until this question can be settled by a comparison of specimens, I prefer to view it as a variety of Sowerby's species. In the fineness and regularity of its striae, as well as in its remarkable thinness, it agrees with *V. pertenuis*, M. & H., from the Jurassic beds near the Black Hills; but, in addition to being much larger, it is more arcuate, and has more prominent umbonal ridges; while its anterior ventral region below and in front of the umbonal ridge is proportionally larger. It is barely possible, however, that these may not be constant characters.

Locality and position.—Weber Cañon, Wasatch Range, Utah; Jurassic.

TRIGONIIDÆ.

Genus MYOPHORIA, Bronn.

MYOPHORIA LINEATA, Münster?

Plate 12, figs. 3, 3 a.

Trigonia lineata, Münster (1834), Leonhard und Bronn's Jahrb., I, 5 and 9.

Lyrodon lineatum, Goldf. (1838), Petref. Germ., II, 199, tab. 136, figs. 4, a, b, c, d.

Myophoria lineata, Münster (1841), Beiträge, IV, 88, tab. 7, fig. 29; and (1864) in Alberti's, Trias, 111.—Laube (1865), Fauna St. Cass., 59, tab. 18, fig. 7.

Trigonia lineata, Giebel (1852), Deutschl. Petref., 392.

Opis lineata, Laube (1864), Bemerk. im Jahrb. d. Geol. Reichsaust., 489; Fauna der Schicht. von St. Cass., 59, pl. xviii, fig. 7.

Shell small, trigonal, rather compressed; anterior end shorter than the other, rounding from below the beaks into the base; posterior side compressed, truncated, with a slight forward slope above, and angular at the base; ventral margin semiovate, rounding up anteriorly, most convex in outline slightly in advance of the middle, and straight or very slightly sinuous near where it connects with the posterior basal angle; beaks apparently elevated, and placed a little in advance of the middle; posterior umbonal slope forming a well-defined angular ridge extending from the back part of

the beaks to the posterior basal angle. Surface ornamented with small, very regular, concentric costæ, which terminate abruptly on the posterior umbonal ridge of each valve, or are only continued on the compressed posterior dorsal region above the angle as fine lines of growth.

Length, 0.44 inch; height, about 0.36 inch; convexity, about 0.15 inch.

This shell seems to agree very closely in outline and surface-markings with the published figures of Münster's species, and I am inclined to believe it the same; though it is quite as probable that a good series of specimens would show specific differences separating it from that shell. As I have only seen a single imperfect specimen, however, and that presents no reliable characters by which it can be distinguished, I refer it with doubt to *M. lineata*. I should remark here that its costæ are much more strongly marked than on Münster's species, as illustrated by Dr. Laube, in his work on the St. Cassian Fossils, but in this respect our specimens agree exactly with Goldfuss' figures of that species.

Locality and position.—Weber Cañon, Wasatch Range, Utah; from above "quarry rock". In Europe, *M. lineata* occurs in the St. Cassian beds; but the shell here described appears to occupy a higher position (in the Jurassic series) if its exact position in the section was accurately determined.

ARCIDÆ.

Genus CUCULLÆA, Lamarck.

CUCULLÆA HAGUEI, Meek.

Plate 12, figs. 1, 1 a, 1 b.

Compare *Cucullæa concinna*, Phillips (1835), Geol. Yorks., 160, pl. v, fig. 9.

Shell small, oblong-subrhomboidal in outline, about once and a half as long as high, and rather gibbous in the central region; posteriorly a little obliquely truncated above, and obtusely-subangular and most prominent at its connection with the base below; base nearly straight and parallel to the cardinal margin along the middle, and rounding up rather more gradually in front than behind; anterior margin compressed, convex in outline, and connecting with the hinge above at an angle of about 98° ; hinge-line less than the greatest length of the valves; beaks rather prominent, gibbous,

incurved, and very nearly central; posterior umbonal slopes more or less angular, while the posterior dorsal region above these oblique umbonal ridges is compressed. Surface neatly ornamented with small, regular, radiating lines, or raised striæ, which are rather widely separated and larger on the anterior part of the valves, where they curve gracefully forward, and alternate with a smaller intermediate series, none of which are continued to the beaks; posteriorly they all become much smaller, and closely crowded; crossing all of these, there are, on all parts of the valves, numerous very small regular and crowded concentric lines.

Length, 0.57 inch; height, 0.35 inch; convexity, 0.30 inch.

This species seems to be closely allied to, and may even be identical with, some of the forms that have been referred to *Cucullæa concinna*, Phillips, by different authors. It certainly differs, however, very materially from the type of *C. concinna*, as originally illustrated by Phillips, in being much less depressed, proportionally shorter, decidedly less angular along the posterior umbonal slopes and at the posterior basal extremity. Phillips' figure also shows obscure, coarse, radiating costæ, on the posterior surface of the valves above the umbonal angle, not seen on our shell, which likewise differs in having more prominent and more gibbous umbones, with a more rounded basal outline. It is more nearly like the form figured under Phillips' name by Goldfuss (Petref. Germ., plate cxxiii, fig. 6 *a*, *b*), and by Quenstedt (Der Jura, tab. 67, fig. 16); but it is less angular at the extremities, and has more gibbous umbones. It may also be compared with a shell figured from the Jura by Richard Andree, in the Zeitschrift der Deutschen Geologischen Gesellschaft, XII, plate xiv, fig. 7, under d'Orbigny's name *Arca subconcinna*, which, however, is less depressed, much more rounded in outline, and has smaller and lower umbones than our shell.

Locality and position.—Weber Cañon, Wasatch Range, Utah; from a limestone apparently of Jurassic age.

ANATINIDÆ.

Genus MYACITES, Auct.

MYACITES (PLEUROMYA) SUBCOMPRESSA, Meek.

Plate 12, figs. 6, 6 a.

Myacites (Pleuromya) subcompressa, Meek (1873), Hayden's Ann. Rep. U. S. Geol. Survey of the Territories, 472.

Shell of medium size, oblong-subovate, moderately convex, the greatest convexity being nearest and above the middle of the anterior end; valves nearly closed, or but slightly gaping behind; posterior margin somewhat abruptly cuneate, rounded in outline, though slightly more prominent below the middle; basal margin with a moderately convex outline, rounding up more gradually behind than in front; anterior end short, subtruncated; dorsal margin rather short, rounding off gradually into the posterior margin; beaks gibbous, but somewhat flattened on the outer side, rather prominent, and located about half-way between the middle and the anterior end; anterior umbonal slopes prominently rounded, or forming a rounded undefined ridge, which descends nearly vertically from the anterior side of each beak to the anterior basal margin; the sides behind this ridge being a little flattened, or possibly sometimes slightly concave below. Surface marked by small, rather regular, but not strongly-defined, concentric ridges that become nearly obsolete on the posterior dorsal region and near the front.

Length, 1.27 inches; height, 0.92 inch; convexity, 0.66 inch.

This shell closely resembles some varieties of *Pleuromya ferruginea* and *P. impressa*, Agassiz, but has the anterior end shorter and more truncated, the concentric ridges of less regularity, and the concavity extending from the beaks to the anterior basal margins of the valves either entirely wanting or very feebly marked. In first preparing this report, I had written the above diagnosis of this species, and prepared the figure on plate 12; but being in doubt respecting its affinities, I did not then propose a name for it. Subsequently numerous specimens of this shell were brought in by Dr. Hayden's party from the Cañon of Yellowstone River; Spring Cañon; near Fort Hall, Montana; and other localities. These show that it varies considerably in

form and the distinctness of its costæ, though our figure on plate 12 gives a good idea of the most usual appearance of this shell.

Locality and position.—Weber Cañon, Wasatch Range, Utah; Jurassic.

MYACITES INCONSPICUUS, Meek.

Plate 12, fig. 10.

Shell very small, depressed, elongate-subelliptic, moderately convex; posterior margin narrowly rounded; anterior very short, truncated obliquely forward from the beaks above, and rounded below; basal margin, subparallel to the dorsal, most convex in outline at or slightly behind the middle, and a faintly sinuous anteriorly; dorsal outline nearly straight, and horizontal behind the beaks, but rounding off very gradually posteriorly; beaks somewhat tumid, rising slightly above the cardinal margin just behind them, and placed near the anterior end; posterior umbonal slopes prominently rounded; while a broad shallow compression, or slight concavity, extends from the beaks to the anterior ventral margin of each valve. Surface only showing obscure concentric marks of growth.

Length, about 0.45 inch; height, 0.20 inch.

Although there is nothing particularly notable in the form or general appearance of this little shell, I have been unable to identify it with any of the described species. Perhaps its most marked features are its small size, depressed form, and narrowly-rounded extremities. It may be a young shell, and in larger individuals, more nearly approaching some of the described species; but my present impression is that it is new.

Locality and position.—Weber Cañon, Wasatch Range, Utah. The specimen was supposed to have come from the rock in which the *Spiriferina* and *Aviculopecten* of the same plate were obtained; but it probably belonged to some Jurassic bed at that locality. (See note on the explanations of plate 12.)

MYACITES (PLEUROMYA) WEBERENSIS, Meek.

Plate 12, figs. 11, 11 a.

Shell of about medium size, moderately gibbous, subovate; anterior side very short and subtruncated, but rounding into the base; basal margin forming a semioval curve, more prominent anteriorly, and curving up more

gradually behind; posterior side apparently narrowly rounded, and most prominent above the middle; beaks nearly over the anterior margin, rather pointed, depressed, and strongly incurved. Surface ornamented by numerous, rather small, but well defined and very regular, concentric costæ, about equaling in breadth the furrows by which they are separated.

Length, about 1.40 inches; height, 0.81 inch; convexity, 0.72 inch.

The only specimen of this species in the collection has had about one-third of the posterior dorsal region broken away. The general outline, however, can be pretty accurately inferred from the curve of the costæ. It has somewhat the appearance of the anterior portion of an *Allorisma*; and I am not quite sure that it may not more properly belong to that genus, especially as it seems to have the cardinal margins of the valves inflected, as we see in *Allorisma*. Still the curves of its costæ show that it was a proportionally shorter shell than is usual in that genus, and its beaks are more nearly terminal than is often seen in *Allorisma*.

Locality and position.—Weber Cañon, Wasatch Range, Utah. Originally supposed to have come from the same horizon as the *Spiriferina* and *Aviculopecten* figured on the lower half of the same plate; but as those shells are certainly of Carboniferous age, this one, unless it may be an *Allorisma*, probably belonged to a higher horizon, although found loose with the other forms mentioned.

CEPHALOPODA.

BELEMNITIDÆ.

Genus BELEMNITES, Auct.

BELEMNITES NEVADENSIS, Meek.

Plate 12, figs. 7, 7 a, 7 b (and 8 a, 8 b?).

Guard attaining a medium or larger size, gradually tapering, apparently not perfectly straight; section circular at the anterior end, but compressed-elliptic near the posterior end; alveolus elongate-conical, and extending back nearly half the length of the guard; surface smooth.

Length, about 3.25 inches; diameter at the anterior end, 0.60 inch; larger diameter, at 2.60 inches behind the anterior end, 0.46 inch; smaller diameter, at the same point, 0.30 inch.

From another locality in the same region in which the guard described above was obtained, several fragments were bought in, of an elongate-conical chambered shell, that may be the phragmacone of the same or of another Belemnite. It is represented by figs. 8 and 8 *a* of plate 12, and will be seen to taper regularly from the larger to the smaller end. Its section at all points is very nearly circular, while its septa are deeply concave, and separated by spaces equaling about one-fifth the greater diameter of the shell at the point of measurement. The siphuncle is very slender, and exactly marginal; surface smooth, or only showing under a magnifier, traces of obscure lines of growth that arch forward on the side opposite the siphuncle. The whole shell must have been, when entire, nearly six inches in length, and, if really the phragmacone of the above Belemnite, it must be evident that that species attained a much larger size than the guards figured would indicate.

Whether the last-mentioned shell is the phragmacone of a Belemnite, or the shell of an Orthoceras, may perhaps admit of some doubt until better specimens can be obtained; but that the guard described above is that of a true Belemnite, there can be no doubt whatever.

Locality and position.—The specimens of the guard are labeled "Cottonwood Cañon, West Humboldt Range", and came, I am informed by Mr. King, from the upper beds of the series, above those containing the Triassic fossils, and are therefore probably of Jurassic (Liassic) age. The larger chambered shell (figs. 8, 8 *a*) is labeled "American District, West Humboldt Range," Nevada; and probably came from the same horizon.

CRETACEOUS FOSSILS.

MOLLUSCA.

OSTREIDÆ.

Genus OSTREA, Linn.

OSTREA (undt. sp.).

Plate 15, figs. 10, and 10 *a, b, c*.

Shell of about medium size and thickness, more or less elongate-subovate, tapering to the beak, which is usually abruptly pointed, and often bent a little to the left or to the right, generally compressed and subequivalve. Lower valve rather shallow; ligament-area triangular, with its mesial furrow usually deep; surface merely showing appressed imbricating laminæ of growth, without any traces of radiating ridges, plications, or striæ. Upper valve a little more flattened, or sometimes nearly as convex as the other, but rather less concave within; beak usually more obtuse, and the ligament-area often proportionally a little shorter, with its mesial ridge well defined; lateral margins often thickened and crenated near the beaks; surface much as in the other valve.

Length of a medium-sized specimen, about 2.80 inches; breadth, 1.90 inches; convexity of the two valves, about 1 inch.

In first preparing this report, I merely gave figures of this Oyster without a specific name. Subsequently, in revising portions of the report, without having the type-specimens at hand for comparison, I was impressed with the similarity of this shell, as figured on our plate, to a species that I had in the mean time described in one of Dr. Hayden's reports from Wyoming, under the name *O. Wyomingensis*, and placed that name with a mark of doubt opposite its number on the explanations of the plate, while I also in the same way mentioned it in a list of Coalville species. Having since made a direct comparison of the specimens from the two localities, I am led to doubt their specific identity, though they are certainly very much alike. The Coalville specimens have the beak of the under valve less curved upward, and the lateral margins of the only upper valve I have seen from that

locality more strongly crenate or transversely striated than I have yet seen in any example of the Wyoming shell. As I have only two lower valves and one upper from Coalville, it is not possible to say to what extent this shell may vary. If distinct from *O. Wyomingensis*, it might be called *O. Coalvillensis*.

Locality and position.—Coalville, Utah; Cretaceous.

ANOMIIDÆ.

ANOMIA RÆTIFORMIS, Meek.

Shell of well-developed specimens transversely subovate, generally more

Fig. 1.



Anomia rætiformis.
Cast of upper valve, natural size.

broadly rounded on the left side (as seen from above), and rather narrowly rounded on the right margin, with the pallial margin between semiovate in outline; upper valve moderately convex, the greatest convexity being toward the left margin, while the narrowly-rounded right margin is more compressed and produced; beak marginal, nearly central, with generally a slight curvature toward the right; surface showing small, obscure wrinkles and striæ of growth, with sometimes traces of

a few indistinct radiating markings on the most convex part of the umbo; lower valve unknown.

Greatest (transverse) diameter, 1.26 inches; diameter from beak to pallial margin, 1.12 inches; convexity of upper valve, about 0.30 inch.

This species presents, in the well-developed adult, a singular *Ræta*-like form, being narrowed and subrostrate, or more or less produced on the right (posterior) margin. The younger specimens are generally more nearly circular in form.

I know of no other Cretaceous species of the genus very nearly allied to this.

Locality and position.—Ridge southeast of Laporte, Colorado Territory; Cretaceous. Horizon of the Fox Hills Group of the Upper Missouri section.

PTERIIDÆ.

Genus INOCERAMUS, Sowerby.

INOCERAMUS SIMPSONI, Meek.

Plate 13, fig. 3.

Inoceramus Simpsoni, Meek (1860), *Proceed. Acad. Nat. Sci. Philad.*, XII, 312; and (1876) in *Col. Simpson's Report Expl. across the Great Basin of Utah*, 360, pl. iv, fig. 4.

Shell (right valve) attaining a rather large size, transversely oval-suboblong, gibbous, the greatest convexity being in the antero-central region, cuneate posteriorly; length nearly twice the height; anterior end very short and rounded from the beaks; base forming a long, semi-elliptic curve, most prominent near the middle, and somewhat straightened, or even slightly sinuous, posteriorly; hinge-line long, straight, and ranging parallel to the longer axis of the shell; posterior margin subtruncated, with a slight backward slope above, and forming an abrupt curve into the oblique posterior basal margin; beaks depressed so as to project little above the hinge-line, incurved, and placed nearly over the anterior margin. Surface ornamented with moderately distinct, regular, concentric undulations and lines of growth.

Length, 8.10 inches; height, about 4.30 inches; convexity of right valve, nearly 2 inches.

The only specimen I have seen of this shell is a cast of the interior of the right valve, with some portions of the moderately thick fibrous shell attached. It belongs to the group *Catillus*, as most generally understood, excepting in wanting the peculiar flexure near the cardinal margin; that is, to the group composed of nearly equivalve (or, at any rate, not very strongly inequivalve) shells, with a more or less elongated hinge, ranging nearly or quite parallel to the longer axis of the valves, instead of having a shorter hinge standing nearly at right angles to the longer axis, as in the typical forms of *Inoceramus*, which latter are often decidedly inequivalve. Although I have seen but the right valve of this shell, it is evident, from its moderately gibbous, as well as transversely elongated form, that it does not belong to the more inequivalve section of the genus. Its most remarkable characters are its transversely elongated, very inequilateral form; being proportion-

ally longer and more depressed than any otherwise nearly allied species with which I am acquainted.

Locality and position.—North Platte River, above Platte Bridge, in Dakota Territory; from the Cretaceous formation No. 2 or 3 of the Upper Missouri section. Discovered by Colonel Simpson. Museum of the Smithsonian Institution.

INOCERAMUS PROBLEMATICUS, Schlot.?

Plate 13, figs. 2 and 2 a.

Mytilites problematicus, Schloth. (1820), Petref., 312.

Inoceramus mytiloides, Sowerby (1823), Min. Conch., V, 61, pl. 442; Goldf. (1836), Petref., II, 118, tab. cxiii, fig. 4.

Catillus Schlotheimii, Neilsson (1827), Petref. Suecana, 19.

Catillus mytiloides, Deshayes (1830), Encyc. Méth., II, pl. 211.

Inoceramus problematicus, d'Orbigny (1843), Paléont. Fr., III, 510.—Meek (1873), Hayden's Sixth Report, 476; and (1876) in Col. Simpson's Report Expl. across Great Basin of Utah, 358, pl. 4, fig. 1 a.

Compare *I. mytiloides*, Roemer (1852), Kreid. von Texas, 60, pl. vii, fig. 5 (= *I. mytilopsis*, Conrad (1857), U. S. and Mex. Bound. Report, I, 152, pl. 5, figs. 6 a, and 6 b; also with *I. pseudo-mytiloides*, Schiel (1855), Pacific Railroad Reports, II, pl. 3, fig. 8.

Shell obliquely subovate, extremely inequilateral, rather compressed, and apparently nearly equivalve; anterior margin truncated or sloping very obliquely backward from the beaks to near the middle, where it passes imperceptibly into the base; basal margin sloping obliquely backward and rounding into the posterior basal extremity, which is generally narrowly rounded; hinge-line rather short and very oblique to the longer axis of the valves; posterior dorsal margin sloping obliquely with a more or less convex outline from the posterior extremity of the hinge to the posterior basal margin; beaks very oblique, acutely pointed, incurved, and terminal. Surface ornamented with small, more or less regular, concentric undulations and striæ.

At the time I wrote the above description, I had seen only the figured specimens, which are much broken and distorted. Since that time, I have had an opportunity to collect and examine a large series at the same locality in Wyoming from which those figured on plate 13 were collected. These additional specimens show that this shell varies greatly in form; there being apparently an unbroken series from specimens like those figured on our

plate to forms much broader posteriorly, and less oblique. They all agree, however, in having the beaks much more attenuated and curved forward than in any figures of Schlotheim's *I. problematicus* I have seen. Some of the broader forms agree more nearly with some of those cited above, and figured by Roemer and others from western localities; but still they have more pointed and oblique beaks. I suspect that this shell belongs to a distinct species from *I. problematicus*; but, if so, it will probably have to be designated by Dr. Schiel's name *I. pseudo-mytiloides*.

Locality and position.—The figured specimens were brought by Colonel Simpson's party from a bed of yellow Cretaceous Sandstone over a bed of coal, at the mouth of Sulphur Creek on Bear River, Wyoming. (See bed number 12 of sec., on page 451, Dr. Hayden's Sixth Ann. Rep., 1873.)

INOCERAMUS (sp. undt.).

Plate 13, figs. 4, 4 a.

Compare *I. dimidiatus*, White (1876), Palæont. Wheeler's Surv., 179, pl. XVI, figs. 2 a-d.

This is a neat, symmetrical, little shell, of obliquely-ovate or mytiloid form, with rather pointed, oblique, terminal beaks, and very regular, distinct, concentric surface-undulations. It may be a young of the last, or an entirely distinct species. In some respects, it resembles one of the forms figured by Mr. Conrad in the United States and Mexican Boundary Report (I, plate 5, fig. 6 b); but it has much more regular surface-undulations, and apparently more produced beaks. I was long inclined to believe it the young of the last described form; but it may be distinct.

[Long since the above was written, Dr. White described from Lieutenant Wheeler's collections, a form under the name *I. dimidiatus*, from near Pueblo, Colorado, that agrees very nearly with this, and I am rather inclined to believe it to be the same. He had so many specimens all of the same small size, as to lead to the conclusion that it is most probably distinct from *I. problematicus*.]

Locality and position.—Cretaceous sandstone, on Sulphur Creek, near Bear River, Wyoming. (Benton or Niobrara group of Upp. Mo. Sec.)

INOCERAMUS ERECTUS, Meek.

Plate 13, figs. 1 and 1 a; and pl. 14, fig. 3.

Compare *Inoceramus Elliottii*, Gabb (1868), Palæont. of California, II, 193, pl. 31, fig. 90.

Shell attaining a medium size, vertically ovate-oblong, being higher than wide, not oblique, very gibbous, and nearly or quite equivalve; hinge shorter than the antero-posterior diameter of the valves, and ranging at right angles to their longer (vertical) axes; basal margin regularly rounded; anterior margin truncated nearly vertically from the front of the beaks more than half-way down, but rounding into the base below, inflected in both valves along the rather gibbous anterior umbonal slopes, so as to form a long, undefined, lunule-like excavation, that extends more than half-way down from the beaks; beaks not very prominent, abruptly pointed, very nearly equal, incurved with rather slight obliquity, and placed nearly directly over the vertical anterior margin. Surface of both valves ornamented by regular, medium-sized, concentric undulations, which are usually obsolete on the posterior dorsal region and the inflected anterior margins.

Height, about 2.50 inches; length, 2 inches; convexity, 2.30 inches.

As I have only seen imperfect specimens (mainly casts in sandstone) of this shell, and Mr. Gabb merely gives a single side-view of one specimen of the California species *I. Elliottii*, without measurements, I have doubts in regard to the relations of these shells. In outline, as seen in a side-view, it agrees well with Mr. Gabb's figure cited above, excepting that it appears to be more convex than his shading would indicate, and has more obtuse undulations.

[Since writing the above, I have, through the politeness of Mr. Gabb, had an opportunity to compare our shell with the type of his *I. Elliottii*, and I am led to regard the two as belonging to distinct species. The California form is, as I had inferred from Mr. Gabb's figures, much more compressed; while its surface undulations differ decidedly in being very acutely angular. As I have not been able to identify our shell with any other described species, I add the name *I. erectus* for it here as this report is passing through the press.]

Locality and position.—Chalk Creek, near Uptown, Utah; Cretaceous.

INOCERAMUS DEFORMIS, Meek.

Plate 14, figs. 4, 4 a.

Inoceramus ———?, Hall (1845), in Gen. Frémont's Report Expl. Rocky Mts., 309, pl. iv, fig. 2.

Inoceramus deformis (1872), Hayden's Second Ann. Report U. S. Geol. Survey of the Territories, 296.—White (1876), Palæont. Wheeler's Survey, 179, pl. xv, figs. 1 a, b.

Compare *Haploscapa capax*, Conrad (1874), in Hayden's Ann. Geol. Report for 1873, 456; also *H. grandis*, Conrad (1875), in Cope's Report on the Vertebrates of Hayden's Survey, 23, pl. lvi.

Shell attaining a rather large size, obliquely ovate, and rather compressed in young examples, but more rounded, gibbous, and irregular, as well as much less oblique, in adult specimens; more or less inequivalve, but never very decidedly so; posterior and basal margins rounded; the latter curving up more gradually and obliquely to the short anterior margin; hinge short and usually not very oblique; beaks moderately prominent and placed between the middle and the anterior margin; neither greatly more elevated than the other. Surface ornamented with large, strong, concentric undulations, which are sometimes moderately regular, but often very irregular, and generally becoming rather abruptly smaller on the umbones, where their curves indicate the greater obliquity of the young shell.

Height of a medium-sized specimen, about 4.50 inches; length of same, 4.30 inches; convexity of right valve, about 2.50 inches.

I have frequently had under examination, during the last twelve years, specimens of this shell, without being able to identify them with any described species. Nearly all of the explorers who have visited the eastern slope of the Rocky Mountains between the south branch of Platte River and New Mexico have brought in specimens of it, but almost always in a distorted or broken condition. Its distortion, however, is evidently not always due to accident, since it often resulted from one of the depressions between two of the undulations being so much larger and deeper than the others, as to give the valves a remarkably constricted appearance. In other cases, it resulted, in part at least, from the great irregularity in the size of the undulations themselves. Although it is often found distorted in general form by accidental pressure, it was evidently also naturally quite variable in outline, particularly in convexity.

Our figured specimen is merely an imperfect internal cast of a right valve with the umbonal and anterior portions broken away.

Professor Hall seems, from his remarks in Frémont's report, to have regarded this shell as being related to *I. involutus* of Sowerby. It is, however, very distinct from that species, and even belongs to a different section of the genus, as it certainly did not have one valve very greatly larger than the other, as I know from the examination of numerous specimens of both valves. The specimen figured by Professor Hall, and described by him as being "flat", is, as may be readily seen by the curve of the undulations, a left valve; while the corresponding valve in *A. involutus* is extremely gibbous, elevated, and involute, being almost like a spiral univalve. His figure well illustrates a peculiar flattening of the umbonal region, and the greater obliquity of the undulations often seen on that part of both valves.

I believe the shell here described to be also the same as that on which Mr. Conrad has proposed to found a new genus, *Haploscapha*. Since the publication of his descriptions, already quoted, he has informed me that he had arrived at the conclusion that his proposed new genus is identical with *Catillus*, Brongniart; but that he still retains his name, on the ground that the name *Catillus* had been previously used for *Navicella*, Lamarck, by Humphrey, in 1797.* I have not had an opportunity to examine Mr. Conrad's specimens, but I had always supposed this shell to be an *Inoceramus*, and, like nearly all others, had believed *Catillus*, Brongniart, not to be more than subgenerically distinct from *Inoceramus* proper. If Mr. Conrad's name *Haploscapha* should be retained, the name of the species here described would probably become *Inoceramus (Haploscapha) deformis*. If not, it will probably be *Inoceramus (Catillus) deformis*.†

**Catillus*, of Humphrey, however, was published merely in a list, without any diagnosis, figure, or the citation of any known type, and therefore, I should think, ought not to stand.

† The principal characters that have led Mr. Conrad to separate such shells from *Inoceramus* are, if I have correctly understood him, a kind of rolling or flexure of the hinge-margin (none of our specimens are in a condition to show whether they possess this character of the hinge-margin or not), the entire absence of hinge-teeth, the very thin substance of the shell near the umbones, and its greater thickness at the free margins. There are various types of *Inoceramus*, however, without hinge-teeth; the

Locality and position.—Common in Kansas, and near Pueblo and Colorado City, as well as at other places in Colorado along eastern base of Rocky Mountains, and farther west; everywhere in the Benton and Niobrara Groups.

ARCIDÆ.

Genus CUCULLÆA, Lamarck.

CUCULLÆA (TRIGONARCA ?) OBLIQUA, Meek.

Plate 14, figs. 1, 1 a, 1 b.

Shell attaining about a medium size, rhombic-subovate, moderately convex, the greatest convexity being along the posterior umbonal slope,

presence of one or more obscure anterior teeth being an exceptional, and not by any means a general, character in this group. *I. striatus*, Mantell, for instance, has one obscure anterior hinge-tooth in one valve, while the nearly allied *I. substriatus* is figured by Goldfuss without any traces whatever of such tooth. Again, Goldfuss figures another shell that he refers to *I. Brongniarti*, with indications of three small anterior hinge-teeth. On the other hand, *I. Cuvierii*, Sowerby, from which the original figures and description of the genus were prepared, has no hinge-teeth;* and, according to the best authorities, this is the case with nearly all the other known species the hinges of which have been seen.

In regard to the greater thinness of the shell at the umbones than at the free margins, it should be remembered that it is the outer prismatic layer, and not the inner pearly layer, that Mr. Conrad refers to. So far as I have been able to see, however, this outer layer is not unfrequently thinnest near the umbones, excepting under the beaks along the hinge, in different types of the genus. In our shell, this outer fibrous layer, like that of other species in the lower divisions of the Upper Missouri Cretaceous, is nearly always found with the inner pearly layer dissolved away, in which condition the fibrous part appears to have been flexible, as I have often seen it abruptly folded upon itself in various ways. The rolling-over of the hinge-margin in Mr. Conrad's type I should think not of generic importance. Mr. Conrad thinks *I. involutus* of Sowerby has the hinge-characters of his *Haploscapa*; but Dr. Stoliczka had previously proposed for that type the name *Volviceramus* as a subgenus under *Inoceramus*, in which genus all authorities have placed it.

Since writing the above, Mr. Conrad has informed me that he adopts the name *Volviceramus*, and ranges *Haploscapa* as a subgenus under it.

* Sowerby's original diagnosis of this genus, read before the Linn. Soc. in 1814, and published in the Trans. of same, XIII (dated 1821, but usually cited 1822-3), was drawn up from *I. Cuvierii*; and Parkinson, who first adopted the genus in Trans. Geol. Soc., 1821 (often cited 1819), mentioned first (p. 53) *I. Cuvierii*; while Mantell, who adopted it with a generic diagnosis in Geol. Suss., 1822 described under it first a species referred by him to *I. Cuvierii*. Hence this species has been cited as the type of the genus; but, owing to the fact that Sowerby, in publishing the genus in his Min. Con., III (title p. 1821, index 1822), described under it first *I. concentricus*, Park., some regard that as the type.

while the anterior ventral region is abruptly cuneate; anterior margin rounded in outline; base with a shallow semiovate outline, being usually slightly more prominent in advance of the middle; posterior margin long, and very obliquely truncated, with a slightly convex outline, from the hinge to the posterior basal extremity, which is prominent and subangular; hinge-margin very short, or little more than equaling one-third the length of the valves; posterior umbonal slopes prominent, and more or less angular from the beaks to the posterior basal angle; cardinal area short and rather narrow; beaks moderately prominent, incurved, and placed one-fourth to one-third the length of the valves from the anterior margin. Surface ornamented by moderately distinct lines of growth, crossed by obscure radiating costæ that are wider than the mere linear furrows between.

. Length, 1.50 inches; height, 1 inch; convexity, about 0.70 inch.

I only know this shell from casts that do not show the hinge. They bear impressions, however, in some instances, of a ridge or projection along the margin of the posterior muscular scar, as in *Cucullæa*. From the general form of the shell, and its very short hinge-margin, I can scarcely doubt that it belongs to Mr. Conrad's group *Trigonarca*; but, until the hinge can be seen, its relations to that genus cannot be satisfactorily determined. I know of no very nearly allied species.

Locality and position.—East Cañon Creek, Wasatch Range, Utah; in a whitish sandstone of Cretaceous age.

Genus AXINÆA, Poli.

AXINÆA WYOMINGENSIS, Meek

Shell attaining a medium size, subcircular or very slightly longer than high, gibbous, thick, and strong; beaks rather prominent; basal margin semicircular, and rounding regularly upward in front into the anterior border, which rounds to the cardinal edge, so as scarcely to produce more than a very slight angularity at the connection of the two above; posterior margin making a slightly broader and similar curve, excepting that it is faintly sinuous above the middle; hinge-plate thick, moderately arched, with denticles rather strong, nearly straight, or a little curved, numbering about eight or ten well-developed ones in front, and seven or eight behind, with per-

haps a few other smaller ones toward the central region; cardinal margin short; hinge-area small, with apparently only a few coarse cartilage-fur-

Fig. 2.

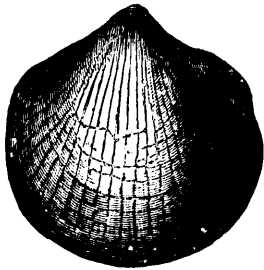


Fig. 3.

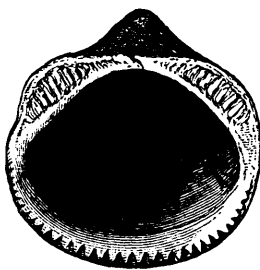
*Axinæa Wyomingensis.*

Fig. 2. Exterior or left valve, with surface somewhat eroded.

Fig. 3. Interior, and hinge of same.

rows; pallial margin strongly crenate within; surface ornamented by fine concentric striæ, and a few stronger marks of growth, crossed by about thirty-five to forty very obscure radiating, flattened, or much depressed costæ, only separated by scarcely perceptible narrow or linear furrows.

Height, 1.30 inches; breadth, 1.33 inches; convexity, 1.04 inches.

This species is perhaps as nearly allied to *A. subimbricata*, M. & H., as to any other Cretaceous form. It is a much thicker and more gibbous shell, however, with proportionally less transverse valves, and much less distinctly defined costæ. It also differs in having a broader hinge-plate and straighter hinge-denticles. If Poli's name *Axinæa* should not be retained for this genus, the name of this species here described will become *Pectunculus Wyomingensis*.

Locality and position.—East side of Cooper Creek, near Old Stage Station; Laramie Plains, Wyoming Territory; Cretaceous.

CORBULIDÆ.

Genus CORBULA, Bruguière.

CORBULA (undt. sp.).

Plate 14, fig. 2.

Shell transversely ovate-pyriform, being gibbous in the anterior and umbonal regions, and distinctly contracted, compressed, and subrostrate behind; ventral margin semiovate, with the most prominent part a little in advance of the middle; anterior margin truncated obliquely forward from the beaks above, and somewhat abruptly rounded from near the middle into the base; beak (of left valve) prominent, rather gibbous, incurved, and

placed in advance of the middle; dorsal outline somewhat concave behind the beaks. Surface apparently smooth. Hinge and interior unknown.

Length, 0.95 inch; height (of left valve), 0.66 inch.

I have seen but a single cast of the left valve of this shell (apparently of its exterior), and consequently know nothing of its hinge, muscular, and pallial impressions, nor of the relative convexity of its right valve. It will be seen, however, to agree very closely in form, so far as we have the means of making a comparison, with the large species *C. pyriformis*, from the fresh- or brackish-water deposits at the Sulphur Creek locality near Bear River, Wyoming, figured on plate 17. The resemblance is so close to certain forms of that variable species, such as fig. 2 *a* of plate 17, that I should have suspected that the label, indicating a different locality and position, had been accidentally associated with it, were it not for the fact that it is composed of a different material (a light-colored sandstone) from the matrix of the Sulphur Creek fossils. If the label really refers to its proper locality, it will probably prove to be a distinct species from that found at Sulphur Creek, as there seems, so far as yet known, to be no species common to the two localities, unless this one may be so. If a new species, *C. pirum* would be a good name for it.

Locality and position.—Coalville, Utah; Cretaceous sandstone.

CARDIIDÆ.

Genus CARDIUM, Linnaeus.

CARDIUM CURTUM, M. & H. ?

Plate 15, fig. 3 (not 3 *a*).

Cardium (*Hemicardium* ?) *curtum*, Meek and Hayden (1861), Proceed. Acad. Nat. Sci. Philad., XIII, 442.

Shell truncate-suborbicular, with height and length generally about equal, and the greatest convexity along or near the angular posterior umbonal slopes; anterior margin rounding into the rounded or semi-ovate base, which is often most prominent slightly behind the middle; posterior margin obliquely truncated above, and very abruptly rounded or subangular below; beaks elevated, rather pointed, and strongly incurved at right angles to the hinge, placed slightly in advance of the middle; hinge-margin short; posterior

umbonal slopes and back part of beaks angular, the angularity being continued obliquely to the posterior basal margin, while the surface behind these angular slopes is flattened, and rather abruptly inflected to the truncated hinder margin. Surface ornamented by distinct radiating non-spiniferous costæ, about equal to the intermediate furrows; costæ largest and sometimes bifurcating on the flattened surface behind the umbonal angles, and simple and very regular in front of the same, where they gradually diminish in size anteriorly; lines of growth moderately distinct.

Length, about 0.80 inch; height, 0.75 inch; convexity, about 0.60 inch.

The specimens of this shell in the collection seem to agree pretty closely with *C. curtum*, but are proportionally slightly longer, with rather more depressed beaks, and less sloping anterior and posterior dorsal margins. Hence, I am not *quite* sure of their exact specific identity. At the time this report was originally prepared, I supposed the smaller shell, represented by fig. 3 *a* of the same plate, might possibly be the young of that here under consideration; but, on subsequently collecting and examining a number of specimens at the same district and horizon, I was led to believe these forms much more probably distinct, and consequently proposed the name *C. subcurtum* for that represented by our fig. 3 *a*, in one of Dr. Hayden's reports.

These shells belong to the genus *Cardium*, but not to the typical section. I originally referred the typical *C. curtum* very doubtfully to the section *Hemicardium*; but it cannot be properly included in that section, being much nearer the subgenus *Fragrum*, but still not agreeing with that group either.

Locality and position.—The type-specimens of *C. curtum* were brought by Captain Reynolds from Gros Ventres River, Wyoming, from a gray sandstone of Cretaceous age. The specimens here under consideration came from Chalk Creek, two miles west of Uptown, Utah, where they occur in a whitish Cretaceous sandstone.

CARDIUM SUBCURTUM, Meek.

Plate 15, fig. 3 *a* (not fig. 3).

Cardium subcurtum, Meek (1873), see foot note in Dr. Hayden's Sixth Ann. Report Geol. Survey of the Territories, 476.

Shell under medium size, truncato-suborbicular, about as high as wide.

rather convex, and but very slightly oblique; beaks nearly central, rather prominent, distinctly incurved almost at right angles to the hinge; posterior margin truncated with a slight forward obliquity, so as to connect with the dorsal margin at an obtuse angle; anterior margin rounding regularly into the base, which describes a slightly oblique semi-ovate curve, being more prominent behind, where it rounds up very abruptly to the posterior margin, so as to give a subangular outline to the posterior basal extremity; umbonal slopes rather prominent, but not angular; hinge-margin shorter than the length of the valves. Surface ornamented by small, regular, simple radiating costæ, and moderately distinct lines of growth.

I have seen specimens nearly twice the linear dimensions of that figured on plate 15; and, as these have the posterior umbonal slopes rounded instead of angular, there seems to be very little reason for doubting that it is a distinct species from the last. As already stated, I at first thought it the young of *C. curtum*; but the specimens I have since had an opportunity to examine have led to a different conclusion.

Locality and position.—Chalk Hill, near Coalville, Utah, where it occurs in a whitish sandstone of the coal-bearing Cretaceous series of that region. I also collected specimens of it between Coalville and Weber Cañon, at apparently higher horizons than the Chalk Hill beds.

MACTRIDÆ.

Genus MACTRA, Linnæus.

MACTRA? EMMONSI, Meek.

Plate 15, fig. 8.

Shell small, oval-subtrigonal, rather compressed, longer than high, nearly or quite equilateral, or with anterior side slightly longer than the other; basal margin forming a semi-elliptic curve; anterior margin narrowly rounded below the middle; posterior margin somewhat broader, most prominent and abruptly rounded or obtusely subangular below, and very faintly subtruncated obliquely above; dorsal margin sloping before and behind the beaks, the anterior slope being greater, with a concave outline; beaks nearly central, or sometimes placed a little behind the middle, rather depressed, and incurved with very slight obliquity; posterior umbonal slope very obscurely

angular from the beaks to the posterior basal extremity. Surface only marked by fine obscure lines of growth. (Hinge and other internal characters unknown.)

Length, 0.45 inch; height, 0.30 inch; convexity, 0.17 inch. Some specimens of apparently the same species are nearly double the size of that from which the above measurements were taken, and some of the smaller ones are proportionally a little shorter.

As I am unacquainted with the hinge and other internal characters of this little shell, it is only provisionally referred to the genus *Mactra*. In addition to this, until conchologists can agree in regard to which one of the several generic types included by Linnæus in that genus is to be regarded as the typical form, it is impossible to know what we ought to call a shell of this type, even where the specimens are in a condition to show clearly all the generic characters.

It is a smaller and more depressed shell than any of the known Upper Missouri Cretaceous Mactras, and more closely resembles a species described by Dr. Hayden and myself, from the southwestern base of the Black Hills, under the name *Tancredia Warrenana*, from beds believed, from their stratigraphical position, to belong to the Jurassic series. The typical specimens of the *T. Warrenana* are merely casts, showing none of the internal characters, but have almost exactly the form and general appearance of the genus *Tancredia*; though they may belong to some other genus. On critical comparison with the species under consideration, the latter is found to differ in having its beaks slightly more obtuse, its posterior umbonal slopes less angular, and its posterior margin more rounded in outline.

The specific name is given in honor of S. F. Emmons, Esq., of the United States Geological Survey of the Fortieth Parallel.

Locality and position.—East Cañon Creek, Wasatch Range, Utah, in an ash-colored sandstone, believed to belong to the upper bed of the Cretaceous of that region.

MACTRA (TRIGONELLA)? ARENARIA, Meek.

Plate 14, fig. 5.

Shell attaining a medium size, trigonal-subovate, rather compressed; posterior margin rounded, or sometimes faintly subtruncated; anterior more

narrowly rounded, most prominent a little below the middle; base forming a nearly semi-elliptic curve, being most prominent along the central region, and rounding rather more abruptly into the posterior margin; dorsal margin sloping from the beaks toward the extremities; beaks moderately prominent, but very slightly oblique, and very nearly central, or placed slightly behind the middle; posterior umbonal slopes with each a shallow but distinct sulcus extending obliquely from the beak toward the posterior basal margin. Surface ornamented by very regular, distinctly-defined, concentric lines and furrows. (Hinge and interior unknown.)

Length, 1.48 inches; height, 1.10 inches; convexity, about 0.60 inch.

As the specimens of this shell yet obtained show neither its hinge nor internal characters, it is not possible to determine from them whether it is a true *Mactra* (*Trigonella*), or a *Spisula*, or whether it belongs to some of the other allied groups. It has the form and general external appearance of *Mactra* (*Trigonella*), but differs from all of the otherwise similar described species of that genus known to me, in the distinctness and regularity of its concentric lines and furrows, as well as in the possession of the oblique posterior umbonal sulcus. In the latter character, it seems to agree very nearly with *Mactra? tenuistria*, Gabb (California Palæontology, vol. II, plate 29, fig. 68). It differs, however, in being proportionally longer and more abruptly or narrowly rounded in front, much more coarsely striated, and in having the posterior umbonal sulcus of each valve directed so as to reach the posterior margin farther up. This sulcus seems not to impart any distinct sinuosity to the posterior margin, but perhaps gives it a very slightly truncated appearance in some specimens.

Compared with the last, this species will be seen to differ, not only in its larger, more gibbous, and less depressed form, but in the possession of proportionally stronger concentric ridges and furrows.

Locality and position.—Whitish Cretaceous sandstone, including coal, on Red Creek, Uinta Mountains; and in the same rock on Chalk Creek, Utah.

MACTRA (CYMBOPHORA)? UTAHENSIS, Meek.

Plate 15, figs. 9, 9 a, and 9 b.

Shell subovate, moderately convex; anterior margin rounded; posterior

margin narrower, and rather abruptly rounded, or sometimes apparently slightly truncated, being most prominent below; basal margin forming a semi-elliptic or semi-ovate curve, being sometimes more prominent anteriorly; dorsal outline sloping from the beaks toward the extremities; beaks moderately prominent, very nearly central, and incurved with little obliquity; umbonal slopes merely rounded, and not terminating in a flexure of the posterior basal margin. Surface apparently merely marked with fine, obscure, irregular lines of growth. Hinge merely known to possess linear anterior and posterior lateral teeth. Ligament and internal characters unknown.

Length, 1.35 inches; height, 0.90 inch; convexity, about 0.50 inch.

The specimens of this shell in the collection agree so nearly with a form described by the writer in connection with Dr. Hayden, from the Upper Cretaceous beds on Deer Creek near the North Platte, under the name *Tellina nitidula*, that I was at one time inclined to think they might belong to a variety of that species. Still, as they are merely internal casts, giving but a limited knowledge of the hinge, and showing nothing of the internal characters, it is much more probable that they are really very distinct. So far as regards their form and general appearance, they seem only to differ in having the anterior side rather more produced and sometimes wider.

From this general resemblance, however, I have, in the absence of any knowledge of the nature of its cardinal teeth or pallial line, ventured to refer it provisionally to the same section of the *Macra* group to which *Tellina nitidula* is now believed to belong; that is, to *Cymbophora*, Gabb. I should have been inclined to refer it to *Macoma* or *Gastrana*, were it not for the impressions of lateral teeth seen before and behind the beaks in the casts.

Locality and position.—Whitish Cretaceous sandstone, East Cañon Creek, Wasatch Range, and near Coalville, Utah.

TELLINIDÆ.

Genus TELLINA, Linnæus.

TELLINA??ISONEMA, Meek.

Plate 15, fig. 6.

Shell transverse, elliptic-subtrigonal in outline, compressed, and nearly

or quite equilateral; anterior margin narrowly rounded; base forming a semi-elliptic curve; posterior end narrowly rounded or subangular at the termination of a slight, oblique flexure of the valves; dorsal margin sloping from the beaks to the extremities, with a moderately convex outline; beaks almost central, rather small, and projecting little above the cardinal margin. incurved with scarcely any visible obliquity; hinge and interior unknown. Surface ornamented by fine, perfectly regular, concentric, thread-like lines, gradually becoming smaller and more crowded toward the umbones, on which they are nearly or quite obsolete.

Length, 0.90 inch; height, 0.60 inch; convexity, about 0.20 inch.

The fact that this is one of the characteristic shells of the formation in which it occurs seems to render it desirable that some notice should be taken of it, although we have not the means of arriving at satisfactory conclusions in regard to its affinities. At the same time that I place it provisionally in the above genus, I really have very little faith in its belonging properly to that group. It seems to be a very thin shell, as the specimens (which in some instances appear to be internal casts) show the exceedingly regular thread-like concentric lines quite distinctly. In some of these casts there are appearances of the impression of a thin lamina, or very slender ridge, nearly parallel to the hinge-margin both behind and in front of the beaks. These may have been left by elongated lateral teeth; though they appear not to be exactly marginal, but a little removed from it, as if they had been made by a thin projecting lamina, somewhat similar to the cartilage-support in the genus *Edmondia*. I do not think the shell at all related to that group, however.

After numerous comparisons, I have been unable to identify this shell with any described species.

Locality and position.—In whitish and buff-colored sandstone, at Chalk Creek, above Coalville, Utah; also in a similar matrix from East Cañon Creek, Wasatch Range; Cretaceous.

TELLINA MODESTA, Meek.

Plate 15, figs. 4 and 5.

Shell rather small, transversely elongate-subelliptic, being twice as long as high, rather distinctly compressed; anterior margin narrowly rounded;

base forming a long, semi-elliptic curve; posterior extremity more narrowly and less regularly rounded than the other, apparently slightly bent to the left; dorsal margin declining very slightly, with convex slopes, both in front and behind the beaks; beaks very nearly central and inconspicuous, being depressed and compressed. Surface of casts smooth, but probably on well-preserved shells marked with fine concentric striae. Hinge and interior unknown, with the exception of some appearances of lateral teeth seen in casts.

Length, 0.86 inch; height, 0.44 inch; convexity, 0.10 inch.

This little shell has the general form of *Tellina*, or *Abra*, but without seeing the hinge and interior it is impossible to determine whether it may not belong to some allied, but distinct, group. It is a more depressed shell than *T. scitula*, M. & H., or any of the other species from the Cretaceous rocks of the Upper Missouri, and I have been unable to identify it with any of the known American or foreign species. Perhaps the most nearly allied American fossil species yet known is Mr. Gabb's *T. Ashburnerii* (from division A of the California Cretaceous series), which, however, is a proportionally higher (wider) shell, with much less depressed and more angular beaks.

Locality and position.—Whitish sandstone of East Cañon Creek, Wasatch Range, upper part of series; Cretaceous.

VENERIDÆ.

Genus CYPRIMERIA, Conrad.

CYPRIMERIA ? SUBALATA, Meek.

Plate 15, fig. 7.

Cyprimeria subalata, Meek (1873), Hayden's Sixth Report U. S. Geol. Survey of the Territories, 476.

Shell transversely broad-subovate or subelliptic, strongly compressed; extremities rather narrowly, and nearly equally rounded; basal margin forming a regular semi-elliptic curve, being most prominent along the middle, and rounding up gradually and equally into the anterior and posterior lateral margins; dorsal margin sloping from the beaks, the posterior slope being more convex in outline than the anterior; beaks small, scarcely pro-

jecting above the hinge-margin, very nearly or exactly central, and almost entirely without obliquity. Surface apparently smooth, or only showing very fine, obscure, concentric striæ. (Hinge and interior unknown.)

Length, 1.22 inches; height, 0.90 inch; convexity of left valve, only about 0.12 inch.

Although I have seen only casts of this species, giving no satisfactory knowledge of its hinge and internal characters, from its very close similarity to *Cyprimeria depressa* of Conrad, described from the North Carolina and Mississippi Cretaceous rocks, I can scarcely doubt its generic identity with that shell. It is quite unlike Mr. Conrad's type-species of *Cyprimeria* (*C. excavata*), so much so, indeed, that I should not have suspected it to belong to the same genus. Its *very* close specific relations, however, as stated above, to *C. depressa*, which has the characteristic hinge of *Cyprimeria*, leaves little reason for doubts on this point. On comparison with good specimens of *C. depressa*, sent to me by Mr. Conrad, I find our shell only differs (in external characters at least) in having its beaks a little less flattened and placed slightly farther forward, while its posterior dorsal outline is somewhat less straightened, and its anterior outline a little less narrowly rounded. These, however, are not greater differences than we often see between different individuals of the same species among such shells.

Locality and position.—Whitish Cretaceous sandstone, at East Cañon, Wasatch Range, Utah.

GASTEROPODA.

NATICIDÆ.

Genus GYRODES, Conrad.

GYRODES DEPRESSA, Meek.

Plate 15, figs. 1, 1 a.

Shell depressed so as to be about twice as wide as high; volutions three to three and a half, increasing rapidly in size; last one widest below the middle, narrowly rounded, but not angular on the under side, at least in casts; spire much depressed; suture channeled in such a manner as to be flattened within, owing to the presence of a revolving furrow just above it; umbilicus wide and depressed-conical in form, without showing any revolv-

ing ridges within; aperture obliquely suboval, with its longer axis ranging downward and outward. (Surface unknown.)

Height, 0.55 inch; breadth, 1.05 inches.

The specimens of this shell in the collection are merely casts in a very fine arenaceous material. It certainly differs, however, in its much depressed form, from any otherwise similar described species with which I am acquainted. Its umbilicus is quite wide, but diminishes rapidly in breadth within, in consequence of the depressed form of the shell. The under side of the body-volution is prominently and narrowly rounded around the umbilicus, but not properly angular; at any rate not so in casts. Owing to the form of the body-volution, the aperture has an oblique outward slope. The whorls seem not to be truncated around the upper edge, as is often the case in this genus; but a revolving furrow, just above the suture, gives the latter a duplicated or banded appearance, the band forming a flattened bottom to the channeled suture. Only faint traces of very oblique lines of growth are seen on the cast.

Locality and position.—Chalk Creek, at the mouth of the cañon, above Coalville, in the whitish Cretaceous sandstone series, Utah.

APORRHAIIDÆ.

Genus ANCHURA, Conrad.

ANCHURA? FUSIFORMIS, Meek.

Plate 15, figs. 2, 2 a.

Shell subfusiform; spire conical, rather short; volutions about five, moderately convex, those of the spire smooth and separated by a comparatively distinct suture; last one subovate, obscurely angular around the middle in young examples, but with angle entirely obsolete in the adult, gradually tapering below into a long, straight, rather stout canal, which has some appearance of being obliquely truncated at the extremity; outer lip, with extension apparently short, simple, and slightly recurved; surface with only obscure lines of growth, excepting near the lip on the body-volution in adult shells, where there are usually a few small, slightly oblique, longitudinal costæ, that become obsolete before reaching the suture above and a little below the middle of the volution. (Aperture and columella unknown.)

Length of the largest specimen seen, including canal, about 1.28 inches; breadth of body-volution, including the lip as far as preserved, about 0.70 inch.

The specimens of this shell are unfortunately not in a condition to show the entire lip, though they leave no room for doubting that it is more or less extended. The fact that the commencement of a single mesial angle can also be seen on the outside of the dilated part indicates that the lip probably has but one spur; and, from a slight upward curve of this angle, it is probable the extended part is more or less recurved. None of the specimens show the inner lip or the exact form of the aperture.

Owing to the stoutness and straightness of the canal, and the presence of flexuous costæ on the outer side of the body-volution in this species, it presents some general resemblance to *Pugnellus manubriatus*, Gabb, from the Cretaceous rocks of California. Unfortunately, no specimens have been found in a condition to show whether or not it has the outer margin of its lip thickened as in that genus; but it seems not to present that character. It at least differs specifically from *G. manubriatus* in having its canal more slender and elongated, and its spire more elevated.*

Locality and position.—The type-specimens were found at the water-tank two miles from Coalville, Utah, and on Chalk Creek above Coalville, in a whitish Cretaceous sandstone. I also found several specimens of it at Coalville, in bed No. 11, of section given on page 439 of Dr. Hayden's Sixth Annual Report of the United States Geological Survey of the Territories, 1873.

* Since the foregoing description and remarks were written (in 1870) Dr. White has figured and described, in his report on Lieutenant Wheeler's collections (page 190, pl. xvii, fig. 4), a shell from New Mexico supposed to belong to this species. Although when he showed me his specimens with others when I was lying sick at Oakland, Md., in 1874, I was inclined to believe it not distinct from this species, a later comparison has led me to regard the New Mexican shell as belonging to another species with a more elevated and more slender spire. Better specimens of the two forms would doubtless show other differences.

SIPHONARIIDÆ.

? Genus ANISOMYON, M. & H.

ANISOMYON SEXSULCATUS, M. & H.?

Helcion sexsulcatus, Meek and Hayden (1856), Proceed. Acad. Nat. Sci. Philad., VIII, 68.*Anisomyon sexsulcatus*, Meek and Hayden (1860), Am. Jour. Sci., XXXVIII (2d ser.),35.—Meek (1876), Palæont. Upper Missouri, 293, pl. 18, figs. 8 *a*, *b*.

Fig. 4.

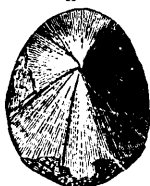
*Anisomyon sexsulcatus*.

Fig. 5.



Fig. 4. An internal cast as seen from above—(nat. size).

Fig. 5. A side-view of same.

The specimen I have here referred doubtfully to the above species is smaller than the original type of the same, being but little more than half the linear dimensions of that species. It also has its apex proportionally a little higher, and the anterior slope slightly convex near the apex, instead of concave; while it shows on the internal cast an obscure mesial carina down the posterior slope, not seen on the cast of the type of *A. sexsulcatus*. It shows the six radiating furrows, however, exactly as in that species, and agrees so very nearly in all other known characters that I have concluded to refer it provisionally to the same.

The original type-specimen of *A. sexsulcatus* is an imperfect cast of the interior, retaining only thin films of the inner layer of the shell. That now before me is also an internal cast, but retains some fragments of the shell near the margin, and one of these shows that there is, as I had long since conjectured, a narrow furrow on the outer surface of the shell over each of those seen on the internal cast. These fragments of the shell, although apparently not worn, show only obscure marks of growth.

I suspect that a good series of specimens may show this shell to be a distinct species from *A. sexsulcatus*, of smaller size. If so, it may be called *A. Wyomingensis*.

Locality and position.—Outer sandstone ridge southeast of La Porte, Colorado; Fox Hills Group of the Upper Missouri Cretaceous series.

FOSSILS OF THE BEAR RIVER FRESH- OR BRACKISH-WATER BEDS.

As it is still a matter of some doubt whether the above-mentioned highly-inclined strata seen on Sulphur Creek near Bear River, Wyoming, very nearly conformable to well-marked marine Cretaceous beds at the same locality, belong to the latest member of the Cretaceous or to the earliest Eocene Tertiary, I prefer to describe the fossils from them here separately under a distinct heading. I have from the first inclined to the opinion that these brackish-water beds belong to the horizon of the oldest Eocene, though I have several times mentioned certain reasons for suspecting that they may prove rather to belong to the closing period of the Cretaceous. One difficulty in deciding in regard to their precise horizon is, that all of the fossils yet known from them are new and entirely distinct from those found elsewhere in very well-determined horizons. None of them belong to any of the characteristic Cretaceous genera, while several of the species are nearly allied to Lower Eocene forms of the Old World, though clearly distinct specifically.

The fact, however, that at least one species occurring here seems to be identical with a form (*Vivipara Conradi*) found in a similar brackish-water group of strata, associated with Cretaceous types of Vertebrate remains at the mouth of Judith River on the Upper Missouri, when taken in connection with the recent discovery of a Cretaceous type of Saurian remains in Wyoming, apparently at a higher horizon, and of a decidedly brackish-water group of Molluscan remains beneath a considerable thickness of Cretaceous strata at Coalville, Utah, certainly seems to indicate that these beds belong rather below than above the line of division between the latest Cretaceous and the oldest Eocene. Unfortunately, however, as I have often remarked, fresh-water and estuary shells do not generally present the same well-defined distinguishing features, if I may so speak, in each of the various geological horizons, usually observable among marine types, being often very similar from rocks of quite different ages, and again quite distinct in equivalent beds at different localities.

MOLLUSCA.
LAMELLIBRANCHIATA.
UNIONIDÆ.

Genus UNIO, Retzius.

UNIO VETUSTUS, Meek.

Plate 16, figs. 5, 5 *a*, 5 *b*, and 5 *c*.

Unio vetustus, Meek (1860), Proceed. Acad. Nat. Sci. Philad., VIII, 117; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 359, pl. v, figs. 12 *a*, *b*.—White (1875), Rep. on Wheeler's collections 206, pl. xxi, figs. 12 *a—d*. Compare *U. priscus*, Meek and Hayden (1856), Proceed. Acad. Sci. Philad., 117.—Meek (1876), Pal. Upp. Mo., 516, pl. 43, figs. 8 *a*, *b*, *c*.

Shell of about medium size, transversely-subovate or subelliptic, the widest part being anteriorly, though young examples are narrower, with dorsal and ventral margins more nearly parallel, rather thin and moderately convex, about twice as long as high; base forming a long semi-elliptic or semi-ovate curve in adult shells, but usually straighter in the young; posterior margin rather narrowly rounded below in large specimens, and obliquely truncated in small examples; dorsal margin nearly straight, excepting in large shells, where it is more arched; anterior margin short and rounded; beaks depressed, not eroded, placed near the anterior, very neatly ornamented with small, perfectly regular, concentric ridges and furrows, that generally end abruptly behind at a small, oblique, linear, posterior umbonal ridge extending backward and downward, while midway between this and the cardinal margin there is a second similar ridge; other portions of the surface merely marked with lines of growth, which sometimes assume a subimbricating appearance near the free margins. Hinge of moderate length, with two cardinal teeth in the left valve, the posterior one being larger than the other; lateral teeth long and nearly straight (cardinal teeth of right valve unknown); scars of anterior muscles deep and irregularly pitted.

Length of a large specimen, about 4 inches; height, 2.23 inches; convexity, about 1.10 inches.

Young specimens of this species seem to be generally proportionally narrower, and have the posterior margin more distinctly truncated, while the costæ or concentric ridges of the beaks cover proportionally more of the umbonal region. In large examples, these markings become obsolete, excepting on the immediate umbones, and the posterior margin is more round or less distinctly truncated, while the valves become proportionally less depressed in general outline. I have long suspected that this shell may possibly be identical with *U. priscus*, M. & H., as the specimens seem to be very much alike. Still, as we only know the latter from very imperfect specimens, while the Bear River beds from which the form here under consideration was obtained, seem to be very local, and, so far as yet known, to contain a peculiar fauna, almost without exception unknown in the Upper Missouri country where the type of *U. priscus* was discovered, it is perhaps better to keep these two proposed species separate until we can have an opportunity to compare better series of specimens from the two distantly separated localities.

Locality and position.—Fresh-water beds on Bear River, near the mouth of Sulphur Creek, Wyoming.

UNIO BELLIPLICATUS, Meek.

Plate 16, figs. 4, 4 a.

Unio belliplicatus, Meek (1870), Proceed. Philosophical Society of Philadelphia, XI.

Unio (Loxopleurus) belliplicatus, Meek (1873), Hayden's Second Report Geol. Survey of the Territories, 294.

Shell attaining a medium size, transversely subovate, the widest part being a little in advance of the middle, moderately convex, generally less than twice as long as high; anterior margin short, rather regularly rounded; posterior margin obliquely-subtruncated, with a more or less convex outline, most prominent below, where it is obtusely subangular or abruptly rounded into the base; dorsal outline nearly straight, or more or less arched; base broad-semiovate, being most prominent in advance of the middle, in large specimens generally a little sinuous posteriorly; beaks much depressed, or scarcely rising above the cardinal margin, oblique, and placed near the anterior end, not eroded; hinge moderately long, with car-

dinal and lateral teeth, so far as known, much as in the last-described species. Surface ornamented by a series of very regular, distinctly-defined, and generally simple plications, which commence very small, and closely approximated along the dorsal margin just before the beaks, and after slight curves, radiate and descend obliquely toward the posterior basal margin, increasing in breadth and becoming more obtuse as they descend and diverge, and at last in large specimens becoming obsolete before reaching the margins; while another more or less similar series of plications sometimes originates along the cardinal margins behind the beaks, and descends obliquely backward and downward, so as to connect with those of the first-mentioned series along the posterior umbonal slopes at very acute angles, somewhat like we see on species of *Goniomya*. Marks of growth moderately distinct, becoming sometimes stronger or subimbricating near the margins.

Length of a large specimen, 2.75 inches; height, 1.50 inches; convexity, about 0.85 inch.

This beautiful species may be distinguished at a glance from the last by its peculiar plications, the principal series of which, although originating, as in that species, just before the beaks, always radiate obliquely backward and downward *across* the lines of growth, instead of running horizontally backward parallel to those lines. The fact that these plications do not converge to the beaks will serve to distinguish this shell from another associated species, of which there are fragments in the collection, with a series of very prominent plications converging more nearly to the apex of each beak. In the latter, the beaks are also much more gibbous.

In its style of ornamentation, this species seems to approach South American types, such as *U. hylea* and *U. Guaraniana*, more nearly than any of the numerous North American forms. Its radiating plications remind one of the genus *Castalia*; but its form and hinge are entirely different, the latter being that of true *Unio*.

In Dr. Hayden's Second Annual Report of the Geological Survey of the Territories, page 294, published in 1872, I proposed a subgenus *Loxopleurus*, for the reception of this species, which it can retain, if it shall be considered desirable to separate it subgenerically or otherwise from the typical and other established sections of the genus *Unio*, on account of its very peculiar

surface-markings or other characters. My present opinion, however, is, that it may find a place in some of the previously-proposed sections of *Unio*.

Locality and position.—The typical specimens of this species were brought by Dr. Hayden from Limestone Hill, on Bear River, Utah. Mr. King also found it on the same river, beneath indications of lignite. Specimens were also sent by Mr. H. R. Durkee to the Smithsonian Institution, from the same horizon at Gilmer, Wyoming.

CYRENIDÆ.

Genus CORBICULA, Benson.

CORBICULA (VELORITINA) DURKEEI, Meek.

Plate 16, figs. 6, a, b, c, d, e, f, g.

Cyrena (*Corbicula*?) *Durkeei*, Meek (1870), Proceed. Acad. Nat. Sci. Philad., XI, 431.

Corbicula (*Veloritina*) *Durkeei*, Meek (1872), Hayden's Second Ann. Report U. S. Geol. Survey of the Territories, 294.

Cyrena (*Veloritina*) *Durkeei*, White (1876), Report on Lieut. Wheeler's collections, 207, pl. xxi, fig. 13.

Shell attaining a large size, thick, trigonoid-subcordate, gibbous, oblique, with length exceeding somewhat the height, most convex a little in advance of and above the middle, and cuneate postero-ventrally; posterior dorsal slope long, straight, or slightly convex in outline from the umbones to the angular or subangular posterior basal extremity; basal margin semi-ovate in outline, being most prominent anteriorly; anterior margin short, descending very abruptly from the beaks, with a slightly concave outline above, and rounding regularly into the base below; beaks elevated, gibbous, obliquely incurved, contiguous, and placed about half-way between the middle and the anterior end, or sometimes nearly over the latter; posterior umbonal slopes prominently rounded, with posterior dorsal margins inflected or incurved so as to form a profound, broad concavity, or sulcus, along their entire length, as the two valves are seen united; lunule in most cases deep, but generally without well-defined margins; ligament short, narrow, and so deeply seated in the broad dorsal concavity as not to be visible in a side-view when the valves are united; surface only showing moderately distinct lines of growth; hinge strong; cardinal teeth oblique, excepting the anterior

one, which ranges nearly vertically; lateral teeth elongated, and only very minutely striated, or very nearly smooth, the posterior one of the left valve being sometimes mainly formed by the beveling of the inflected edge of the valve, instead of standing out at right angles from an erect margin; pallial line with a short, very shallow sinus, immediately under the ovate, shallow, and oblique scar of the posterior adductor muscle (see fig. 6 *g*); anterior muscular impression deeper, slightly smaller than the other, and ranging nearly vertically.

Length of a large specimen, 1.78 inches; height, 1.56 inches; convexity, 1.12 inches.

As may be seen by our figures, this shell varies greatly in form, some specimens being more depressed, with the posterior basal extremity more produced than in others (see fig. 6 *b*); while others have the umbones more elevated, and the whole shell proportionally shorter, as seen in our fig. 6 *c*. Still other specimens, that seem to be younger examples of this species, are proportionally both more compressed and more depressed, with a more nearly ovate outline, as represented by fig. 6 *f*. It is possible that the latter may belong to a distinct species; but my present impression is that it can hardly be separated from the others, as there seem to be all intermediate gradations of form and size.

Some varieties of this species look almost exactly like a Lower Lignite Paris Basin species, described by Deshayes under the name *Cyrena Forbesi* (see plate xxxvii, figs. 24 to 26, Descr. des An. sans Vert., Bassin, Paris, 1), particularly as seen in a side-view of the exterior. Deshayes' species, however, is a thinner shell, with a weaker hinge, and has its lateral teeth more strongly striated, and the posterior dorsal margins of the valves not near so strongly inflected; while its umbonal slopes are less prominently rounded, and it wants the small sinus of the pallial line seen in our species. In its greater thickness, more trigonal form, and prominent umbonal slopes, our shell agrees more nearly with another species described by Ferussac under the name *Cyrena antiqua*, and figured by Deshayes (from the Lignite beds of the Paris Basin) on plate xviii of his "Coquilles Fossiles des Environs de Paris". The latter species, however, is proportionally shorter, with still more elevated beaks, a broader hinge-plate, less

diverging cardinal teeth, and more strongly striated laterals. Its surface is also rougher, being more strongly furrowed and ridged than that of our shell, and its lunule is much larger.

Deshayes has noticed, in his later work on the Paris Basin fossils, the points of resemblance between the latter of the above-mentioned species and the existing genus *Velorita*, and yet points out some differences that indicate a transition from the typical forms of *Corbicula* toward *Velorita*, through such species as *C. antiqua*. The species here under consideration seems to me also to occupy a somewhat intermediate position between the two genera mentioned, having more nearly the trigonal form, oblique cardinal teeth, and thick solid shell of *Velorita*, while its anterior lateral teeth are as elongated and slender as in *Corbicula*. It, however, differs from both, in the peculiar incurved character of the posterior dorsal edges of its valves, so as to form a very deep concavity or furrow along their entire length, as seen when the valves are united. This inflection of the borders and the depressed nature of the ligament, bring the latter so far below the elevated umbonal slopes that it is entirely hidden from view in looking at the shell from either side, instead of projecting above the umbonal slopes, as in the two types above mentioned. Again, the posterior lateral tooth of its left valve is sometimes mainly formed by beveling of the inflected edge of the valve, instead of projecting out at right angles to an erect margin. In consequence of these peculiarities of our shell, I have already proposed to make it the type of a new section, under the name *Veloritina*, in Dr. Hayden's Report of 1872. Whether or not this section can properly include *Cyrena antiqua*, I am not well enough acquainted with that shell to decide; but, although it seems to depart from our type in some of its distinguishing characters, I am inclined to believe that it may find a place in the same group.

Locality and position.—The first specimens of this species that I have seen, were brought from the brackish- or fresh-water beds on Sulphur Creek, near Bear River, Wyoming. Soon after, Mr King's party brought in additional specimens from the same locality and beds; and, at a later date, Mr. Durkee, an engineer on the Union Pacific Railroad, sent numerous specimens of it and the associated fossils to the Smithsonian Institution, for the use of which

specimens I am indebted to Professor Henry. Dr. White has also identified it among Lieutenant Wheeler's collections from the north fork of Virgin River, Utah.

CORBULIDÆ.

Genus CORBULA, Brug.

CORBULA (ANISORHYNCHUS) PYRIFORMIS, Meek.

Plate 17, figs. 2, and 2 a, b, c, d.

Corbula (*Potamomya* ?) *pyriformis*, Meek (1860), Proceed. Acad. Nat. Sci. Philad., 312.

Corbula (*Potamomya* ?) *concentrica*, Meek (1860), ib., 313.

Corbula (*Anisorhynchus*) *pyriformis*, Meek (1871), Extract from Dr. Hayden's Second Ann. Report Geol. Survey of the Territories; and (1872) in the last-mentioned Report, 292; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 359.

Corbula pyriformis, Dall (1872), Am. Jour. Conch., VII, 90.

Shell attaining a large size, rather thick, oval-subpyriform, nearly equivalve, very gibbous in the central and anterior regions, and much more compressed, narrowed, and produced posteriorly; beaks elevated, nearly equal, incurved, and placed more or less in advance of the middle; anterior side generally truncated obliquely forward above, from the beaks to near the middle, thence rounding abruptly to the base; posterior side much attenuated, and usually slightly truncated at the immediate extremity; dorsal margin generally very concave in outline behind the beaks, and provided with a well-defined marginal carina, extending in each valve from the beaks nearly to the posterior extremity, and between these carinæ with a deeply-excavated lanceolate escutcheon; basal margin deeply rounded in the central and anterior region, and more or less sinuous in outline behind the middle; lunule deeply and rather largely impressed, without being always distinctly defined, though it is sometimes margined by a subangular ridge on each side. Surface ornamented with concentric ridges and furrows, most regularly and strongly defined on the umbonal region, and gradually becoming more irregular and less distinct toward the basal margin, or in some cases entirely fading away, so as to leave only the lines of growth over the whole exterior. Hinge with the tooth of the right valve rather thick, prominent, subtrigonal, striated, and a little curved upward; cartilage-pit deep and trigonal; hinge of left valve, with pit and cartilage-process, presenting the usual characters; pallial line with apparently a small shallow

sinus; posterior muscular impressions very faintly marked; anterior muscular impressions generally well defined, subovate, attenuated, and curving backward above where they connect with the small scars of the pedal muscles.

Length of a medium-sized specimen, 1.33 inches; height of the same, 0.87 inch; convexity, 0.78 inch.

This species varies considerably in form, as well as in surface-markings. In some specimens, the whole surface is nearly smooth or only marked with obscure lines of growth (fig. 2a); while, in others, the most gibbous part of the valves and the umbones are marked with very regular, distinct, concentric ridges and furrows (fig. 2). In still others, the ridges and furrows are exceedingly irregular and very strongly marked (fig. 2c). There are also more or less marked differences in the elevation of the beaks, the convexity of the anterior region, and the proportional length of the attenuated posterior extremity. Yet all of these varieties blend together by such slight shades of difference that it seems impossible to find constant characters by which they can be separated specifically.

In first describing this species, from the few imperfect specimens originally brought from the Far-West, I was led to believe that there were two distinct species represented among them; one nearly smooth, which I called *Corbula pyriformis*, and another with regular, concentric ridges, for which I proposed the name *C. concentrica*. The extensive series of specimens, however, brought in by various explorers from the same locality, soon led to the conclusion that the two types really belong to one variable species.

None of the specimens originally studied were in a condition to give any clue to the nature of the hinge; but, from the fact that they were found associated with some fresh-water shells, it seemed quite probable that they belonged to the brackish-water group *Potamomya*, or more properly *Azara*, and for that reason I placed the name *Potamomya*, with a mark of doubt, parenthetically between the generic and specific names. Some years later, however, when large numbers of fine specimens of this shell were at hand for study, I succeeded in working out the hinge, and found that it does not

present the characters of *Azara* at all, but seems to agree almost exactly with that of *Corbula* proper. From this fact, and its apparent fresh- or brackish-water habits, I at first thought it might possibly find a place in a newly proposed South American group for which Mr. Gabb used the name *Pachydon* (but afterward named *Anisothyris* by Mr. Conrad, because *Pachydon* had been previously used by Sowerby for another genus), some species of which closely resemble the shell under consideration; while the South American type differs little from *Corbula* in its hinge-characters.* Soon after, on informing my friend Mr. Conrad that I had found our shell to differ in its hinge from *Azara*, and to agree almost exactly with *Corbula*, he wrote to me that he had been studying specimens of the same, sent to the Academy of Sciences from the original locality, and that he had proposed, in manuscript, to make it the type of a new genus *Anisorhynchus*, founded mainly on its brackish- or fresh-water habits, *Neæra*-like form, and supposed gaping posterior; and I adopted his name in a subgeneric sense, in an extract from Dr. Hayden's Second Annual Report, then just ready to go to press, as well as in the report itself, printed a month or two later.

After examining hundreds of specimens of this shell, however, I have failed to detect any evidence that its valves were in the least gaping; and, as regards its *Neæra*-like form, there is an objection to giving very much weight to it as a distinguishing character, that is the fact that *Corbula alæformis* Gabb, from marine beds, has exactly the same general form; so that, so far as yet known, the group *Anisorhynchus* seems to rest entirely upon the apparent brackish-water habits of our shell. There are not known at present any well-determined fresh-water living species of *Corbula*; but Dr. Stoliczka says (Palæont. Indica, III, p. 35) that there certainly are Indian brackish-water species which cannot be distinguished from true *Corbula*, excepting that they are thinner and *Neæra*-like in form.

From all that is therefore yet known in regard to the characters of this

*Originally, *Anisothyris*, Conrad, or *Pachydon*, Gabb, was supposed by both of those authors to have an external ligament; but, on examining a series of the type-species, I found that it really has an internal cartilage like *Corbula*, with only a more oblique cartilage-process. Hence Mr. Conrad now rests the group mainly on its brackish-water habits, the subspiral character of the beaks, and the presence, in *some of the species*, of an obscure rudimentary posterior lateral tooth.

shell, I am of the opinion that it is most probably not more than subgenerically distinct from *Corbula* proper. As I have elsewhere stated, we have (at present) reason to believe that in this internal region of the continent, the changes from marine conditions, first to comparatively large areas of brackish-water, then to more restricted bodies of fresh-water, were so gradual, as the continent was slowly rising at about the close of the Cretaceous, and the beginning of the Tertiary periods, that probably a few types of *Mollusca*, originally exclusively marine in their habits, may have gradually adapted themselves to a brackish-water habitat.

The most characteristic specific features of this shell are its large size, very nearly equal valves, gibbous anterior, attenuated or subrostrate posterior extremity, and incurved, equal, and rather oblique beaks. In most specimens, the valves seem to be almost exactly equal, though usually a close examination reveals the fact that the right valve is a little larger than the other; although the immediate apex of its beak curves in under that of the left valve, and seems to be placed very slightly farther forward.

I have been inclined to think that the species described from the California Cretaceous by Mr. Gabb, in vol. ii of the California Palæontology, under the name *Corbula alæformis*, may be somewhat nearly related to this species. At any rate, certain varieties of our shell seem to agree very closely with Mr. Gabb's figure and description of his species. Most of our specimens are more coarsely furrowed and ridged; but, as already stated, they vary greatly in this respect, so much indeed, that it is difficult to know how far we can rely on this character in distinguishing Mr. Gabb's species from our type, especially as he has figured only a single specimen. The fact, however, that our shell is apparently only found associated with fresh-, or perhaps in part, brackish-water types, while Mr. Gabb's came, if I am not mistaken, from a marine deposit, would favor the conclusion that there were developed sufficiently marked differences to constitute specific, if not more important, distinctions.

Locality and position.—The original type-specimens of this species were brought by Colonel Simpson's party from Sulphur Creek, near Bear River, Wyoming. The Union Pacific Railroad there cuts directly through a small ridge composed of the upturned strata of the estuary beds containing this

and various fresh- and some brackish-water shells, which occur there by millions. Dr. Hayden's and Mr. King's parties have brought large collections of these shells from this locality; and Mr. Durkee, an intelligent civil engineer, sent great quantities of them to the Smithsonian Institution. I have, as elsewhere stated, referred these beds to the Lower Eocene; but they may yet prove rather to belong to the latest Cretaceous, as suggested by me in Dr. Hayden's Reports, and in the Upper Missouri Palæontology.

CORBULA (ANISORHYNCHUS ?) ENGELMANNI, Meek.

Plate 17, figs. 1 and 1 a.

Corbula (Anisorhynchus ?) Engelmanni, Meek (1860), *Proceed. Acad. Nat. Sci. Philad.*, XII, 312.

Shell subovate, moderately gibbous, nearly equivalve; anterior margin rather narrowly rounded; base forming a semi-ovate curve, with the most prominent part in advance of the middle; posterior more or less narrowed and compressed, with the immediate extremity slightly truncated; beaks rather depressed, nearly or quite equal, and placed a little in advance of the middle; dorsal outline sloping gradually before and behind the beaks toward the extremities, with a shallow marginal furrow extending from the beaks posteriorly; lunule excavated, but not sharply defined. Surface with small, more or less regular, concentric furrows and striae.

Length of the typical specimen, 0.50 inch; height, 0.20 inch; convexity, 0.20 inch.

Since seeing how greatly the preceding species varies in form and other characters, I am led to suspect that this may be only a young or more depressed form of the same shell. Its greatest differences, aside from its generally smaller size, are its less gibbous form, more depressed beaks, placed a little farther backward, and its proportionally less attenuated posterior, with its dorsal margin merely sloping backward from the beaks without being concave in outline. Although with my present impressions of the variable character of *C. pyriformis*, I should hesitate to separate the form under consideration from that species, if I were now for the first time investigating these shells, as it has already been described under another name, it may be better to keep them separated until we can have an oppor-

tunity to study the development of the young of *C. pyriformis* through its various stages of growth.

This form resembles Mr. Gabb's *C. Hornii*, though not so closely as the last resembles his *C. alæformis*.

Locality and position.—Bear River, mouth of Sulphur Creek, Wyoming, from the same horizon as the last.

GASTEROPODA.

AURICULIDÆ.

Genus RHYTIPHORUS, Meek.

(*ῥυτίς*, a wrinkle; *φορέω*, to bear.)

Rhytiphorus, Meek (1873), Hayden's Sixth Ann. Rep. U. S. Geol. Survey of the Territories, 478.

The type of this group has the general aspect of *Melampus*, excepting that it has a series of small, oblique, short folds around the top of the somewhat shouldered whorls; while a slight curve in these little folds or costæ indicates the presence of a faint sinus in the lip near the suture, somewhat as in *Schizostoma*, Lea, but much less deeply defined. It has two folds on the columella, while the outer lip is thin, and apparently entirely smooth within.

Type *Melampus priscus*, Meek, which is the only species known.

RHYTIPHORUS PRISCUS, Meek.

Plate 17, figs. 6 and 6 a.

Melampus priscus, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 315.

Rhytiphorus priscus, Meek (1876), Col. Simpson's Report Expl. across the Great Basin of Utah, 364, pl. v, figs. 4 a, b.*

Shell obovate, about once and a half as long as wide; spire depressed-conical; whorls about five, convex, or faintly subangular; last one large, somewhat shouldered above, and tapering below the middle; suture well defined; surface marked by rather obscure lines of growth, and the small, regular, vertical, or slightly oblique folds, which are distinct on the volutions of the spire, and around the upper edge of the body-whorl, but obsolete on all the surface below this; aperture narrow, angular above, and apparently very narrowly rounded below; outer lip sharp and apparently smooth

* These are better figures than those here given.

within; columella provided with one rather strong oblique fold below, and a much smaller less oblique one about half-way up the aperture.

Length, about 0.77 inch; breadth, 0.50 inch; apical angle nearly regular, divergence about 80° .

I know of no other shell so nearly allied to this as to render a comparison necessary. Its most striking character is the presence of the little folds around the upper part of its body-volution and on those of the spire. These will at once distinguish it from any type of the *Melampinæ* known to me, even in specimens not in a condition to show any of the other characters.

Locality and position.—The only three specimens of this species I have seen were found by Colonel Simpson's party in the brackish-water carbonaceous beds at the mouth of Sulphur Creek, on Bear River, Utah.

CERIPHASIIDRÆ.

PYRGULIFERA HUMEROSA, Meek.*

Plate 17, figs. 19, 19 a, and wood-cut fig. 6.

Melania humerosa, Meek (1860), Proceed. Acad. Nat. Sci., XII, 313.

Tiara humerosa, Meek (1866), in Conrad's Smithsonian Check-List of Eocene and Oligocene Fossils, 12.

Pyrgulifera humerosa, Meek (1872), in Dr. Hayden's Second Ann. Report Geol. Survey of the Territories, 294 and 299; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 363, pl. v, fig. 6 a, b, c.

Shell attaining a rather large size, moderately solid, ovate-subfusiform; spire prominent, distinctly turreted; volutions five and half to about seven,

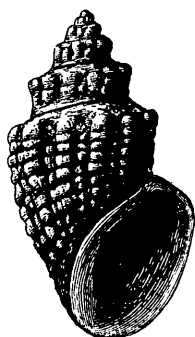
*This genus is related to *Lithasia*, as originally defined by Professor Haldeman, and presents the following characters:

Shell subovate, thick, imperforate; spire produced, turreted; volutions angular, shouldered, and nodular above; surface typically with vertical ridges and revolving markings; aperture subovate, faintly sinuous, but not notched or distinctly angular below; outer lip prominent in outline below the middle, retreating at the base, and subsinuous at the termination of the shoulder of the body-volution above; peristome continuous; inner lip a little callous below, and thickened all the way up, but without a protuberant callus above, sometimes with a shallow umbilical furrow along its outer margin below.

Differs from *Lithasia*, Haldeman, in not having its aperture distinctly angular and notched, or subcanaliculate below, in wanting a protuberance at the top of the inner lip, and in having a more produced, distinctly turreted spire, as well as very different surface markings.

angular and strongly shouldered, the upper surface being flattened or a little

Fig. 6.



Pyrgulifera humerosa.

Showing the aperture much better than the specimen figured on the plate.

concave, with usually a slight outward slope from the suture to the angle or shoulder, where it meets the vertical outer surface nearly at right angles; last or body-volution large, or generally composing about two-thirds the entire bulk and length of the shell; suture well defined by the prominence and angularity of the volutions, but not channeled. Surface of each turn ornamented by about ten to fifteen rather strong, vertical, or slightly oblique folds, or costæ, each of which terminates in a small nodular projection at the shoulder above, so as sometimes to impart a subcoronate appearance to the same, while they all become nearly or quite obsolete below the middle of the body-volution; vertical costæ crossed by smaller, but quite distinct revolving, raised lines, or small ridges, some four to six of which may be counted on the outer surface of each turn of the spire, and about ten on the body-volution, where they increase in size downward;* upper flattened surface of the volution generally only marked by the moderately distinct lines of growth seen below; aperture obliquely rhombic-subovate, being higher than wide, rounded-subrectangular above, and narrowed and more or less angular, with a slight sinus or notch, at the connection of the outer and inner lips near the middle below; columella arcuate; inner lip, in mature specimens, rather thick all the way up, but more so below, where it is somewhat reflected and margined by a slight, revolving umbilical furrow, with usually an angular outer margin; outer lip sharp, prominent near the middle, and retreating below and at the angle of the whorls above.

Length of the largest specimen seen among hundreds, 1.63 inches; breadth, 0.90 inch; height of aperture, 0.81 inch; breadth of same, 0.50 inch.

All of the specimens of this shell first studied, as well as all those for some years after brought in, had the outer lip and lower part of the columella broken away, so that no very clear idea of the nature of its aperture and the connection of its outer and inner lips below could be formed from them; while, in all its characters that could then be determined, it so closely

* These revolving ridges are represented too coarse in the above figure.

resembled the typical forms of the foreign genus *Melania* (= *Tiara*) that I was led to refer it to that group. At last, however, a fine, large, nearly perfect specimen was brought from the original locality, and this at once showed that the outline of the lower part of its aperture is more angular, and its inner lip more thickened below than in the *Tiara* group; the whole combination of characters being more nearly as in *Lithasia*, but still evidently different from that genus. Consequently, in Dr. Hayden's Second Annual Report, I proposed to found a new genus *Pyrgulifera*, for its reception; which name I now retain for it.

Among the Old World fossil species, this shell seems to be most nearly represented by *Melania armata* of Matheron, from the Lower Eocene lignite beds at the mouth of the Rhône, in the southeast of France (see Cat. Méth. Corps Org. Foss. du Départ. des Bouches-du-Rhône, pl. 37, figs. 11, 12, and 13). It differs, however, in the form of its aperture, as well as in having the vertical folds, or costæ, on all of the volutions of the spire and the upper flattened part of its whorls nearly or entirely without revolving lines; while those below the angle of *M. armata* are finer and more numerous than on our shell, which also has its inner lip generally thicker below.

Locality and position.—Sulphur Creek, near Bear River, Wyoming, directly on the Union Pacific Railroad, where it occurs in the upheaved beds in great numbers, along with numerous fresh-water and perhaps some brackish-water shells, belonging to the horizon of the latest Cretaceous or oldest Tertiary.

VIVIPARIDÆ.

Genus VIVIPARUS, Montfort.

VIVIPARUS CONRADI, Meek and Hayden.

Plate 17, figs. 18 and 18 a.

Paludina Conradi, Meek and Hayden (1856), Proceed. Acad. Nat. Sci. Philad., VIII, 112.
Viviparus Conradi, Meek (1866), in Conrad's Smithsonian Check-List, 12.

Shell subtrochiform; spire conical, moderately prominent, abruptly pointed at the apex; volutions five or six, flattened nearly to the slope of the spire; last one rather distinctly angular around the middle in young shells, but more obtuse in the adult; suture generally merely linear. Sur-

face marked with fine oblique lines of growth, which, in well-preserved specimens, are sometimes seen to be crossed on the upper volutions by traces of minute revolving striæ, scarcely visible without the aid of a magnifier. Aperture rhombic-subcircular; columella rather deeply sinuous in the umbilical region; axis imperforate.

Length of an adult shell, about 1 inch; breadth, 0.70 inch; length of aperture, 0.44 inch; apical angle nearly regular, or with slightly convex slopes, divergence 54° .

The above description was made out from the typical specimens from the Upper Missouri country near the mouth of the Judith River. The example we have figured from Wyoming is quite imperfect, though agreeing well with those from the Upper Missouri in all respects, so far as its condition affords the means of comparison. Being so far as yet known *apparently* common to these two distantly separated localities, I have thought it desirable to give a figure of it, notwithstanding the imperfect condition of the specimen. The identity of the Bear River specimen with the true *V. Conradi* cannot be regarded as positively demonstrated.

Locality and position.—Mouth of Sulphur Creek, on Bear River, Wyoming, at the same horizon as the last; Museum of the Smithsonian Institution, Colonel Simpson's collection.

Genus CAMPELOMA, Raf.

CAMPELOMA MACROSPIRA, Meek ?.

Plate 17, figs. 17 a, b.

Melantho (Campeloma) macrospira, Meek (1872), Hayden's Second Ann. Report U. S. Geol. Survey of the Territories, 299.

Compare *Turbo paludinaformis*, Hall (1845), Frémont's Report Expl. Rocky Mts., 309, pl. iii, figs. 13 and 13 a.

Shell ovate, of medium size; volutions about five or six, convex, increasing rather gradually in size, and without revolving ridges or angularities; spire moderately prominent, conical, and not eroded at the apex; suture distinct in consequence of the convexity of the volutions; surface with fine, obscure, slightly sigmoid lines of growth; aperture ovate; inner lip somewhat thickened below.

Length, about 0.95 inch; breadth, 0.60 inch; length of aperture, 0.45 inch; breadth of aperture, 0.30 inch.

I have been inclined to refer this shell to *C. paludinæformis* (= *Turbo paludinæformis*, Hall), figured in Frémont's Report; but the fact that that species is said to be associated with *Goniobasis nodulosa* (= *Cerithium nodulosum*, Hall), in a light-colored "Oölitic limestone", seems to be a very strong objection to the conclusion that it can be the species here under consideration; the latter being from dark, carbonaceous, shaly and arenaceous beds, probably belonging to a very different horizon. I have seen specimens believed to belong to *G. nodulosa*, in a light-colored matrix from this region, densely packed with *Cypris*, presenting much the appearance of oölitic particles; but these came from an entirely different formation, containing a different group of fossils from those found in the strata from which the shell under consideration was obtained. In size and general appearance, our shell is not very unlike Professor Hall's figures of *C. paludinæformis*; but still it has a less oblique suture and more convex volutions.

The form here described agrees well with many specimens now before me from the same locality and beds, which specimens I think most probably medium-sized examples of *C. macrospira*, founded on a much larger, more elongated shell; but, as they may possibly be distinct, I have merely referred them provisionally to that species. In order to facilitate comparison, I give below a description of *C. macrospira*, from the original typical specimens:

Campeloma (Melantho) macrospira, Meek.—Shell attaining a rather large size, conoid-subovate; spire elongate-conical; volutions five or six, moderately convex; suture deep, rather oblique; body-volution larger in proportion to the others than would be formed by the regular rate of increase of those above, and obliquely produced below; aperture comparatively large, ovate; inner lip rather thick, arcuate, a little reflexed, but not covering the deep umbilical indentation, in old shells rather distinct from the body-volution all the way up; surface only showing the usual slightly sigmoid lines of growth. Length, about 1.80 inches; breadth, 1.14 inches.

The form here referred to *C. macrospira* seems to agree pretty well in size and proportions with the upper three or four volutions of that shell;

though it still has a rather less oblique suture. The body-volution of the adult *C. macrospira*, however, is suddenly, and disproportionally enlarged, and so oblique as to give a rather different aspect to the whole shell.

Locality and position.—Same as foregoing.

CAMPELOMA (undt. sp.).

Plate 17, figs. 15 *a*, *b*, and 16 *a*, *b*, *c*.

Shell ovate, attaining a medium size; volutions about five or six, convex, rounded, increasing moderately in size, all without revolving angles; spire moderately prominent; suture well defined, in consequence of the convexity of the volutions; surface showing fine, slightly oblique, somewhat sigmoid lines of growth; aperture ovate; inner lip apparently a little thickened, and in adult shells somewhat reflexed below, but leaving a small umbilical pit uncovered.

Length of one of the larger specimens, about 1.45 inches; breadth, about 0.95 inch.

Our fig. 15 *a* does not give a correct idea of the form of the aperture, which, in the specimen figured, is filled with rocky material that laps upon the columella, so as to give an unnatural apparent breadth to the mouth of the shell. The engraving also makes the marks of growth *much* too coarse and too straight on fig. 15; and the specimen is compressed accidentally, so as to appear broader than natural. It may, therefore, be only a distorted specimen of the last; and the smaller specimens represented by figs. 16 and 16 *a*, *b*, *c* are probably young shells.

Locality and position.—Same as foregoing.

LIMNÆIDÆ.

Genus LIMNÆA, Lamarck.

LIMNÆA (LIMNOPHYSA) NITIDULA, Meek.

Plate 17, figs. 5, 5 *a*.*

Melania ? nitidula, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 314.

Limnæa nitidula, Meek (1866), in Conrad's Eocene Smithsonian Check-List, 9.

Shell small, ovate-subfusiform; spire conical, moderately elevated; volutions about six and a half, convex, last one forming two-thirds of the

* Fig. 5 *a* does not give a very correct representation of the aperture of this shell.

entire length; suture well defined; aperture subovate, narrowly rounded below and angular above, scarcely equaling one-half the length of the shell; columella apparently with only a very small fold, and showing by the side of the inner lip below, appearances of a small umbilical indentation. Surface marked by fine, rather obscure lines of growth, with (on some specimens) exceedingly faint traces of microscopical revolving striæ.

Length, 0.40 inch; breadth, 0.20 inch; apical angle convex, divergence 40°.

Among recent species, this may be compared with *L. humilis*, and the several forms regarded by Mr. Binney as varieties of that species. It is a decidedly more slender shell, with a less expanded aperture and less developed inner lip than Mr. Binney's figure (p. 63, fig. 99, Land and Fresh Water Shells) of an authentic specimen of that species. It agrees, however, more nearly in form with some of those figured by Mr. Binney as varieties of *L. humilis*, but still differs from them all in other details.

Locality and position.—Same as last. By some oversight, in first describing this species, the locality was wrongly given as Ham's Fork, latitude 41° 40' north, longitude 110° 10' west.

SPECIES OF UNDOUBTED TERTIARY AGE.

MOLLUSCA.

LAMELLIBRANCHIATA.

CYRENIDÆ.

Genus SPHÆRIUM, Scopoli.

SPHÆRIUM RUGOSUM, Meek.

Plate 16, figs. 2, 2 a, and 2 b.

Sphærium rugosum, Meek (1870), Proceed. Acad. Nat. Sci. Philad., Ap., 56.

Shell above medium size, rather gibbous, thick, quadrato-suborbicular in outline, the length being a little greater than the height; greatest convexity slightly above the middle; anterior margin more or less regularly rounded; base semi-elliptic or sub-semicircular in outline; posterior margin

generally a little wider than the anterior, and faintly subtruncated, with an anterior slope; dorsal outline rounding into the anterior and posterior margins, but more regularly into the former. Beaks not eroded, nearly central, rather prominent, and incurved, but not oblique. Surface ornamented by sharply-defined, often elevated, concentric striæ, separated by rounded furrows, in which very minute lines of growth may be seen under a magnifier; the elevated concentric striæ becoming more regular, coarser, more distantly separated, and more prominent on the umbones. Cardinal margin and lateral teeth comparatively stout.

Length of largest specimen, 0.34 inch; height, 0.30 inch; convexity, 0.28 inch.

The most marked characteristics of this species are its quadrato-suborbicular, rather gibbous form, very nearly central beaks, and particularly its sharply elevated, concentric striæ, growing stronger, more prominent, and more distantly separated on the umbones, until near the points of the same they often assume the character of sharp, raised plications. In some of the smaller specimens, these raised, rather distantly separated, stronger striæ extend over nearly the whole surface; while in others they pass gradually into mere irregular lines of growth on most of the surface, occasionally separated by wider furrows.

In form, this species is very similar to the existing *S. Vermontanum* of Prime, with which it also agrees nearly in size. It is more regularly rounded in front, however, and has stouter lateral teeth; while its concentric, raised striæ and impressed sulcations are generally larger and grow more distinct on the umbones than below, instead of the reverse. In this latter character of marking, it agrees more nearly with *S. aureum*, Prime, from which, however, it differs entirely in form.

Locality and position.—Fossil Hill, Kaw-soh Mountains, Nevada; in a white calcareous matrix of Tertiary age.

SPHÆRIUM? IDAHOENSE, Meek.

Plate 16, fig. 1 and 1 a.

Sphærium? Idahoense, Meek (1870), Proceed. Acad. Nat. Sci. Philad., Ap., 57.

Shell attaining a large size, moderately convex, rather thick in proportion to size, orbicular-subovate in outline, being wider in front than pos-

teriorly; anterior margin regularly rounded; base semi-ovate in outline; posterior margin somewhat narrowly rounded below and sloping forward above; dorsal margin short; beaks placed in advance of the middle, a little compressed, and directed obliquely forward and inward; surface marked by concentric striæ and furrows; lateral teeth stout.

Length, 0.98 inch; height, about 0.92 inch; convexity, about 0.54 inch.

The specimens of this shell are not in a very good state of preservation, being, with one exception, internal casts, and this one only retains a part of the shell. They certainly differ, however, from the last not only in their much larger size, but in being less nearly equilateral, more produced, and rather more narrowly rounded posteriorly, as well as proportionally less convex. The internal casts have the umbonal region from a little above the middle of the valves compressed. Some of these casts show a few rather distinct, broad, irregular, concentric undulations that were doubtless more strongly defined on the exterior of the valves.

None of the specimens of this shell show the hinge very clearly; but, from its large size and thickness, I was at first inclined to believe it a *Cyrena* or a *Corbicula*. Impressions in the matrix, however, show that its lateral teeth are not striated, nor of the form seen in the latter genus. Possibly I should call it *Cyrena Idahoensis*; as its pallial line is certainly simple, however, and not sinuous, as in most of the American living species, and, so far as known, in nearly all the fossil *Cyrenas* and *Corbiculas* of this continent, I have concluded to place it provisionally in the genus *Sphærium* until better specimens can be obtained for study.

Locality and position.—Same as last, and from same formation at Castle Creek, Idaho.

UNIONIDÆ.

Genus UNIO, Retzius.

UNIO HAYDENI, Meek.

Plate 16, figs. 3, 3 a, and 3 b.

Unio Haydeni, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 312; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 364, pl. v, figs. 11 a, b.

Shell rather small, or of nearly medium size, elliptic-subovate, rather

more than once and a half as long as high, moderately convex, the greatest convexity being usually slightly above and in advance of the middle; anterior end rounded; posterior end more or less regularly rounded, being usually most prominent a little below the middle; basal margin forming a semi-elliptic curve; dorsal outline somewhat straightened, or slightly convex, along the central region, and rounding into the anterior and posterior margins, but more abruptly to the former; beaks much depressed and inconspicuous, located about half-way between the middle and the anterior margin; hinge equaling about two-thirds the length of the valves; lateral teeth rather long and nearly straight; cardinal teeth unknown. Surface smooth, excepting small striae of growth.

Length, 1.60 inches; height, 1 inch; convexity, 0.64 inch.

This species is mainly characterized by its regular, nearly elliptic outline, inconspicuous beaks, and smooth surface. Its shorter and more elliptic form, and especially its smooth umbones, will at once distinguish it from both of the Bear River species. I have sometimes suspected that this shell might possibly be the same figured and described by Professor Hall, in Frémont's Report, page 307, plate iii, fig. 1 (not fig. 2), under the name *Mya tellinoides*. Still, that figure seems to represent a shell with a more attenuated posterior and more prominent beaks. At any rate, it may be regarded as extremely improbable that the figure cited, if correctly drawn, represents a shell even nearly related to *Mya*; and, although not agreeing exactly with any of the *known* Uniones from that region, it very probably represents a species of that genus. I greatly regret not having an opportunity to compare our western fresh-water shells with those figured in Frémont's Report, the types of which are in Albany, N. Y. I saw them all many years back; but, not being at that time interested in the study of such forms, I retained no very distinct recollection of their specific characters, while the published description is too brief to aid one much in identifying them.

Locality and position.—The typical specimens of this species were brought by Colonel Simpson from a whitish limestone, containing great numbers of *Goniobasis Simpsoni*, at Ham's Fork, near Fort Bridger, Wyoming Territory. Dr. Hayden has also obtained specimens of it from near the same locality. It belongs to the Bridger Group of the Tertiary series.

GASTEROPODA. LIMNÆIDÆ.

Genus ANCYLUS, Geoffroy.

ANCYLUS UNDULATUS, Meek.

Plate 17, figs. 12 *a* and 12 *b*.

Ancylus undulatus, Meek (1870), *Proceed. Acad. Nat. Sci. Philad.*, 57.

Shell thin, attaining a very large size, elliptic-oval in outline, being sometimes slightly widest a little in advance of the middle; apex much elevated, pointed, curved backward, and placed about half-way between the middle and the posterior margin; posterior slope concave; lateral slopes nearly straight; anterior slope distinctly convex. Surface marked with fine, rather obscure lines of growth, and strong, comparatively large, concentric undulations, most distinct and regular on the anterior slope, where there are sometimes very obscure traces of about three radiating ridges.

Length of the largest specimen seen, 0.67 inch; breadth of the same, 0.54 inch; height, 0.35 inch.

The specimens show some variation in their proportions, as well as in the regularity and distinctness of the undulations; the largest individual from which the above measurements were taken being proportionally a little wider and more elevated than some of the smaller ones, while its undulations are less distinctly and regularly defined. As there are various gradations, however, in these characters, I am at present inclined to regard them as mere individual modifications of one species.

Owing to the thinness of the shell, the undulations are often quite well defined on internal casts, particularly along the anterior slope.

The only North American recent species with which I am acquainted that approaches this in size is the *A. Newberryi*, described by Dr. Lea, from California. From this, the species under consideration differs in having its apex nearer the posterior, and much more pointed and curved backward. The undulations of its anterior slope also give the shell quite a different appearance.

Locality and position.—Fossil Hill, Kaw-soh Mountains, Nevada.

Genus CARINIFEX, Binney.

Subgenus VORTICIFEX,* Meek.

(Proceed. Acad. Nat. Sci. Philad., Ap., 1870, 59.)

This type differs from *Carinifex* proper in having no traces of the revolving carinæ seen on the typical species of that genus, and in having very strongly defined costæ of growth on young examples. It is also a thicker shell, with a smaller umbilicus. The first of the following species is regarded as the type of the subgenus. The group seems to be related to *Choanomphalus*, Gerstfeldt; but, as that genus was founded on minute or very small shells, quite similar to *Valvata*, it is not very probable that our type is congeneric.

CARINIFEX (VORTICIFEX) BINNEYI, Meek.

Plate 17, figs. 11, 11 a.

Carinifex Binneyi, Meek (1870), Proceed. Acad. Nat. Sci. Philad., 59.

Shell attaining a large size, depressed-subglobose in form; spire scarcely rising above the body-whorl; umbilicus large, but rapidly contracting within; volutions about three and a half, increasing very rapidly in size; those of the spire a little convex; last one forming more than nine-tenths the entire bulk of the shell, widest above, and produced below so as to form a prominent ridge, or subangular margin around the widely-excavated umbilical region; all without revolving carinæ; aperture large, obovate, being widest above and narrowed abruptly to a subangular termination below; lip remarkably oblique, apparently very slightly reflexed, and strongly produced forward above. Surface marked with extremely oblique lines of growth, which apparently sometimes form little regular costæ.

Height, 0.59 inch; breadth, 1 inch; height of aperture, about 0.50 inch; breadth of aperture, 0.54 inch.

This species differs too widely in nearly all of its characters to require comparison with *C. Newberryi*, the typical and only known living species of true *Carinifex*, which it also exceeds in size.

All of the specimens of this species in the collection are incrustated by a laminated, smooth, calcareous deposit that has to be removed before the sur-

* This name was wrongly printed *Vortifex* in the Proceedings of the Academy.

face-marking can be seen. This is continuous over the suture, and covers all the volutions of the spire. At first, I was inclined to think that it might have been secreted by the mantle of the animal enveloping the whole shell; but further examinations have led to the conclusion that it is more probably merely an inorganic incrustation precipitated over the surface after the death of the animal, as some of the other types from the same beds are similarly covered.

This shell approaches the aspect of the typical form of the genus *Carinifex*, but still wants the characteristic carinæ of that type.

Locality and position.—Same as last.

CARINIFEX (VORTICIFEX) TRYONI, Meek.

Plate 17, figs. 10, 10 a, 10 b, 10 c.

Carinifex (Vorticifex) Tryoni, Meek (Ap., 1870), Proceed. Acad. Nat. Sci. Philad., 59.
Carinifex (Vorticifex) Tryoni var. *concava*, Meek, ib.

Shell depressed-subglobose, approaching subdiscoidal, the spire being much depressed. Volutions four and a half to five, increasing rather rapidly in size; those of the spire slightly convex; last one sometimes becoming a little concave on the upper slope near the aperture, and more or less ventricose below, the most prominent part being near the rather small, deep umbilicus, into which its inner side rounds abruptly; all the whorls rounded on the outer side, and without any traces of carinæ or revolving markings; suture well defined; aperture rather large, subcircular, its height being to its breadth about as 29 to 34; lip sharp, oblique, and produced forward above, faintly sinuous at the middle of the outer side, as well as at the inner side of the base, where it is a little thicker. Surface ornamented with small, distinct, regular ridges, and much finer lines of growth, running parallel to the very oblique outline of the lip.

Height, 0.35 inch; breadth, 0.64 inch; height of aperture, 0.29 inch; breadth of aperture, 0.34 inch.

This shell differs from the foregoing species in its smaller size, more rounded, less rapidly enlarging whorls, more prominent spire, and less excavated umbilical region. It evidently varies considerably in form and surface-markings, some of the specimens being proportionally more ventricose, or, in other words, have the body-volution, and consequently the aperture,

higher in proportion to breadth than the others, while more or less difference in the elevation or depression of the spire is observable. The most marked differences, however, are to be observed in the character of the surface-markings. Yet, since proposing for it a distinct name, more critical comparisons lead me to suspect that it may be only the young form, or the inner volutions of the last.

Another form, which I described as *C. Tryoni* var. *concava*, in the Proceedings of the Academy, cited above, has the spire depressed below the top of the body-whorl, so as to be a little concave. This may possibly be a distinct species, but it agrees so nearly with the typical *C. Tryoni* in nearly all other respects that I am inclined to regard it as a mere variety of this shell. It is represented by fig. 10 c of plate 17.

Locality and position.—Fossil Hill, Kaw-soh Mountains, Nevada; Tertiary.

Genus PLANORBIS, Guttard.

PLANORBIS SPECTABILIS, Meek.

Plate 17, figs. 13, and 13 a, b, c, d, e, f.

Planorbis spectabilis, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 312; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 366, pl. v, figs. 7 a-d.*

Shell rather large, discoidal, concave above and below, but more deeply below than above; volutions about six, increasing gradually in size, generally a little higher than wide, rounded on the periphery, more narrowly rounded below, and convex but more depressed above; each about half enveloped below, and near one-fourth above, by the succeeding turn. Surface and aperture unknown.

Greatest breadth, 0.80 inch; height, 0.26 inch; section of outer volution, 0.23 inch wide by 0.26 inch in height.

Since describing this shell under the above name, I have suspected that it may possibly be only a large variety, or more fully developed *P. convolutus*, M. & H. It has much the same form; but, as the types were found at widely different localities, and apparently at different horizons, I do not feel sure that they can be properly united under one specific name.

Locality and position.—The specimen figured was found by Colonel Simpson on Ham's Fork, Wyoming.

* These figures were drawn from better specimens than those here illustrated.

PLANORBIS SPECTABILIS var. UTAHENSIS, Meek.

Plate 17, figs. 14, 14 a, 14 b, and 14 c.

Planorbis Utahensis, Meek (1860), Proceed. Acad. Nat. Sci. Philad., XII, 314; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 365, pl. v, figs. 8 a, b, c.

Shell large, discoidal; upper side nearly flat, or sometimes slightly concave in the middle; periphery rather narrowly rounded or subangular; umbilicus moderately large, rather deep; volutions five and a half to six, increasing gradually in size, wider than high, and moderately convex both above and below, each about one-half enveloped on the under side, and less than one-fourth on the upper, by the next succeeding turn. Surface and aperture unknown.

Greatest breadth of a large specimen, about 1.19 inches; height, 0.35 inch.

This form is much like the last, but differs in having a deeper umbilicus, and proportionally wider volutions, which are generally distinctly wider than high, instead of the reverse. It seems to be quite similar to *P. rotundatus* of Brongniart, from the Paris Basin; but none of the specimens show any traces of the angle around the under side of the volutions, generally seen in that shell, as illustrated by Deshayes in the supplement to his great work on the fossils of the Paris Basin. Among our known recent American species, it is perhaps most nearly represented by *P. subcrenatus* of Carpenter, from Oregon; but it evidently shows a greater number of volutions on the upper side, and certainly seems not to have had as strong marks of growth as that shell. It is true the specimens are all casts; but it seems scarcely probable that if it had ever possessed these lines there would have been no traces of them left.

The type-specimens of this form certainly have much more depressed and proportionally wider volutions than the last; and if we could be quite sure that this is not, at least in part, due to accidental pressure, there would be scarcely any reason for doubting that it is specifically distinct.

The form referred to this species by Dr. White, in his report on Lieutenant Wheeler's collections, plate XXI, fig. 8, seems to me to agree more nearly with the last.

Locality and position.—Ham's Fork, near Fort Bridger, Bridger beds of the Wyoming Territory; collections of Colonel Simpson's expedition, in Museum of the Smithsonian Institution; Tertiary. Dr. Hayden's party have also brought this shell from the same region.

Genus LIMNÆA, Lamarck.

LIMNÆA (LIMNOPHYSA) VETUSTA, Meek.

Plate 17, figs. 4, 4 a, and 4 b.

Limnæa vetusta, Meek (1860), *Proceed. Acad. Nat. Sci. Philad.*, XIII, 314; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 365, pl. v, figs. 3 a, b.

Shell small, elongate-subovate, or subfusiform; spire moderately prominent, conical, scarcely as long as the aperture; volutions five and a half to six, compressed-convex; last one not very ventricose, sometimes almost subcylindrical; suture well defined, with comparatively little obliquity; surface showing only obscure lines of growth; aperture very narrow, subovate; columella with a moderately distinct fold.

Length, 0.56 inch; breadth, 0.26 inch.

Among existing species this may be compared with *L. decidiosa* of Say, some varieties of which it quite nearly resembles. Its body-volution, however, is less ventricose, and its aperture less expanded, than we see in any of the several forms that have been supposed to be varieties of that species. It is perhaps more nearly allied to some of the real or supposed varieties of *L. humilis*, Say; though not exactly agreeing with any of them. It varies much in form.

Locality and position.—Ham's Fork, near Fort Bridger; Colonel Simpson's collection, in the Museum of the Smithsonian Institution; Tertiary.

LIMNÆA SIMILIS, Meek.

Plate 17, figs. 3 and 3 a.

Limnæa similis, Meek (1860), *Proceed. Acad. Nat. Sci. Philad.*, XII, 314; and (1876) in Col. Simpson's Report Expl. across the Great Basin of Utah, 365, pl. v, figs. 2 a, b.

Shell small, narrow-subovate, approaching subfusiform; spire rather prominent, nearly as long as the aperture; volutions five and a half to six, convex; suture rather deep and oblique; surface showing only fine, obscure

lines of growth, scarcely visible without the aid of a lens; aperture subovate, rather narrowly rounded below, and acutely angular above; columella twisted into a moderately prominent fold.

Length, 0.39 inch; breadth, 0.19 inch; apical angle slightly convex, divergence about 38° .

This variable form is so closely allied to the last that I am nearly satisfied that it is only a variety of the same. Its chief difference consists in having the volutions of its spire a little more convex, and more drawn out, as it were, so as to give decidedly greater obliquity to the suture. It seems to be even more nearly allied to some of the more slender forms regarded by Mr. Binney as varieties of *L. humilis* of Say; though it is a decidedly more attenuated, less compact shell than that represented by Mr. Binney's figure of *L. humilis*, given on p. 63 of his "Land and Fresh-Water Shells", published by the Smithsonian Institution. There is scarcely any probability, however, that our shell is identical with any of the existing species.

Locality and position.—Same as last. Colonel Simpson's collection, in the Museum of the Smithsonian Institution.

LIMNÆA (POLYRHYTIS) KINGII, Meek.

Shell ovate; spire short; volutions about four, convex, rapidly increasing in size, last one very large and ventricose; suture well defined; aperture large, subovate; columella apparently with a moderately well-developed fold; surface ornamented by regular, distinct, vertical costæ, that are strongly defined on the body-volution, but more obscure or nearly obsolete on the spire.



Limnæa Kingii.

Fig. 6. A side-view, with outer lip restored.

Fig. 7. A slightly different view of same (nat. size).

Length, 0.73 inch; breadth, about 0.43 inch.

This species is remarkable for having its surface ornamented by very regular, vertical costæ, quite strongly defined on its body-volution. This character will readily distinguish it from any other species, either recent or fossil, known to me, and, with its other characters, forbid its reference to any of the established subgenera. In the possession of ribs, it agrees with *Pleu-*

rolimnæa, but it differs extremely in form from that type. I have therefore proposed for its reception a new subgenus under the name *Polyrhytis*.*

I have seen but a single specimen of this shell, consisting of a well-defined mould, from which a gutta-percha cast has been taken, and from this the figures and description were prepared. The specific name is given in honor of Clarence King, esq., the Geologist-in-charge of the Survey of the Fortieth Parallel.

Locality and position.—Cache Valley, Utah; Tertiary, probably of Miocene age.

CERIPHASIIDÆ.

Genus GONIOBASIS, Lea.

GONIOBASIS SIMPSONI, Meek.

Plate 17, figs. 7, 7 a, 7 b, 7 c, and 7 d.

Melania Simpsoni, Meek (1860), *Proceed. Acad. Nat. Sci. Philad.*, XII, 313.

Goniobasis ? Simpsoni, Meek (1866), in Conrad's *Smithsonian Check-List*, 12; and (1876) in Col. Simpson's *Report Expl. across the Great Basin of Utah*, 365, pl. v, figs. 1 a to 1 e.

Shell attaining nearly a medium size, elongate-conical; spire gradually tapering apparently to an acute apex, which is not eroded; volutions eight or nine, flattened or more or less convex, increasing gradually and regularly in size; last one rounded below; suture generally linear, and sometimes presenting a very slightly banded appearance, or becoming deeper as the volutions assume a more convex outline. Surface ornamented with more or less distinct, regular little vertical, or slightly arched costæ, which are crossed by small, often obscure, revolving, raised lines, usually largest and most widely separated on the lower half of the body-volution; costæ sometimes assuming a very faintly nodose appearance around the middle of the volutions. Aperture rhombic-subovate, and a little oblique, slightly sinuous at the base of the columella; outer lip somewhat sinuous above, and moderately prominent below.

Length of a mature specimen, 0.78 inch; breadth, about 0.30 inch;

* This subgenus bears the same relations to *Limnæa* proper, that *Costella*, Dall, bears to the typical forms of *Physa*. It was first proposed by the writer in the *Palæont. Upper Mo.*, 532, 1876.

angle of spire nearly or quite regular, divergence somewhat variable, but usually about 26° .

This species seems to be very variable, particularly in its ornamentation. On some specimens, both the costæ and the revolving lines are quite distinct, while, in others, one or the other, or both, become more obscure, or nearly obsolete. Sometimes the costæ are rather closely arranged, and in other specimens they are proportionally a little larger and more widely separated. Occasionally they are somewhat more prominent, or even assume a minutely nodular appearance, around the middle of the volutions of the spire and above the middle of the last turn (see fig. 7 *d*). Where the costæ fade away, they sometimes, especially on the body-volution, merely pass into coarse, irregular lines of growth. The volutions also vary in their convexity, being sometimes flattened on a line with the slope of the spire, so as to show a merely linear suture (see fig. 7 *a*), and, in other examples, they are more convex. In one specimen in the collection, the volutions are decidedly convex. This specimen also has the revolving lines and the costæ very nearly obsolete, though small, obscure, closely-arranged costæ are seen near the upper part of the spire, and the rather strong lines of growth on the body-volution show a tendency to gather into a few irregular folds, or costæ. (See fig. 7 *c*.)

There are also in the various Tertiary beds of Wyoming forms more or less nearly like this, ranging through a great thickness of strata, and varying so much as to be with great difficulty separated from each other. In regard to their exact relations to the shell here figured, and to each other, as well as to two species figured by Professor Hall in Frémont's report, and one by Mr. Conrad in the *Proceed. Acad. Nat. Sci. Philad.*, from this region, I have not been able to arrive at any very satisfactory conclusion. Our specimens, however, certainly look very unlike Professor Hall's figures of the species described by him.

This species resembles more or less nearly several of the existing western forms; but, after careful comparisons, I have been unable to identify it with any of them. Its specific name was given in honor of Col. J. H. Simpson, of the United States Topographical Corps, who brought the typical specimens from the Far West.

Locality and position.—Ham's Fork, near Fort Bridger, Wyoming Territory, from the Bridger group Tertiary; Colonel Simpson's collections, in the Museum of the Smithsonian Institution.

MELANIIDÆ.

Genus MELANIA, Auct.

MELANIA? SCULPTILIS, Meek.

Plate 17, fig. 8.

Melania (Goniobasis?) sculptilis, Meek (1870), *Proceed. Acad. Nat. Sci. Philad.*, 58.
Compare *Melania Taylora*, Gabb (1869), *Palæont. California*, II, 13, pl. 2, fig. 21.

Shell of medium size, conoid-subovate; spire more or less elongate-conical, with convex slopes, the apical angle being greater in the young than in the adult, not eroded at the apex; volutions six to seven, rather distinctly convex; suture strongly channeled; aperture ovate, a little oblique, rather narrowly rounded below; lip sharp, most prominent below the middle, and slightly sinuous at the lower inner side. Surface elegantly ornamented by numerous, very regularly disposed, slightly flexuous or sigmoid, vertical costæ,* which are crossed by equally distinct and regular spiral ridges, about four of which may be counted on each volution of the spire (excepting those near the apex, which are smooth), and eight to ten on the last turn, on the under half of which they are most strongly defined; minute lines of growth may also be seen by the aid of a magnifier; costæ slightly nodulous at the points where they are crossed by the little revolving ridges.

Length, 0.62 inch; breadth, 0.27 inch.

This is a neat species, remarkable for its sharply-defined and very regular cancellated style of sculpturing. The vertical costæ are equally well defined on all the volutions, excepting those near the apex, and on the under side of the last one; while the revolving lines, or ridges, become a little more distinct on the lower part of the body-turn. Although there are nearly always four of these revolving ridges on the volutions above the last one, in a few examples as many as six may be counted on these turns; but this is due to the intercalation of a smaller one between two of the others, and

* These are represented too straight on the figure.

the exposure of another above the suture that is usually hidden beneath it by each succeeding turn.

Among the existing American species, this seems to be most nearly represented by *G. Albanyensis*, Lea. Mr. Tryon, to whom I sent a specimen of it, thinks it resembles some Asiatic species of *Melania*, and that it may possibly belong to that genus, and not to *Goniobasis*.

Since publishing a description of this shell under the name *Melania* (*Goniobasis*?) *sculptilis*, I have been led to suspect that it may not be distinct from *Melania Taylora* of Gabb, described in the California Report from the same region. Mr. Gabb's type seems to be much more slender and elongated, however, especially if his restored outline of the wanting part of its spire is nearly correctly drawn. Still, our types may be only young specimens of the same, as they are much smaller. I remember that there were with them a few larger casts and imperfect specimens from the same locality, so coated over with a calcareous deposit that their characters could not be made out. These agree more nearly in size and form with Mr. Gabb's type.

Locality and position.—Kaw-soh Mountains, Nevada; Tertiary.

MELANIA ? SUBSCULPTILIS, Meek.

Plate 17, fig. 9.

Melania (*Goniobasis* ?) *subsculptilis*, Meek (1870), Proceed. Acad. Nat. Sci. Philad., 58.

Shell apparently less than a medium size; spire conical, with convex slopes; apex pointed, not eroded; volutions about seven and a half, flattened-convex; suture channeled; aperture ovate, slightly oblique, rather abruptly rounded below; margin of lip most prominent below the middle, and faintly sinuous on the lower inner side. Surface ornamented by small, regular, slightly sigmoid, vertical costæ, with an obscure revolving ridge just below, and a slight angle above the suture, to which prominences the costæ impart a somewhat crenated appearance; last turn marked with a few distinct, revolving, raised lines, strongest on the lower half.

Length, 0.43 inch; breadth, 0.19 inch; length of aperture, 0.14 inch; breadth of same, 0.10 inch.

This form differs from the last by its smaller and more crowded costæ,

less convex whorls, and the absence of revolving ridges, or lines, excepting on the body-volution, and the one just below and above the suture. As in that form, its apical whorls are smooth. The only good specimen of it in the collection is smaller than the average size of those of the last, and probably a young shell. I am now of the opinion that it is most probably only a variety of that shell; but it may be distinct.

Locality and position.—Same as last.

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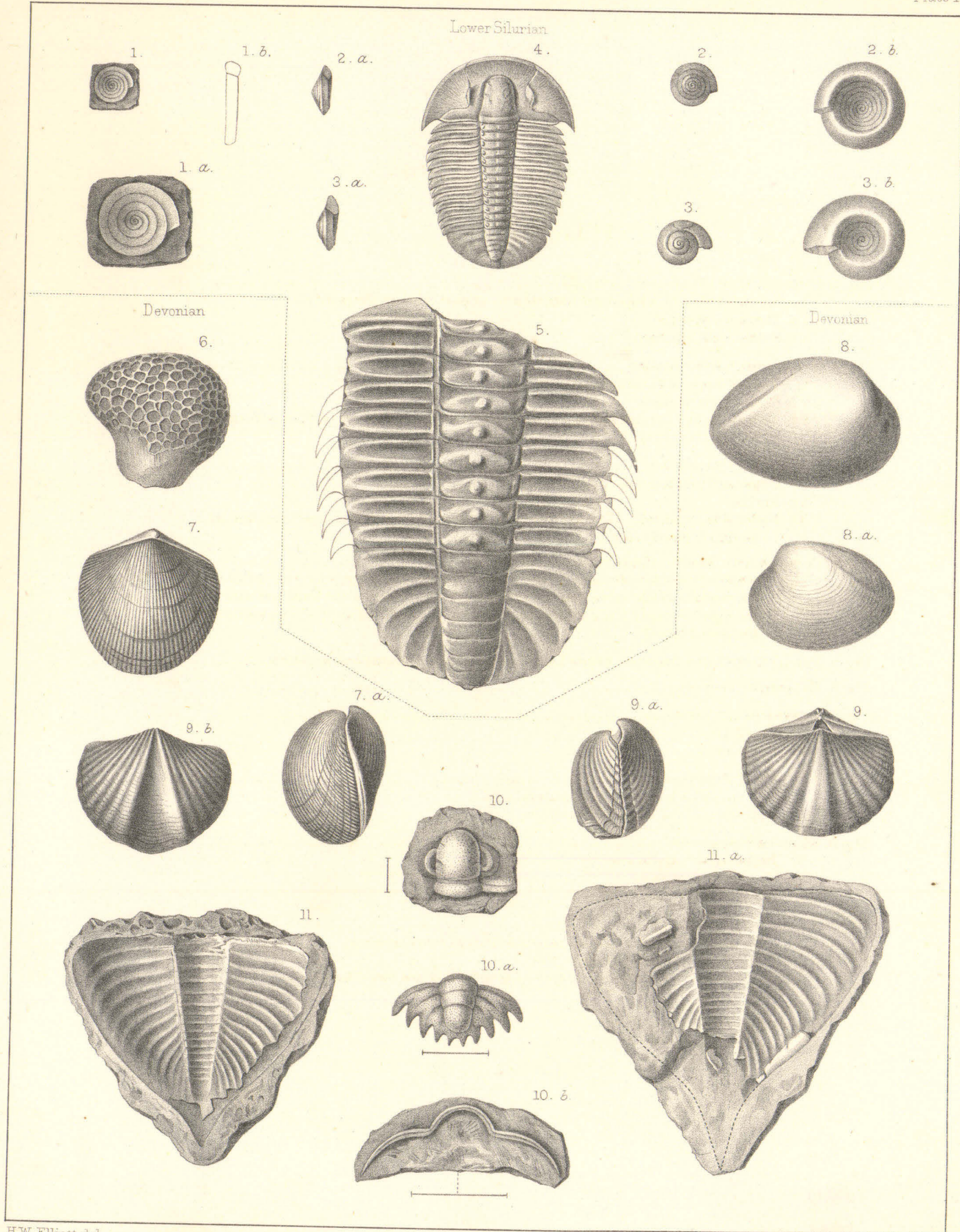


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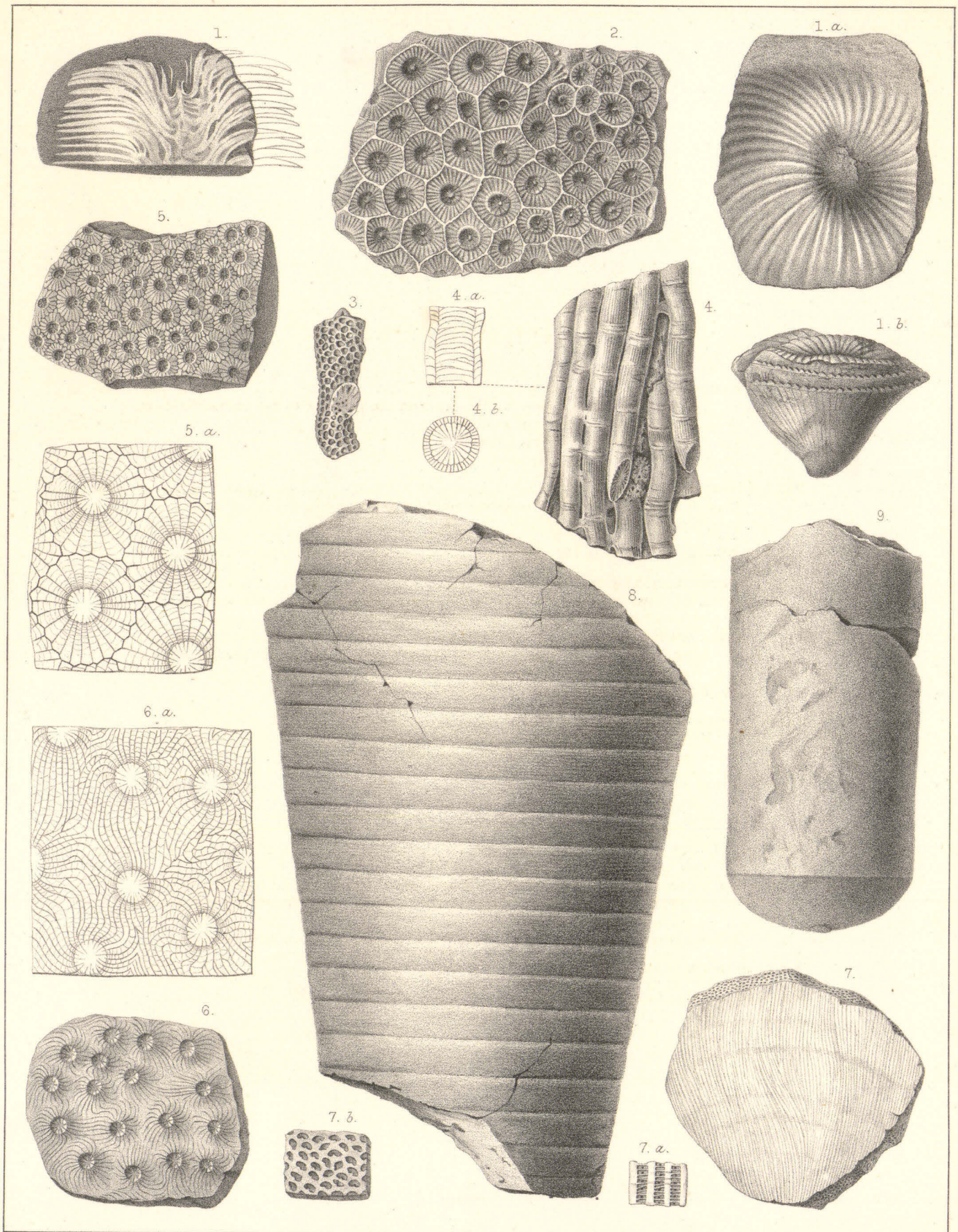


PLATE III.

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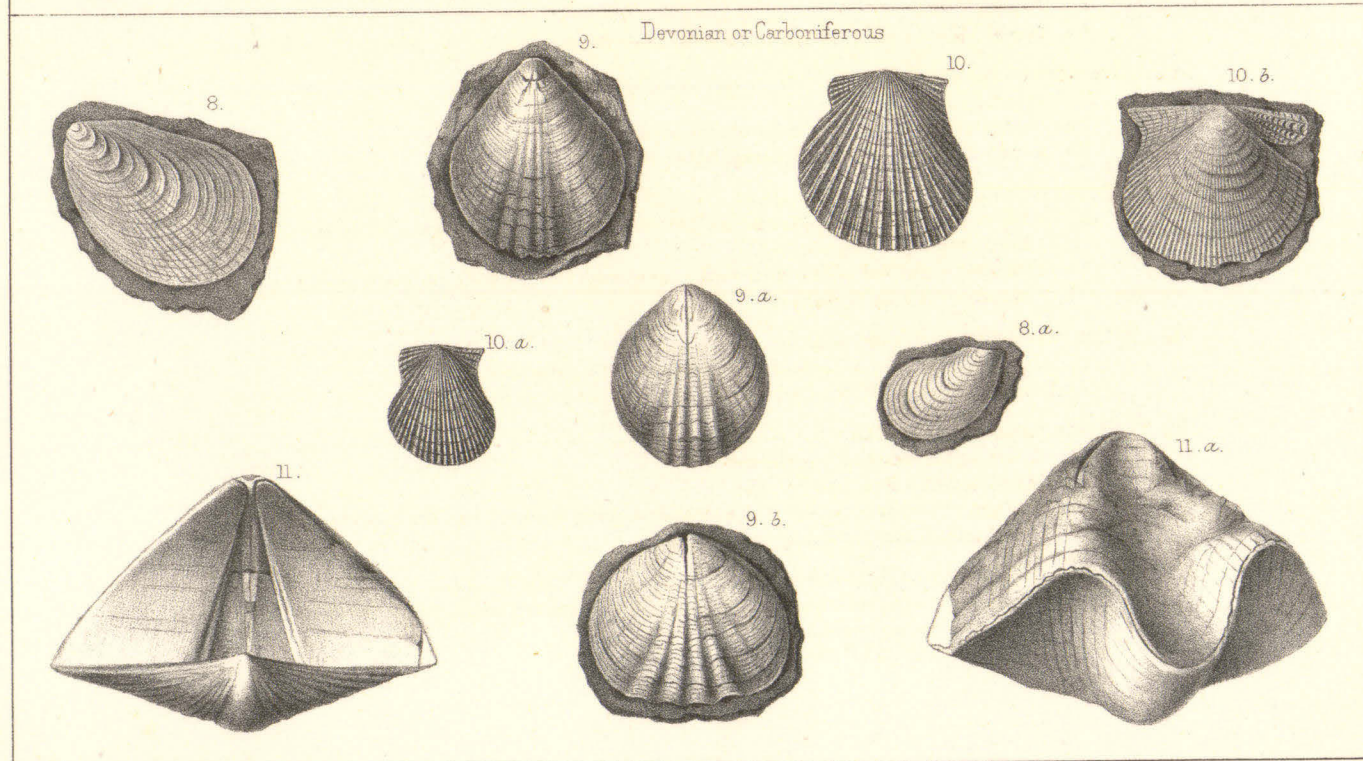
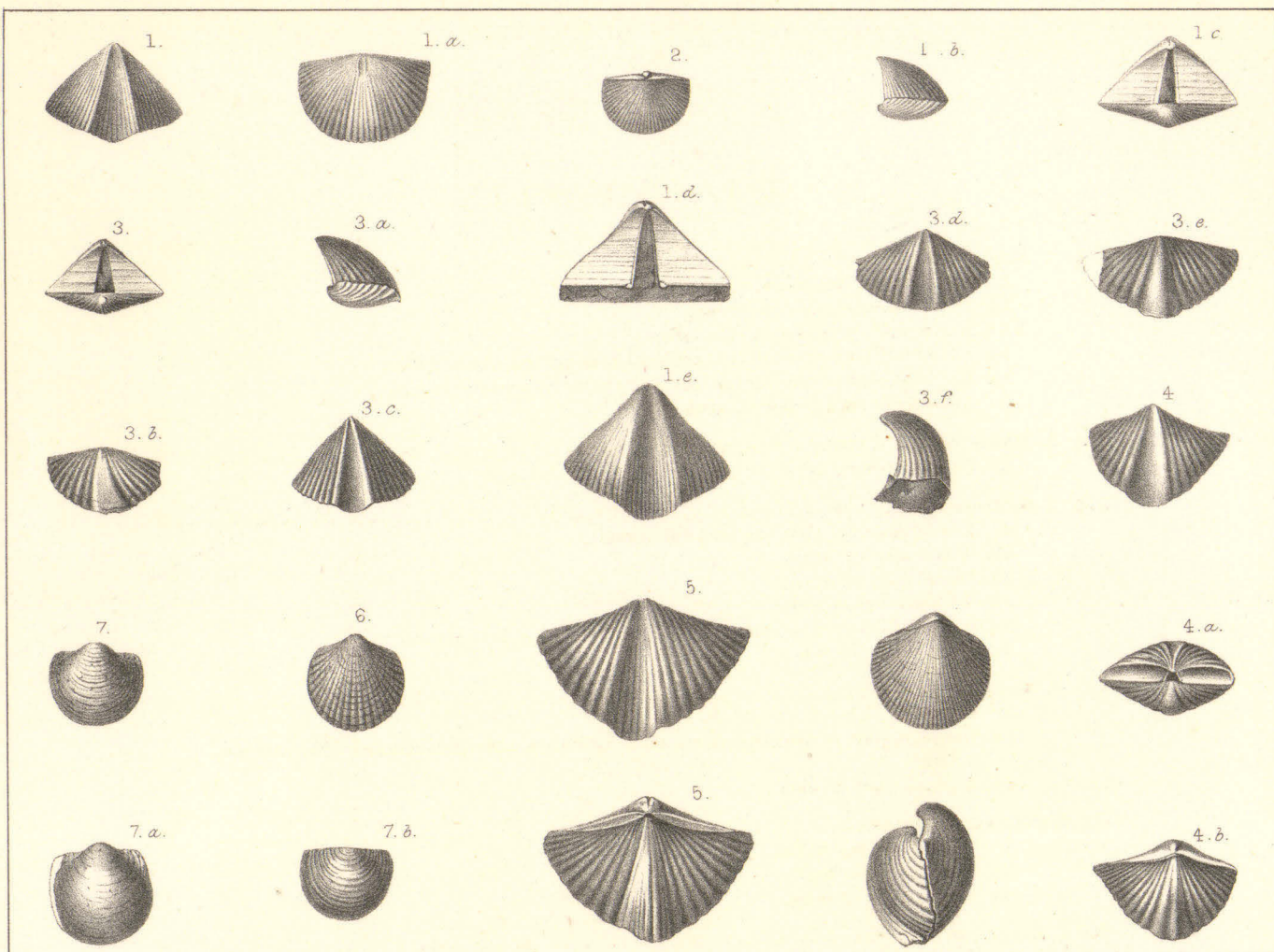


PLATE IV.

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| <p>Fig. 1. ZAPHRENTIS EXCENTRICA</p> | <p>Page.
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|---|---------------------|
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 - 1 *a*. A longitudinal section of same, mainly as exposed by fracture, showing the very broad tabulæ (*t*); and at (*v*) the large vesicular space on the ventral side. The points marked (*s, s, s*) show the lateral surfaces of the septa, which are marked with curved striæ; while the points (*g, g, g, g*) show the surfaces of the septa ground smooth; (*l*) is the fossula.
 - 1 *b*. A dorsal view of the coral as seen with the epitheca worn or weathered off, so as to show the edges of the septa divaricating along the middle of the dorsal side.
 - 1 *c*. A side view of same specimen.
 - 1 *d*. A transverse section of same, nearly at the middle.

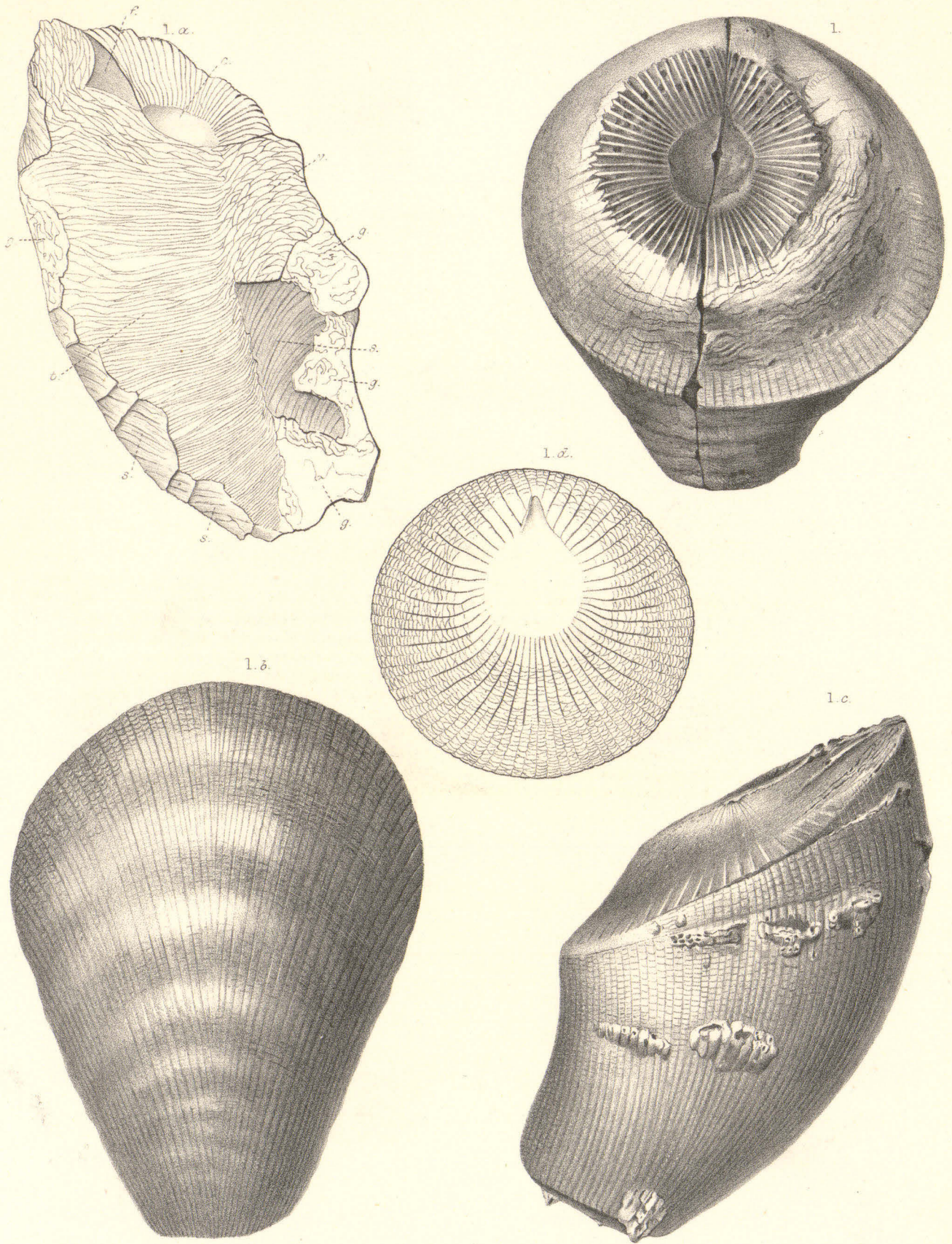


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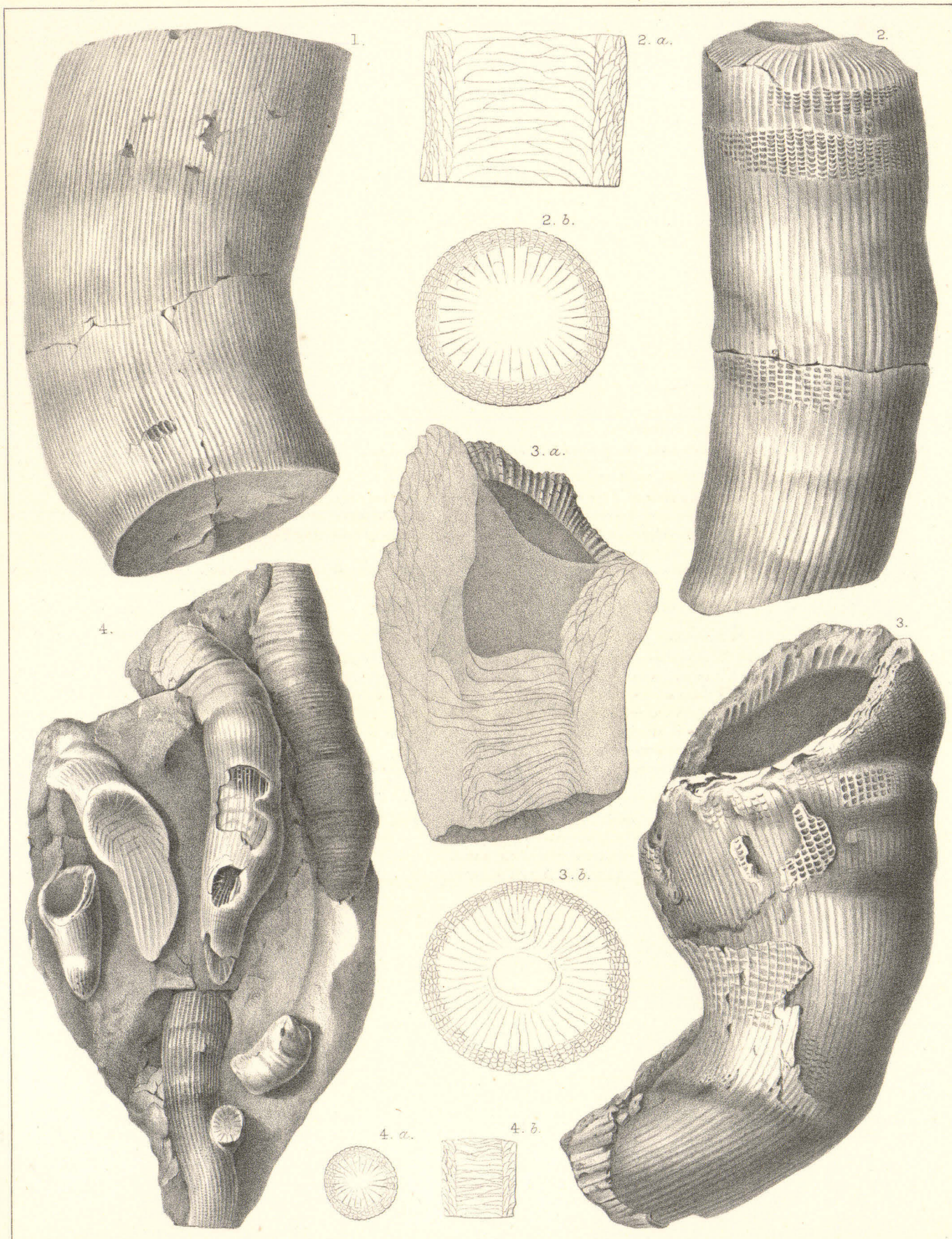
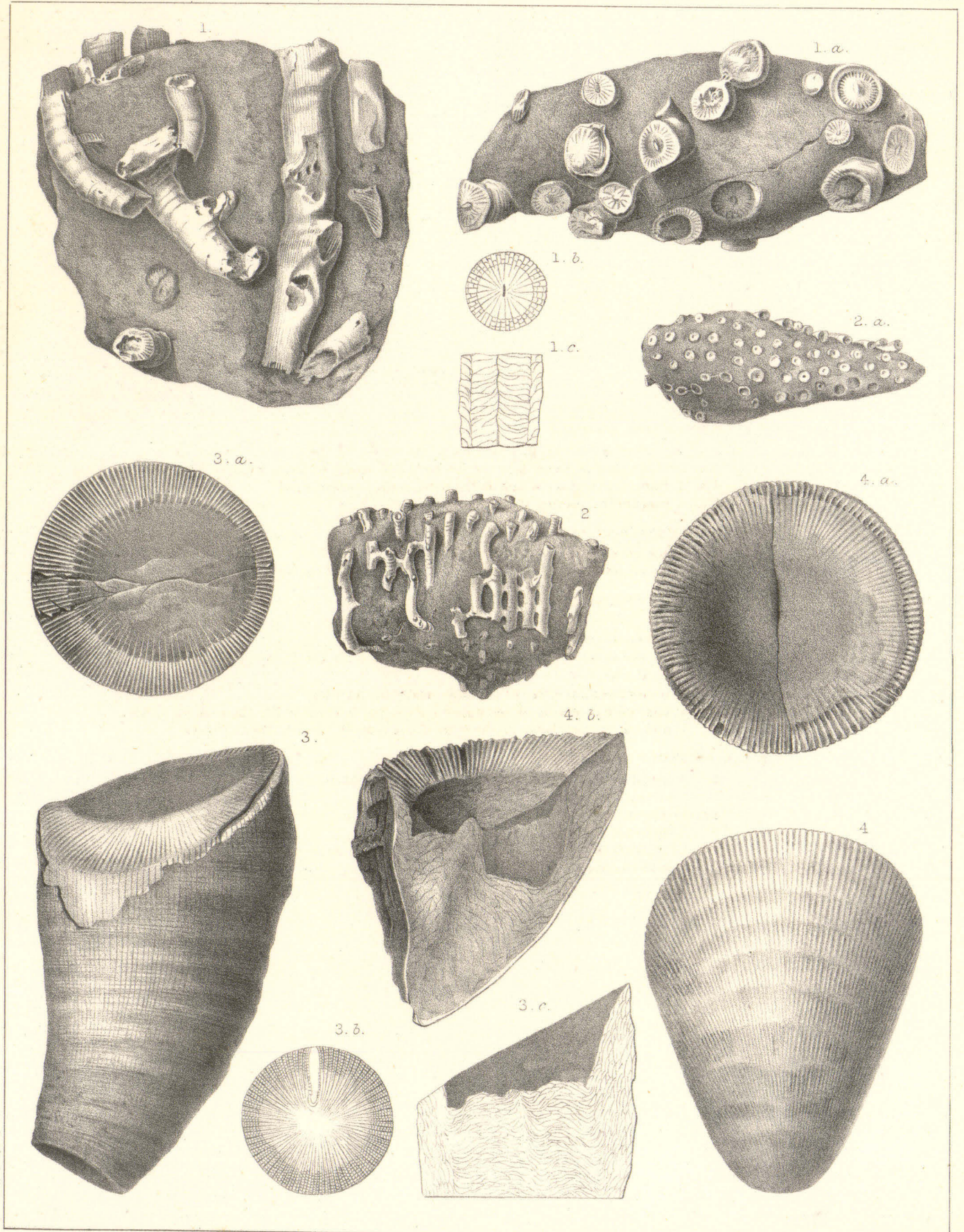


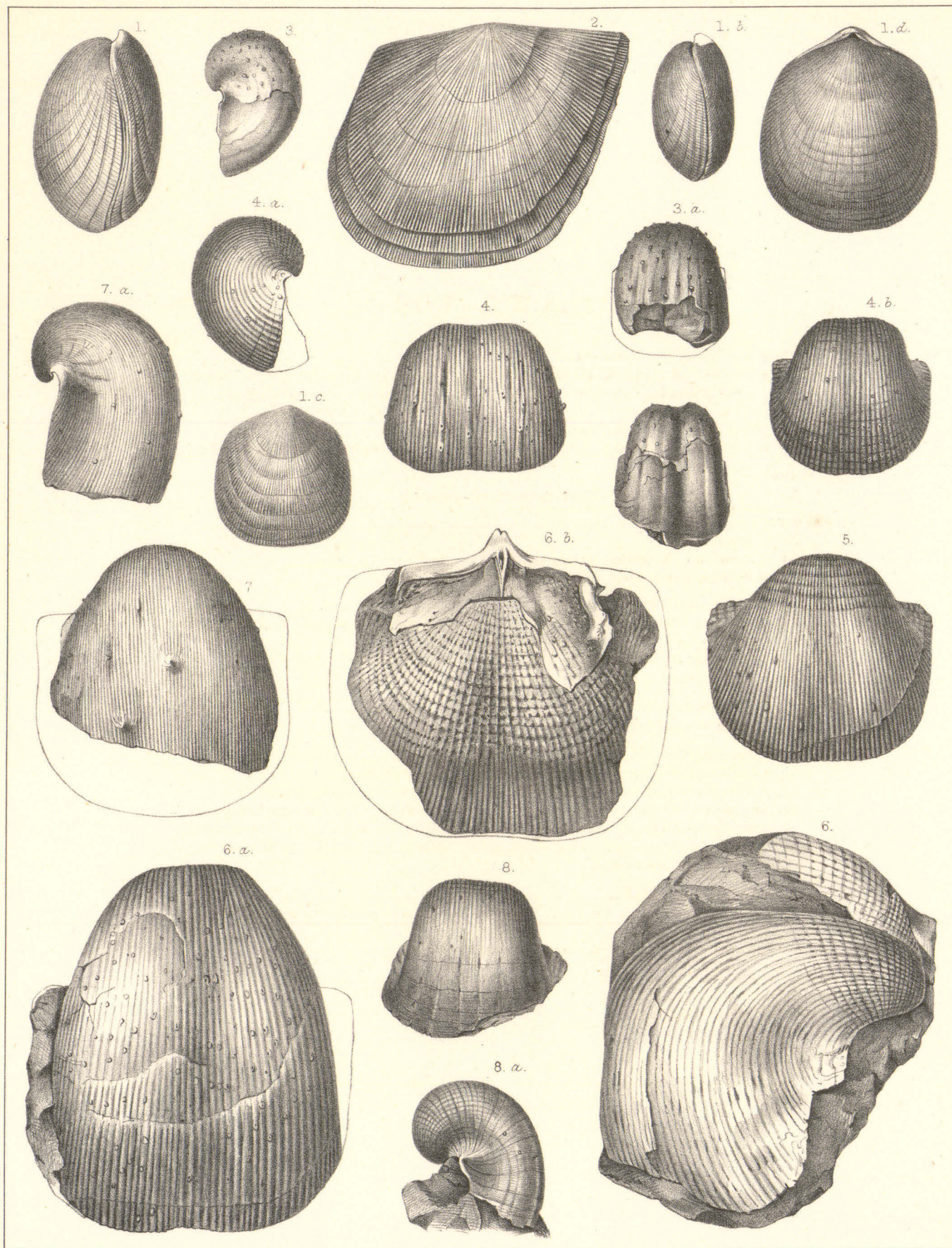
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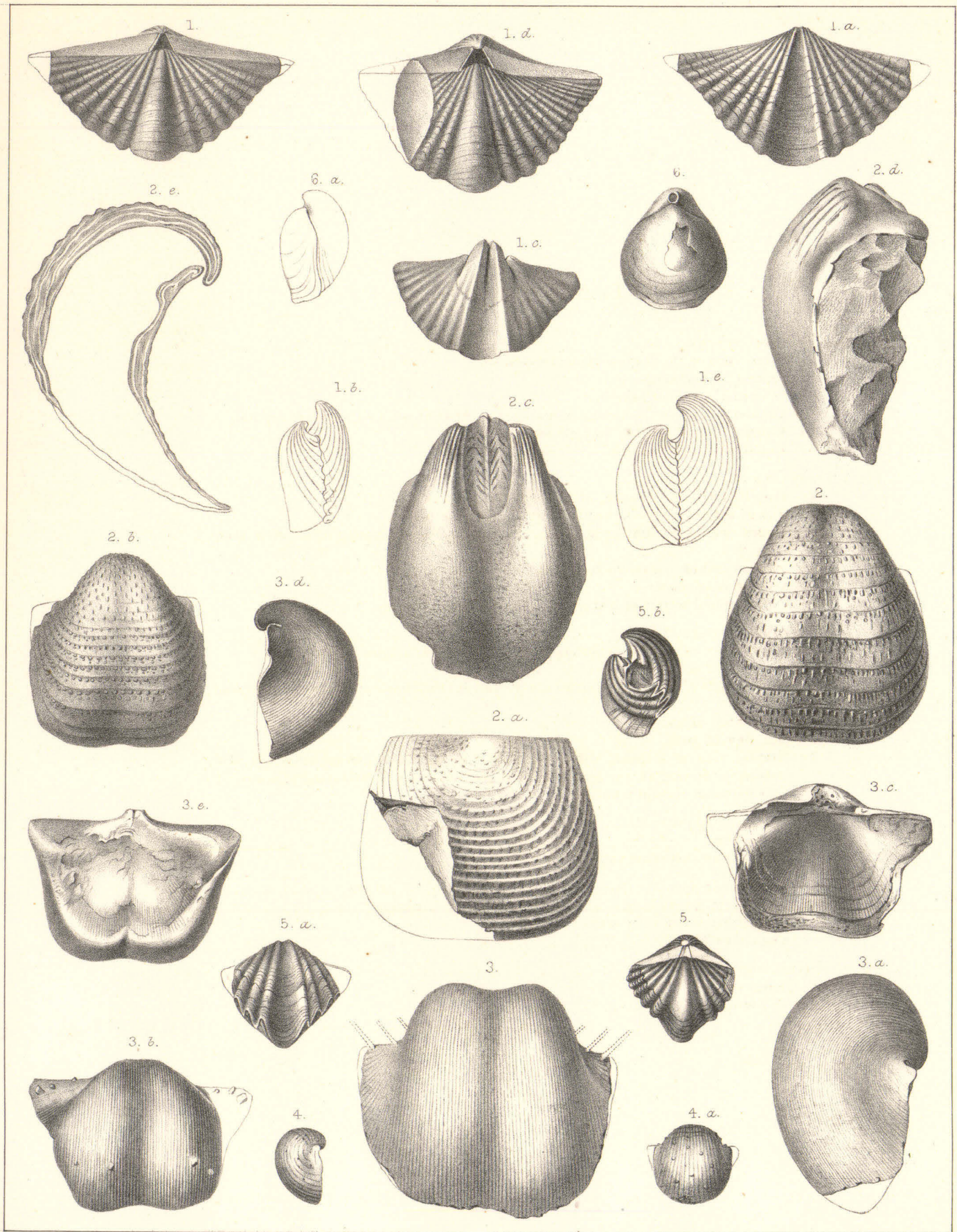


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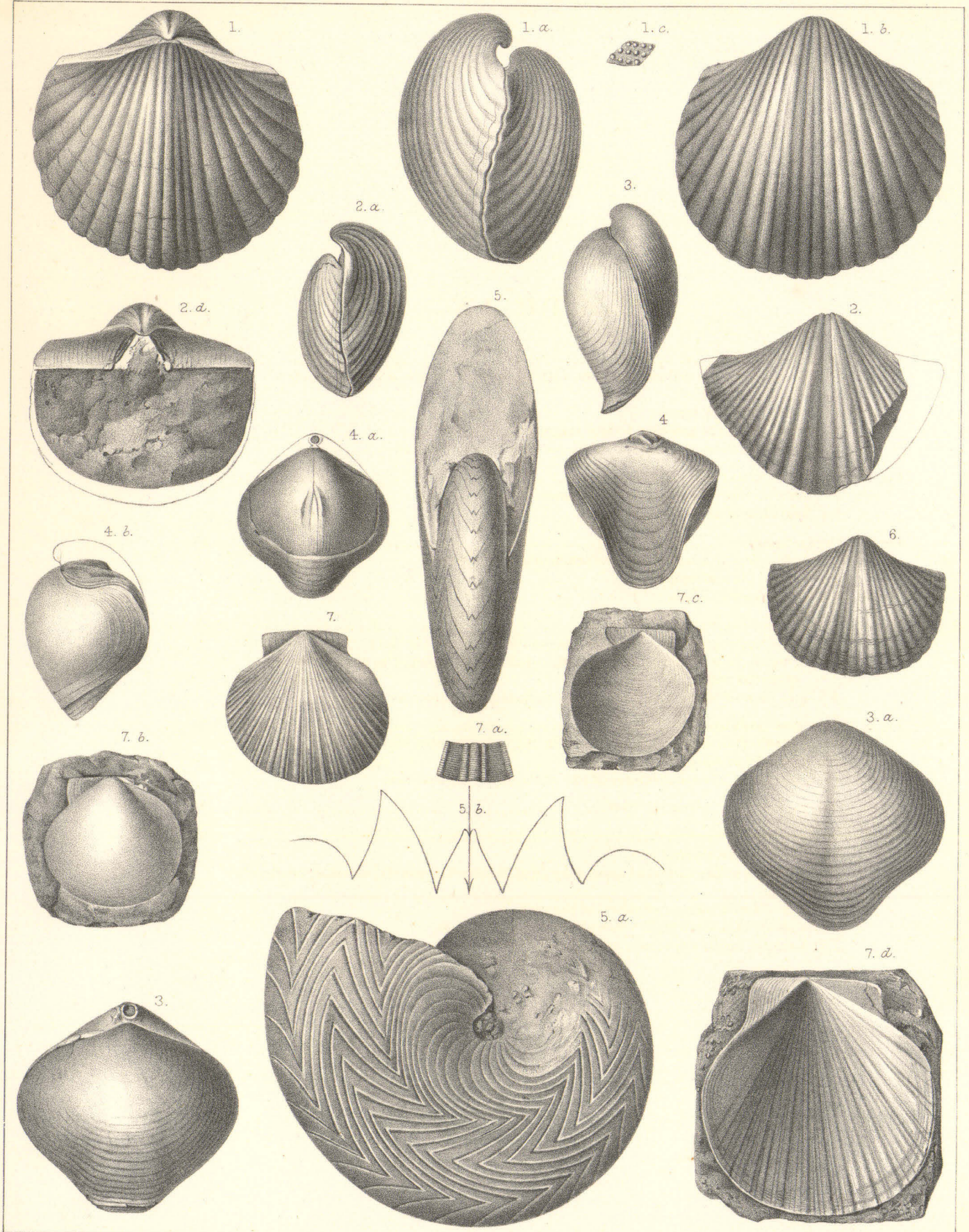


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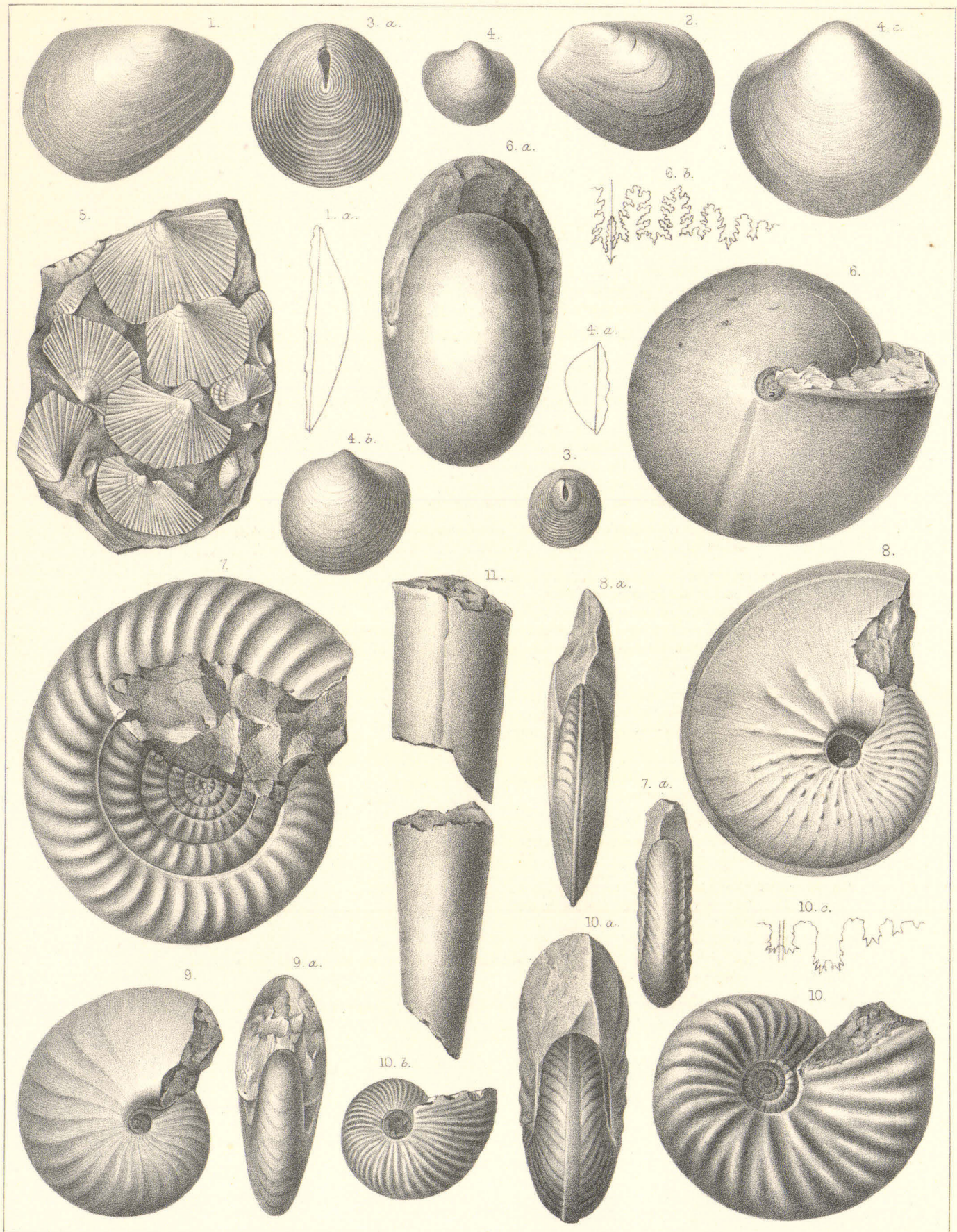
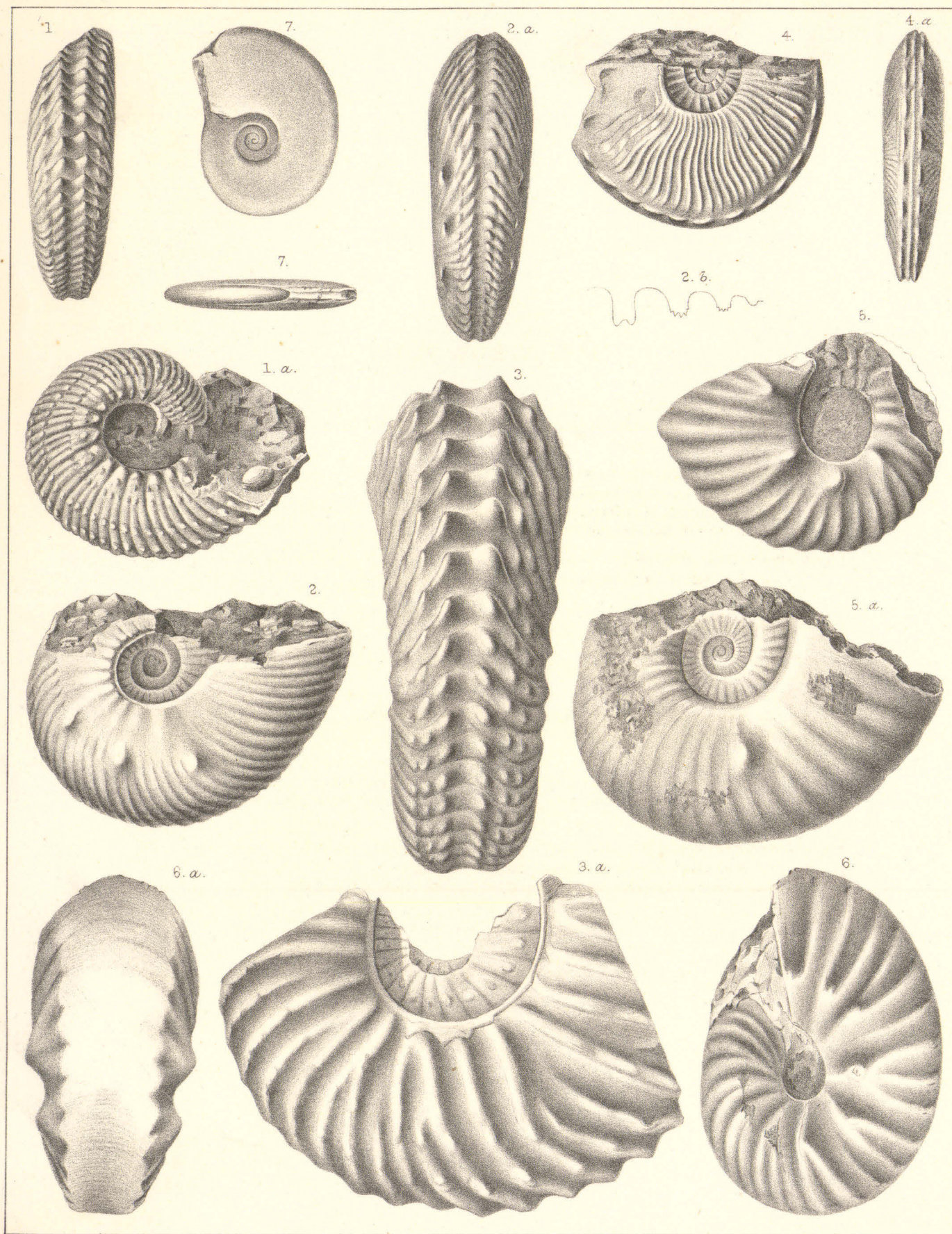


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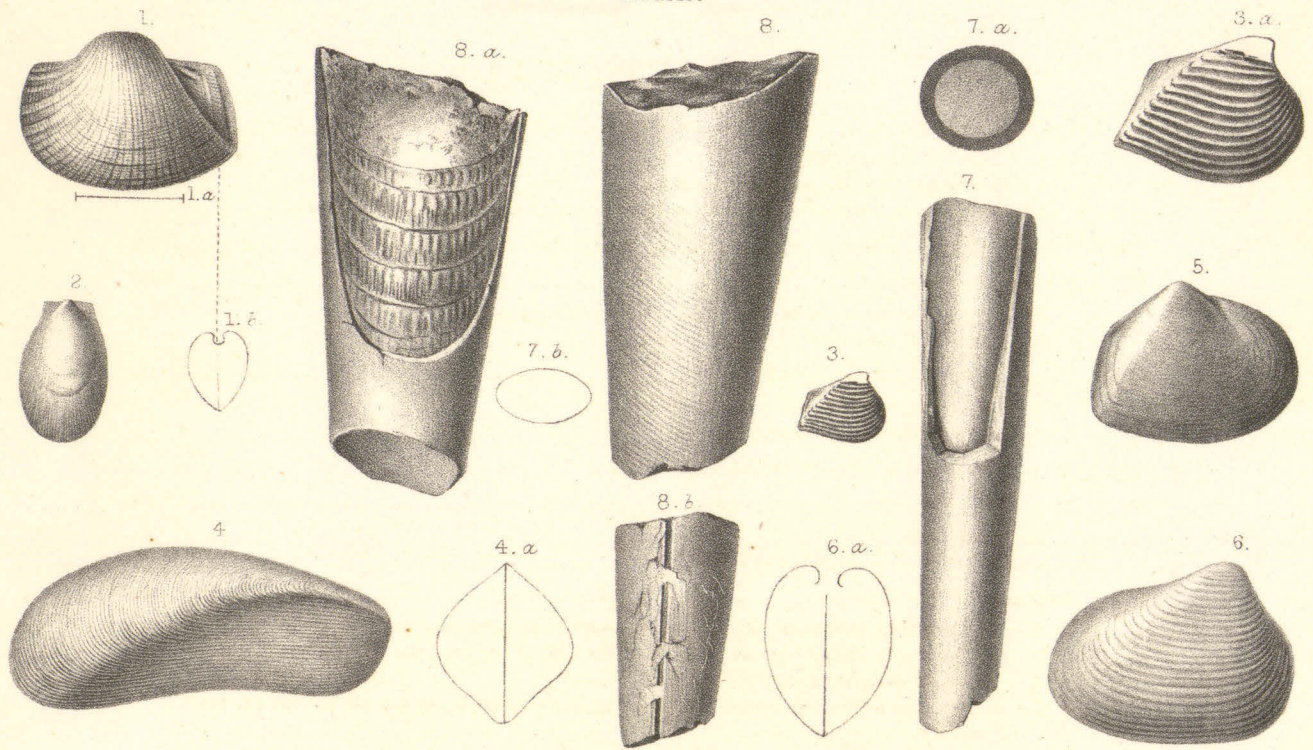
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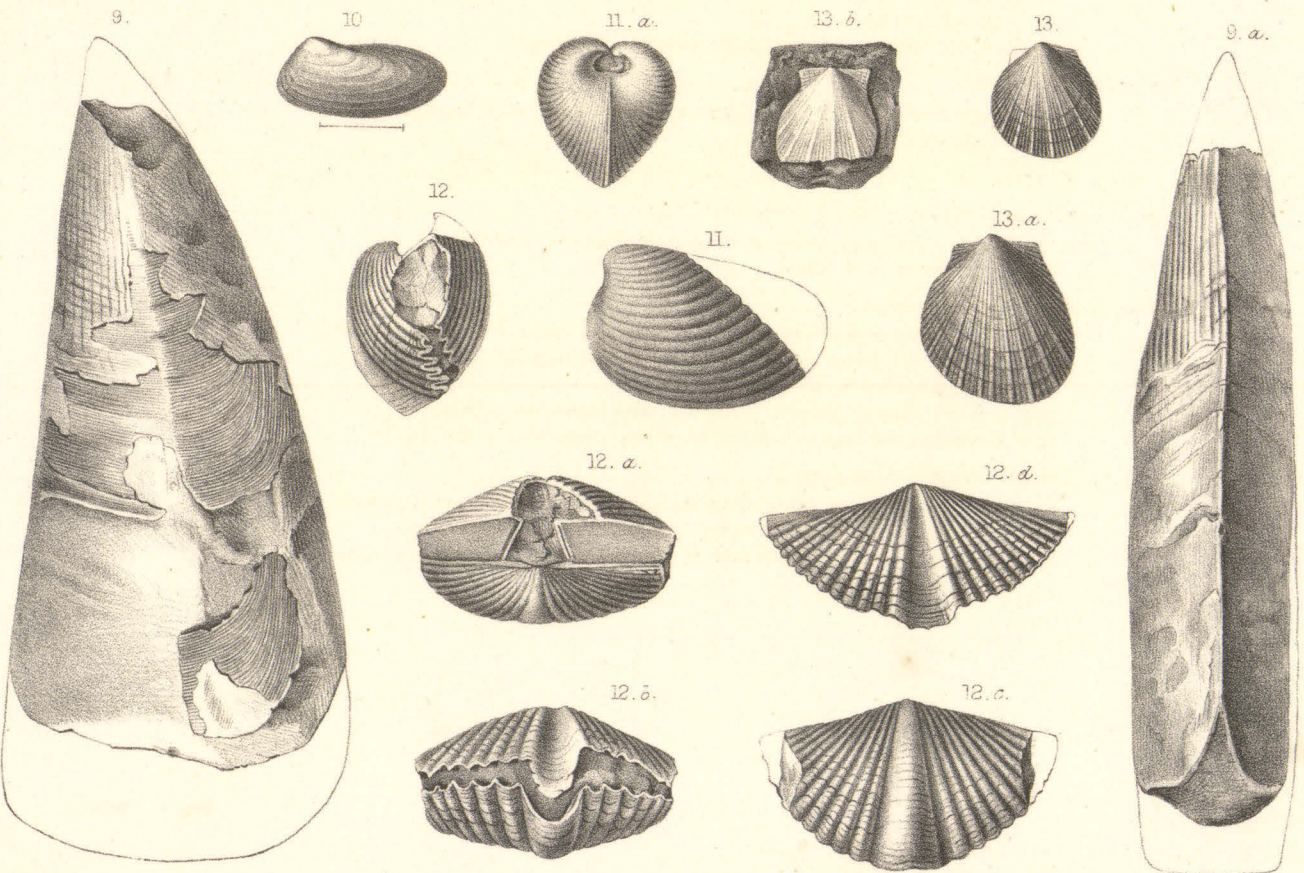
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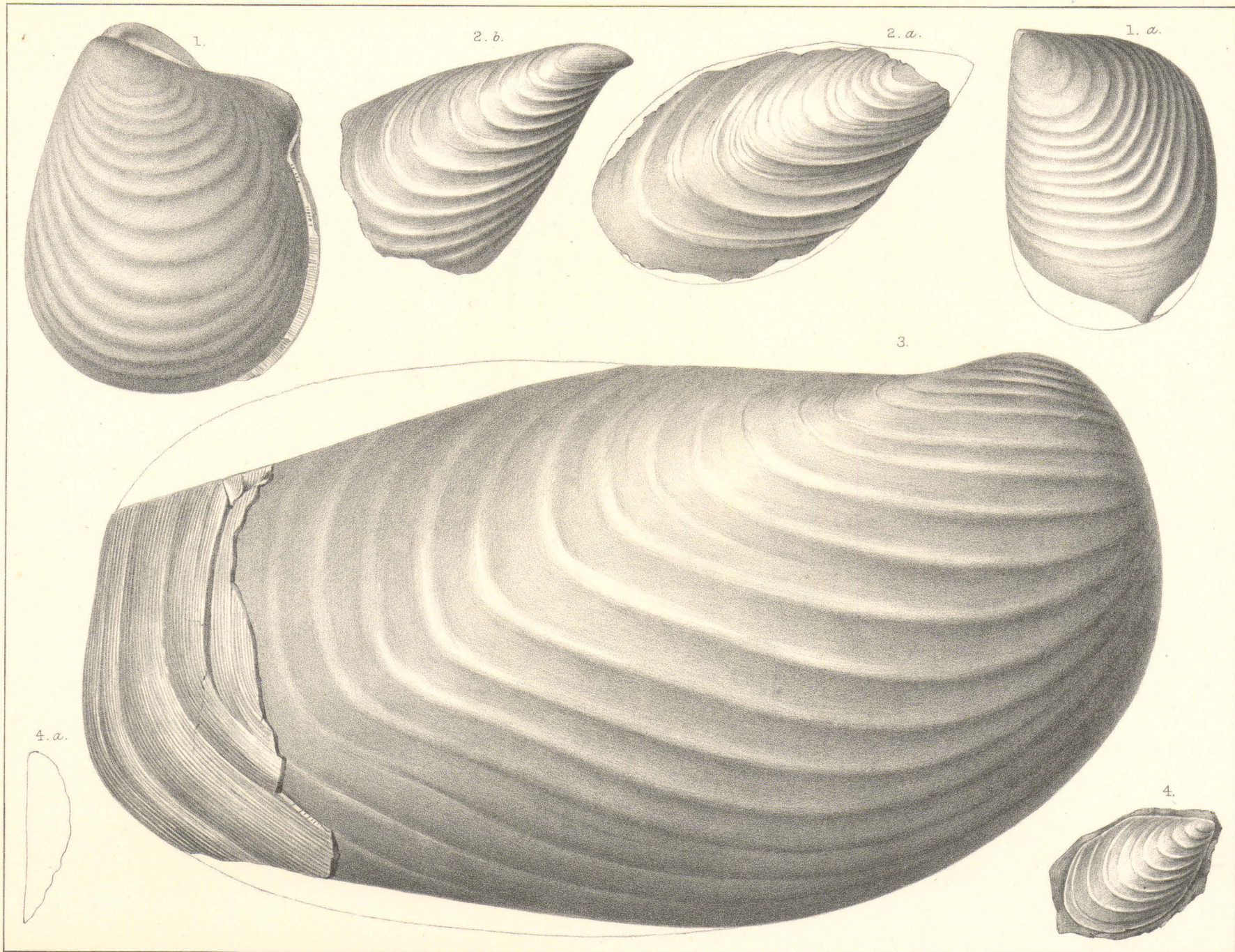


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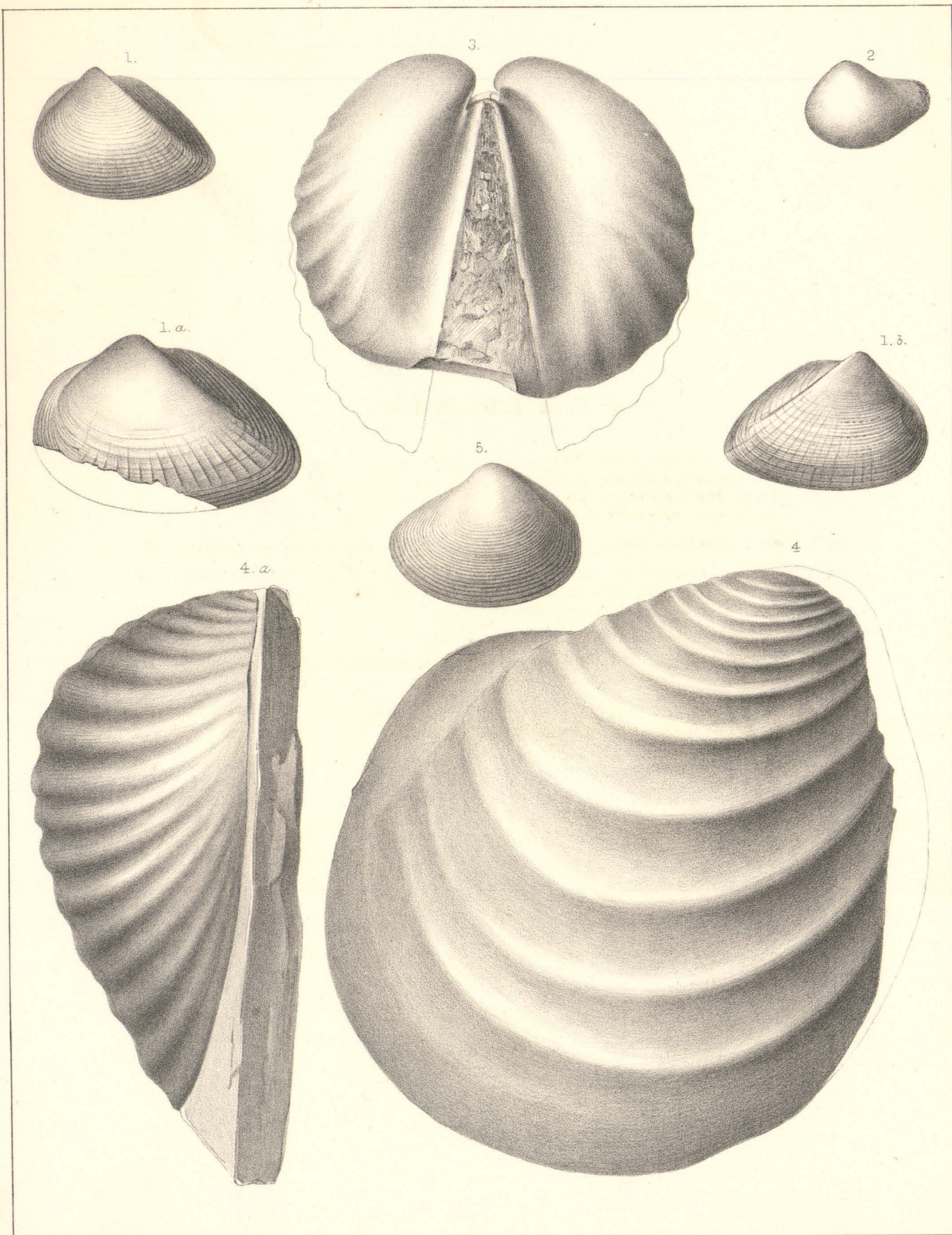
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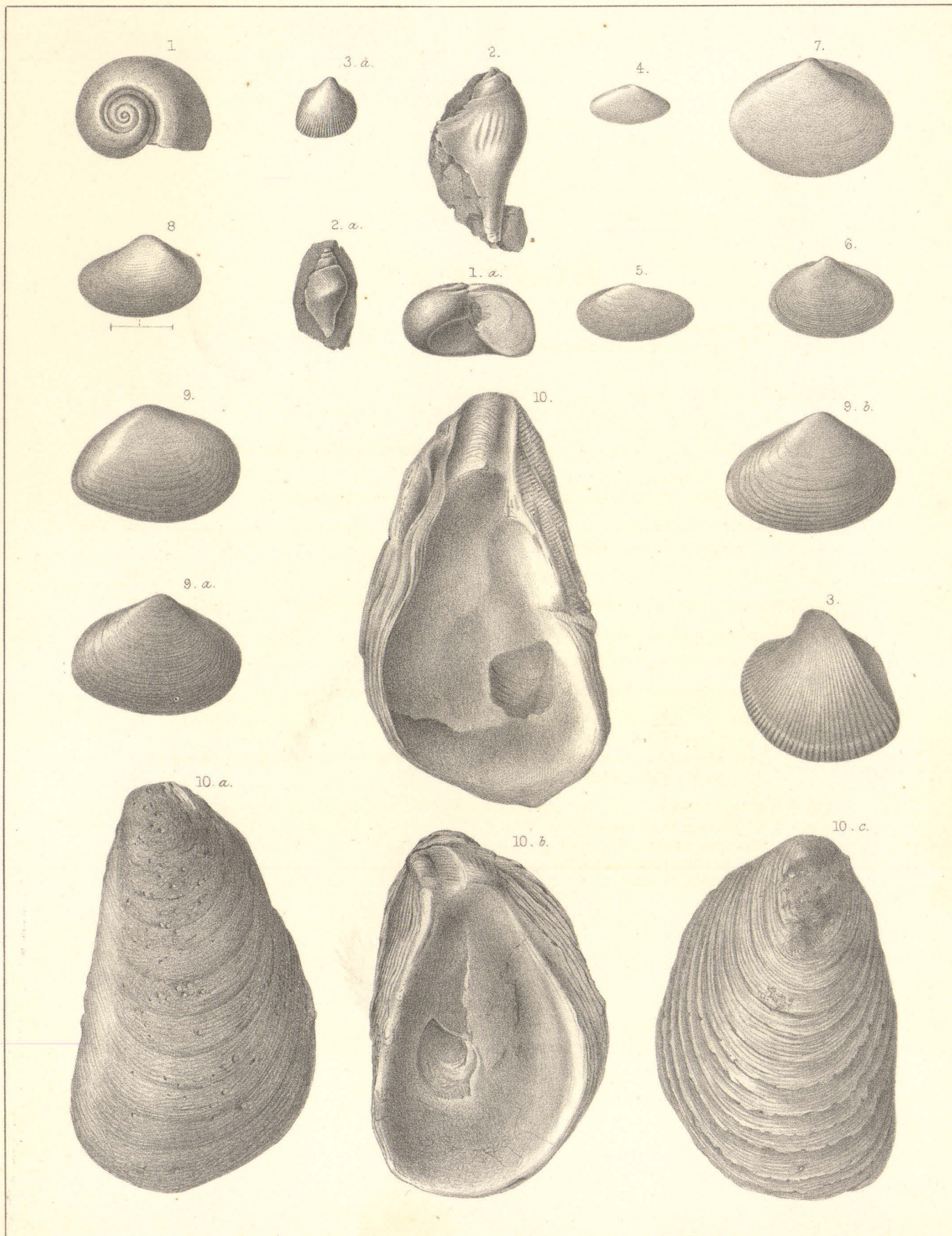


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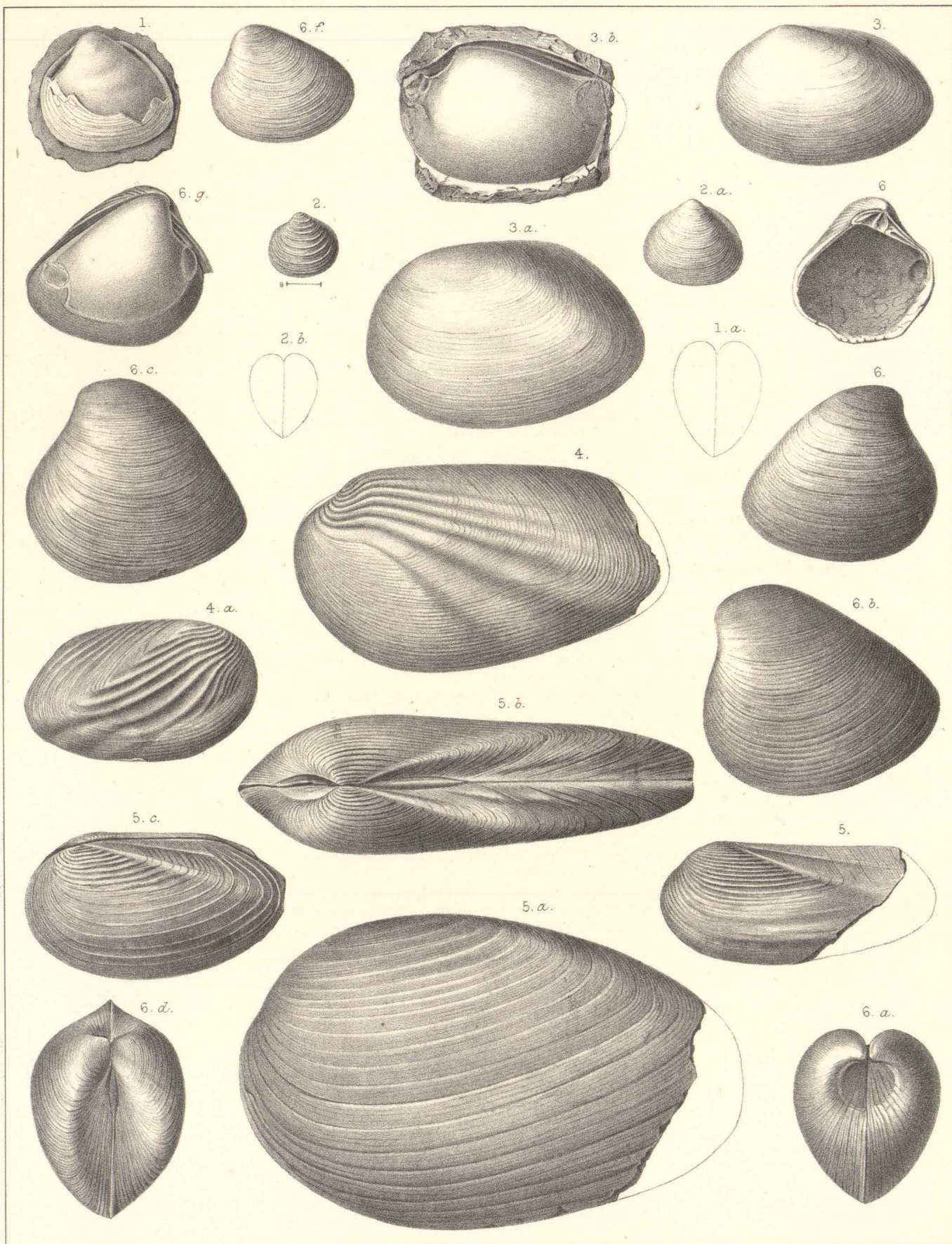
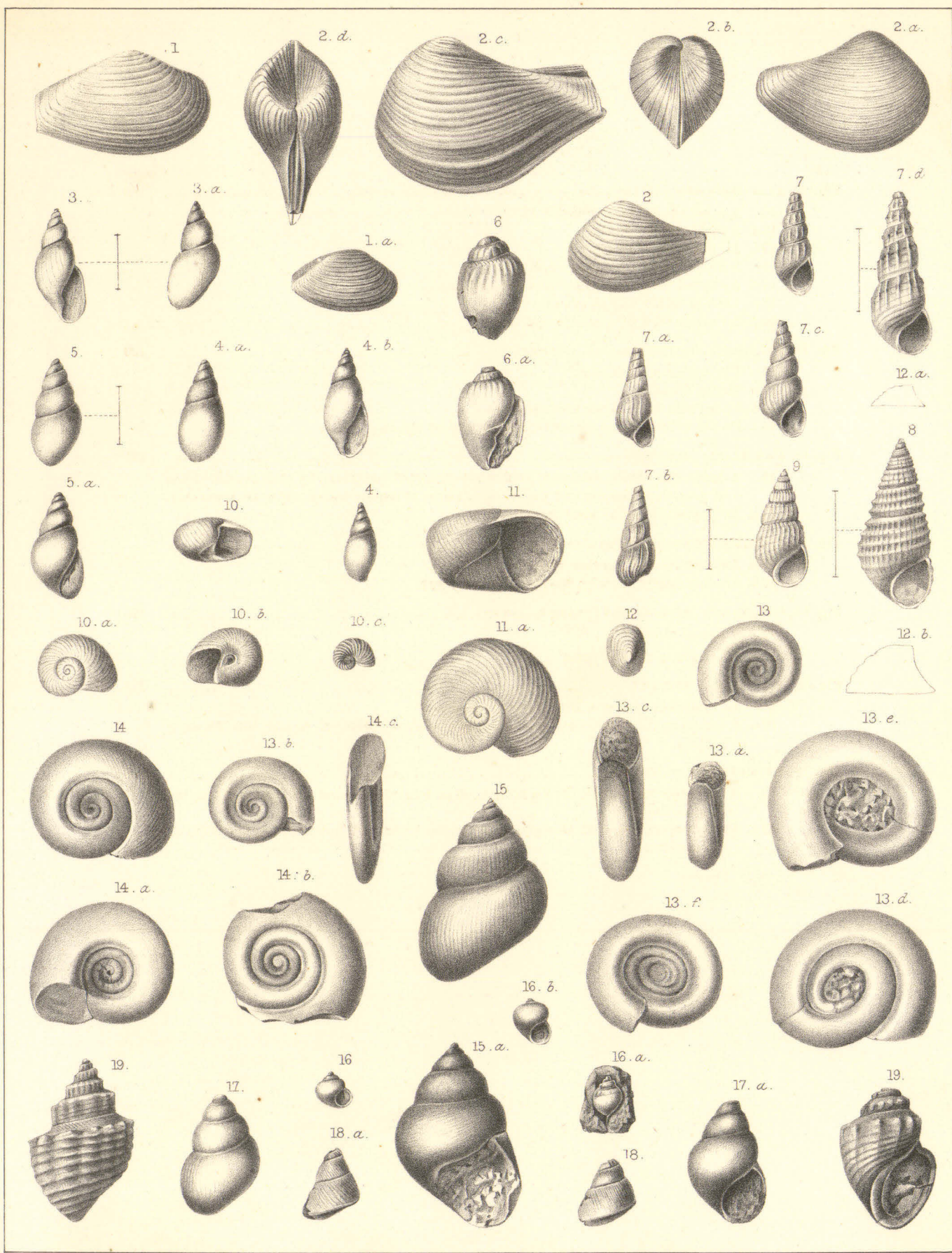


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UNITED STATES GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL.
CLARENCE KING, GEOLOGIST-IN-CHARGE.

PART II.

PALÆONTOLOGY.

BY

JAMES HALL AND R. P. WHITFIELD.

GENERAL REMARKS.

In studying the fossils placed in our hands, from the several Palæozoic formations occurring in the regions examined by the "Geological Exploration of the Fortieth Parallel", there are several groups of special interest noticed; but perhaps none more deserving of close attention than those from the limestones and silico-calcareous shales representing the Potsdam Period, from the White Pine and Eureka mining-districts and from Schell Creek. The peculiar interest attached to these specimens arises chiefly from the great number and variety of the Trilobitic remains, represented in the few blocks present in the collection, and their great resemblance to forms previously described from the soft, friable sandstones of the same period in the Mississippi Valley, within the States of Wisconsin, Iowa, and Minnesota. Although there is not a single species common to the two regions, yet there is such a close generic resemblance as to leave no doubt whatever of the positive identity of the formations. As yet, there have been fewer genera recognized from these far western localities than from the more eastern ones; but if the smaller number of distinct locations and the restricted space or territory over which collections have been made, as well as the small amount of material examined, be taken into consideration, it will at once be seen that the probability of the existence of as varied and equally abundant fauna is very great, especially as there are at present several undescribed, but quite distinct, forms recognized among the material in hand, but in fragments too poor for description or figures.

The species here described also present a striking resemblance to forms recognized in beds of corresponding age in the San Saba Valley, Texas, by Dr. F. Roemer, in his work on the Cretaceous formations of Texas (Kreid. von

Texas, &c.). The remarkable form there described and figured, under the name *Pterocephalia Sanctisabæ*, finds a close representative in the one here given as *Pterocephalus laticeps*, and shows the propriety of the generic separation, while the form characterized by the "slipper-shaped" glabella of Dr. Owen shows not only the wide geographical distribution of this peculiar type, which is common in the Wisconsin beds, and largely prevails in the White Pine, Eureka, and Schell Creek localities, and also occurs in the San Saba district, but also its value as a generic type, for which Dr. Owen proposed the name *Crepicephalus*, which may with propriety, we think, be retained for this widely-distributed group. The extensive geographical range of these peculiar and marked generic forms, through the western countries, is a point of great interest, and a feature that will undoubtedly be of much service in the future study of the formations over these as yet imperfectly-explored regions, as, from their strongly-marked character, they will be readily recognized, and serve as reliable guides in tracing out and locating, stratigraphically, the formations wherever they may be met with.

Besides the above, the genera *Dikellocephalus*, *Ptychaspis*, *Chariocephalus*, and *Agnostus* have been recognized in one or more species each. The Brachiopodous fauna of these localities is quite meager, both as regards species and individuals, and affords but imperfect means for comparison with that of other localities. The genus *Lingulepis* has been fully recognized, and a species, apparently referable to the genus *Obolella*, also occurs at Eureka, together with a minute species of *Kutorgina*. No other forms of life have as yet been noticed among the collections from rocks of this age within the region covered by the Survey.

A few very interesting species of Trilobites and other forms have been given from the collections from the base of Ute Peak, Wahsatch Range, Utah, which, from the evidence furnished by the Brachiopodous and Molluscan fauna, have been referred to the age of the Quebec group, together with other beds at White Pine, Nevada, and East Cañon, Oquirrh Mountains, Utah.

The Devonian formations are represented in a few localities; among the most interesting of which may be mentioned that of Treasure Hill, and the black slates near Eberhardt Mill, White Pine Mountains, Nevada. The

fossils of this last locality have a peculiar interest, from the occurrence of *Leiorhynchus quadricostatus*, Hall, a form which characterizes the black slates (Genesee Slates) at the top of the Hamilton group of New York, and also a species of *Lunulicardium* (*L. fragosa* = *Posidonomya fragosa* Meek). The occurrence of these two species, together with an *Aviculopecten*, scarcely distinguishable from *A. equilatera* (= *Avicula equilatera* H., Geol. Rept., 4th Dist. N. Y., p. 180, fig. 7), would appear to be sufficient reason for considering these shales of an earlier date than the Carboniferous, and much more nearly related to the Devonian Black Slates of New York. It is true there are black slaty layers, bearing Carboniferous fossils, immediately above them, or separated from them by only a thin bed of sandy calcareous shales, as at Eberhardt Mill; but these upper layers are lithologically quite distinct from those below, being, in fact, a bituminous limestone; and the fossils are so entirely distinct and strongly Carboniferous in character, one of them (*Cardiomorpha Missouriensis* S.) being positively identical with a well-known Coal-Measure species, that it appears to us there can be no doubt of their Carboniferous age and entire distinction from those below. The specimen of sandy calcareous shale in the collection, marked as occurring in the black slates at Eberhardt Mill, contains fragments and imperfect individuals of a *Spirifer*, resembling *S. Keokuk* H., but too imperfect for positive identification. If this specimen is authentic in its location, it undoubtedly marks a line of separation between the two beds of black slates.

Another group of fossils of considerable interest will be found figured on plate IV. These were obtained from limestones at Dry Cañon, Oquirrh Mountains; and from Ogden, Little Cottonwood, and Logan Cañons, in the Wahsatch Range, Utah, from their character we should consider them as of about the age of the Waverly group of Ohio and the yellow sandstones of Burlington, Iowa; which have been referred to the same age. Some of the species are identical with forms described from these localities, while others are very closely representative species; and all have more of a Devonian than a Carboniferous aspect. The occurrence of so many Devonian types at several localities within a limited district, and in considerable numbers, showing that it is not an accidental feature of an

isolated spot, would appear to be a matter of some importance in a stratigraphical point of view. The genus *Proetus* seldom occurs in rocks above the Devonian, but is here represented by two distinct species; one of which, *P. peroccidens*, has been recognized at three different localities. Besides the species illustrated on the plate, there are represented, in the collection from near Dry Cañon, a species of *Syringopora*, and a small-celled, closely-aggregated *Cyathophyllum*, an undetermined *Productus*, and a *Platyceras*; also what appears to be a Goniatite, but too imperfect for determination.

Above the limestone beds bearing Waverly fossils, at Dry Cañon, and separated from it by about twelve hundred feet of limestone, occurs a band of somewhat sandy calcareous shale, filled with Bryozoans, among which can be recognized a *Fenestella*, a *Polypora*, and a *Glaucanome*, together with a species of *Spirifera* too indistinct for determination; above this sandy shale there is nearly or quite another thousand feet of limestone, near the top of which occur the fossils figured on plate V. These latter are all of Lower Carboniferous forms, and mostly of known species, and interesting, as occurring in limestones without any intermingling of Coal-Measure types, a feature rarely met with in the Carboniferous localities of the Far West. The species represented are known in the more eastern localities as characteristic of several of the Lower Carboniferous divisions; but none of them occur in the true Coal-Measures, except *Productus semireticulatus*, which is a well-known cosmopolitan.

The age of the shales containing the Bryozoans is somewhat doubtful, as there are no known species by which to identify them with other localities; but the layers holding the fossils in question, and which occur just beneath the Weber quartzite, would appear to represent nearly all the divisions of the Lower Carboniferous as recognized in the Mississippi Valley. At one time, it was hoped, by Mr. Clarence King and his associates, that the Weber quartzite might prove a line of separation between the Lower Carboniferous and the true Coal-Measures; but all the localities except this one have yielded fossils of both formations, or of Coal-Measure forms only, showing a mingling of the two faunæ, as usually recognized in the Mississippi Valley and eastward, but in this locality, only the lower forms occur.

On that account, it will prove to be of very great interest in a stratigraphical point of view.

The section of the formations in the Western Oquirrh Mountains, in which Dry Cañon and Snowstorm Hill are situated, is likely to prove one of the most instructive of the Western Palæozoic localities, as in it will probably be found the most complete representation of the Palæozoic formations, extending from the quartzites of Ophir City (which are likely to prove as old as Huronian, being overlaid by shales bearing Trilobites of Primordial age) to these Weber quartzites, lying above the beds containing the Lower Carboniferous fossils. The layers of limestones between the Trilobitic shales and the limestones furnishing Waverly group fossils, two thousand feet in thickness, undoubtedly represent the Silurian and Devonian formations, and will probably, when thoroughly examined, yield fossils of these formations in some of their outcrops.

The rocks at this locality are said to change gradually, in passing upward, from a limestone to a quartzite, and above, having limestone bands interstratified. If such be the case, some of these limestones will most probably yield fossils on thorough examination, and show a gradual change from a Lower Carboniferous to a Coal-Measure fauna.

A few additional species furnished by the later collections from the Upper Coal or Permo-Carboniferous beds of the Weber River section, will be found figured on plate VI.

On plates VI and VII are given a few forms each of Triassic and Jurassic species. The later collections from these formations are rather unsatisfactory in their character, and not very abundant. There is one group, however, of special interest, labeled as coming from Shoshone Springs, Augusta Mountains. Of the age of these beds we are not at all satisfied. Mr. King and his associates are inclined to place them as low as Jurassic or even Triassic. This view may be correct. The species are all of undescribed forms, and therefore of but little stratigraphical value. The generic value of the *Aviculopecten*-like shell would indicate an age at least as great as this, if the generic reference is correct, about which there may possibly be some doubt; but the features of some others would incline one to believe them of much more recent date, especially the two described under the new generic name

of SEPTOCARDIA. These shells have the general aspect externally of the genus *Cardita*, and resemble very cosely the forms of that genus peculiar to the Eocene formations. Since, however, they prove to be a new generic type, they cannot be said to possess the same stratigraphical importance as one already known to be peculiar to any definite horizon, and they may be only the first appearance of what afterward becomes a common feature of a group, characterizing a later period. Several fragments of additional species, all apparently new to science, occur in the collections from this locality, but all in too imperfect a condition to be serviceable.

Among the collections are many small groups of species from various localities, which would have been of great interest, and highly advantageous to science, could they have been illustrated, but the limited time and means at our disposal would not permit.

FOSSILS OF THE POTSDAM GROUP.

BRACHIOPODA.

Genus OBOLELLA Bill.

OBOLELLA DISCOIDA n. sp.

Plate I, figs. 1-2.

Shell very small, discoid, and scale-like; valves depressed convex; the larger one a little longer than wide, giving a very short, ovate form, only perceptibly narrowing toward the beak, rounded on the sides and a little straightened on the front margin; surface slightly convex, more convex on the umbo and flattened toward the front. Smaller valve circular, sometimes almost truncate at the beak, slightly convex on the umbo, and flattened in front, having a less degree of convexity throughout than the other valve.

Surface-structure not observed. The shells are all more or less exfoliated by separation from the rock. The substance of the shell is calcareous, and the surface of the cast smooth and shining, with very fine concentric lines.

The shells seldom measure more than an eighth of an inch in their greatest diameter, and are usually smaller; while the largest examples seen do not exceed one-sixth of an inch. It is remarkable only for its small size and flattened form, possessing no salient features by which it can be compared with other species.

Formation and locality.—Quite common in some hard, sandy limestones of the Potsdam formation, in the Eureka District, Nevada, associated with *Kutorgina*, *Agnostus*, and several species of *Trilobites*. Collected by Arnold Hague, esq.

Genus LINGULEPIS Hall.

LINGULEPIS MÆRA n. sp.

Plate I, figs. 5-7.

Shell small, short-ovate, a little longer than wide, point of greatest width a little below the middle of the length; base regularly rounded; beak small, pointed, and slightly incurved; cardinal slopes long, diverging from the beak to below the middle of the shell, and inclosing an angle of about ninety degrees. Valves convex, a little the most ventricose above the middle of the valve; the beak of the longer valve appearing quite full and round.

Surface of the shell apparently smooth. Internal cast distinctly radiated.

The surfaces of the shells are all more or less exfoliated in separating from the matrix, and in this condition are more or less lamellose in their structure, while the layers are bright and polished. The shell in many of its features resembles *L. pinnaformis* Owen, from the Potsdam sandstones of the St. Croix River, but has not the extended beak of that species, the valves being more nearly of equal length, that of the ventral exceeding the dorsal only by the beak being pointed instead of rounded.

Formation and locality.—In hard, somewhat ferruginous, sandy limestone of the Potsdam group in the Eureka District, Nevada. Collected by Arnold Hague, esq.

LINGULEPIS ? MINUTA n. sp.

Plate I, figs. 3-4.

Shell minute, seldom exceeding a line in its greatest diameter; in form very short-ovate, the greatest width considerably below the middle of the length and narrowing to the beak, especially on the larger valve, which is apparently slightly truncate at the extremity; base broadly rounded. Valves moderately convex, but not rotund. Smaller valve nearly circular. Substance of the shell nacreous and apparently phosphatic, not presenting any appearance of having been calcareous; the exterior concentrically lamellose.

Casts of the interior of the larger valve show a sharp, longitudinal depression along the middle, extending in some cases to near the front

margin; also two shorter, widely-diverging impressions near the beak. The same features are seen in the smaller valve, except that the shorter impressions are less divergent.

There may be some doubt as to the true generic relations of this shell. Its entire phosphatic structure places it at once among the true Linguloid species, but the muscular scars are not quite like those of *Lingulepis*. We know of no species very closely resembling it with which it may be compared.

Formation and locality.—In thinly laminated siliceous and somewhat ferruginous shales of the Potsdam formation, in the Eureka District, Nevada. Collected by J. E. Clayton, esq.

Genus KUTORGINA, Billings.

KUTORGINA MINUTISSIMA n. sp.

Plate I, figs. 11-12.

Shell minute, quadrangular in outline, and a little wider than long, with a straight hinge-line nearly or quite equaling the greatest width of the shell; sides straight or slightly rounded; antero-lateral angles rounded; front margin broadly rounded or very slightly emarginate in the middle by the very faint mesial sinus of the dorsal valve. Ventral valve somewhat pyramidal, with the side formed by the cardinal area vertical; apex of the valve obtusely pointed; cardinal area triangular, about half as high as wide. Features of the area and foramen not observed. Dorsal valve convex, but much less elevated than the ventral, and having the beak obtusely rounded and rather tumid, a very little projecting beyond the cardinal line; middle of the valve marked by a very broad, shallow, and faintly-defined mesial sinus, which does not extend quite to the apex of the valve.

Surface of the shell marked by fine, elevated, concentric lines, which are sharp on the top and often interrupted in their course, coalescing or bifurcating, and appearing as if broken, giving a peculiar roughened but not lamellose surface-structure. There are also a few very faint, scarcely defined, and somewhat irregular, distant radii. This latter feature has only been observed on the dorsal valve.

The shells have all the generic features of the specimens upon which the genus *Kutorgina*, as given by Mr. Billings (Pal. Foss. Canada, vol. 1, p. 8, figs. 8 and 10; the specimen fig. 9 probably belongs to some other genus), was founded, but differs specially in the minute size of the shell. Our specimens figured measure scarcely a line in width, and are less in length; while the original of his species, which we had the pleasure of examining some years ago, considerably exceed half an inch in length. The peculiar surface-character is one that cannot be easily mistaken, and one which we do not remember to have seen on any other Brachiopodous shell.

Formation and locality.—In limestone of the Potsdam group, at Eureka, Nevada. There are also remains of shells of the same genus, but of a species two or three times the size of this one, in some green shales from East Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton, esq.

Genus LEPTÆNA Dalman.

LEPTÆNA MELITA n. sp.

Plate I, figs. 13-14.

Shell of medium size, transversely semi-oval in form, the length equal to about two-thirds of the width; hinge-line straight, as long as the width of the shell below; sides nearly straight for a short distance below the cardinal extremities and rectangular to the hinge-line; lower lateral margins rounded; basal line regularly convex; ventral valve depressed-convex, regularly arching from beak to base, but sometimes slightly marked by a broad, shallow, not distinctly defined, mesial depression; beak low and inconspicuous; dorsal valve concave, nearly conforming to the curvature of the opposite valve, leaving but a limited space between the two. Area not definitely ascertained, but apparently quite narrow and linear.

Surface of the shell marked by distinct, strong, somewhat arching, radiating striæ, with an indefinite number of very fine intermediate ones occupying the concave spaces between the stronger, and with them forming fascicles. This feature varies very greatly in strength and number of the finer striæ in different individuals, and also in the number of stronger radii; in some cases there being only nine or ten of the strong radii on the entire

shell, while in others there may be fifteen or twenty. Concentric lines of varying strength cross the radiating lines at irregular distances.

The shell is a very pretty and strongly-marked form, and not easily confounded with any previously-known species.*

Formation and locality.—In sandy shales of Lower Silurian age, probably of the horizon of the Potsdam or Calcareous, at Eureka, Nevada. Collected by J. E. Clayton, esq.

CRUSTACEA.

Genus CONOCEPHALITES Zenker, = CONOCORYPHE Corda.

Subgenus CREPICEPHALUS Owen, ? = LOGANELLUS Devine.

The following species of Trilobites possess some peculiar features, which, being common to the whole, mark them at once as a distinct generic type or group. In many of these features, they closely resemble some of the forms described under the name *Conocephalites*, from the same horizon in Wisconsin; while at the same time these peculiar characters distinguish them from the greater number of those species. They all possess more or less distinctly the “*slipper-shaped*” glabella referred to by Dr. D. D. Owen, in his generic description of CREPICEPHALUS, and all appear to have been more or less distinctly marked by three pairs of glabellar furrows, although some of them so faintly as to be seen only by the reflection of light across their surfaces. Another marked peculiarity is the great breadth of the frontal limb between the facial sutures along the anterior border, most of them widening perceptibly in front of the eyes to the anterior margin of the head, where the rim is intersected, almost at right angles with the border, by the suture-line. The great width of the fixed cheeks opposite the eye is another peculiar character of the entire group, in several cases exceeding one-half the width of the anterior end of the glabella; while in only one example, *C. (C.) unisulcatus*, is this feature reversed, and that to only a limited degree.

Among the Wisconsin species, the frontal limb is usually not wider

* *Orthis Barabouensis* Winchell, from the Potsdam sandstone near Spirit Lake, Wisconsin, specimens of which we have lately examined, is closely related to this shell, but less strongly plicated and more deeply sulcated.—R. P. W.

than the breadth across the eyes, but generally a little narrower, and the antero-lateral angles are rounded by the extreme point of the movable cheeks, which extend in front on the upper side of the carapace, while the fixed cheeks are as a general thing reduced to their minimum breadth.

Another feature which prevails throughout the entire group is the well-marked, and often strong, ocular ridges, a feature rarely noticed among the specimens from Wisconsin. The absence of this feature in these latter may, however, be in great part owing to the unfavorable material and condition of preservation, they being all casts in a loose, friable, and often coarse sand, not fitted for retaining the more faintly marked characters of the organisms;* while the matrix from these western localities is a hard and very solid limestone, containing a considerable amount of sand in some parts, and extremely difficult to separate from the organic remains.

The features above noticed are mostly those pertaining to Dr. D. D. Owen's genus *CREPICEPHALUS* as shown in the figures, cited by him as generic (Geol. Iowa, Wis., and Minn., plate 1A, figs. 10 and 18); and we see no sufficient reason why they should not be considered as of generic importance. But whether the name *Crepicephalus* shall be retained is not so readily determined. The genus *LOGANELLUS* Devine, 1863, is a very closely allied, if not identical, form; but as no entire individuals have been obtained, either from the Wisconsin or these more western localities, except of *C. (L.) Haguei*, herein described, it is impossible to satisfactorily determine their true generic relations. There would seem, however, to be no doubt in regard to the generic identity of the latter, or of *C. (L.) quadrans*, with *Loganellus Logani* Devine, and from the great similarity of these to the dismembered parts of the other species, we are inclined to consider them as all pertaining to one genus.

CREPICEPHALUS (LOGANELLUS) HAGUEI n. sp.

Plate II, figs. 14-15.

Body broadly ovate in form, widest across the base of the head, broadly rounded in front and rapidly tapering behind to the small pygidium, strongly trilobed and moderately convex.

* Since this matter has been in the printers' hands, I have examined many freshly collected specimens from several localities of this formation in Wisconsin, and find, on most of them, the ocular ridges strongly marked.—R. P. W.

Cephalic shield semicircular forward of the occipital line, the posterior extremities extending in rather broad spines, which reach to the fifth or sixth thoracic segment, and when in their normal condition are nearly parallel to the axial lobe, but are usually spread out laterally by the flattening of the head.

Glabella rather small, rounded-conical, narrowing gently from the occipital furrow forward; front regularly rounded; surface depressed-convex, marked by three pairs of transverse furrows, which extend rather more than one-third of the distance across the glabella, and are strongly curved backward at their inner ends; occipital furrow broad and shallow; occipital ring narrow. Fixed cheeks narrow at the eye, separated from the glabella by rather distinct furrows. Frontal limb long, about half as long as the glabella, strongly and nearly equally concavo-convex; posterior limb narrowly triangular, reaching about two-thirds of the width of the movable cheeks.

Movable cheeks of moderate size, irregularly triangular, distinctly notched at the inner angle for the reception of the eye-lobe; surface convex, irregularly striated by very fine lines, which radiate from the base of the eye-tubercle; marginal rim of moderate width, flattened, the flattening extending upon the spine; occipital furrow well pronounced and reaching to the inner margin of the posterior spine.

Suture-lines distant, cutting the anterior margin of the head with a slightly inward curvature, leaving the frontal limb nearly half as wide as the entire width of the base of the head; thence directed gently inward, with a slight curvature to the anterior angle of the eye, and, after passing around the eye-tubercle is directed in a straight line to the posterior margin of the head, which it reaches at about two-thirds of the distance between the glabella and outer margin of the cheek.

Eye distinct, slightly elevated, distinctly reniform, and about one-third as long as the glabella and occipital ring.

Thorax considerably wider than long, distinctly trilobed, rather rapidly tapering from the third or fourth segment posteriorly, and composed of twelve segments. Axial lobe rather narrow and gradually tapering throughout, scarcely equaling at its widest part one-fourth of the entire width of

the thorax; segments distinct, moderately elevated, slightly flattened, and, on the older specimens, having obscure flattened tubercles at the outer extremities; lateral lobes convex, flattened on the inner half, and gradually rounding on the outer portion, becoming flattened and slightly concave toward the free ends of the pleura. Pleura straight for nearly one-half their length, beyond which they are directed backward with an increasing curvature to the free ends; furrows broad and deep, occupying nearly the entire breadth of the pleura on the straight portion, beyond which they are narrowed, and become obsolete on the flattened part of the extremities.

Pygidium small, elliptical, the anterior and posterior margins nearly equally rounded; outer angles obtuse; surface convex, strongly trilobed; axis not quite one-third of the entire width, prominently convex, and reaching nearly to the posterior margin, marked by three rings exclusive of the terminal ones; lateral lobes depressed-convex, marked by three pairs of furrows, which are curved backward, and become obsolete before reaching the margin.

This species differs from *Conocephalites (Conocoryphe) Kingii* Meek in its broader form, proportionally wider axis, and smaller pygidium; in having one less thoracic ring, a broader and less conical glabella; and in the broader furrows of the pleura, as well as in several points of minor importance. It also bears considerable resemblance to *Loganellus Loganii* Devine (Pal. Foss. Canada, vol. 1, pp. 200 and 201), but differs conspicuously in the proportionally larger cephalic shield, larger cheek-spines, and in wanting the extended extremities of the pleura, as in that species.

Formation and locality.—In dark-colored limestone of the Potsdam group, on the west side of Pogonip Mountain, and near French Mine, White Pine District, Nevada. Collected by Arnold Hague, esq.

CREPICEPHALUS (LOGANELLUS) NITIDUS n. sp.

Plate II, figs. 8-10.

Glabella pyramidal, squarely truncate in front; lateral margins nearly straight; height above the occipital furrow less than the width at the base, and the anterior end equal in width to the entire height, including the occipital ring, separated from the fixed cheeks by well-defined, rather deep,

dorsal furrows. Surface regularly convex, with a scarcely perceptible angularity along the median line, which is seen only by the reflection of light from the surface; glabellar furrows nearly obsolete, or the posterior pair visible only on the most critical examination. Occipital furrow narrow, and the ring distinct and rounded.

Fixed cheeks rather narrow, prominent at the eye, and rapidly declining in front, and more especially to the antero-lateral angles of the frontal limb; ocular ridges distinct. Frontal limb, including the narrow, elevated, and rounded border, as long as the width of the anterior end of the glabella, and strongly convex between the rim and glabella, from which point it rapidly descends to the margin; very wide in front between the suture-lines, and rapidly contracting to the eyes. Posterior lateral limbs triangular, their lateral extension greater than the width from the eye to the basal border of the head. Eye-lobes small.

Facial sutures cutting the front margin considerably outside of the line of the eye, the angles of the limb slightly rounded; from this point the line is directed strongly inward to the eye, behind which it again passes outward and downward to the posterior margin, making an angle of about thirty-five degrees with the base of the head. Surface of the crust of the head smooth.

The pygidium associated with the glabellas in the same fragments of rock is suborbicular or obscurely pentangular, slightly transverse; the posterior margin regularly curved; junction of the anterior and posterior lines forming obtuse angles; the anterior margin is also angular on the shoulders. Axis small, convex, about two-thirds the length of the shield, and marked by four annulations exclusive of the terminal ones; lateral lobes flattened, broad, slightly convex on the inner half; anterior margin bordered by a strong flattened rib, extending to the lateral angles; three other obscure ribs mark the convex portion; border broad and flattened.

The species differs from any other herein described in the short, truncate glabella, associated with the laterally-expanded frontal limb, and want of glabellar furrows. There are none of the Wisconsin species which approach it in the combination of these features. *C. Iowensis* is perhaps as closely related as any, but the eyes are much larger, and the lateral limbs very much longer and narrower. The pygidium has much the appearance

of a *Dikellocephalus*; but, as there is no other form of pygidium in the rock containing the heads, it would seem to belong with them.

Formation and locality.—In limestone of the Potsdam group, at Eureka, Nevada. Collected by Arnold Hague, esq.

CREPICEPHALUS (LOGANELLUS) GRANULOSUS n. sp.

Plate II, figs. 2-3.

Glabella and fixed cheeks when united having a quadrangular form, with projecting posterior lateral limbs, giving to the whole a somewhat pyramidal form, with a broadly-truncated summit.

Glabella short-conical, somewhat rapidly tapering in front of the occipital furrow, and squarely truncate at the summit; height equal to the width at the occipital furrow; surface depressed-convex, and marked by three pairs of very oblique furrows, the posterior pair extending nearly across and almost uniting in the middle with the occipital furrow; anterior pair very short and faint, situated near the anterior angles of the glabella; second pair intermediate in size and position.

Fixed cheeks about half as wide as the center of the glabella, very prominent in the region of the eye, and rapidly declining anteriorly and posteriorly from this point; palpebral lobes long and narrow, rather distinct and prominent. Frontal limb nearly half as long as the glabella anterior to the occipital furrow, rapidly declining forward, and bordered by a thickened rounded rim, which is equal to one third of the entire length of the limb; the space between the glabella and the marginal rim is strongly convex. Posterior lateral limbs triangular, once and a half as long as high; ocular ridges existing in the form of an abrupt elevation, passing from the front of the eye to the anterior furrow of the glabella; occipital furrow strongly marked on the lateral limb.

Facial suture passing in a direct line from the eye to the anterior margin, and from behind the eye obliquely backward to the posterior margin of the head, forming an angle of about thirty degrees to the occipital line.

Surface of the crust densely covered by rather coarse granules or pustules.

This species approaches more nearly to *Conocephalites Shumardi* Hall (16th Rept. State Cab., p. 154, pl. 1, fig. 7, and pl. 8, fig. 2) than to any other described species, but differs very conspicuously in the greater breadth of the front of the head between the facial sutures. No other parts of the organism have been detected. Although the fragments of rock containing the heads are filled with Trilobitic remains, there are none showing the granulose surface corresponding to this one; and, where the entire crust of the head is so thickly covered with granules, it would seem natural to suppose the other parts of the animal would be similarly marked.

Formation and locality.—In compact limestone of the Potsdam group at Eureka, Nevada. Collected by J. E. Clayton, esq.

CREPICEPHALUS (LOGANELLUS) MACULOSUS n. sp.

Plate II, figs. 24, 25, and 26?

Glabella and fixed cheeks quadrangular; glabella rounded, conical, a little higher than wide, and highly convex, prominent and gibbous along the median line, marked by very oblique furrows, only two pairs of which show upon the cast, except on critical examination, the anterior pair being very obscure, and situated very near the anterior end of the glabella; middle pair more distinct, and situated at about the anterior third of the length; posterior pair commencing a little behind the middle of the length, at the margin, and directed backward so as to unite with the occipital furrow just before reaching the center of the glabella, separating the posterior glabellar lobes, which form triangular areas of large size; occipital furrow wide, and ring distinct.

Fixed cheeks nearly half as wide as the central diameter of the glabella, moderately prominent in the middle near the eye-lobe, and gently declining in front and posteriorly; ocular ridges strongly marked. Frontal limb longer than the width of the fixed cheeks, strongly convex in front of the glabella, and rapidly declining to the front margin, which has been bordered by a narrow rim, the form and extent of which has not been determined. Lateral limbs unknown. Surface of the cast, except the glabella, which is smooth, marked by distant elevated pustules of moderate size.

A movable cheek, associated in the same blocks, and possessing a simi-

lar surface, is distinctly convex between the eye and the outer border, and the latter rather broad and flattened, separated from the inner convex area by an abrupt sinus, and terminating behind in a short, sharp, rounded spine, and anteriorly the under surface is continued in a spiniform extension. The facial suture starting from the front margin on a line with the eye passes in a nearly direct line to the eye, behind which it passes obliquely with a sigmoid curve to the posterior line of the head, a little outside of the center of the movable cheek, as seen on the latter.

Associated with the above specimens are several forms of pygidia, two of which have the form and character of *Dikellocephalus*, while other two are similar to forms associated with, and referred to heads of this kind in the sandstones of Wisconsin. One of these is transversely elliptical, nearly twice as wide as long, acutely pointed at the lateral angles; the anterior and posterior margins nearly equally curved, the posterior being a little the most regularly arcuate. Axis narrow, and not more than two-thirds the length of the shield, roundly pointed at the extremity, and marked by five annulations, exclusive of the terminal ones; lateral lobes broad and flattened, very slightly convex on the inner half; anterior border marked by a comparatively strong and distinct rib, with two fainter, almost obsolete ribs farther back; margin wide and plain; surface smooth.

This species differs from any other in the collection, and also from all those from the Wisconsin localities, in the general form and pustulose surface. Mr. Billings describes a species under the name of *Bathyurus conicus*, from the calciferous formation at St. Timothy, on the Beauharnois Canal, Canada, having a similarly-formed glabella and pustulose surface, but showing no furrows on the glabella.

Formation and locality.—In limestone of the Potsdam group, at Eureka, Nevada. Collected by Arnold Hague, esq.

CREPICEPHALUS (LOGANELLUS) UNISULCATUS n. sp.

Plate II, figs. 22-23.

Glabella and fixed cheeks united, elongate-quadrangular in form, the entire length nearly one-third greater than the width between the suture-lines on the anterior margin; sides very gently increasing in width to the base of the posterior limbs.

Glabella moderately tapering from the base anteriorly, and squarely truncate in front, the width of the anterior end equal to half of the entire height; marked by a single pair of transverse furrows near the base, which are united and deepest on the middle of the glabella, the outer extremities having a slightly forward curvature. The second pair of furrows are very faintly marked, and sometimes obsolete or only seen in the reflection of light across the surface, oblique, and situated anterior to the middle of the length of the glabella; anterior furrows obsolete.

Fixed cheeks rather narrow, prominent at the eye-lobes, and rapidly sloping anteriorly and posteriorly; separated from the glabella by very sharp and distinct dorsal furrows. Frontal limb short, abruptly convex between the anterior margin and the glabella, strongly arched upward in the middle, and bordered by a narrow, thickened, rounded rim; ocular ridges not observable; occipital furrows and ring distinct. Lateral limbs not observed.

A pygidium associated in the same block is transversely broad, semi-circular, or short paraboloid; nearly twice as wide as long, and margined on the under side of the posterior border by a wide, considerably thickened, recurved selvage. Axial lobe narrow, depressed-convex, and marked by six annulations exclusive of the terminal ones; lateral lobes depressed-convex; their anterior margin bordered by an elevated ridge, which extends with increasing strength to near the outer angle; two other faint ribs can be detected on each lobe.

The species somewhat closely resembles *Conocephalites Shumardi* Hall (16th Rept. State Cab., p. 154, pl. 7, figs. 1 and 2, and pl. 8, fig. 32). It is, however, proportionally wider in front between the suture-lines, the palpebral lobes are smaller, and the furrows of the glabella less distinct. The pygidium is also very similar, but proportionally longer, the axis stronger, and the ribs of the lateral lobes much more distinct.

Formation and locality.—In limestone of the Potsdam group, at Eureka, Nevada. Collected by J. E. Clayton, esq.

CREPICEPHALUS (LOGANELLUS) SIMULATOR n. sp.

Plate II, figs. 16-18.

Head within the facial sutures quadrangular in form, exclusive of the postero-lateral limbs, slightly contracted in width in the region of the eyes.

Glabella narrowly conical, very gradually tapering from the base anteriorly, the sides nearly straight, and rather squarely truncate in front; bordered by distinct, impressed, dorsal furrows; surface evenly convex throughout, and marked by three pairs of faint, moderately oblique, transverse furrows; the two anterior pairs not extending quite one-third of the width of the glabella; third or posterior pair longer, but faintly marked, their inner ends strongly recurved, almost separating the posterior glabellar lobes; occipital furrow distinct; ring prominent and rounded.

Fixed cheeks of moderate width, prominent at the eye-lobes, and rapidly declining in front and behind; ocular ridges faintly marked. Frontal limb longer than the width of the fixed cheeks, bordered by a narrow, elevated rim, between which and the front of the glabella it is distinctly convex, and the part immediately in front of the glabella more strongly convex. Eye-lobes small. Posterior lateral limbs not known. Surface of crust smooth.

Specimens of movable cheeks associated with the above, and corresponding in character, are somewhat triangular in form; margined by a slightly-flattened, elevated border of moderate width, which is continued in a long, rather slender spine at the posterior angle; inner area of the cheek convex and distinctly marked with radiating striæ; inner angle strongly notched for the proportionally large eye-lobe. Pygidium unknown.

The species very closely resembles in form and characters the corresponding parts of *C. (L.) maculosus*, but is somewhat shorter in proportion to the width; the glabella is not rounded at the summit as in that species, and the furrows are more distinctly marked and not so oblique, while the surface does not possess the pustules characteristic of that one.

Formation and locality.—In limestone of the Potsdam group, at Eureka, Nevada. Collected by Arnold Hague, esq.

CREPICEPHALUS (LOGANELLUS) ANYTUS n. sp.

Plate II, figs. 19-21.

Glabella and fixed cheeks, when united, irregularly quadrangular in form, contracted at the eyes, and broadly spreading below by the projecting postero-lateral limbs.

Glabella conical, moderately tapering anteriorly; the height and width about equal, measuring from the occipital furrow, and the width of the anterior end equaling two-thirds of the height; marked by three pairs of transverse furrows, the posterior and middle ones distinct and strongly recurved, situated at the first and second third of the length of the glabella; anterior furrows small and faintly marked, rising from the antero-lateral angles of the glabella and directed obliquely backward; occipital furrows broad and well defined; ring distinct and moderately elevated.

Fixed cheeks about half as wide at the eyes as the width of the anterior end of the glabella, widening in front and rapidly expanding behind, moderately elevated but not prominent; ocular ridges very strong, prominent, and rounded; frontal limb as long as the width of the front of the glabella, and rather rapidly sloping from the glabella to the anterior marginal rim, which is of moderate width, and rounded in the smaller specimens, but becomes thin and somewhat projecting and angular in the center in older individuals. A distinct angularity along the median line of the entire head is a noticeable feature. Postero-lateral limbs triangular, their length from the dorsal furrows about once and a half as great as their breadth at base, the lower edge distinctly grooved by the occipital furrows. Facial sutures distant on the anterior margin of the head, and rapidly converging to the eye, behind which they are directed obliquely backward to the posterior border of the head, at an angle of about thirty-five degrees to the occipital border, forming a slightly sigmoidal line.

Movable cheeks irregularly triangular, elongated in a postero-lateral direction, and produced behind in form of a sharp, rather slender spine, one-half as long as the cheek; central area convex, and strongly marked with radiating striæ; border wide and flattened, or slightly rounded; ocular sinus small.

Pygidium transversely elliptical, obtusely angular at the lateral extrem-

ities; anterior and posterior margins subequal; the anterior margin having the flattest curve. Axis narrow, two-thirds as long as the shield, and marked by three annulations exclusive of the terminal ones; lateral lobes large, concavo-convex, the margin being slightly recurved; border thin and entire; four faintly-marked ribs may be counted on each side.

This species closely resembles *C. (L.) simulator* in the form of the middle portions of the head, but is proportionally longer in front of the eye, and this latter organ smaller than would be indicated by the sinus in the cheek referred to that species, while the cheeks are more oblique and longer in a postero-lateral direction. The parts here associated are the only ones occurring in the specimens from the locality, and there can therefore be no doubt of their correct reference to the one species.

Formation and locality.—In limestone of the Potsdam group, at Schell Creek, Nevada. Collected by J. E. Clayton, esq.

CREPICEPHALUS (BATHYURUS ?) ANGULATUS n. sp.

Plate II, fig. 28.

Entire form unknown, the specimen consisting only of an imperfect glabella and fixed cheeks united. The form of the fragment is somewhat quadrangular, strongly angular in front, and constricted at the anterior angle of the eye-lobe.

Glabella rounded-conical, narrowly rounded at the summit, strongly and regularly convex on the surface, the height and width subequal, measured from the occipital furrow, entirely destitute of transverse furrows; occipital ring narrow, moderately prominent, and having the appearance of an obscure tubercle in the center. This feature may be deceptive.

Fixed cheeks narrow at the eyes; palpebral lobes small, obliquely situated; postero-lateral limbs short, equilaterally triangular; continuation of the occipital furrow faintly marked; frontal limb short in front of the glabella, wide and extended at the sides and antero-lateral angles; the width between the facial sutures equaling the entire length of the head; anterior margin thickened, distinctly angular in the middle, the sides sloping rapidly to the suture-lines. Facial suture cutting the anterior margin a little outside of a line with the outer angle of the eye, and directed with a gently convex

curvature to the anterior angle of the ocular sinus; behind the eye, it is directed obliquely outward to the posterior margin of the head at an angle of about forty-five degrees. No indication of ocular ridges can be detected.

There is considerable doubt as to what genus this species should be referred. It lacks many of the characters of *Crepicephalus* and *Conocephalites*, and possesses neither glabellar furrows nor ocular ridges. The form of the glabella corresponds with many of those referred to the genus *Bathyrurus* by its author, but it differs in the direction of the facial sutures; in this latter feature, it corresponds with *Loganellus* Devine, but differs in the absence of glabellar furrows. The projecting angular frontal margin is a marked and distinguishing feature.

Formation and locality.—In the lowest beds of limestone, Potsdam group, on the west side of Pogonip Mountain, White Pine, Nevada; associated with *Pterocephalus laticeps*. Collected by Arnold Hague, esq.

Genus PTEROCEPHALUS Roemer.

CONOCEPHALITES (PTEROCEPHALUS) LATICEPS n. sp.

Plate II, figs. 4-7.

Entire form unknown; the remains consisting of dismembered and fragmentary parts imbedded in the rock together.

Glabella and fixed cheeks, when united, having a somewhat elongate-quadrangular form, exclusive of the postero-lateral limbs; widest at the front margin, and contracted in the region of the eyes; the greatest width being one-fifth less than the entire length of the head. Glabella comparatively small, highly convex and subangular along the median line, regularly tapering from the base, including the occipital ring, to the summit, which is rather abruptly truncate; width at the occipital lobe more than equaling three-fourths of the entire height, and the width across the anterior lobe of the glabella equal to a little more than one-third of the height. The glabella is divided by three pairs of strongly-marked transverse furrows, which extend about one-third of the width of the glabella at their respective points, and are slightly inclined backward at their inner ends, separating the glabella into four pairs of distinct lobes, which decrease regularly in

size from below upward. Occipital furrow narrow, not extending entirely across the lobe; occipital ring narrow, flattened on the outer ends, and marked by a node-like tubercle in the center.

Fixed cheeks broad in proportion to the size of the glabella; palpebral lobes large, rapidly rising from the margin of the glabella to the border of the eye; lateral limbs of moderate size, and, judging from the direction of the sutural margin of the movable cheek, have been short, and rapidly sloping, with an almost direct line, from the posterior angle of the eye to the posterior border of the head. Frontal limb excessively expanded, and forming about three-fifths of the entire length of the head, including the occipital ring. From the front of the glabella, the surface rises gently for a distance equal to the width of the anterior end of the glabella, and beyond is gracefully and gently concave to the anterior margin, where it has been bordered by a double rim. The rising surface in front of the glabella is distinctly marked by fine, irregular lines, or striæ, radiating from the edge of the glabella. Ocular ridges well pronounced, rising from the sides of the anterior lobe of the glabella, and passing with a slight upward curvature to the anterior angle of the eye-lobes. Eyes not observed.

Movable cheeks very large and wide, irregularly triangular in outline, the posterior angle projecting backward in the form of a broad, short, flattened spine; outer margin gently arcuate; anterior margin, forming the facial suture, slightly concave to near the eye, where it becomes slightly recurved. Ocular sinus large. Surface of the cheek gently concave from the eye to the outer border, and marked by a low, rounded ridge parallel to the margin at a little more than one-third of the entire width from the eye. Continuation of the occipital furrow very faintly marked. Upper surface of the cheek marked by fine, closely-arranged, irregular striæ, nearly parallel with the margin. Under surface more strongly and distantly striated.

Thorax known only by a part of a single articulation, associated with the other parts in the same fragment of rock. The fragment consists of a right pleura, and is of moderate width, with parallel margins slightly recurved throughout its length, and more abruptly near the free extremity. The surface is characterized by a very broad, shallow furrow, occupying nearly the entire width, and becoming obsolete near the end of the rib. The ante-

rior margin is elevated, forming a narrow, sharply-rounded ridge, gradually widening toward the outer end. The upper surface bears no markings whatever, while the under side is marked by strong obliquely vertical striæ.

The pygidium associated with the other parts is transversely elliptical, almost one-third wider than long; the anterior and posterior margins nearly equally rounded, and the lateral extremities, or sides, somewhat subangular at the junction of the two lines; the posterior margin deeply and angularly notched in the middle. Axial lobe small, about one-half as long as the shield, elevated and subangular along the median line, and obscurely pointed behind; marked by seven low, rounded rings, exclusive of the terminal ones. Lateral lobes large, concavo-convex, rather rapidly declining on the inner half, and slightly recurving to the margin; marked by five broad, rather indistinct ribs, exclusive of the anterior articulating projection, which become obsolete near the middle of the lobe.

The species is peculiar in its broad, expanded cephalic shield and rapidly-tapering conical glabella; in these respects differing from all other forms with which it is associated, as well as all of those from the Wisconsin beds of this age, to so great an extent that there is not the least danger of mistaking it. In the broadly-expanded cheek and frontal limb, it resembles some forms of *Dikellocephalus*, as well as in the form of the pygidium; but the glabella is so very different that it at once distinguishes it, although so closely allied to that genus in other respects.

It closely resembles *Pterocephalus Sancti-sabæ* Roemer, from the same position in Texas (see Kreid. von Texas, plate xi, fig. 1, p. 93), but differs specifically in many and important features.

Formation and locality.—In the lowest limestones seen on the west side of Pogonip Mountain, White Pine, Nevada; age of the Potsdam group. Collected by Arnold Hague, esq.

Genus PTYCHASPIS Hall.

PTYCHASPIS PUSULOSA n. sp.

Plate II, fig. 27.

Entire form unknown. Glabella and fixed cheeks united, irregularly quadrangular in form, slightly angular in front, the margin declining on

each side of the middle. Glabella strongly convex, subangular along the central line; broadly conical in outline, and rounded-truncate in front; the length from the occipital furrow a very little exceeding the greatest width at base; marked by two pairs of transverse furrows, which divide it into three nearly equal parts on the margin, and are directed very obliquely backward for their entire length, reaching two-thirds of the distance between the margin and the median line. Occipital furrows broad, well defined; occipital ring rather strong.

Fixed cheek wide, separated from the glabella by an indistinctly defined furrow; ocular ridge strong, rising from the upper lateral angles of the glabella, and passing with but little curvature to the anterior angle of the eye. Front border of the head of moderate width; marginal rim thickened and cord-like, separated from the inner portion by a deeply-marked furrow, within which the surface rises abruptly to the edge of the narrow anterior furrow bordering the glabella. Posterior lateral limbs unknown.

Surface of the fixed cheeks and frontal limb marked with strong, scattered granules or pustules. The surface of the glabella may have been marked with similar pustules, but has been somewhat injured by weathering, so that none show in its present condition.

The species somewhat closely resembles *Ptychaspis Miniscaensis* Owen's sp., from the Mississippi Valley, in the form of the glabella and the furrows marking the same, but differs in the wider fixed cheeks and the form of the anterior border, so far as that one is known, as well as in the pustulose surface. No other parts of the organism have been detected than those here described.

Formation and locality.—In the lowest layers of limestone seen, on the west side of Pogonip Mountain, White Pine District, Nevada; of the age of the Potsdam sandstone. Collected by Arnold Hague, esq.

Genus CHARIOCEPHALUS Hall.

CHARIOCEPHALUS TUMIFRONS n. sp.

Plate II, figs. 38-39.

Glabella large, prominent, and cylindrical, nearly as wide as long, strongly rounded and protuberant in front, projecting beyond the rim of the

head fully one-fourth of its entire length, including the occipital ring, in a rounded, tumid boss; marked by two transverse furrows anterior to the occipital ring, the anterior one rudimentary and directed forward, visible only on the sides of the glabella; posterior furrows strong and deep, but narrow, extending entirely across the glabella in equal strength and nearly in a direct line, situated a little in front of the middle of the entire length of the head; occipital furrow a little stronger than the posterior glabellar furrow, directed slightly forward in the middle. Occipital ring wide and flattened, about of the same dimensions as the space between the occipital furrow and the posterior glabellar furrow.

Fixed cheeks trapezoidal, strong, and broad, inflated and tumid between the eye and the glabella, so as to overhang the eye and the suture-line. Frontal limb very short, and abruptly bent downward. Posterior lateral limbs short-triangular, nearly vertical outside of the line of the eye; occipital furrow deep, and the ring narrow; ocular sinus very small, situated on a line with the occipital furrow of the glabella.

Facial suture cutting the anterior margin of the head a little outside of the line of the glabella, and almost immediately deflected outward with a strong convex curvature to the ocular sinus, behind which it is directed to the posterior border at an angle of about forty-five degrees to the axis.

Surface of the crust smooth, so far as can be determined from the specimens.

The species will be easily recognized by the highly convex and cylindrical glabella, which projects far in advance of the frontal border of the head.

Formation and locality.—In the lowest limestone beds on the west side of Pogonip Mountain, White Pine District, Nevada, of the age of the Potsdam group; associated with *Conocephalites* (*Dikellocephalus*) *laticeps*, *Bathyrurus*? *angulatus*, &c. Collected by Arnold Hague, esq.

Genus DIKELLOCEPHALUS Owen.

Associated with the preceding species from the Eureka beds of the Potsdam group are two forms of pygidia, so unlike anything positively known to belong to species with conical or slipper-shaped glabellas, that it

seems unnatural to thus refer them. On the other hand, they so closely resemble the corresponding parts of the genus *Dikellocephalus* from the sandstone of the Mississippi Valley, that it has been deemed safer to refer them to that genus, although no other parts recognized as belonging to the genus have been observed. It is even more than probable, however, that, on examining a larger collection of material from this locality, other parts of the organisms will be found justifying this reference, as there are many fragmentary portions of undetermined species in the few blocks now before us.

DIKELLOCEPHALUS BILOBATUS n. sp.

Plate II, fig. 36.

Pygidium transverse, irregularly oval, rather straight on the anterior border, rounded and deeply bilobed on the posterior margin by a sharply angular constriction of the posterior border on the median line, extending to the extremity of the axial lobe; marginal lobes rounded on their posterior extremities. Axis comparatively small, moderately convex, marked by six or seven transverse rings, exclusive of the terminal ones. Lateral lobes broad, rounded behind, and wing-like, slightly convex on the under surface, and recurved toward the border; marked by four ribs on each side, which appear to have been obscurely divided, and do not extend to the margin of the shield. On the under surface, the posterior border is inflected, forming a very wide inner rim, or lining, occupying nearly one-half the area of the lateral lobes. Surface apparently smooth.

The deeply bilobed character of the posterior border is a marked and distinguishing feature.

Formation and locality.—In limestone of the Potsdam group, in the Eureka District, Nevada. Collected by Arnold Hague, esq.

DIKELLOCEPHALUS MULTICINCTUS n. sp.

Plate II, fig. 37.

Pygidium somewhat triangular in general form, or, considering the anterior border as consisting of two sides, would be somewhat trapezoidal; front margin arcuate, a little angular on the shoulders, and more rapidly declining toward the outer extremities; the entire front nearly semicircular; posterior margin extended in the direction of the median line, and presenting the appearance of having been digitate on the lateral borders. This

feature may have been wrongly interpreted, as the specimen is mutilated and somewhat obscure. Axial lobe narrow and moderately elevated; less than two-thirds of the entire length of the shield; marked by ten very short annulations, exclusive of the terminal ones. Lateral lobes moderately convex in the middle and becoming flattened toward the margin; marked by five simple, faint ribs on each side, exclusive of the anterior one, which is also the most prominent and angular. The posterior border has the appearance of having been produced at the extremity into a broad, flattened, triangular process, or spine; and judging from another individual, apparently of the same species, has had two other points or digitations on each side, one at the lateral angle and the other just below, leaving a deep, broad sinus between it and the central point.

The specimen has some resemblance to small convex examples of *D. Minnesotensis* Owen, but differs in the more arcuate anterior border, extended posterior extremity, and greater number of rings on the axis. From *D. Pepinensis* Owen, it differs in the stronger axis, more numerous rings, simple ribs of the lateral lobes, and in the form of the posterior lateral margins.

Formation and locality.—In limestone of the Potsdam group, in the Eureka District, Nevada. Collected by Arnold Hague, esq.

DIKELLOCEPHALUS FLABELLIFER n. sp.

Plate II, figs. 29-30.

A small pygidium occurring in a fragment of dark-colored limestone, associated with those containing *Conocephalites laticeps*, *Bathyurus ? angulatus*, and *Chariocephalus tumifrons*, but probably from a different layer, judging from the lithological characters of the specimens, has a character so marked and peculiar that it has been deemed worthy of notice. The specimen possesses the following characters:

Pygidium transversely semicircular, the length and width being as three to seven; front margin slightly arcuate to near the outer extremities, where it curves somewhat abruptly backward to the point of the first digitation. Posterior margin digitate, having three points on each side, and a central one; digitations broad and obtuse, the middle one on each side the largest. Axial lobe of moderate strength, highly convex, faintly subangular

along the median line, reaching two-thirds of the entire length of the shield; obtusely pointed at the extremity, and marked by five transverse rings, exclusive of the terminal ones, which gradually decrease in size posteriorly. Lateral lobes moderately elevated and convex on the inner half, becoming concave or flattened toward the edge; marked by four elevated, angular ribs on each side, including the one submarginal to the anterior border, with broad, shallow, depressed areas between them. The ribs rise from the margin of the axial lobe, and reach the border of the shield at the angles of the marginal sinuities, most strongly marked near the axis, and becoming nearly obsolete toward the outer border. Surface of the crust apparently smooth.

The specimen is remarkable for the simple ribs of the lateral lobes, and for the digitation of the margin. In these respects, it differs very materially from any Trilobite hitherto described from the Potsdam group; and it is possible that it may have come from a somewhat higher position at the same locality than the other specimens with which it is placed.

Formation and locality.—In dark crystalline limestone of the Potsdam group, on the west side of Pogonip Mountain, White Pine District, and in the Eureka District, Nevada. Collected by Arnold Hague, esq.

Genus AGNOSTUS Brongniart.

AGNOSTUS COMMUNIS n. sp.

Plate I, figs. 28-29.

Cephalic shield subparaboloid, wider than long, the respective diameters being as six and seven. Surface strongly convex and distinctly trilobed. Glabella nearly equaling one-third of the width of the shield, more prominent than the lateral lobes, and separated from them by distinct dorsal furrows, three-fourths as long as the entire length of the head, broadest at base and gradually narrowing for two-thirds of the length, beyond which point it is more abruptly narrowed or obtusely pointed; anterior third separated from the part behind by a faint, scarcely perceptibly impressed, transverse line. Central portion of the glabella marked by a distinct elongated and angular tubercle. Right and left lateral lobes, or sides of the head, separated in front of the glabella by a narrow furrow, which is a continuation

of the dorsal furrows, and reaches to the anterior border. Small triangular occipital nodes are situated one on each side at the base of the glabella. Entire shield margined by a flattened border of moderate width. Thoracic segments unknown.

The caudal shield associated with the above in the same fragments of rock, and in equal numbers, is shorter in proportion to its width, being more regularly rounded, and is margined by a similar flattened border, which is projected in form of a short, spine-like process on each side, about two-thirds of the length from the anterior border. Surface strongly convex and trilobate in the anterior half, the dorsal furrows being directed gently inward for half their length, and then suddenly deflected outward with a slight curvature, becoming obsolete a little behind the middle of the length. An elongated, angular node marks the axial lobe near its anterior margin. Surface of both shields smooth under an ordinary magnifying power. Length of the larger specimens about one-seventh of an inch.

Formation and locality.—In blackish limestone of the Potsdam group, White Pine. Collected by A. J. Brown, esq.

AGNOSTUS NEON n. sp.

Plate I, figs. 26-27.

Cephalic shield short, subparaboloid, three-fourths as long as wide, highly convex; sides nearly straight for half its length from the base, and gradually rounding in front; anterior margin broadly rounded, being almost straight in the middle. Glabella rather more than two-thirds the length of the shield, and less than one-third as wide at its base, conical throughout, more rapidly tapering near the anterior end; anterior third distinctly separated by a transverse furrow. Dorsal furrows well marked, scarcely continued in front of the glabella; occipital nodes large, rounded-triangular. Lateral lobes of the head convex, margined in front and on the sides to just behind the middle of the length by a narrow, flattened border, which gradually becomes obsolete before reaching the posterior line of the head. Thoracic segments unknown.

Caudal shield of similar form to the cephalic shield, but entirely margined by a flattened border of nearly twice the width of that of the head,

and much wider posteriorly than on the sides, produced into spine-like projections at the lateral angles. Axial lobe distinct, strongly marked, more than one-third as wide as the entire shield; posterior division, or lobe, broader, rounded; anterior division short; annulation well marked; a longitudinally angular node marks the middle of the axis, extending from the anterior to the posterior division, across the furrow which marks their limits.

This species differs from the *A. communis* in the shorter form of the cephalic shield, and proportionally longer caudal shield, both being equal in this species, while in that one the cephalic shield is much the longest. It also differs in the wider border of the caudal shield and in the absence of a node on the glabella. The caudal shield is precisely similar to that of *A. Josepha* of the Wisconsin sandstone of similar age, except in the spine-like processes of the lateral angles. The cephalic shield, however, is entirely different.

Formation and locality.—In limestone of the Potsdam group, at Eureka, Nevada. Collected by Arnold Hague, esq.

AGNOSTUS PROLONGUS n. sp.

Plate I, figs. 30-31.

Cephalic shield elongate, or very high dome-shaped in outline; sides straight, or nearly straight, for more than one-half the length, above which the margin, including the anterior border, is regularly and beautifully rounded. Surface low or depressed-convex in front and gradually rising to near the occipital border, where it becomes low-tumid; glabella not visible except under a strong magnifying power, and by the reflection of light across the surface, when the outline of a conical form, with triangular occipital nodes, may with difficulty be detected. The shield is margined by a narrow, somewhat rounded rim, which gradually fades out toward the postero-lateral angles. Thoracic segments unknown.

The caudal shield associated with the head is much shorter in proportion to the width. The form is much like that of a cephalic shield, and it is with some hesitation that we have associated it with the above. Its shortness, however, and the want of occipital nodes, together with the

absence of all other forms in the same block, has determined us in so doing. The axial lobe forms more than one-third the width of the shield, is short and rounded obconical; marked by a node at its upper end, and divided across by a doubly-curved transverse furrow near the lower end. Dorsal furrows distinct, and continued as a median furrow from the end of the axial lobe to the posterior margin. Posterior border emarginate and surrounded by a flattened rim

Formation and locality.—In limestones of the Potsdam group, at Eureka, Nevada. Collected by Arnold Hague, esq.

AGNOSTUS TUMIDOSUS n. sp.

Plate I, fig. 32.

Cephalic shield highly dome-shaped in outline, very slightly contracted near the occipital border, very convex, and margined by a narrow, flattened border. Dorsal furrows very distinct, not continued in front beyond the glabella. Glabella proportionally small, less than two-thirds as long as the head, distinctly conical in form and very highly convex, especially tumid in the lower part; the central tubercle marked near its edge by a very slight, depressed line, which presents the appearance of a border surrounding it. Anterior lobe forming a little more than one-fourth of the length of the glabella; the furrow separating it from the principal lobe very distinct. Occipital nodes very small, triangular, and distinctly modifying the base of the glabella on each side. Thoracic segments and caudal shield unknown.

The specimen above described is so entirely distinct and well marked that we have no hesitation in giving it as a species, although it is as yet the only individual specimen noticed. The highly dome-shaped outline, literally horseshoe-shaped, is peculiar, which, together with the form and markings of the glabella, cannot fail to distinguish it from all others.

Formation and locality.—In limestones of the Potsdam group, at Eureka, Nevada. Collected by Arnold Hague, esq.

FOSSILS OF THE LOWER SILURIAN.

BRACHIOPODA.

Genus LINGULEPIS Hall.

LINGULEPIS ELLA n. sp.

Plate I, fig. 8.

Shell below the medium size. Dorsal valve subcircular or oblate, the width slightly exceeding the length; the beak perceptibly projecting beyond the general contour of the shell, but very obtuse and slightly truncate; sides and base rounded, the latter more broadly curved. Surface of the valve depressed-convex, a little the most prominent on the umbone; marked by fine irregular concentric lines of growth on the upper part, becoming more strongly marked and finally quite lamellose toward the margin of the valve. A few very indistinct, radiating lines may be seen near the beak by the aid of a strong magnifier. Ventral valve unknown. Shell-substance phosphatic.

There may be some doubt as to the true relations of this shell. The broadly oblate form would be an objection to considering it as a true *Lingula*, while the truncation of the beak of the dorsal valve would accord more nearly with what is known of some forms of *Lingulepis*. It is possible it may prove to be a *Lingulella*, but, in the absence of the ventral valve, it cannot be satisfactorily determined. It differs from most known species very perceptibly in the oblate form of the valve.

Formation and locality.—In greenish argillaceous shales of the age of the Quebec group, in the cañon above Call's Fort, north of Box Elder Cañon, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

Genus ORTHIS Dalman.

ORTHIS POGONIPENSIS n. sp.

Plate I, figs. 9-10.

Shell quite small, seldom exceeding a third of an inch in width, and usually much less; paraboloid in form below the hinge-line, but somewhat

variable in proportion; beak obtuse, and rather prominent; the cardinal margins sloping rapidly to the extremities of the hinge. Area not observed, but, judging from the prominent beak, it must be rather high and but slightly arcuate; hinge-extremities angular, or slightly rounded. Surface of the valves strongly convex and marked by extremely fine striæ, which become a little coarser toward the margins of the shell. Interior unknown.

The species has much the general form of *O. costalis* Hall of the New York Chazy limestone, but the striæ differ greatly in their extreme fineness. It also somewhat resembles *O. Electra* Billings (Pal. Foss. Canada, vol. 1, p. 79, fig. 72), but is not so broad, and the valves are more convex, and beak more prominent. The shells occur in a coarsely granular and highly crystalline limestone, and become more or less exfoliated in separating from the matrix, so that the external features are not perfectly recognized. The examples used are all separated valves, partially imbedded in the rock, so that the hinge-features are not fully revealed. Those figured would seem to be dorsal and ventral, and, if so, the dorsal is much less convex than the ventral.

Formation and locality—In limestone of the age of the Chazy of New York, Pogonip Mountain, White Pine District, Nevada. Collected by A. J. Brown, esq.

Genus STROPHOMENA Rafinesque.

STROPHOMENA NEMEA n. sp.

Plate I, fig. 15.

Among the specimens received from the gray granular limestones of the Pogonip Mountain, there is a small Strophomenoid shell, which is somewhat semi-oval in outline, about two-thirds as high as wide; the hinge-line nearly straight and not quite as long as the width of the shell below; the cardinal angles are slightly rounded; and the lateral margins and basal line almost regularly curved, forming a little more than half of a circle. The surface of the ventral (?) valve is regularly and evenly convex longitudinally and laterally, but not highly rounded, and marked by rather fine, even, and somewhat sharp radiating striæ. The dorsal valve and interior of the shell have not been seen.

The species presents much the appearance of a *Chonetes* in its regularly rounded valve, even striæ, and general characters, but shows no appearance of spines on the hinge-line. We know of no species of this or any allied genus from rocks of a similar age having a very close resemblance to this one.

Formation and locality.—In the granular limestones of the age of the Quebec group, Pogonip Mountain, west side, White Pine District. Collected by A. J. Brown, esq.

Genus PORAMBONITES Pander.

PORAMBONITES OBSCURUS n. sp.

Plate I, fig. 16.

Shell of moderate size; irregularly transversely oval in form; a little angular toward the beak, and broadly emarginate in front. Ventral valve flattened-convex on the middle of the shell; more sharply rounded near the lateral margins, and strongly bent upward in front in the form of a broad linguiform extension, which is rounded on the end, two-thirds as long as wide, and distinctly concave on the exterior, forming an emargination in the front of the valve; beak very obtuse, short, and but little curved. Dorsal valve unknown, but, judging from the elevation of the front extension of the ventral valve, it must have been quite rotund.

The surface of the shell is mostly exfoliated; but near the front a portion is partially preserved, and shows what appears to have been punctate lines, or striæ, though they are obscure and unsatisfactory. A number of concentric lines of growth are clearly distinguishable. The beak of the specimen, where the shell has been removed, shows the two diverging lamellæ which characterize the genus *Porambonites*. The specimen is quite imperfect, but interesting as representing a genus so seldom recognized in this country.

Formation and locality.—In dark grayish crystalline limestone of the age of the Quebec group, Pogonip Mountain. Collected by A. J. Brown, esq.

GASTEROPODA.

Genus RAPHISTOMA Hall.

RHAPHISTOMA ACUTA n. sp.

Plate I, figs. 20-22.

Shell small to medium size, lenticular in form, and sharply acute on the periphery; volutions three to three and a half, moderately increasing in size with the growth of the shell; suture close. Upper surface of the volutions less convex than the lower, very slightly rounded below the suture-line, and a little concave just within the margin, giving an acutely angular edge. Lower surface of the volution once and a half as deep as the upper part, measuring from the angle; subangular or sharply rounded at the edge of the umbilicus, which is nearly one-third as wide as the entire diameter of the shell, showing all of the inner whorls when free from rock. Aperture triangular, wider than high, acute on the outer edge, the widest part being above the middle. Surface of the shell not observed, the specimens being either internal casts or having partially-exfoliated surfaces.

The species bears considerable resemblance to *R. lenticularis* Sow. from the Trenton limestone, but is more depressed, and the volutions are more angular on the lower side. In this latter feature, it corresponds more nearly with the forms of the genus occurring in the Chazy and Calciferous formations than with those from the Trenton group, and bears a striking resemblance to some forms of *R. staminea* Hall, but has probably not had the strong surface-markings of that species. It differs from *Euomphalus ? rotuliformis* and *E. ? trochiscus* Meek in having a smaller number and more rapidly-increasing volutions.

Formation and locality.—In limestone of Lower Silurian age, probably Chazy, at Ute Peak, Wahsatch Range, Utah. Collected by Arnold Hague, esq.

Genus MACLUREA Lesueur.

MACLUREA MINIMA n. sp.

Plate I, figs. 17-19.

Shell quite small, subdiscoidal, the largest individuals not measuring more than four-tenths of an inch in their greatest diameter. Spire depressed,

as in the typical species of the genus, and appearing as an umbilicus on a sinistral shell, the depression rather narrow and abrupt; under side flattened, without any depression or umbilicus. Volutions about two in number, somewhat rapidly increasing in size with the increased growth of the shell; flattened on the lower surface for more than one-half their diameter, but very evenly and regularly rounded above; periphery rounded, a little less so below than above the middle; aperture semi-ovate, or having the form of a circle, with the lower third truncated. Surface of the shell not observed.

The specimens of this species which have been observed are all internal casts, and occur in a coarsely crystalline and quite friable limestone. The substance of the shell has been quite thick, and, being also coarsely crystalline, crumbles at once on attempting to remove the specimens from the surrounding rock, so that the surface-characters of the shell cannot be obtained. The generic features of the specimens are so obvious that there can be no doubt whatever of their right reference to *Maclurea*; and their small size, together with the rounded upper surface of the volutions, which do not show the least tendency to become angular at the edge of the spiral depression or cavity, but is evenly and regularly rounded on the inner as well as on the outer side, will serve, we think, to distinguish it from all other described species of the genus.

Formation and locality.—In limestone, probably of the age of the Chazy limestone of New York, at Ute Peak, Wahsatch Range, Utah. Collected by Arnold Hague.

Genus FUSISPIRA Hall.

FUSISPIRA COMPACTA n. sp.

Plate I, fig. 25.

Shell elongate, turreted; spire elevated, forming considerably more than half, probably two-thirds, of the entire length of the shell; composed of six or more short, compact, rather rapidly-increasing volutions, which are strongly rounded on the surface, and less than half as high as their diameter. Aperture not definitely determined, but apparently elongated, and probably attenuate below, judging from what can be seen of the lower

part of the last volution on the specimen examined. No surface-markings can be detected.

The specimen is quite imperfect, and is only given on account of its low geological horizon; the most of the species hitherto recognized being from the Trenton or Hudson River groups. The species differs from all others of the genus yet described in the short compact volutions.

Formation and locality.—In the granular limestones, Pogonip Mountain, west side, White Pine District, Nevada; of the age of the Quebec group. Collected by A. J. Brown, esq.

Genus CYRTOLITES Conrad.

CYRTOLITES SINUATUS n. sp.

Plate I, figs. 23–24.

Shell small, laterally compressed; composed of about one and a half to two volutions, which are closely coiled, but not embracing. Volutions acutely triangular; the dorso-ventral diameter about one-half greater than the lateral diameter; sides of the outer one marked by a broad, shallow depression or sinus a little within the margin, between which and the umbilicus the surface is rounded. Umbilicus broad, exposing the inner volutions; the sides abrupt or nearly vertical except on the edge, which is slightly rounded. Surface of the shell unknown.

The species is characterized by the vertical margins of the umbilicus, and the broad, shallow, depressed sinus of the outer half of the volution, giving a somewhat concavo-convex curvature to the surface between the umbilicus and the outer edge, or keel. In this respect, it differs from all other species with which we are acquainted.

Formation and locality.—In the granular limestone, on the west side of Pogonip Mountain, White Pine District, Nevada. Collected by A. J. Brown, esq.

CRUSTACEA.

Genus CONOCEPHALITES Zenker.

CONOCEPHALITES SUBCORONATUS n. sp.

Plate II, fig. I.

Glabella short, conical, with straight lateral margins, regularly con-

verging from the base upward to the rather squarely truncated summit; height above the occipital furrow scarcely exceeding the breadth of the base, and the width at the summit equal to about two-thirds of the height; marked by three pairs of very oblique, subequally distant, and moderately distinct transverse furrows. Occipital furrow narrow and well marked; ring distinct, widest and somewhat pointed on the center of the posterior margin.

Fixed cheeks wide, separated from the glabella by distinct dorsal furrows, prominent and rounded between the glabella and eye-lobe, almost equaling the convexity of the glabella; ocular ridges slender and curved. Frontal limb wide and concave, destitute of a thickened marginal rim, as long as the glabella, and obscurely trilobed from an extension of the dorsal furrows, forming a convex, boss-like area in front of the glabella, which is divided transversely by a double depressed line, or narrow fillet, midway of the limb and parallel with the anterior margin of the head. Eye-lobes about half as long as the glabella, obliquely situated, and separated from the fixed cheek by a deeply-depressed ocular sinus.

Facial suture cutting the anterior border on a line with the front angle of the eye, which it reaches by a broad, convex curvature, giving rounded lateral margins to the frontal limb; posterior to the eye, it is directed outward; the actual course not determined. Posterior lateral limbs not seen. Surface of the crust in front of the glabella strongly striated.

The species is only known by the glabella and fixed cheeks. The specimens are all minute, but readily recognized by the peculiar formed boss in front of the glabella.

Formation and locality.—In limestone of the age of the Quebec group, at the base of Ute Peak, Wahsatch Range, Utah. Collected by Arnold Hague, esq.

Genus CREPICEPHALUS Owen ? = LOGANELLUS Devine.

CREPICEPHALUS ? (LOGANELLUS) QUADRANS n. sp.

Plate II, figs. 11-13.

Form of entire body unknown. Glabella and fixed cheeks together broadly quadrangular, about four-fifths as high as wide, and quite uniform

in many individuals, very depressed-convex, or quite flattened, as occurring on the surface of the shale in which they are imbedded; glabella distinctly conical, moderately tapering above the occipital furrow, and broadly rounded in front; marked by three pairs of distinct transverse furrows, which are directed obliquely backward from their outer ends; the posterior pair almost or quite meeting in the middle, the others shorter, and situated at almost equal distances from each other. Occipital furrow well marked, proportionally wide and shallow; occipital ring narrow, not well defined.

Fixed cheeks very broad, nearly two-thirds as wide as the glabella, depressed-convex; frontal limb short, the border and inner part of nearly the same width; sides of the limb in front, wide, and slightly rounded at the antero-lateral angles; posterior limb wide at its junction with the glabella, and rapidly narrowing outward, being about once and a half as long as its greatest width; ocular ridges slender, but very distinct; rising from the anterior angle of the eye and uniting with the glabella near the anterior furrow, forming a slightly curved line parallel with the marginal furrow of the head.

Facial sutures directed inward from the anterior margin of the head to the eye-lobe, behind which they are directed outward and backward to the posterior margin of the head, at an angle of about forty degrees to the occipital line.

A form of movable cheek found associated in considerable numbers with the glabellas, and corresponding in size and character, is narrowly triangular, the posterior extremity terminating in a short, blunt spine, slightly curved; inner angle strongly notched for the reception of the eye-lobe, and the outer margin bordered by a thickened, rounded rim, which gradually increases in width to the base of the spine. The facial suture corresponds to the margin of the fixed cheek above described, and, on the under side, the anterior border is prolonged in the form of an acute process, to extend along the anterior border of the frontal limb.

The pygidium associated with the above specimens is minute, transversely subelliptical in form, most strongly rounded on the front border, with a wide axis terminating obtusely a little within the posterior margin. The axis is marked by five rings, exclusive of the terminal ones. Lateral

lobes convex, marked by three or four divided ribs, exclusive of the anterior single one.

Surface of the head and cheeks marked by fine anastomosing lines, radiating from the eye and front of the glabella.

Formation and locality.—In dark greenish, thinly-laminated shales of the Quebec group, in cañon above Call's Fort, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

Genus DIKELLOCEPHALUS Owen.

DIKELLOCEPHALUS QUADRICEPS n. sp.

Plate I, figs. 37-40.

Glabella and fixed cheeks united, quadrangular in form, with a regularly and symmetrically arcuate front margin. Glabella elongate quadrangular, a little expanded and rounded in front, three-fourths as wide across the middle as the length above the occipital furrow, very gibbous or somewhat inflated; marked by three pairs of transverse furrows, which extend about three-fourths of the distance to the center, not in the least oblique, and so faint as to be detected only on the closest examination, or by the reflection of light along the surface; occipital furrow very distinct; ring strong and robust, supporting a strong, thickened spine of undetermined length on the posterior margin. The base of the spine is broad, and the spine directed backward and upward.

Fixed cheeks of moderate size, strongly convex, a little more than one-third as wide at the eye as the width of the glabella, and rapidly declining to the antero-lateral angles. Eye-lobes small, situated rather behind the middle of the length of the head; ocular ridges distinct, strongly directed forward in their passage from the eye to the glabella. Frontal limb very short, not extending beyond the frontal margin of the glabella, and strongly curving backward to the point of intersection with the facial sutures.

Facial sutures commencing at the anterior margin on a line with the inner angle of the eye-lobe, and running directly back to the eye in a straight line; behind the eye, the direction is outward, but its exact course has not been ascertained. Lateral limb not observed.

A pygidium associated with the glabella is paraboloid in form, and

surrounded on the margins by twelve short, rather strong spines, the four on the posterior margin being shorter than the others. Axis narrow, highly convex, two-thirds as long as the shield, and marked by four rings, exclusive of the terminal ones. Lateral lobes broad, convex, and marked by four low, rounded ribs, the anterior one much narrower than the others; each of the four ribs terminating in one of the lateral spines.

There can be no doubt that the above-described pygidium belongs to the same species with the associated glabella, as they are both equally abundant, and are the only trilobitic remains brought from the locality, except those of *Conocephalites subcoronatus*. The glabella is enlarged to three diameters in the figure, while the pygidium is given natural size, but is one of the largest individuals seen; while there are fragments of glabellas in the rock fully twice the size of the specimen figured. The species bears a very close resemblance to *D. gothicus*, herein described, but differs principally in the simple ribs; while in that species they are divided, a feature that will very readily distinguish the two forms.

Formation and locality.—In limestone of the age of the Quebec group, from the base of Ute Peak, Wahsatch Range, Utah. Collected by Arnold Hague, esq.

DIKELLOCEPHALUS WAHSATCHENSIS n. sp.

Plate I, fig. 35.

Glabella elongate-quadrangular, with parallel lateral margins and slightly-rounded front; height and width about as four to three; very depressed-convex, and marked by two pairs of transverse furrows, which do not quite meet in the center, dividing the glabella into three nearly equal portions. Occipital furrow narrow, not strongly defined; ring narrow, distinct, and bearing a slender spine on the center; dorsal furrows narrow and poorly defined.

Fixed cheeks wide and flattened; ocular ridges faintly marked, rising opposite the anterior furrow of the glabella, and directed slightly backward to the eye-lobe. Frontal limb very short and wide, the marginal rim regularly arcuate, narrow, and prominent, closely cutting the front of the glabella. Facial sutures not fully determined, but are distinct on the anterior margin, cutting the rim with a strong outward curvature, and again

recurving to the eye, leaving the limb nearly two-thirds as wide at its widest point as the glabella.

This species differs from any other described in the length of the glabella and the position of the furrows, in the short frontal limb, and great lateral extension of the same. No other parts of the species have been recognized. There are, however, several specimens of a pygidium associated in the same slates, and, as they are the only remains of Trilobites occurring in the slates, except *C. (L.) quadrans*, which cannot well be confounded with either, it would be natural to suppose they were parts of the same species. But the characters of the pygidium are so unlike anything heretofore recognized or known to belong to the genus *Dikellocephalus*, that we have great doubt of their generic identity, and for that reason have placed them under different specific names with a doubt as to the generic reference.

Formation and locality.—In green argillaceous slates of the Quebec group, in the cañon above Call's Fort, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

DIKELLOCEPHALUS? GOTHICUS n. sp.

Plate I, fig. 36.

Pygidium semi-ovate, or short paraboloid, with a very strong central axis, and spinose margin; anterior margin straightened for about two-thirds the width of the lateral lobes, where it curves abruptly backward to the lateral angles. Axial lobe strong, cylindrical, and prominent, forming one-third of the entire width exclusive of the spines, and reaching almost to the posterior margin of the shield; obtusely rounded at the extremity, and marked by six annulations exclusive of the terminal ones. Lateral lobes very moderately convex, and marked by four divided ribs on each side, each terminating in a strong and proportionally long marginal spine; central area of each rib depressed, forming a flattened groove, extending to the base of the marginal spine. Borders of the ribs elevated, the anterior one strongest and prominent, gradually widening from its origin to the margin of the shield; posterior border narrow and rounded, separated from the next succeeding rib by a sharply-depressed, narrow groove. This peculiar form

of rib gives to the shield an appearance similar to the groining of a Gothic arch. Margin of the shield surrounded by twelve long, rather strong spines, four of which, on each side, are about equal in size and strength, while the four occupying the posterior border are shorter and unequal, those in the middle being the shortest.

The peculiar feature of the specimen consists in the divided ribs of the lateral lobes and spinose margin. In these features, it differs from all others known, and may possibly, when better material shall be examined, showing other parts of the organism, require a distinct generic name.

Formation and locality.—In greenish argillaceous slates of the Quebec group, in the cañon above Call's Fort, north of Box Elder Cañon, Wahsatch Mountains, Utah. Collected by S. F. Emmons, esq.

Genus BATHYURUS Billings.

BATHYURUS POGONIPENSIS n. sp.

Plate I, figs. 33-34.

The species is recognized only by the pygidium, which is rather small, measuring a little less than three-fourths of an inch in the greatest transverse width, by a length of a little less than half an inch. Form transversely elliptical, the posterior margin nearly twice as convex as the anterior border; lateral extremities angular; axis narrow, forming only about one-fourth of the entire width, highly convex, and about three-fourths as long as the entire shield, extremity obtusely rounded and terminating abruptly; marked by four transverse annulations exclusive of the terminal ones, the posterior one being as long as the two next preceding it; rings highly convex and rounded, with interspaces of nearly equal dimensions. Lateral lobes broad and somewhat triangular; the inner third of the width horizontal, beyond which the surface slopes rapidly to the outer margin; marked by three broad, slightly flattened, but strong and very distinct ribs, which terminate about one-third of the width within the margin, leaving a plain border surrounding the shield. The two anterior ribs are broad, and show a faint depression along the middle in the upper part. Surface of the crust, under an ordinary magnifying power, apparently smooth, except on the crest of the axial rings, where there are a few node-like granules

The pygidium is associated with a granulose glabella of corresponding dimensions, which is too imperfect for illustration or description, but probably of the same species. The sides are parallel or slightly widening anteriorly, and the front rounded. The entire surface is covered with small, closely-set pustules. The glabella bears considerable resemblance to that of *B. strenuus* Bill. (Pal. Foss. Canada, vol. 1, p. 204), but shows indications of a faint glabellar furrow behind the middle of the length.

Formation and locality.—In coarse, crystalline limestones, on the west side of Pogonip Mountain, White Pine, Nevada. Collected by A. J. Brown, esq.

Genus OGYGIA Brongn.

OGYGIA PRODUCTA n. sp.

Plate II, figs. 31-34.

Glabella very much elongated, twice as long as wide, measuring from the occipital furrow; slightly expanded in front, and rounded on the anterior extremity; convex and subangular along the median line; marked by two pairs of faint, very oblique furrows, which do not quite meet in the middle. Occipital furrow broad and distinct; ring strongly marked and thickened in the middle.

Fixed cheeks of moderate width; eye-lobes large, two-thirds as long as the glabella, extending from the occipital furrow to the middle of the anterior lobe of the glabella; distinctly marked by a narrow, depressed furrow just within and parallel to their margins. Lateral limbs narrow. Frontal limb unknown.

Movable cheeks obliquely triangular, the outer face being much the longest, and regularly arcuate; posterior extremity rounded, showing no evidence of a spine in the impression of the under surface, though the upper portion may have borne a spine, as seems to be indicated by other impressions of the exterior. Ocular sinus very large, but shallow, regularly arcuate; surface of the cheek depressed-convex, with a faint, shallow groove just within the margin and a scarcely thickened rim beyond.

Thorax depressed-convex, distinctly trilobed. Axis narrower than the lateral lobes, and gradually tapering from the occipital region posteriorly, and

slightly convex; annulations indistinctly marked. Pleura curving backward near the outer ends and pointed at the extremity; marked along the middle by a broad, shallow furrow, which occupies one-half of the width for a distance of nearly two-thirds the length of the rib, becoming obsolete near the free flattened extremity.

Pygidium broadly elliptical, scarcely twice as wide as long, anterior face much less convex than the posterior, which sometimes becomes irregularly paraboloid in the slate from distortion. Axial lobe less than one-third of the entire width, and rapidly tapering posteriorly; about four-fifths as long as the shield, and terminating just within the rather broad, recurved marginal lining of the under surface in an obtusely-rounded point; axis marked by six strong, rounded rings, exclusive of the terminal one; lateral lobes depressed-convex, marked by three or four obscure ribs, which, when compressed in the slates, become very faint and obscure.

The material from which the above description is taken is in a very unsatisfactory condition, being fragmentary and much distorted by the slipping and contortions of the shale in which they are imbedded, so that the features of form as here given may be somewhat modified on finding other and more perfect material. The great length of the glabella will serve as a distinguishing feature in the identification of the species.

Formation and locality.—In greenish and reddish shales of the age of the Quebec group, at East Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton and S. F. Emmons.

OGYGIA PARABOLA n. sp.

Plate II, fig. 35.

Pygidium long-paraboloid, posterior to the antero-lateral angles, with a slight emargination at the posterior border; front margin somewhat irregularly arcuate; surface flattened, or very gently convex, and in the cast showing a very wide marginal lining on the under surface, which extends to nearly one-half the width of the lateral lobes on the anterior margin, and very gently widening posteriorly. Axis convex, wide and bulbous in front, narrowed and cylindrical below for about four-fifths of its length; the anterior bulbous portion forming a single strong annulation, once and a

half as wide as the cylindrical portion below, which appears to be smooth and destitute of rings. Lateral lobes also marked by a single, wide, flattened rib, corresponding to the annulation of the axis, and a narrow, sharply-elevated, anterior ridge, corresponding to the articulating projection of the axis.

The pygidium is all that has yet been recognized of this peculiar species, but it is so marked in its characters that we have no hesitation in pronouncing it distinct from any hitherto described. The absence of rings on so great a length of the axial lobe is a marked and distinguishing feature.

Formation and locality.—In greenish shales of the age of the Quebec group, at East Cañon, Oquirrh Mountains, Utah. Collected by S. F. Emmons and J. E. Clayton.

FOSSILS OF THE DEVONIAN.

BRACHIOPODA.

Genus STROPHODONTA Hall.

STROPHODONTA CANACE.

Plate III, figs. 1-3.

Strophodonta Canace H. & W., 23d Rept. St. Cab., p. 236, pl. II, figs. 8-11.

Shell of medium size, subquadrangular in outline, wider than long; hinge-line a little shorter than the greatest width of the shell, the external border very gently sloping from the middle to the extremities; lateral margins and basal border of the shell somewhat straightened, and the angles rounded. Ventral valve convex, slightly geniculated near the middle of its length, and flattened on the umbonal disk; cardinal area narrow, sublinear or moderately decreasing in width from the middle outward, vertically striated or crenulate and divided in the center by a narrowly triangular fissure. Dorsal valve concave, a little more than half as deep as the convexity of the ventral; area very narrow. Surface of the ventral valve marked by strong, sharp, distant, radiating striæ, with concave interspaces, which are occupied by three or more finer, even striæ. Surface of the

dorsal valve marked by fine, even striae. The specimen measures about seven-eighths of an inch in length by a little more than an inch in width; convexity of the ventral valve about five-sixteenths of an inch.

The specimen possesses all the essential specific characters of the Iowa shells, but differs slightly in the more decidedly quadrangular outline. This feature alone, however, cannot be considered of specific importance, since, among the typical specimens, the variation in this respect is considerable.

Formation and locality.—In limestone of Devonian age, at Treasure Hill, south of Aurora Mine, White Pine, Nevada. Collected by Arnold Hague, esq.

Genus RHYNCHONELLA Fischer.

RHYNCHONELLA EMMONSI n. sp.

Plate III, figs. 4-8.

Shell rather above the medium size, globosely subcuboidal, very ventricose, highly gibbous on the dorsal side, shallow and somewhat flattened on the ventral and squarely truncate in front; cardinal margin broadly rounded, the small, pointed, ventral beak projecting beyond the general contour, and having the appearance of a small cardinal area from the projection of the margin of the foramen, into which the beak of the dorsal valve passes; sides of the shell more sharply rounded than the cardinal border. Front of the ventral valve abruptly bent upward in a broad, linguiform extension, nearly or quite equal to the entire height of the shell, and almost two-thirds as wide as the entire width; the sides of the extension are straight and parallel for most of the height, the top being broadly and evenly rounded. Dorsal valve emarginate in front, corresponding with the extension of the ventral valve.

Surface marked by from twenty-three to twenty-five low, rounded, simple plications on each side of the elevation and sinus, and about fourteen on the elevation of the dorsal valve, with a corresponding number on the extension of the ventral valve.

The species is of the type of *R. cuboides* of Europe and *R. venusta* Hall, of the Tully limestone of New York. It differs from the former in its much less cuboidal form and broader and shorter proportions, and from the latter

in the same particulars, as well as the finer and more numerous plications, and in the want of the flattening of these latter on the front of the shell.

Formation and locality.—In limestones of Devonian age, south of Aurora Mine, White Pine, Nevada. Collected by Arnold Hague, esq.

LAMELLIBRANCHIATA.

Genus PARACYCLAS Hall.

PARACYCLAS PEROCCIDENS n. sp.

Plate III, figs. 14-17.

Shell comparatively large, circular in outline, with scarcely projecting, but well-marked beaks; valves ventricose, somewhat inflated along the strongly-curved or convex umbonal ridge; cardinal line strongly arcuate, but becoming slightly alate toward the posterior end, especially perceptible on the internal casts; anterior side of the shell marked by a slight constricting sulcus, or depression, extending from the front of the beaks to the margin of the shell just below the middle of the anterior side, strongly reminding one of the similar constriction on many of the recent *Lucinas*; beaks pointed and strongly curving forward, situated well anteriorly. On the internal casts, the muscular impressions are large and strongly marked, the posterior one is irregularly quadrangular, and the anterior one reniform, widening below, and not more than half as large as the posterior; pallial line consisting of strong longitudinal pustules, arranged side by side.

Surface of the shell somewhat roughened by strong, irregular, but not lamellose, concentric undulations formed by aggregating lines of growth.

The shell differs from any form previously described in this country in the presence of the anterior constriction, but, in many other respects resembles *P. elliptica* var. *occidentalis* H. & W., from the Upper Helderberg limestones of Southern Indiana.

Formation and locality.—In dark limestone of Devonian age, at Treasure Hill, south of Aurora Mine, White Pine. Collected by Arnold Hague, esq.

Genus NUCULITES Conrad.

NUCULITES TRIANGULUS n. sp.

Plate III, figs. 12-13.

Shell comparatively large for the genus, subtriangular in outline, about

four-fifths as high as long; valves depressed-convex, perhaps partly due to compression; beaks large, broad, and prominent, situated about one-third of the length from the anterior end; posterior cardinal margin rapidly sloping to below the middle of the valve, from which point the posterior end rounds forward to the straight basal line; anterior end rounded, its greatest length being much below the middle of the valve, above which the margin is concave to just below the beak. Teeth and hinge unknown. On removing the shell from a portion of the valve, a slight impression was seen on the cast anterior to the beak, resembling that left by the removal of a muscular clavicle, or ridge, but not quite satisfactory in its character.

Surface of the shell marked only by moderately strong, irregular, concentric undulations.

The general form of the shell is much like that of *N. triquetra* Con. from the Hamilton group of New York, but with a straighter basal line, much larger and tumid beaks, and of very much greater size than is known in that species.

Formation and locality.—In the lower black slates of the White Pine District, near Eberhardt Mill. Collected by Arnold Hague, esq.

Genus LUNULICARDIUM Munster.

LUNULICARDIUM FRAGOSUM.

Plate II, figs. 9-11.

Posidonomya? fragosa, Meek. (Part I, page 92 and Plate.)

The specimens figured and described by Mr. Meek, under the name *Posidonomya? fragosa*, prove, on carefully uncovering the cardinal portions of the specimens, to belong to the genus *Lunulicardium*, a genus, so far as we are aware, that has only been recognized in rocks of Devonian age, unless the genus *Chanocardia* M. & W. should prove to be identical, about which we have some doubt. In the rocks of this age in New York, it has been recognized in several species, ranging from the Marcellus shales to the Chemung group inclusive, one or more species being known in each formation. The shells are readily recognized by the broadly gaping anterior (?) end, bordered by a more or less reflected margin or flange-like projecting border, extending from the beak to the basal margin, which we presume is analogous to the byssal opening in other forms of shell. The species

under consideration shows this feature on several specimens in the collection in a somewhat remarkable degree. The flange widens and is somewhat roundly pointed in some cases near the beak, and gradually narrows below. The general form of the shell is obliquely ovate, widest below, varying much, however, in different examples. The substance of the shell has been thin, and marked by comparatively strong concentric undulations, but without other surface-characters.

Mr. Meek's figures are true in all respects, except in wanting the flange-like border; and the figures given on plate 3 are for the purpose of illustrating this feature. The species has considerable resemblance to *L. fragilis* = *Avicula fragilis* Hall (Geol. 4th Dis. N. Y., 1843, p. 222, figs. 1-2) (fig. 2, *loc. cit.*, falsely represents a posterior wing), from the Genesee slate and Portage group of New York, but differs materially in the greater elongation of the valves. Examples could, however, be selected from among the New York collections that would exceed in length the shorter form from the black slates of the White Pine District, while the peculiarity of having the flange widening near the beak is a feature noticed only in that species among all of those recognized in the New York formations, and is one that shows the close relations of the two species. The greater proportional length of the shells of this one will serve to distinguish them.

GASTEROPODA.

Genus BELLEROPHON Montf.

BELLEROPHON NELEUS n. sp.

Plate III, figs. 18-20.

Shell rather above the medium size, nearly globular in form, a little wider than high. Volutions rounded and very slightly carinate on the back, the keel showing only as a low, rounded, scarcely elevated band on the internal cast. Lip somewhat expanded laterally, the outer axial margin forming a strong auriculation on each side of the shell; margin of the lip bilobed, deeply and broadly notched in the middle; the sides of the notch moderately expanding at first, but more rapidly above; lobes of the lip rounded. Umbilicus closed, but on the internal cast showing as of consid-

erable width from the great thickness of the shell. The inner lip, as seen on a specimen preserving this part of the shell, is much thickened and forms a callus, slightly trilobate and strongly modifying the form of the aperture. Aperture semilunate or reniform, about twice as wide as long. A fragment of the exterior surface preserved is covered with oblique rows of closely crowded, rounded granules, or small tubercles, outside of the median band; the obliquity of the rows being caused by the quincunx arrangement of the tubercles. The form and ornamentation of the revolving median band has not been fully determined, but is apparently broad and flattened, with retrally curved striæ.

The species very closely resembles, and is probably identical with, an undescribed form from the Chemung group of New York; being similar in size, form, and surface-markings, as well as in the solid axis and form of the callus of the inner lip. It differs in the surface-markings from any described form with which we are acquainted.

Formation and locality.—In limestone of Devonian age, at Treasure Hill, south of Aurora Mine, White Pine District, Nevada. Associated with *Strophodonta Canace*, *Rhynchonella Emmonsii*, *Paracyclas peroccidens*, and other Devonian forms. Collected by Arnold Hague, esq.

FOSSILS OF THE WAVERLY GROUP.

RADIATA.

Genus MICHELINA D'Kon.

MICHELINA — sp. ?.

Plate IV, fig. 19.

Among the fossils received from Dry Cañon there occurs a worn specimen of this genus, composed of tubes which vary from an eighth of an inch in diameter to nearly or quite twice that size. The corallum seems to have been highly convex, but not hemispherical in form, with few but rapidly diverging tubes of moderate size. The specimen is imbedded in the rock so as to expose the lower part of the tubes cut transversely. The walls have been quite thick at this point, but become much more attenuate

or even quite sharp on their upper edges. The specimen is in such a state of preservation that it is impossible to detect the specific characters, and is chiefly interesting on account of the association in which it is found. The genus *Michelina* is not common in this country in rocks above the Devonian, although very abundant in many of the formations of that series, and has been recognized in several species in the Carboniferous rocks of Europe. This species, therefore, furnishes another instance of the mingling of Devonian and Carboniferous forms in the rocks of the age to which we suppose these to belong (viz, Waverly group), showing intimate relations, if not absolute transition without break, from the Devonian to the Lower Carboniferous in several widely distant parts of the country.

BRACHIOPODA.

Genus STREPTORHYNCHUS King.

STREPTORHYNCHUS EQUIVALVIS.

Plate IV, figs. 1-2.

Orthis equivalvis Hall, Geol. Rept. Iowa, vol. 1, pt. 2, p. 490, pl. 2, fig. 6.

Specimens of a species of *Streptorhynchus*, having characters very similar to many of those occurring in the Burlington sandstones, occur in the rocks of this formation at Ogden and Logan Cañons, Wahsatch Range, Utah. The shell is at all times a very variable one, and not easily determined with satisfaction. The specimen represented by fig. 1, plate IV, is rather wider than most of those above referred to, but resembles them in form except in this particular, and in want of the sinus which often marks them. The alternations of coarser and finer striæ is a common character. The specimen represented by fig. 2 of the same plate is also a not unusual form, although shorter than the generality of individuals. The specimen fig. 1 is from Ogden Cañon, and fig. 2 from Logan Cañon. Collected by S. F. Emmons, esq.

STREPTORHYNCHUS INFLATUS.

Plate IV, fig. 3.

Streptorhynchus inflatus White & Whitfield, Proc. Bost. Soc. Nat. Hist, vol. viii, 1862, p. 293.

The specimen fig. 3, plate IV, possesses the character of the above-cited species in all particulars as far as can be ascertained from the specimen, except

that it is a little wider, but not sufficiently so to be considered beyond the limits of specific variation. The shell is very gibbous, in fact quite inflated in form, and evenly striate. Other individuals show the large cardinal process known to exist in the original, and, considering the extreme variations to which species of this genus are subject, we see no reason why this should be considered as distinct from the typical forms.

Formation and locality.—In limestones of the age of the Waverly group, at Dry Cañon, Oquirrh Mountains, Utah. Collected by S. F. Emmons, esq.

Genus STROPHOMENA Rafinesque.

STROPHOMENA RHOMBOIDALIS Wilckens.

Plate IV, fig. 4.

For synonymy see Palæont. N. Y., vol. iv, p. 76.

The examples of this species observed present a broad flattened surface with but a slight geniculation, the flattened portion being covered by close, rather small, or narrow, concentric wrinkles, which are crossed by fine radiating striæ. The form is similar to those found in the yellow sandstones of Burlington, Iowa. The straight hinge-line is about as long as the width of the shell below, or a little shorter, and the length of the shell about two-thirds as great as the width. The geniculation is near the margin; the flattened disk occupying almost the entire extent of the shell. Only the ventral valve has been observed.

Formation and locality.—In limestone of the age of the Waverly group, Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton, esq.

Genus CHONETES Fischer.

CHONETES LOGANENSIS n. sp.

Plate IV, fig. 9.

Shell of moderate size, semicircular; hinge-line straight, longer than the width of the shell below; the extremities acutely angular. Ventral valve convex, with a slight flattening, scarcely a depression, along the median line, widening gradually toward the front; sides of the valve rounded,

becoming flattened, or very faintly concave, near the hinge-extremities; hinge-line marked by three or four very short, appressed spines on each side of the beak. Dorsal valve and area of the ventral unknown. Surface marked by very fine, closely crowded, radiating striæ; the number not determined, owing to the exfoliated condition of the shell.

The species resembles somewhat *C. Illinoisensis* Worthen, from the Burlington limestone, in the size and convexity of the valve, and also in the striæ, but differs in the greater proportional length of the hinge-line and in the flattening of the mesial portion.

Formation and locality.—In limestone of the age of the Waverly group, at Logan Cañon, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

Genus SPIRIFERA Sow.

SPIRIFERA CENTRONATA.

Plate IV, figs. 5-6.

Spirifera centronata Winchell, Proc. Acad. Nat. Sci. Phil., 1865, p. 118.

Shell rather below the medium size, transversely elongate, with mucronate extensions, exclusive of which the front margin of the shell forms nearly a semicircle, the length from beak to front being sometimes greater and sometimes less than half the length along the hinge. Valves convex, the ventral most ventricose, with a moderately sized, rather pointed beak, which is slightly incurved and projecting beyond the hinge-line. Area narrow; mesial sinus distinct, narrow, angularly defined at the margins, and extending to the beak; occupied by from three to five plications near the front, formed by the bifurcation of two, which originate at the beak. Sides of the shell marked by from twelve to eighteen or twenty plications, mostly simple, but sometimes bifurcating. The plications are slender and rounded, not very angular. Dorsal valve depressed-convex; the narrow fold well defined, but not highly elevated. Minute surface-characters not observed, as the specimens are all in a state of exfoliation.

This species seems to be a common form in the rocks near the base of the Wahsatch limestone. It is subject to some variation in external form and number of plications, but is readily recognized and identified.

Formation and locality.—Near the base of the Wahsatch limestone (Wav-

erly?), at Dry Cañon, Oquirrh Mountains, Logan and Ogden Cañons, Wahsatch Range, Utah, collected by S. F. Emmons, esq. We have also seen several specimens of it in collections from a white limestone brought from the Black Hills by Mr. G. Bird Griinnell, in 1874.

SPIRIFERA ALBA-PINENSIS n. sp.

Plate IV, figs. 7-8.

Compare *Spirifera biplicatus* Hall, Geol. Rept. Iowa, vol. 1, pt. ii, pl. 7, fig. 5, p. 519.

Shell rather below a medium size, transversely elongate, greatly extended on the hinge-line, with submucronate extremities; the width or length along the hinge equal to about twice the length from beak to front. Ventral valve ventricose, regularly arcuate from beak to front, the margin of the valve forming nearly a semicircle exclusive of the hinge-extremities; beak of moderate size, incurved and pointed; area moderate; a narrow, rather shallow, and not distinctly defined mesial sinus marks the center of the valve, and is bordered on each side by a broad, rounded plication, much stronger and more elevated than the others, and which is divided along the middle on the lower half of the shell by a slightly impressed line, giving it the appearance of a bifurcated rib. The middle of the sinus is sometimes smooth, and in some cases marked by two or three faint plications, which do not extend beyond the anterior half of the shell. Besides the strong plications bordering the sinus, there are from fourteen to eighteen low, rounded, simple plications on each side, six or eight of which on the outer end of the valve are often very obscure and sometimes obsolete. Dorsal valve unknown.

This species is very closely related to, and may possibly prove to be identical with, *S. biplicatus* Hall (*loc. cit.*), from the Burlington sandstones of Iowa, but it appears to differ in not possessing the central depressed line on the mesial fold, if it is safe to rely upon the evidence furnished by the absence of a corresponding fold in the sinus of the ventral valve and the presence of two or more obscure plications in its place. As the dorsal valve has not been observed, although several ventrals have been examined, these differences cannot be positively affirmed.

Formation and locality.—In limestones near the base of the Wah-

satch limestone, at Dry Cañon, Oquirrh Mountains, Logan and Ogden Cañons, Wahsatch Range, Utah, and from a band of chert beneath the upper black slates of the White Pine District. Collected by J. E. Clayton, S. F. Emmons, and Arnold Hague.

Genus *ATHYRIS* McCoy.

ATHYRIS CLAYTONI n. sp.

Plate IV, figs. 15-17.

Shell of moderate size, oval or very slightly ovate in general outline when viewed from the dorsal side, the entire length being one-sixth greater than the greatest width, and the rostral half of the shell being slightly more attenuated than the forward part. Valves moderately and nearly equally convex. Dorsal valve nearly circular in outline, convex, most ventricose in the upper part, and somewhat angular along the middle throughout, but not forming any distinct mesial elevation; beak small, incurved, and rather pointed, the apex passing within the fissure of the opposite valve. Ventral valve much longer than the dorsal, the rostral half very ventricose, but becoming somewhat flattened on the antero-median portion, without forming a distinct sinus; beak large and tumid, abruptly curved upward, and rather strongly truncated at the apex on a line with the plane of the valves; cardinal margins strongly inflected or enrolled, almost presenting the appearance of a cardinal area, but without any defined limits; fissure large, broadly triangular, and partly filled by the dorsal beak. Surface of the valves smooth, except a few strong concentric lines marking stages of growth.

The species is peculiar in shape, the cardinal portion presenting so much the appearance of a species of *Spirifer* of the type of *S. Maia* Bill., as figured in Pal. N. Y., vol. 4, pl. 63, fig. 8, as to be readily mistaken for one of that group; but the entire absence of a defined cardinal area, together with the perforated beak, readily distinguishes it on a closer inspection. The absence of any defined mesial fold and sinus is also a good specific character.

Formation and locality.—In limestones of the Lower Carboniferous (Waverly?) age, Little Cottonwood, 800 feet east of Reed and Benson's

mine, Wahsatch Range, Utah. Named in honor of Prof. J. E. Clayton, of Salt Lake City, Utah, to whom we are indebted for the use of the specimens.

ATHYRIS PLANOSULCATA?

Plate IV, figs. 10-11.

Compare *Athyris planosulcata* Phil., Geol. Yorkshire, vol. ii, p. 220, fig. 15.

A small species of *Athyris* not readily identified with any known species, and yet so closely resembling several described forms, that it is difficult to cite differences which would distinguish it from them, occurs associated with the fossils described from the Cottonwood divide. It is of medium size, nearly circular in outline, with ventricose valves and destitute of mesial fold or sinus; beaks small, that of the ventral valve incurved and but slightly truncated by the small foramen. The surface of the shell is smooth except from concentric lines marking stages of growth, and entirely destitute of any marked or distinguishing feature. The specimens are of the size and general appearance of those usually referred to *A. planosulcata* Phil., and from its lack of distinguishing features we hesitate to refer it with certainty to any known species.

Formation and locality.—In limestone of the Lower Carboniferous (Waverly?) age, Cottonwood divide, 800 feet east of Reed and Benson's mine, Wahsatch Range, Utah. Collected by J. E. Clayton.

Genus RHYNCHONELLA, Fischer.

RHYNCHONELLA PUSTULOSA White?.

Plate IV, figs. 12-14.

Rhynchonella pustulosa White, Jour. Bost. Soc. Nat. Hist., vol. viii, p. 226.

Shell small, transversely subtrigonal, with a broadly rounded front and straightened cardinal slopes; sides of the shell sharply rounded; beak pointed and projecting; valves ventricose, the dorsal the most gibbous.

Surface marked by from sixteen to twenty-two simple rounded plications, five of which are elevated in the middle, to form the proportionally broad mesial elevation, and a corresponding number depressed on the ventral forming the sinus.

The specimens of this species seen are mostly poor; one, however, preserves the form and features, with but little or no distortion, giving the characters as above. The shell varies considerable from the description of Dr. C. A. White; but, on comparison with a group of several individuals from the typical locality, sent by Dr. White as of that species, we find the variations great enough to include specimens departing still further than these here referred. The minute surface-structure having pustules has not been observed among those in this collection, as they are all more or less exfoliated, and it does not appear to be commonly preserved on those from the typical locality. The greater number of plications would seem to be a distinguishing feature, but eight of the twenty-two counted occur on the cardinal slopes, where, in very many cases, they might not be distinguishable.

Formation and locality.—In limestone of the Waverly group, at Logan Cañon, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

Genus TEREBRATULA (Llhwyd.) Brug.

TEREBRATULA UTAH n. sp.

Plate IV, fig. 18.

Shell of medium size, elongate-ovate, the greatest width opposite the middle of the dorsal valve, forward of which point the sides are somewhat rapidly contracted to the rather squarely truncated front margin. Valves ventricose, the ventral more gibbous than the opposite. Dorsal valve most ventricose within the upper third of the valve; beak small and sharply pointed for a dorsal beak, scarcely if at all incurved. Surface of the shell smooth, with the exception of several rather strong concentric lines marking stages of growth. Beak of ventral valve not observed.

The shell is described from a separate dorsal valve and a partially concealed ventral valve, but the form of the shell is somewhat different, and the proportions unlike any other known from rocks of a corresponding age.

Formation and locality.—From a dark limestone of Lower Carboniferous age (Waverly?), on the Cottonwood divide, 800 feet east of Reed and Benson's mine, Wahsatch Range, Utah. Collected by J. E. Clayton.

GASTEROPODA.

Genus EUOMPHALUS Sow.

EUOMPHALUS (STRAPAROLLUS) UTAHENSIS n. sp.

Plate IV, figs. 20-23.

Shell of medium size, discoidal, composed of about four volutions, which are coiled nearly or quite in the same plane, and in close contact with each other, but not embracing or overlapping, and but moderately increasing in diameter with increased growth. On the upper surface, the volutions are marked, near the middle of their diameter, by a narrow, sharply elevated band, or carina; within which the surface slopes rapidly and evenly to its contact with the preceding whorl; outside of the carina, the volution is evenly and regularly rounded across the dorsum and to the edge of the broad, open umbilicus, where there is a nearly obsolete angularity, situated considerably within the middle of the volution; within the umbilicus the surface is somewhat evenly rounded. The surface of contact of each volution with the preceding one is very narrow and slight, leaving the inner ones projecting on the sides of the shell, exposing the greater part of each volution.

Surface of the shell marked by rather distinct transverse lines of growth, which are sometimes grouped so as to form slight transverse undulations on the larger part of the shell. These lines have a slight outward convexity on that portion within the carina of the upper side, and on the outer portion a somewhat retral curvature as they cross the body of the volution.

The species is of the type of *Euomphalus pentangularis* Sow., and somewhat closely resembles *S. similis* var. *planus* M. & W. (Geol. Rept. Ills., vol. ii, pl. 19, fig. 5), but differs in the sharp carina of the upper side, and in having the volutions coiled more decidedly in the same plane. This shell also attains a much greater size than that one is known to do; the largest specimen observed having a diameter of nearly an inch and two-thirds. It is also related to *S. planodorsatus* of the same authors (*loc. cit.*, pl. 24, fig. 2), but is readily distinguished by the form of the upper surface of the volution.

Formation and locality.—In limestone near the base of the Wahsatch limestone, of the age of the Waverly group, at Dry Cañon, Oquirrh Mountains, Ogden and Logan Cañons, Wahsatch Range, Utah. Collected by J. E. Clayton and S. F. Emmons.

EUOMPHALUS LAXUS.

Plate IV, figs. 24-25.

Euomphalus laxus White, MSS. Lieut. Wheeler's Rept. of Geograph. and Geol. Surv. and Expl. W. of 100th Meridian.

Shell subdiscoidal; the height of the spire above the body of the last volution equal to from one-third to about one-half its diameter, the inner volutions being scarcely elevated above the general plane. Umbilicus broad and proportionally deep, exposing all the inner whorls. Volutions three or more, seldom, however, exceeding four; rather slender in their proportions; the last one more rapidly increasing in size than the others; obscurely pentangular in transverse section; the periphery being obtusely angulated just below the middle, slightly flattened above the angle, and distinctly so on the upper surface. The lower side of the volution is gently rounded on the outer part, but more sharply curved at the edge of the broad open umbilicus.

Surface of the shell marked by distinct, somewhat irregular, lines of growth, parallel to the margin of the aperture, their direction being nearly at right angles to the axis of the shell, with a very slight sinuosity as they cross the upper flattened surface of the volution.

The species is a well-marked one, and appears to be quite characteristic of beds near the lower part of the Wahsatch limestone, Wahsatch Range, Utah. It bears a strong resemblance to specimens of *E. laxus* H. from the Burlington limestones, but the volutions increase much more rapidly, and the flattened space on the upper side is narrower in proportion to the diameter of the volution than in those specimens, and it is also a much smaller form. It also bears considerable resemblance to an angulated form in the Burlington sandstones, usually referred to *E. cyclostomus* H., but probably distinct. There is also a species in the Chemung group of New York very closely resembling this one, but which does not show the angularity of the

periphery, although flattened on the top of the volution. The individual figured is somewhat smaller than the specimen used and figured by Dr. C. A. White in Lieutenant Wheeler's Report above cited, but possesses all the characters of those specimens.

Formation and locality.—In limestones near the base of the Wahsatch limestone, of the age of the Waverly group of Ohio, at Dry Cañon, Oquirrh Mountains, and Logan Cañon, Wahsatch Range, Utah. Collected by S. F. Emmons and J. E. Clayton.

EUOMPHALUS (STRAPAROLLUS) OPHIRENSIS n. sp.

Plate IV, figs. 26-27.

Shell of medium size, broadly conical or subtrochiform; height equal to two-thirds the greatest transverse diameter of the base; composed of four and a half to five volutions, which are closely coiled, so as to rest nearly upon the surface of the succeeding ones; four of the volutions obliquely compressed on the outer upper portion, and sharply rounded on the periphery and below, giving a somewhat convex trochiform aspect to the coils. Umbilicus broad and deep, exposing more than one-half of each of the preceding whorls, which are strongly rounded and full. Transverse section of the volution obliquely and irregularly ovate, narrow, and somewhat pointed at the upper end at the junction of the volutions, rounded on the inner, and obliquely flattened or depressed-convex on the outer surface.

Surface of the shell marked only by very fine transverse lines of growth, which have a slightly backward curvature as they cross the volution.

This species has something of the form and general appearance of *S. umbilicus* M. & W., from the Coal-Measures (see Geol. Rept. Ills., vol. ii, pl. 27, fig. 1), but is more depressed and proportionally broader, without the horizontal flattening on the upper surface of the volutions, which are instead obliquely compressed nearly in the direction of the slope of the spire.

Formation and locality.—In limestones of the age of the Waverly group, at Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

CRUSTACEA.

Genus PROETUS Stein.

PROETUS PEROCCIDENS n. sp.

Plate IV, figs. 28-32.

One of the most persistent and characteristic fossils of this formation at the several localities where it has been recognized, and one that will probably serve to identify it at other localities, owing to its marked features, is a small species of Trilobite of the genus *Proetus*. Although specimens of the pygidium have been obtained at all the localities yet recognized, no other parts of the animal have been noticed except from one locality. These were collected, and sent, among other species, by J. E. Clayton, esq., of Salt Lake City, from Dry Cañon, Oquirrh Mountains, Utah. They consist of some detached and imperfect examples of the glabella and cheeks; and as there are no other forms of Trilobites yet known from the locality, and these occurring in the same blocks with the pygidia, it is reasonable to infer that they belong to the same species.

The glabella is conico-cylindrical in form, once and a half as long as wide, very gently narrowing from the base forward, and rounded-truncate in front; very depressed-convex throughout, and marked by four pairs of transverse furrows; the posterior ones strongest, curving backward at their inner ends, nearly surrounding the posterior lobes, forming rounded convex tubercles, each of which is equal in width to one-third that of the entire glabella. The other three pairs are faintly marked, and reach nearly one-third across the glabella; the anterior one transverse and very obscure, distant from the anterior end of the glabella, equal to its width at the furrow; second and third pairs distinct, slightly curving backward at their ends. Occipital ring narrow, depressed-convex, and not strongly marked. Fixed cheeks narrow; palpebral lobe small, situated a little more than one-third of the distance from the posterior border of the head, angular in outline. Frontal border thickened and rounded, well defined, but not distinctly separated from the glabella in front. Posterior lateral limbs not preserved, but narrow at their junction with the fixed cheeks. Suture-line cutting the frontal margin, with a slight curvature at a point distant from the sides of

the glabella equal to one-half its width at the anterior end, and rounding inward with a gentle curvature to the anterior side of the palpebral lobe, the cheek being very narrow at this point, thence passing along the top of the eye to the junction of the posterior lateral limb. Surface of the glabella and cheeks smooth, except a few granules near the base of the glabella.

Movable cheeks of medium size in proportion to the glabella, flattened convex from the base of the eye to the narrow, thickened, and chamfered marginal rim; occipital furrow narrow, not strongly marked, and reaching nearly to the depression within the marginal rim; posterior angles of the cheeks extending backward in the form of short angular spines.

Thoracic segments unknown.

Pygidium paraboloid in outline, highly convex, abruptly so at the sides and posteriorly. Axial lobe forming a little less than one-third of the entire width, and reaching nearly to the posterior margin, rounded and strongly elevated throughout; gradually tapering posteriorly and narrowly rounded at the extremity; marked by from fifteen to seventeen annulations in different individuals exclusive of the anterior articulating ring. Lateral lobes well marked, very convex, slightly flattened near the axis, but very abrupt at the sides and behind; marked by from fourteen to sixteen very sharply elevated angular ribs, which occupy the entire border, extending beyond the end of the axial lobe, and reaching almost to the margin, leaving only a narrow plain space at the edge. The surface of the annulations is marked by a series of small nodes, or pustules, along their crests, arranged in four longitudinal rows on the axial rings, and an indefinite number, closely arranged, occur on those of the lateral lobes.

The species in some of its features resembles *P. macrocephalus* Hall of the shales of the Hamilton group of New York, especially in the markings of the pygidium; but it differs in the more elongate form and number of ribs of this part, while the glabella is proportionally narrower and the sides more nearly parallel; the fixed cheeks and anterior border are narrower, and the movable cheeks terminate in spines, which is not the case with that one. The surface of the glabella and head is also destitute of the strong pustules which characterize that species.

Formation and locality.—In limestones of the age of the Waverly group of the Mississippi Valley, at Ogden and Logan Cañons, Wahsatch Range, and Dry Cañon, Oquirrh Mountains, Utah. Collected by S. F. Emmons and J. E. Clayton.

PROETUS LOGANENSIS n. sp.

Plate IV, fig. 33.

The pygidium of a small species differing very materially from the preceding occurs at Logan Cañon, associated with that one. The form is more nearly semicircular, being but very slightly paraboloid. The axial lobe is highly convex, rapidly tapering below and terminating abruptly a little within the posterior margin; anterior end forming fully one-third of the entire width of the shield. Lateral lobes moderately convex, with a slightly thickened, scarcely elevated border of moderate width, on which the ribs become nearly obsolete. Axial lobe marked by nine rounded and distinct annulations, exclusive of the terminal ones; strong in front and rapidly decreasing in size posteriorly. The ribs of the lateral lobes are ten in number on each side; simple, highly rounded, and continuing entirely around the posterior margin of the shield, the most posterior ones being very faintly marked.

This species differs conspicuously from the corresponding parts of *P. peroccidens* in its shorter form, small number of ribs, and in being destitute of the surface ornamentation which characterizes that one.

Formation and locality.—In limestones of the age of the Waverly group, at Logan Cañon, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

FOSSILS OF THE LOWER CARBONIFEROUS.

BRACHIOPODA.

Genus ORTHIS Dalman.

ORTHIS RESUPINATA ?.

Plate 5, figs. 1-2.

Orthis resupinata Martin sp.

Shell of moderate size, transversely elliptical or quadrate-elliptical; valves ventricose, the dorsal quite rounded and almost evenly ventricose, sometimes a little fuller on the umbone; middle of the valve slightly impressed with a broad, shallow, mesial sinus, extending from near the beak to the front of the valve; beak proportionally large and full, somewhat incurved, and projecting beyond the line of the hinge; area moderately large, extending about half the length of the valve, the plane of its surface nearly in the direction of the plane of the valve. Muscular impression large, extending to about two-fifths of the length of the shell, distinctly flabellate and lobed. Ventral valve unknown. Surface marked by moderately strong, rounded, radiating striæ and concentric lines of growth.

The species is represented in the collection only by dorsal valves, but the specific characters are unmistakable and easily recognized.

Formation and locality.—In Lower Carboniferous limestone, near the base of the formation, at Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

Genus PRODUCTUS Sowerby.

PRODUCTUS FLEMINGI var. BURLINGTONENSIS Hall.

Plate 5, figs. 9-12.

Productus Flemingi var. *Burlingtonensis* Hall, Geol. Rept. Iowa, vol. i, part ii, p. 598, pl. 12, fig. 3.

Shell of medium size, wider than long; height and length subequal, or a little longer than high, except in old individuals, where the front is much produced, giving additional height; hinge-line as wide, or a little less than the width of the shell below. Ventral valve strongly arcuate, more abruptly curving just posterior to the middle of the valve; auriculations distinct when

well preserved, and in some cases strongly separated from the body of the valve; sides of the valve a little straightened; front rounded on the lateral portions, but strongly emarginate in the center by the rather strong, sometimes abruptly depressed, mesial sinus, which extends from near the beak to the front of the shell; beak moderately strong, extending beyond the hinge-line and incurved. Dorsal valve nearly flat over the central area, with a slight concavity in the region of the beak, the margins abruptly geniculated to conform to the curvature of the opposite valve. The mesial constriction is as strongly marked, but a little wider than that of the ventral valve, and extends nearly to the beak.

Surface of the shell marked by rather even, rounded striæ of moderate strength, except near the front of the shell, where they become indistinctly fasciculate or blended; also, on the rostral half of the shell by numerous, distinct, closely arranged, concentric, undulating wrinkles, but which seldom extend beyond the point of greatest geniculation. A few scattered spines mark the front and sides of the shell, while several stronger ones are observable on the cardinal auriculations. On the dorsal valve, the concentric wrinkles are more distinct, and occupy the entire flattened area of the valve, while the radiating striæ are found to be more strongly bifurcating.

The specimens bear a very close resemblance to those from Burlington, Iowa; in their general form and characters. There are a few unimportant differences noticed, but not such as can be considered of specific importance. There is also considerable resemblance to *Prod. mesialis* Hall (Geol. Iowa, p. 636, plate 19, fig. 2); but that shell is much wider in proportion to the length than any of those from the more western locality.

Formation and locality.—In dark-blue limestone of Lower Carboniferous age, north of Snowstorm Hill, Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

PRODUCTUS LÆVICOSTUS ?.

Plate 5, figs. 7-8.

Productus lævicostus White?, Jour. Bost. Soc. Nat. Hist., 1860, p. 230.

Shell below the medium size, subtriangular in general outline, rapidly increasing in width from the small, narrow, and rather pointed beak to near

the front of the shell, which is broadly rounded and destitute of any mesial depression; hinge-line short, scarcely more than half as wide as the body of the shell. Ventral valve strongly arcuate in the upper part. Dorsal valve unknown.

Surface of the ventral valve covered by very fine, even, rounded, thread-like striæ, seven to eight of which may be counted in the space of an eighth of an inch on the front of the shell, but are much finer near the beak. The striæ have been marked by numerous fine, slender spines, the bases of which can be seen protruding through a portion of shale adhering to the surface of one of the specimens; but they are so fine as to make scarcely any perceptible scar on the surface of the striæ when denuded.

The species is of the general form of many of those usually referred to *P. Prattenanus* Norwood, but differs materially from the original specimen used and figured by Dr. Norwood in the finer striæ and short hinge-line. It does not appear to be positively identical with any of the forms figured by De Koninck as *P. Cora*, but is a very closely representative species.*

Formation and locality.—In limestone in the higher parts of the Lower Carboniferous, north of Snowstorm Hill, Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

PRODUCTUS SEMIRETICULATUS Martin.

Plate 5, figs. 5-6.

The specimens of this species in the collection have very much the form and characters of those of the species which occur in the Burlington and Keokuk beds in Iowa and Illinois, represented by the specimen figured in the Geological Report of Iowa (vol. i, part 2, plate 19, fig. 4), except that they are only about two-thirds as large as that individual. The shell is rather narrow and strongly arcuate; the beak narrow and rather pointed, and distinctly separated from the body of the shell; the hinge-line appears to have been about equal in length to the width of the shell below; the sides of the shell abrupt, flattened, and squarish, while the middle of the

* The original specimen of *P. lævicostus* is from the base of the Lower Carboniferous, and from the beds at Burlington, Iowa, referred to the Waverly group; but there are forms of very similar character in other beds of the formations at other places that cannot be readily distinguished from those above referred to.

valve is marked by a rather distinct depression, extending from near the beak to the front of the shell, but most marked on the middle of the valve. The striæ are rather coarse, somewhat irregular, and present a rugose, knotty appearance; while the upper half of the shell is very distinctly marked by strong, irregular, concentric wrinkles, a little less marked in the central depression. A few of the transverse wrinkles are seen marking the front half of the shell in one specimen, and are broad and less deep than those above.

The specimens are proportionally longer and narrower than the typical forms of *P. semireticulatus*; but the form is such a variable one that it is somewhat difficult to define the limits of its characters.

Formation and locality.—In the limestone of Lower Carboniferous age, north of Snowstorm Hill, Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

PRODUCTUS ELEGANS.

Plate 5, figs. 3-4.

Compare *Productus elegans* N. & P., Jour. Acad. Nat. Sci. Phila., iii, p. 11, fig. 7.

There are two specimens of a *Productus* associated with the preceding, having so much the form and characters of *P. elegans* N. & P., that, unless from a larger number of individuals other and different features shall be obtained, cannot well be considered as distinct from that one. The form is narrow in the upper part, the hinge-line shorter than the width of the shell below; beak rather small and appressed; auriculations not very marked; ventral valve sharply arcuate above and gently curving throughout, with a slight, scarcely defined depression extending from beak to base. Surface of the valve marked by moderately fine but distinctly radiating striæ, which, on the better preserved specimen, have an irregular, knotty appearance, caused by the thickening of the striæ at the spine-bases. The radiating striæ are marked by very fine transverse lines of growth on the forward part of the shell, and on the upper part of the beak and sides of the shell a few obscure transverse wrinkles may be detected.

There are some slight differences between the specimens, one of them being a little more compressed, giving it a broader form, while the striæ are

a little finer and more even than on the other ; but the differences are even less than occur among specimens of *P. elegans* from the typical locality.

Formation and locality.—In limestone of Lower Carboniferous age, north of Snowstorm Hill, near Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

Genus SPIRIFERA Sowerby.

SPIRIFERA STRIATA.

Plate V, figs. 13-15.

Anomites striatus Martin; *Spirifer striatus* Sowerby and others.

Shell rather above the medium size, transversely oval or semi-elliptical, the hinge-extremities either rounded or slightly extended beyond the width of the shell below. Valves moderately convex, or in some cases rather strongly rounded; the ventral valve most rotund and marked by a broad mesial depression, the margins of which are not strongly defined; front of the valve in the depression somewhat extended and bent upward; beak small, pointed, and closely incurved; area small, poorly defined, the margins rounding to the body of the shell. Dorsal valve most ventricose in the upper part; the sides gradually sloping to the margins, and the center strongly elevated, forming a distinct, sharply rounded mesial fold, which is narrow in the upper part but expands very rapidly as it approaches the front of the shell.

Surface of the valves marked by moderately strong, radiating plications, which are distinct and subangular on the upper part of the shell, but frequently bifurcate and become flattened toward the margin, often forming fascicles of three, four, or more on the extension of the valves, while those near the middle are usually in pairs, but not uncommonly simple.

The species is extremely variable in form and surface-markings as it occurs in the collections examined, representing two quite distinct types, which appear to characterize two different horizons of the geological section of the district in which they were found. Although these differences are easily detected on close examination, still they are not sufficiently strong and marked to be considered as of specific or even varietal importance, and, in their extremes, are not nearly so great as those ascribed to the species

by European authors. The specimens from the lowest horizon are generally more extended on the hinge-line, and sometimes quite elongated; while those from the lower beds are seldom much longer than the width of the shell below, and in some stages of growth appear to have been short and rounded at the cardinal extremities. There is also a perceptible difference in the character of the striae; those from the higher beds being more finely marked, more angular, and more distinctly fasciculate than the others.

Formation and locality.—In limestone of the Lower Carboniferous age, near the base of the section, at Dry Cañon, and in the higher beds at Snowstorm Hill, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

SPIRIFERA SETIGERA.

Plate 5, figs. 17-18.

Spirifer setigeras Hall, Geol. Rept. Iowa, vol. 1, pt. 2, p. 705, pl. 27, fig. 4.

Shell rather below the medium size, transversely oval or elliptical, with ventricose valves, and a short, scarcely defined hinge-line and rounded extremities. Ventral valve more ventricose than the dorsal, most strongly arcuate in the upper part; beak small, somewhat pointed and strongly or closely incurved; area small, the margins not distinctly defined, but rounded almost imperceptibly into the general curvature of the valve. Center of the valve marked by a moderately distinct, but narrow mesial depression, traceable from beak to base. Dorsal valve rather gently and evenly convex, the center elevated in a narrow, not distinctly defined, rounded elevation corresponding to the depression of the opposite valve.

Surface of the shell marked by numerous, rather closely-arranged concentric varices, marking stages of growth at irregular distances, and also by fine, closely-arranged, setose, radiating lines, most distinct just below each concentric line, but becoming indistinct before reaching the next one below. These lines on the natural surface have been elevated and rounded, forming spines at the concentric ridges, but on the exfoliated surface have the appearance of interrupted radiating lines, scarcely raised on the surface of the shell.

The specimen figured is somewhat imperfect and much distorted by

compression, but the features of the species are so well and distinctly represented on it that it is impossible to doubt its identity.

Formation and locality.—In limestone of Lower Carboniferous age, north of Snowstorm Hill, Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton.

SPIRIFERA ——— sp. ?.

Plate 5, fig. 16.

Compare *Spirifera imbrex* Hall, Geol. Iowa, vol. 1, pt. ii, p. 601, pl. 13, fig. 2.

The figure is of a fragment of a cast of the ventral valve in chert, from a fragment of the Weber quartzite, a rock usually destitute of all organic remains, and it is for this reason only that the specimen has been figured. It is of a species possessing numerous sharply-elevated, angular plications, simple on the sides of the shell, and apparently bifurcating in the mesial sinus; although the example does not furnish positive evidence of such bifurcations, still the direction and number would indicate such to be the case. The plications have been crossed by closely-arranged, strong, zigzag, concentric lines; which give a strongly roughened surface to the cast. The only species having strong affinities with it is *S. imbrex* Hall from the Burlington limestone of the Lower Carboniferous formations, at Burlington, Iowa (Iowa Geol. Rept., vol. 1, pt. ii, p. 601, pl. 13, fig. 2), and it is even probable that it may be identical; but, as the ventral valve of that species is unknown to us, we are unable to determine positively. The plications of that species often bifurcate on the upper part of the shell, while these are simple; but this feature may not hold good on all specimens of the same species where the bifurcations are but few.

Formation and locality.—In the Weber quartzite, Bear River, Uinta Range, Utah. Collected by Clarence King, esq.

Genus ATHYRIS McCoy.

ATHYRIS SUBQUADRATA ?.

Plate 5, figs. 19-20.

Athyris subquadrata Hall, Geol. Iowa, vol. 1, pt. ii, p. 703, pl. 27, fig. 2.

Shell of medium size, varying from irregularly circular to distinctly quadrate in outline, with more or less ventricose valves; length usually

somewhat exceeding the width, though often less; point of greatest width a little below the middle of the shell, the margins nearly straight from this point to the beak above and to the front below, giving the quadrangular outline. Dorsal valve ventricose, more distinctly elevated along the middle, forming the proportionally narrow mesial fold, which is often more sharply elevated and sometimes prolonged in front. Ventral valve marked along the center with a narrow depression, corresponding to the fold on the dorsal valve, but narrower, abruptly marked, and extending nearly to the beak; body of the valve ventricose, especially in the upper half; beak strong, sharply incurved, and slightly truncate.

Surface of the valves marked by strong concentric lines of growth at unequal distances, most numerous and crowded near the margin of the shell.

The specimens examined are all more or less imperfect from exfoliation; consequently, the true surface-features cannot be ascertained. The species, however, closely resembles specimens of *A. subquadrata* from the Chester limestones of Illinois and Kentucky, differing mostly in the less distinctly marked and narrower mesial depression of the ventral and corresponding fold of the dorsal valve. The front is also sometimes much produced, but not more so than is often the case with those. The species as found at Chester, Illinois, and elsewhere, is quite variable, and among twenty or thirty individuals from the typical localities specimens could be selected that would correspond in form to any of those presented in this collection.

Formation and locality.—In dark-colored limestone of Lower Carboniferous age; the Wahsatch limestone, at Snowstorm Hill, near Dry Cañon, Oquirrh Mountains, Utah. Collected by J. E. Clayton, of Salt Lake City.

FOSSILS OF THE COAL-MEASURES AND PERMO-CARBONIFEROUS.

LAMELLIBRANCHIATA.

Genus AVICULOPECTEN McCoy.

AVICULOPECTEN WEBERENSIS n. sp.

Plate VI, fig. 5.

Shell of medium size or smaller, suborbicular in outline, the length and height being subequal, anterior side of the shell larger than the posterior, giving a slight obliquity to the valves; hinge-line straight, nearly two-thirds as long as the greatest length of the shell, anterior portion forming rather more than one-third of the length. Left valve very convex, the depth equal to about one-third the height when not compressed. Auriculations not distinctly limited, anterior one small, with a shallow rounded sinus below, extremity rounded; posterior side of moderate size, the sinus faintly marked; extremity obtusely angular.

Surface marked by somewhat irregular radiating costæ, which vary much in size, some of them being moderately strong and distant, with from one to four smaller ones between, most prominent and distinct on the median portion of the valve, becoming gradually smaller on the sides and wings. There are also fine concentric striæ crossing the radii, giving a slightly roughened surface. Right valve unknown.

The species resembles in some of its characters many of those referred to *Eumicrotis Hawni* M. & H., but differs in the size and form of the wings and in the finer radii of the surface. The character of the auriculations would prevent it from being classed as *Eumicrotis*.

Formation and locality.—In limestones of the Upper Coal-Measures (Permo-Carboniferous), foot-hills southeast of Salt Lake City, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

AVICULOPECTEN CURTO-CARDINALIS n. sp.

Plate VI, fig. 4.

Shell of small size, broadly ovate in outline, and nearly equilateral, widest just below the middle of the height; hinge-line short, not exceeding

half the width of the shell below, and sloping somewhat rapidly from the center to the extremities on each side of the beak. Left valve highly convex, becoming almost subangular on the umbone; auriculations subequal, quite small and indistinctly separated from the body of the shell by very slight, rounded depressions, extending from the beak to the margin on each side, in which they cause slight sinuosities, the anterior one most distinct. Beak small, somewhat pointed, and slightly projecting beyond the cardinal line. Surface of the valve marked by fine, even, rounded, thread-like radiating striæ, scarcely visible without the aid of a lens; also by finer concentric lines. Right valve not observed.

The species presents much the appearance of many forms of *Lima*, and it is possible it should be so referred; but there is no other evidence of a cardinal area on the left valve than the sloping of the hinge-line, while the wings and sinuosities are more like those of *Aviculopecten*.

We know of no species so closely related to this one as to be readily mistaken.

Formation and locality.—In limestone of the Upper Coal-Measures (Permo-Carboniferous), foot-hills southeast of Salt Lake City, Wahsatch Range, Utah. S. F. Emmons, collector.

AVICULOPECTEN PARVULUS n. sp.

Plate VI, fig. 6.

Shell quite small, equilateral, broadly ovate in outline, a little higher than wide; sides and base rounded, slightly prolonged on the postero-basal side, and obscurely angular near the middle of the anterior margin. Hinge-line two-thirds as long as the greatest width of the shell, longest on the anterior side, and very moderately sloping from the beak. Left valve highly convex; wings moderate, not distinctly separated from the body of the shell; anterior one largest, the margins nearly rectangular to each other, the sinus scarcely perceptible, forming only a broadly-curved indentation below the angle; posterior wing small, the margins forming an obtuse angle. Surface of the valve highly convex; beak small and obtusely pointed, barely projecting beyond the cardinal line. Body of the valve marked by alternating larger and smaller radii, the stronger ones extending

to the beak, while the smaller are added at irregular distances; wings marked by finer radii of nearly equal strength. A few irregular concentric undulations cross the radii at unequal distances. Right valve unknown.

This species differs from the preceding (*A. curtocardinalis*) in the stronger radii, in being higher in proportion to the width, and in the longer hinge-line. It differs from *A. occidaricus* Meek, plate 12, fig. 13, of his report, with which it is associated, in being a smaller shell, more highly convex, and in having a greater number of strong radii, with a smaller number of intermediate ones; this having usually but one instead of from two to four, as in that species.

Formation and locality.—In limestone of the Upper Coal-Measures (Permo-Carboniferous), foot-hills southeast of Salt Lake City, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

Genus MYALINA De Koninck.

MYALINA AVICULOIDES.

Plate VI, fig. 8.

Myalina aviculoides M. & H., Proc. Acad. N. Sci. Phil., May, 1860, p. 184; Pal. Up. Mo., p. 51, pl. 2, fig. 8.

Shell of rather more than average size, mytiliform, ovate or triangularly ovate in outline, half as high again as long; beak prolonged, narrow, and somewhat curved; body of the shell nearly erect, highly convex, and obtusely angular along the umbonal ridge, which is placed near the anterior border and parallel to it; anterior face of the shell nearly vertical; posterior surface rapidly and regularly sloping from the crest of the ridge to the posterior margin; hinge-line nearly as long as the shell below the prolongation of the beak; anterior border sinuous above and nearly rectangular to the hinge-line below; base narrowly rounded; posterior margin broadly rounded. Surface marked by rather strong, concentric lines, indicating stages of growth.

The shell is somewhat peculiar for the form of the beak, which is slender and greatly prolonged anteriorly beyond the body of the shell, with a slightly upward curvature near the point. It is also remarkable for the great convexity of the valves along the umbonal ridge, which gives an almost vertical anterior face. These features readily distinguish this from all other species.

Formation and locality.—In limestones of Permo-Carboniferous age, foothills southeast of Salt Lake City, Wahsatch Range, Utah. Collected by S. F. Emmons, esq.

MYALINA PERMIANA.

Plate VI, fig. 7.

Mytilus (Myalina) Permianus Swallow, Trans. St. Louis Acad. Sci., vol. 1, 1858, p. 17.

Mytilus (Myalina) concavus (Swal.) Meek, ib., p. 18.

Myalina Permianus (Swal.) Meek, Pal. Missouri, p. 52, pl. ii, fig. 7.

Shell of medium size, elongate triangularly-ovate, much higher than long, suberect; hinge-line shorter than the width of the shell below; anterior margin concave; base sharply and narrowly rounded; posterior margin broadly rounded, sloping abruptly forward in the upper part to meet the hinge-line, considerably contracting the length of the shell at this point. Surface of the valves highly convex near the front border, and somewhat gradually sloping toward the posterior margin; umbonal ridge rounded; beaks obtuse, nearly or quite terminal. Surface of the shell marked by concentric lines of growth, obscurely preserved on the casts.

This species differs from the last (*M. aviculoides*), with which it is associated, in the less convexity of the valves and more rounded umbonal ridge, as well as in wanting the narrow and prolonged beak of that species. The example used and figured differs from those figured by Mr. Meek (*loc. cit.*) only in having the hinge-line a little shorter. This feature, however, varies much among the specimens in the collection.

Formation and locality.—Occurs with the preceding.

Genus SEDGEWICKIA McCoy.

SEDEWICKIA ? CONCAVA.

Plate VI, fig. 3.

Sedgewickia ? concava Meek & Hayden, Pal. Up. Missouri, p. 41, pl. 1, fig. 8, 1864.

Lyonsia concava M. & H., Trans. Albany Inst., vol. iv, March, 1858.

Among specimens on a yellowish-brown sandy shale from the Wahsatch Mountains, near Salt Lake City, is one so nearly resembling the figure cited above that we cannot hesitate in considering it as specifically identical. The specimen is about one-third longer than the figure cited, being about nine-tenths of an inch long. The form is transversely elongate-elliptical,

a little more than twice as long as high, with the posterior extremity rounded and recurved; beak large, prominent, and situated at about the anterior third of the length; anterior end rounded, and longest below the middle; basal line slightly convex, more abruptly directed upward for the posterior third of its length; cardinal line concave; valve convex, becoming slightly more compressed posteriorly; marked by slight concentric undulations of growth parallel with the margins.

Formation and locality.—Upper Coal-Measures (Permo-Carboniferous), foot-hills, southeast of Salt Lake City, Wahsatch Range, Utah. Collected by S. F. Emmons.

Genus CARDIOMORPHA De Koninck.

CARDIOMORPHA MISSOURIENSIS.

Plate VI, figs. 1-2.

Cardiomorpha Missouriensis Swallow, Trans. Acad. Sci. St. Louis, vol. 1, p. 207, 1858.

Shell rather below the medium size, transversely elongate and sub-quadrangular in general outline; valves ventricose, or even gibbous, presenting an almost cylindrical form. Hinge-line more than half the length of the shell, very slightly arcuate and abruptly rounding into the posterior extremity, which is obliquely rounded, and longest below; basal margin nearly straight in the middle, curving more abruptly at each extremity; anterior end short, rounded; beaks tumid and enrolled, situated rather within the anterior third of the length; umbonal prominence faintly sub-angular; cardinal slope narrow and abrupt. Surface of the shell marked with fine concentric striæ of growth and stronger undulations. Substance of the shell very thin.

The specimens described differ so little from examples of the species received from the Coal-Measures of Canton, Illinois, that they are not readily distinguished when placed together; the most marked difference being the slightly greater length of the anterior end, and somewhat more prominent beaks. The shell is also a little more excavated in front of the beaks; but these differences are not strong enough to be deemed of specific importance.

Formation and locality.—In black shale of Coal-Measure age, near Eberhardt Mills, White Pine. Collection of Arnold Hague, esq.

CEPHALOPODA.

Genus CYRTOCERAS Goldf.

CYRTOCERAS CESSATOR n. sp.

Plate VI, fig. 15.

Shell of rather small size, moderately curving throughout its length, and rapidly expanding from below upward; the specimen measured showing an increase of diameter from less than half an inch to about eight-tenths of an inch in a length of only about nine-tenths of one inch; section circular. Surface marked by strong, rather distant, rounded annulations, which are separated by concave interspaces. The annulations are directed slightly upward or forward in crossing the back of the shell, and become gradually more distant with the increased growth of the individual; four of these annulations occupy a length of the shell equal to its diameter at the uppermost of those counted. Septa equal in number to the annulations, their extreme outer margins reaching nearly to the crest of the ridges in some cases; others are more distant. Siphuncle small, submarginal, situated a little to the right of the dorsal line (perhaps only an accidental feature).

Surface of the shell marked by fine, crowded, thread-like, encircling striae on both ridges and interspaces.

The species closely resembles in many of its characters that figured by Meek and Worthen (Geol. Ills., vol. ii, plate 24, fig. 3), under the name of *Orthoceras annulato-costatum*, but differs in its circular section, more rapidly expanding tube, and longitudinal curvature. The latter feature, together with the dorsally-situated siphuncle, would place the species under the genus *Cyrtoceras*, and we strongly suspect the Illinois shell will also prove to belong to the same genus when its true characters are ascertained. The *O. Chesterensis* of Swallow (Trans. St. Louis Acad. Nat. Sci., vol. ii, p. 98) is still further removed from this one by its closely-arranged annulations, though it is not stated if it be curved or straight.

Formation and locality.—In black shales of probably Coal-Measure age, near Eberhardt Mill, White Pine, Nevada; associated with *Goniatites Kingii* and *Cardiomorpha Missouriensis*. Collected by Arnold Hague, esq.

Genus GONIATITES De Haan.

GONIATITES KINGII n. sp.

Plate VI, figs. 9-14.

Shell rather below the medium size, subglobose, the length and breadth being about as three to two; composed of from four to six volutions, which are broadly rounded over the dorsum and subangular at the margin of the broad open umbilicus, into which the sides slope abruptly, forming an angle of about forty-five degrees to the axis of the shell. Each volution embraces the preceding one to near the lateral angle, leaving a very narrow surface exposed within the umbilicus. Extreme width of the volution equal to three times the length, measured from the ventral to the dorsal surface, at the center of the volution.

Surface of the shell and umbilicus marked by fine, subequal, transverse lines of growth, often becoming crowded, and forming incipient undulations on the back of the shell. Surface of the internal casts sometimes marked by transverse constrictions, caused by the thickening of the inner surface of the lip at stated periods of growth, as if for the purpose of strengthening its substance. Two of these constrictions occur in the space of one volution, bringing them on opposite sides of the cast. Septa rather closely arranged and deeply lobed. The dorsal lobe is longer than wide, and deeply divided, forming two long, slender, lanceolate branches, with a shorter, truncated, central projection; dorsal saddle broadly conical, rounded above, and slightly inclined toward the dorsal lobe; lateral lobes as long as the dorsal saddle, obconical, pointed at the lower extremity; lateral saddles broader and shorter than the dorsal saddles.

The shell is somewhat remarkable for the great extent of the outer chamber, appearing from fractured individuals to consist of two complete volutions, and in some cases even more. It does not appear to attain a very large size; the largest fragment observed indicating a specimen of not more than two inches in diameter.

The species is of the type of *G. sphericus* Sow., but is less globose and the umbilicus much larger. There are several American species of the type known, as *G. Nolinensis* Cox and *G. globulus* and *G. Iowensis* M. & W. from

the Coal-Measures, but our shell differs from all of them in the proportionate size of the whorls, in the form of the umbilicus, and in the form and disposition of the septa to such an extent as to be not readily mistaken.

Formation and locality.—In black shale of the Coal-Measures, near Eberhardt Mill, White Pine, associated with *Cyrtoceras cessator* and *Cardiomorpha Missouriensis*. Collected by Arnold Hague, esq.

FOSSILS OF THE TRIASSIC FORMATION.

RADIATA.

ECHINODERMATA.

Genus PENTACRINITES Miller.

PENTACRINITES ASTERISCUS?

Plate VI, fig. 16.

? *Pentacrinites asteriscus* M. & H., Proc. Acad. N. Sci. Phil., 1858, p. 49; 1860, p. 419; Pal. Up. Missouri, p. 67, pl. 3, fig. 2.

Several specimens of the separated disks of a *Pentacrinites* very similar in character to *P. asteriscus* M. & H., but differing somewhat in form, but more particularly in their larger size, have been noticed among the collections from Dun Glen Pass, Pah-Ute Range. When compared with specimens of that species from localities of Jurassic age, they differ slightly in the more obtuse points of the star, and the filling up of the angles between the points, and also in the broader form of the elliptical figures on the articulating surfaces of the disks. As these features, however, are not constant among any considerable number of specimens of that species, even when found together on the same block, we hesitate to consider them of specific importance. The large size is the most noticeable feature of these specimens, some of which exceed one-fourth of an inch in diameter, while those of that species seldom reach one-fifth of an inch, and are usually much smaller. It is possible that this may prove to be a very distinct form when

more and better material shall have been examined, but at present we hesitate to so consider it.

Formation and locality.—In limestone of supposed Triassic age, associated with *Spiriferina Homfrayi* and *Terebratula Humboldtensis* Gabb., near Dun Glen Pass, Pah-Ute Range, Nevada. Collected by Arnold Hague, esq.

BRACHIOPODA.

Genus SPIRIFERINA D'Orb.

SPIRIFERINA HOMFRAYI ?

Plate VI, fig. 18.

? *Spirifer Homfrayi* Gabb, Geol. Sur. Cal., Pal., vol. 1, p. 35, pl. 6, fig. 38.

It is with considerable hesitation that we refer to the above species some very imperfect fragments in the Dun Glen collections. They consist of two imperfect dorsal valves, and some still more fragmentary ventrals; the latter altogether too imperfect for illustration. The dorsal valves are depressed-convex, with slightly rounded cardinal extremities; the mesial fold is simple, broad, and rounded, the front forming a little more than one-fourth of the entire width of the valve, measured along the hinge-line. The sides of the shell are each marked by seven or eight simple, scarcely angular plications, rapidly decreasing in size from the middle outward; front margin nearly semicircular in outline. The ventral valve has been erect and pointed at the beak; the plications appear more angular than those of the dorsal, and the area of considerable height.

The specimens are badly exfoliated, thus rendering the surface-characters obscure. The texture of the shell cannot be distinctly made out, but appears to have been punctate, and for this reason we have classed it under the genus *Spiriferina*, although it may possibly not be properly referred.

Formation and locality.—In dark-colored limestone of Triassic age, one and a half miles south of Dun Glen Pass, Pah-Ute Range, Nevada. Collected by Arnold Hague, esq.

SPIRIFERA (SPIRIFERINA ?) ALIA n. sp.

Plate VI, fig. 17.

Shell of medium size, transversely broad-ovate; the width about one-

sixth greater than the length, measuring on the ventral valve. Valves rotund, with rounded hinge-extremities. Beak of the ventral valve obtuse, incurved, and rounded; area of only moderate height; middle of the valve marked by a well-defined mesial depression, the front of which is equal to more than one-third of the entire width of the valve. Dorsal valve not observed. Surface marked by numerous, rather fine, slightly angular, radiating costæ, which do not appear to bifurcate except on the mesial fold. There are eight plications marking the mesial sinus, near the front margin, on the specimen figured, and about twenty may be counted on each side of the valve. Interior unknown.

We know of no species of *Spirifera* or *Spiriferina* in rock of this age resembling the one under consideration or with which it can be confounded. The substance of the shell, like all those from the same locality, is badly exfoliated, and has apparently undergone some change, which has to some extent obliterated the natural features, so that we are not able to say definitely if it be punctate or not, consequently are in some doubt in regard to its generic relations.

Formation and locality.—In dark-colored limestone of Triassic age, one and a half miles south of Dun Glen Pass, Pah-Ute Range, Nevada. Collected by Arnold Hague, esq.

Genus TEREBRATULA (Llhwyd.) Brug.

TEREBRATULA HUMBOLDTENSIS.

Plate VI, figs. 22-24.

Terebratula Humboldtensis Gabb, Geol. Survey Cal., Pal., vol. 1, p. 34, plate 6, fig. 35.

Shell of medium size, elongate-oval or ovate, widest above or below the middle in different specimens; front of the shell truncate, marked by a simple fold and sinus on the front margin, or by a double fold on the dorsal, with a sinus between, and corresponding elevation and depression on the ventral side. Ventral valve usually slightly flattened across the middle; beak strong and broad, scarcely incurved, truncated by a rather large perforation; cardinal borders broad, strongly inflected and flattened, so as to form an angularity along the edge of the beak.

Surface of the shell marked by strong, irregular, concentric varices of

growth, but without other visible markings. The substance of the shell appears to have been finely punctate; but, owing to some chemical change, the structure is usually obliterated.

The species is a very variable one, both in general form and in the features of the front margin; sometimes being entirely plain, or having a simple elevation and sinus, or being biplicate on the dorsal side, and apparently triplicate on the ventral. These features seldom mark the young or half-grown shells, and on the older specimens are usually confined to the anterior third of the valves.

Formation and locality.—In limestone of Triassic age, near Dun Glen Pass, Pah-Ute Range, Nevada. Collected by Arnold Hague, esq.

LAMELLIBRANCHIATA.

Genus EDMONDIA De Koninck.

EDMONDIA MYRINA n. sp.

Plate VI, fig. 19.

Shell rather below the medium size, transversely ovate, the length nearly one-third greater than the height exclusive of the beaks. Valves very convex, becoming almost inflated near the anterior end and on the umbones; beaks proportionally large and tumid, situated near the anterior end, and projecting largely above the hinge-line; anterior extremity short and rounded; basal line gently convex; posterior extremity more broadly rounded than the anterior; cardinal line nearly two-thirds the length of the shell and gently curved throughout. Surface marked by obscure lines of growth; interior features not determined.

The specimens consist of internal casts, preserving but fragments of the shell in a highly crystalline condition, and do not reveal the true surface of the shell, nor the exact generic relations of the species.

Formation and locality.—In limestone of Triassic age, at Dun Glen, Pah-Ute Range. Collected by Arnold Hague, esq.

FOSSILS OF THE JURASSIC PERIOD.
BRACHIOPODA.

Genus RHYNCHONELLA Fischer.

RHYNCHONELLA MYRINA n. sp.

Plate VII, figs. 1-5.

Shell of medium size, very broadly ovate, being wider than long; the greatest diameter below the middle, valves depressed-convex, the dorsal much the deepest and nearly evenly convex from beak to base, and also transversely. Ventral valve somewhat unevenly convex, slightly flattened toward the sides, and moderately depressed in front to form the proportionally broad mesial extension; beak rather large, pointed, strongly curved upward, and projecting considerably beyond the dorsal valve.

Surface marked by from thirty-two to thirty-four low, rounded plications, eight to ten of which are elevated on the dorsal valve forward of the middle of the shell, forming the rather wide but only moderately elevated mesial fold and a corresponding number impressed on the ventral valve. Minute surface-structure of the shell finely but evenly marked with concentric lines of growth.

This is a very pretty species, and is characterized by the moderately fine plications of the surface, which are of nearly equal strength on all parts of the shell, those of the mesial elevation being hardly perceptibly larger than those on the sides. The species bears considerable resemblance to *Rhynchonella varians* Schl. of the Inferior Oolite from Whitby, England, but differs in the more evenly convex valves and in the rounded plications, those of that species being slightly angular in the specimens examined.

Formation and locality.—In light-colored limestones of Jurassic age, at Flaming Gorge, Uinta Range, Utah.

RHYNCHONELLA GNATHOPHORA ?

Plate VII, fig. 6.

Rhynchonella gnathophora Meek?, Geol. Surv. Cal., Pal., vol. 1, p. 39, pl. 8, fig. 1.

A few individuals referred with doubt to this species occur in the collections from Flaming Gorge. The reference, however, is very unsatis-

factory, and, on examining specimens of that species, appears even more uncertain; still, the differences are not so great as to positively preclude the possibility of specific identification. The individual represented on plate 7, fig. 6, is perhaps as closely related to Meek's species as any one seen, but differs very materially in the strength of the plications on the lateral parts of the shell, there being from two to four on each side more than on the most finely marked individuals referred to that species by its author; the shell is also less rotund and more slender and delicate in habit.

Genus TEREBRATULA (Llhwyd.) Brug.

TEREBRATULA AUGUSTA n. sp.

Plate VII, figs. 7-10.

Shell small, broadly ovate, the widest part being a little below the middle of the length; width of the shell less than the length; valves depressed-convex, the dorsal sometimes nearly flat, but usually two-thirds as convex as the ventral; beak small, minutely perforate, and strongly incurved; cardinal slopes angular; margins of the shell acute. Surface marked by lines of growth without perceptible structure except the very fine punctæ of the shell.

The species of this genus, when of the same general type, are so similar that it is extremely difficult to point out specific differences or institute satisfactory comparisons, and the shells now under consideration belong to a form which is so often repeated, both in this and several other genera, that it would be useless to enter into any discussion of specific characters; therefore we shall rely upon the figures to tell their own story.

Formation and locality.—In limestones referred to the Jurassic, at Shoshone Springs, Augusta Mountains, Nevada.

LAMELLIBRANCHIATA.

Genus OSTREA Linn.

OSTREA ——— sp. ?.

Plate VII, fig. 12.

Compare *O. Engelmanni* Meek, Proc. Acad. Nat. Sci. Phila., 1860, p. 311; Pal. Upper Missouri, p. 73, figs. A and B.

A single example, an impression of an upper valve, found associated with the following species, appears to be entirely distinct. It is a much

larger shell, and possesses all the features of a true *Ostrea*. The form is irregularly ovate in outline, moderately convex, and slightly curving posteriorly; length and breadth about as four to three, the expansion of the valve being most rapid on the posterior side below the middle; posterior border concave in the upper part, and sharply rounded below; anterior border regularly and broadly rounded; adductor muscular scar small, submarginal, situated above the middle of the length; the area embraced above the pallial line being not more than one-fourth as great as that below.

The specimen under consideration was at first supposed to be the young, or a small individual, of *O. Engelmanni* Meek, but there is not the slightest evidence of plications, the shell is proportionally longer, and the muscular imprint proportionally smaller and more nearly submarginal; yet the resemblance to that species is quite strong, and it is possible that in such variable shells such changes may take place in the same species.

Formation and locality.—In rocks of Jurassic age, northwest of Rawlings Station, Wyoming.

Genus GRYPHÆA Lam.

GRYPHÆA CALCEOLA var. NEBRASCENSIS.

Plate VII, fig. 11.

Gryphæa calceola var. *Nebrascensis* M. & H., Proc. Acad. Nat. Sci. Phila., 1861, p. 437; Pal. Upper Missouri, pp. 74–75, pl. 3, fig. 1.

Among the Jurassic fossils of the collection are numbers of a small Oyster-like shell, which we suppose to be identical with many of those referred to the above-named variety of Quenstedt's species *G. calceola*. The specimens are mostly small and of variable form, the prevailing feature being broadly and irregularly reniform, or curved-ovate; more or less truncate at the posterior end; the smaller valve being extremely shallow and scarcely convex, while the attached valves are very irregular and variable in depth and convexity, most of them being flattened and attached over the greater part of their extent, with the edges abruptly curved upward, to give the requisite depth, others scarcely showing any mark of attachment, and still others are squarely and vertically truncate at the upper extremity, similar to those represented in the Pal. Upper Missouri,

pl. 3, figs. 1 *b* and *c*. The most general feature seems to be their small size, although they differ in this respect, for while the majority of the specimens range from half to three-fourths of an inch in length, other examples are found attaining a length of an inch and a half.

It will be seen, by reference to the remarks of Messrs. Meek & Hayden on this species, that they have met with all these various phases and variations among their specimens, although they speak of examples of much larger size, where the attached valves are deep and strongly arcuate, with large, strongly incurved beaks. These they term "normal forms" of the variety, although it would seem that from some of their localities these forms are nearly or quite absent, and that the flattened forms prevail. Among the examples examined by us there are none of these "normal forms", but all are of the irregularly convex, the squarely truncate, or the flattened forms above referred to; and it seems to us that these forms are much more likely to prove an entirely distinct species from the so-called "normal forms" than that they are merely individual differences. In fact, from the specimens before us, and from the figures above referred to, it appears that there is but little reason for considering the forms under consideration as belonging to any other genus than *Ostrea*; while those referred to as "normal forms" are unquestionably true *Gryphæa*.*

In the flattened and almost wholly attached examples, the form and characters are so exactly similar to *Ostrea congesta* Conrad, from the Cretaceous formations, that it is nearly or quite impossible to say wherein they differ, except, perhaps, that they are not so gregarious or so densely packed together as that species often is.

Formation and locality.—In shaly limestone of Jurassic age, at Sheep Creek, Uinta Range, Utah, associated with *Camptonectes bellistriatus*, *Pentacrinites asteriscus*, &c.; and on Ashley Creek, Uinta Range, associated with *Camptonectes? extenuatus*, *Bellemnites densa*, &c. Collected by S. F. Emmons, esq.

* Since the above paragraph was written, Dr. C. A. White has described these small shallow forms under the name *Ostrea strigilecula* (see Pal. Rep. Geograph. and Geol. Surv. and Expl. West of 100th Merid., Lieut. Wheeler in charge, by C. A. White, p. 163, pl. xiii, fig. 3).

Genus AVICULOPECTEN McCoy.

AVICULOPECTEN (EUMICROTIS?) AUGUSTENSIS n. sp.

Plate VII, figs. 14-16.

Shell small, broadly ovate, higher than wide; length of the hinge equal to about half the height of the shell, the anterior side straight and forming two-thirds of the entire length, posterior side slightly declining from the beak; left valve moderately convex, most prominent on the umbone; beak small, obtusely pointed and but slightly projecting beyond the hinge-line; auricularia depressed, but not distinctly separated from the body of the shell, the anterior one of moderate size, posterior one quite small. Surface of the valve marked by simple rounded ribs of equal strength, except on the left auricularia, where they are finer, somewhat corrugated, and strongly curved upward to the margin. Right valve flat or very slightly convex; beak depressed and not extending beyond the hinge-line; ears much more distinctly marked than on the left valve, the lines separating them from the body of the shell, strong, nearly straight, and rapidly diverging from the beak, inclosing an angle of about ninety degrees; anterior auricularia large, rounding inward from the extremity. Byssal notch more than a third as deep as the length of the ear, broad and rounded at the bottom. Surface-markings similar to those of the opposite valve.

The specimens from which the description is taken are slightly exfoliated and do not present the natural surface-markings; but another fragment presenting a weathered surface shows concentric striæ, which are strongly vaulted in crossing the radii, but not distinctly marked in the depressions.

The species has much resemblance, especially the left valve, to many of those referred by Mr. Meek to his genus *Eumicrotis*, in general form and surface-markings, but differs strongly in the large anterior auricularia and byssal notch of the right valve, corresponding in this respect more nearly with *Aviculopecten*, and we are undecided as to which genus they ought properly to be referred.

Formation and locality.—In limestone referred to the Jurassic, Shoshone Springs, Augusta Mountains. Collected by S. F. Emmons, esq.

Genus EUMICROTIS Meek.

EUMICROTIS CURTA.

Plate VII, fig. 24.

Avicula curta Hall, Staus. Rept. Salt Lake, p. 412, pl. 2, fig. 1.*Avicula (Monotis) tenuicostatus* M. & H., Proc. A. N. Sci. Phil., 1858, p. 50.*Monotis curta* M. & H., Proc. A. N. Sci. Phil., 1860, p. 418.*Eumicrotis curta* M. & H., Smithsonian Check-List N. Am. Invert. Foss., 1864.*Eumicrotis curta* M. & H., Pal. Upper Missouri, p. 81, pl. 3, fig. 10.

Shell small, suborbicular or obliquely ovate, a little higher than long, or height and length subequal; valves convex, the left one the most rotund. Hinge-line short, compressed behind and forming a small, obtusely-angular wing; anterior side very short, scarcely forming a wing, the anterior margin rounding nearly to the beak; posterior margin gradually sloping backward from the extremity of the hinge to a point below the middle of the valve, whence it is rather sharply rounded to the junction with the basal line. Base slightly prolonged on the posterior side of the median line, giving a little obliquity to the shell. Right valve apparently less convex than the left. Surface marked by distinct radiating lines or ribs, which are narrower than the spaces between, and usually become obscure or obsolete before reaching the beaks. On the right valve, the radii are much less strongly marked, while the concentric striæ become more distinct.

Among a large number of specimens there are no right valves in a condition to show the hinge-features or byssal notch, and we are therefore left somewhat in doubt concerning these features. The shells appear to possess all the essential characters of *E. curta*, but vary so much among themselves as to give rise to some doubt.

Formation and locality.—In calcareous beds of Jurassic age, above the gypsum beds at Ashley Creek, Uinta Range, Utah. Collected by S. F. Emmons, esq.

Genus CAMPTONECTES Agassiz.

CAMPTONECTES BELLISTRIATUS Meek.

Plate VII, fig. 13.

Camptonectes bellistriatus Meek, Pal. Upper Missouri (Smithsonian Contributions to Knowledge), p. 77, figs. A-D.

“Shell very thin, compressed-lenticular, suborbicular in outline; valves

nearly equally convex; hinge-line equaling two-fifths to one-half the transverse diameter of the valves; posterior ear very short, or nearly obsolete, flat, and obliquely truncated; anterior ear larger, flattened, and marked by rather distinct lines of growth in the right valve, separated from the adjacent margin by a more or less angular sinus, one-third to one-half as deep as the length of the ear, measuring from the beak. Surface striæ very fine, regular, sharply impressed, and increasing in number by the intercalation of others between as they diverge in extending from the umbonal region, so strongly arched as to run out on the hinge-line near the beaks; concentric striæ fine, regular, closely arranged, and often nearly or quite obsolete on the impressed spaces between the impressed radiating striæ, to which latter they impart a subpunctate appearance."

The above is a transcript of Mr. Meek's description of this species. Although there are quite a number of specimens in the collection which are referable to it, there are none which give the entire characters of the shell; nor are there any from which a figure could be made without some restoration. Still the characters of the species are, nevertheless, shown so distinctly as to leave no doubt as to the correct reference. The specimens are generally smaller than the figures given by Mr. Meek, and some of them are a little more oblique in outline, while the characters of the surface vary from being nearly smooth to those strongly cancellated; while on some the concentric striæ are strongest, and on others nearly obsolete.

Formation and locality.—Jurassic; specimens have been recognized from northwest of Rawlins Station, Wyoming, and from Sheep Creek, and Flaming Gorge, Uinta Range, Utah. Collected by S. F. Emmons, esq.

CAMPTONECTES EXTENUATUS Meek.

Plate VII, fig. 18.

Camptonectes? extenuatus Meek, Pal. Upper Missouri (Smithsonian Contributions to Knowledge), p. 78.

Camptonectes? pertenuis M., ib., pl. iii, explanations of fig. 6.

Shell small, erect, broadly ovate, a little higher than wide, the point of greatest width being near the middle of the shell; hinge-line short, about half as long as the width of the valve; ears small, the anterior one slightly

obtuse at the outer angle, the posterior margin sloping gently backward toward the body of the shell, the posterior wing not fully determined. Body of the (right?) valve convex, most prominent, and almost subangular toward the umbo; beak small, pointed, scarcely projecting beyond the hinge-line; margin of the shell broadly rounded anteriorly and posteriorly, and somewhat acutely rounded at the base.

Surface of the valve in the specimen seen marked by fine, concentric, impressed lines, and by stronger radiating lines. These latter seem to be composed of rows of fine dots, or punctures, and are strongly divergent, so as to curve abruptly upward toward the margin on the sides of the valve, the increase being entirely by interstitial addition.

The shell differs from *C. bellistriata* Meek in its smaller size, convex valves, more erect form, and in the proportional height and width of the valve, this being higher than wide, while the reverse is true of the other.

There can be no doubt that this is the shell to which Mr. Meek gave the above names, although he had not seen the radiating striæ of the surface so plainly as to feel sure of their existence. On the specimen used in the above description, the striæ are very distinct, and have exactly the character of that of *C. bellistriata*; consequently, there can be no doubt of its correct reference to the genus *Camptonectes*, although in our specimens the anterior wing and sinus have not been satisfactorily determined, that part in the figure having to be made from analogy.

Formation and locality.—In light-colored shales of Jurassic age, northwest of Rawlings Station, Wyoming.

CAMPTONECTES PERTENUISTRIATUS n. sp.

Plate VII, fig. 17.

Shell small, very broadly ovate, the point of greatest width being about the middle of the length, width equal to about four-fifths of the height; base and sides of the shell regularly rounded. Right valve very depressed-convex or almost flattened; hinge-line short, the anterior side equal to a little more than one-third of the width of the valve below; posterior side unknown, the specimen being mutilated in this part. Beak small, pointed, not rising above the line of the hinge; cardinal slopes nearly straight from

the beak to a little above the middle of the length, and embracing an angle of about ninety degrees; anterior wing narrow, separated from the body of the shell by a deep, sharply rounded notch, which extends about half-way to the center of the valve; a strongly-depressed sinus passes from the base of the notch to the beak, separating the upper part of the wing from the body of the shell.

Surface of the shell marked by rather distinct, concentric lines of growth, which are crossed by exceedingly fine, radiating striae, imperceptible except by the aid of a lens. The striae diverge rapidly from the median line, and curve upward rather more strongly toward the sides of the shell.

The shell differs from *C. ? extenuatus* Meek and Hayden (Pal. Upper Missouri, p. 78, plate iii, fig. 6) in its more attenuated beak, flattened valve, finer striae, and more elongate form.

Formation and locality.—In limestone of Jurassic age, northwest of Rawlins Station, Wyoming.

Genus LIMA Brug.

LIMA (PLAGIOSTOMA) OCCIDENTALIS n. sp.

Plate VII, fig. 23.

Shell of medium size or smaller, very broadly ovate, the height slightly exceeding the greatest width; widest point about one-third of the height from the basal extremity, below which the margin is regularly and evenly rounded, and above the posterior border is more rapidly rounded and contracted to the extremity of the short hinge-line, with which it blends without perceptible angle. Valves strongly convex, most ventricose near the middle of the anterior border, from which point the surface declines to the postero-cardinal and postero-basal margins; beaks apparently small, inconspicuous, and somewhat appressed (?). Anterior wing minute, posterior wing small, but alated, not distinctly separated from the body of the shell; ligamental area not observed. Anterior border of the shell strongly concave, the concavity extending more than half the height of the shell.

Surface of the shell marked by simple, strong, rounded radii, about sixty in number, posterior to the junction of the anterior and basal borders, with a few incipient radii observable on the anterior slope. The radii are

strongest near the middle of the basal border, and decrease very slightly in size anterior to this point; but posteriorly they decrease more rapidly, and on and near the posterior alation are quite fine. Interspaces narrow and concave.

This species is closely allied to *Lima lineata* Gold. (= *Plagiostoma lineata* of authors,) but differs in being more regularly rounded on the basal and postero-basal borders, as well as in being more erect, that species having considerable obliquity, the longest point of the base being much nearer the anterior side. The beak is also shorter, and not nearly so prominent, and the greatest convexity of the shell nearer the anterior margin, while that one is most prominent near the middle of the valve, and nearly evenly rounded in both directions from this point. The posterior wing of this species is more alate than in that one, and more finely ribbed, giving about fifteen additional ribs over and above the number counted on that species. This character is perhaps the most distinctly marked feature of the species, and one that will serve to readily distinguish them, although the general resemblance of the shells is very great.

Formation and locality.—In cherty limestones of Jurassic age, at Flaming Gorge, Uinta Range, Utah. Collected by S. F. Emmons, esq.

Genus TRIGONIA Brug.

TRIGONIA QUADRANGULARIS n. sp.

Plate VII, fig. 22.

Shell small, subquadrangular in outline, with depressed convex valves and flattened inconspicuous beaks; length of the shell a little greater than the height; anterior end broad and rather squarely truncate; the margin but slightly rounded; basal line somewhat straightened or but slightly convex, more strongly rounded behind; posterior end obliquely truncate, longest below; cardinal border short, not more than two-thirds the length of the valve, very little concave, and subparallel with the basal margin.

Surface of the valve marked by a flattened, distinctly elevated ridge, which rises from behind the beaks, and passes along the umbonal slope, extending beyond the posterior margin of the valve in a squarish projection, equal in extent to the elevation of the ridge. Above the ridge, the

cardinal slope is narrow and depressed, marked only by transverse lines of growth. The surface of the ridge is marked by irregular transverse lines of nodes. The body of the shell is marked by a series of low, rounded ridges or undulations, which originate in a point at the edge of the flattened umbonal ridge, and extend in the direction of the postero-basal angle of the shell, where they are again bent forward, forming a series of acute angles marking the umbonal line of the shell, and are directed with a slightly downward tendency to the anterior margin. Along the umbonal ridge of the valve the undulations are broad and rounded, becoming narrow again in their anterior extension.

The strong undulations of the body of the shell of this species is a distinguishing feature, and one by which it will be readily recognized. It differs greatly in this feature from *T. Conradi* M. and H. (Pal. Upper Missouri, p. 83, pl. 3, fig. 11) from the Jurassic of the Black Hills, as well as in the subquadrangular form of the shell, that species being of a subtriangular form.

Formation and locality.—In light-colored, somewhat shaly, limestones of Jurassic age, near Como, Laramie Plains, Wyoming, associated with *Pentacrinites asteriscus* M. and H. and other Jurassic species. Collected by Arnold Hague, esq.

Genus SEPTOCARDIA n. gen.

Shell bivalve, equivalve, inequilateral, cardiform. Hinge strong; right valve with a strong, recurving, hooked tooth under the beak, and a deep cavity below and exterior to it, which is profoundly excavated in the thickened substance of the shell. In the left valve, a large, deep cavity corresponds to the tooth of the right valve. Lateral teeth obsolete. Ligament external, situated in a groove formed by a thickened, overlapping portion of the shell posterior to the tooth and corresponding cavity. Anterior adductor muscular scar very large and deep, separated from the general cavity of the shell by a calcareous plate, or septum, extending across the anterior end of the valve on the inner side of the scar, thereby forming a distinct chamber in each valve. Posterior adductor scar much smaller, situated within the posterior cardinal margin. Pedal scars not observed.

Surface of the shell marked, in the typical species, by strong, elevated, radiating ribs, with ornamented surfaces similar to many of the recent species of *Cardium*. Type *S. typica*.

The shells for which the above generic name is proposed are small, few specimens of the typical species exceeding three-eighths of an inch in their greatest diameter. Externally they closely resemble the Eocene forms of *Cardita*, but the hinge-structure separates them at once from all other known forms. The cardinal border of the right valve appears almost as if composed of two distinct lamellæ of shell, an inner and an outer one, the inner one originating on the inside of the umbonal cavity, and rising to the level of the valve margin, coalescing with the outer portion posteriorly, and diverging considerably anteriorly, so as to leave a gradually-widening space between the two, the anterior end of which is partitioned off, forming the anterior muscular scar, or pit, and leaving a smaller, somewhat triangular, cavity posterior to it. From the inner lamella bounding this cavity, the recurved, hooked tooth rises, overarchng the cavity beneath. In the left valve, the two lamellæ are less distinct; the whole cardinal border being thickened, and the cavity into which the tooth of the right valve fits is excavated in its substance, immediately in front or against the beak of the valve. There are no lateral teeth in either valve. The septum bounding the inner margin of the anterior muscular scar is similar to that of *Cucullæa* or *Idonearca*, except that it borders the anterior instead of the posterior muscle as in those genera, and in the species *S. typica* reaches almost to the basal margin of the valve.

The type-species occurs in rocks referred with some doubt to the Jurassic, although the general appearance of the shells would indicate a much more recent date.

SEPTOCARDIA TYPICA n. sp.

Plate VII, figs. 26-29.

Shell small, subrhomboidal in outline, the united valves angularly cordiform and very gibbous. Valves longer than high, oblique, and widening posteriorly; beaks strong, angularly tumid and enrolled, situated near the anterior end of the shell; cardinal line arcuate, slightly elevated posteri-

orly; anterior end short and obtusely pointed; basal line gently rounded; posterior end broadly truncate and slightly rounded. Body of the valves very ventricose, subangular along the umbonal ridge, marked by strong radiating costæ, separated by equally wide, flattened interspaces; six or eight of these costæ occupy the postero-cardinal slope, and from twelve to sixteen may be counted on the body and anterior portion of the shell. The costæ are flattened on the summit, and marked by closely-arranged, recurved, transverse ridges, or nodes, which become more crowded and stronger with the increased age of the shell. Interior margin of the valves strongly denticulate from the squarely-depressed grooves, corresponding to the external ribs, and which extend to nearly one-third of the width of the shell.

Formation and locality.—In limestones referred to the Jurassic, at Shoshone Springs, Augusta Mountains, Nevada. Collected by S. F. Emmons, esq.

SEPTOCARDIA CARDITOIDEA n. sp.

Plate VII, fig. 25.

Shell of medium size, subrhomboidal in outline, longer than high, narrow anteriorly, and widening behind. Valves ventricose, very angular along the umbonal bridge, rapidly sloping to the postero-cardinal margin, and more gently toward the anterior end of the shell; beaks large, prominent, and strong; placed well toward the anterior end, which is narrowly rounded; basal line broadly rounded; posterior extremity obliquely truncate, longest at the postero-basal angle. Internal features unknown. Surface marked by numerous, strong, sharply-elevated, angular, radiating costæ, with sharply V-shaped interspaces, the exact number not determined; those on the postero-cardinal slope near the basal angle counting about five in the space of half an inch, giving about a tenth of an inch from crest to crest; toward the cardinal line they become gradually finer. Those on the body of the shell appear to have been of nearly equal strength with those on the posterior part, becoming finer toward the anterior extremity. The costæ are crossed transversely by fine, closely-arranged, zigzag lines, strongly arched upward in crossing the ribs. Greatest length of the specimen, $1\frac{3}{4}$ inches; height, $1\frac{1}{8}$ inches.

This species differs from *S. typica* not only in its greater size, but in

being proportionally longer, but most notably in the angular form of the ribs and interspaces, as well as in the different style of transverse ornamentation. The specimen presents much the appearance of an Eocene *Cardita*, and closely resembles *C. alticostata* Conrad (*C. transversa* Lea) of the Claiborne beds in Alabama, except that it is narrower anteriorly.

Formation and locality.—In limestone referred to the Jurassic, Shoshone Springs, Augusta Mountains, Nevada. Collected by S. F. Emmons, esq.

Genus ASTARTE Sowerby.

ASTARTE? ARENOSA n. sp.

Plate VII, figs. 20-21.

Compare *Tancredia Warrenana* Meek and Hayden, Pal. Upper Missouri, p. 96, pl. 3, fig. 7.

Shell small, the largest specimens not exceeding half an inch in length, by a height about two-thirds as great; form transversely suboval, or quadrangularly oval; cardinal line arcuate, but little more than half as long as the body of the shell, gradually and moderately declining posteriorly; anterior end constricted in front of the beaks, and rather sharply rounded below; basal line broadly convex; posterior end narrow and obliquely truncate, being longest below at the junction with the basal border; beaks small, incurved, moderately ventricose, and situated at about one-fourth of the length from the anterior end. Valves ventricose throughout, with a perceptible fullness along the umbonal slope, above which the shell declines more rapidly to the cardinal border. Features of the hinge and muscular system unknown. Surface of the shell smooth, so far as can be determined from the specimens examined.

At first, we were inclined to consider this shell as identical with *Tancredia Warrenana* M. (*loc. cit.*), but on closer comparison with figures and description it would seem to be distinct. At least, it is not a *Tancredia*, and may be equally distant from *Astarte*; but, in the absence of all generic features in the specimens beyond the external form, it is impossible to say definitely to what genus it does belong. It is an abundant species in some localities, the rock being literally filled with the impressions. It differs specifically from the above-named shell in being less distinctly triangular

and in the more anterior position of its beaks, as well as in the want of convexity in the curvature of the antero-cardinal border, as would be required were it a species of *Tancredia*.

Formation and locality.—In red sandstones of Triassic or Jurassic? age, North head of Chalk Creek, Utah. Picked up in the *débris*, and of no stratigraphical importance.

GASTEROPODA.

Genus NATICA Lam.

NATICA? LELIA n. sp.

Plate VII, figs. 19-21.

Shell small, globose; height and width about equal, and seldom exceeding a fifth of an inch in measurement. Volutions two and a half to three, the last one very rapidly expanding and ventricose, constituting almost the entire bulk of the shell; inner volutions minute, moderately elevated above the surface of the body-whorl, and somewhat regularly rounded, forming a very low spire; suture distinct but not channeled; aperture subpatulose or pear-shaped, higher than wide, largest below the middle, pointed at the upper extremity and rounded below, except near the junction with the columella, where it is almost subimate; outer lip thin and sharp. Columella arcuate, rounded, without any appearance of a callus or thickening of any kind as far as can be determined from any of the examples in hand. (This portion of the shell is more or less concealed by adhering rock in all the individuals, so that this feature cannot be satisfactorily determined.) The striae, however, appear to pass from the body of the shell directly upon and over the solid, slightly-twisted, and non-umbilicated columella.

Surface of the shell smooth, appearing almost polished, except for the very fine striae of growth which are directed backward across the body of the volution.

The species has nearly the size and general appearance of *Naticopsis nana* Meek and Worthen, from the Coal-Measures of Illinois and the West, but differs in the columella being less straightened and prolonged below, not giving so great a basal extension to the aperture. The differences of the character of the columella are too distinct to require comparison. The

shell is most probably not a true *Natica*, and may possibly not belong to the same family; but as the real features of this portion cannot be satisfactorily determined, it remains a matter of doubt. It closely resembles, in general form, shells of the genus *Neritopsis* except for the smooth surface. It differs also from *Neritoma* Morris in wanting the peculiar callus of that genus and from *Narica* Recl. in the smooth surface and want of umbilicus.

Formation and locality.—In a greenish white limestone supposed to be of Triassic age,* northwest of Rawlins Station, Wyoming, and on the East Fork of the Duchesne River, Uinta Range, Utah. Collected by S. F. Emmons, esq.

*I do not myself believe this to be Triassic, but it has been so referred by others.—R. P. W.

CLASSIFIED LIST OF THE FOSSILS DESCRIBED IN THIS REPORT.

Class.	Order.	Family.	Genus and species.	Formation.
CCELENTERATA.				
Actinozoa.....	Zoantharia	Favositidae	Michelina sp. undet.....	Waverly group.
ANNULOIDA.				
Echinodermata ...	Crinoidca	Pentacrinidae	Pentacrinites asteriscus? M. & H.....	Triassic.
MOLLUSCOIDA (ARTICULATA?).				
Brachiopoda	Lyopomata	Lingulidae	Lingulepis Mæra n. sp	Potsdam group.
Do.....	do	do	Lingulepis minuta n. sp	do.
Do.....	do	do	Lingulepis Ella n. sp.....	Quebec.
Do.....	do	Obolidae	Obolella discoida n. sp.....	Potsdam group.
Do.....	(?)	(?)	Kutorgina minutissima n. sp	do.
Do.....	Arthropomata	Orthidae	Orthis Pogonipensis n. sp.....	Quebec group.
Do.....	do	do	Orthis resupinata? Martin	Lower Carbonif.
Do.....	do	Strophomenidae	Strophomena Nemia n.sp.....	Quebec group.
Do.....	do	do	Strophomena rhomboidalis Wilkins.....	Waverly.
Do.....	do	do ..?	Streptorhynchus equivalvis Hall	do.
Do.....	do	do ..?	Streptorhynchus inflata W. & W.	do.
Do.....	do	do	Strophodonta Canace H. & W.....	Devonian.
Do.....	do	do	Leptaena Melita n.sp.....	Quebec group.
Do.....	do	Productidae	Chonetes Loganensis n. sp	Waverly.
Do.....	do	do	Productus Flemingi var. Burlingtonensis Hall	Lower Carbonif.
Do.....	do	do	Productus lævicostus? White	do.
Do.....	do	do	Productus semireticulatus Martin	do.
Do.....	do	do	Productus elegans? N. & P.....	do.
Do.....	do	Spiriferidae	Spirifera Alba-pinensis n. sp.....	Waverly.
Do.....	do	do	Spirifera? (Spiriferina) Alia n. sp	Triassic.
Do.....	do	do	Spirifera centronata Winchell	Waverly.
Do.....	do	do	Spirifera imbrex? Hall.....	Lower Carbonif.
Do.....	do	do	Spirifera setigera Hall	do.
Do.....	do	do	Spirifera striata Martin	do.
Do.....	do	do	Spiriferina? Alia n. sp	Triassic.
Do.....	do	do	Spiriferina Homfray Gabb.....	do.
Do.....	Lyopomata	Lingulidae	Athyris Claytoni n.sp.....	Lower Carbonif.
Do.....	do	do	Athyris planosulcata? Phillips.....	do.
Do.....	do	do	Athyris subquadrata? Hall.....	do.
Do.....	do	Rhynchonellidae	Rhynchonella Emmons n. sp	Devonian.
Do.....	do	do	Rhynchonella gnathophora Meek	Jurassic.
Do.....	do	do	Rhynchonella Myrina n. sp	do.
Do.....	do	do	Rhynchonella pustulosa? White	Waverly.
Do.....	do	(?)	Porambonites obscurus n. sp	Quebec.
Do.....	do	Terebratulidae	Terebratula Augustensis n. sp	Jurassic?.
Do.....	do	do	Terebratula Humboldtensis Gabb.....	Triassic.
Do.....	do	do	Terebratula Utah n. sp	Waverly.
MOLLUSCA.				
Lamellibranchiata.	Monomyaria	Ostreidae	Ostrea sp. ?? = O. Engelmanni Meek	Jurassic.
Do.....	do	do	Gryphaea calceola var. Nebrascensis M. & H.	do.
Do.....	do	Pectinidae	Aviculopecten (Eumicr.?) Angustensis n. sp.	do.
Do.....	do	do	Aviculopecten curtocardinalis n. sp	Permo-Carbonif.
Do.....	do	do	Aviculopecten parvulus n. sp	do.
Do.....	do	do	Aviculopecten Weberensis n. sp	do.
Do.....	do	do	Eumicrotis curta Hall	Jurassic.

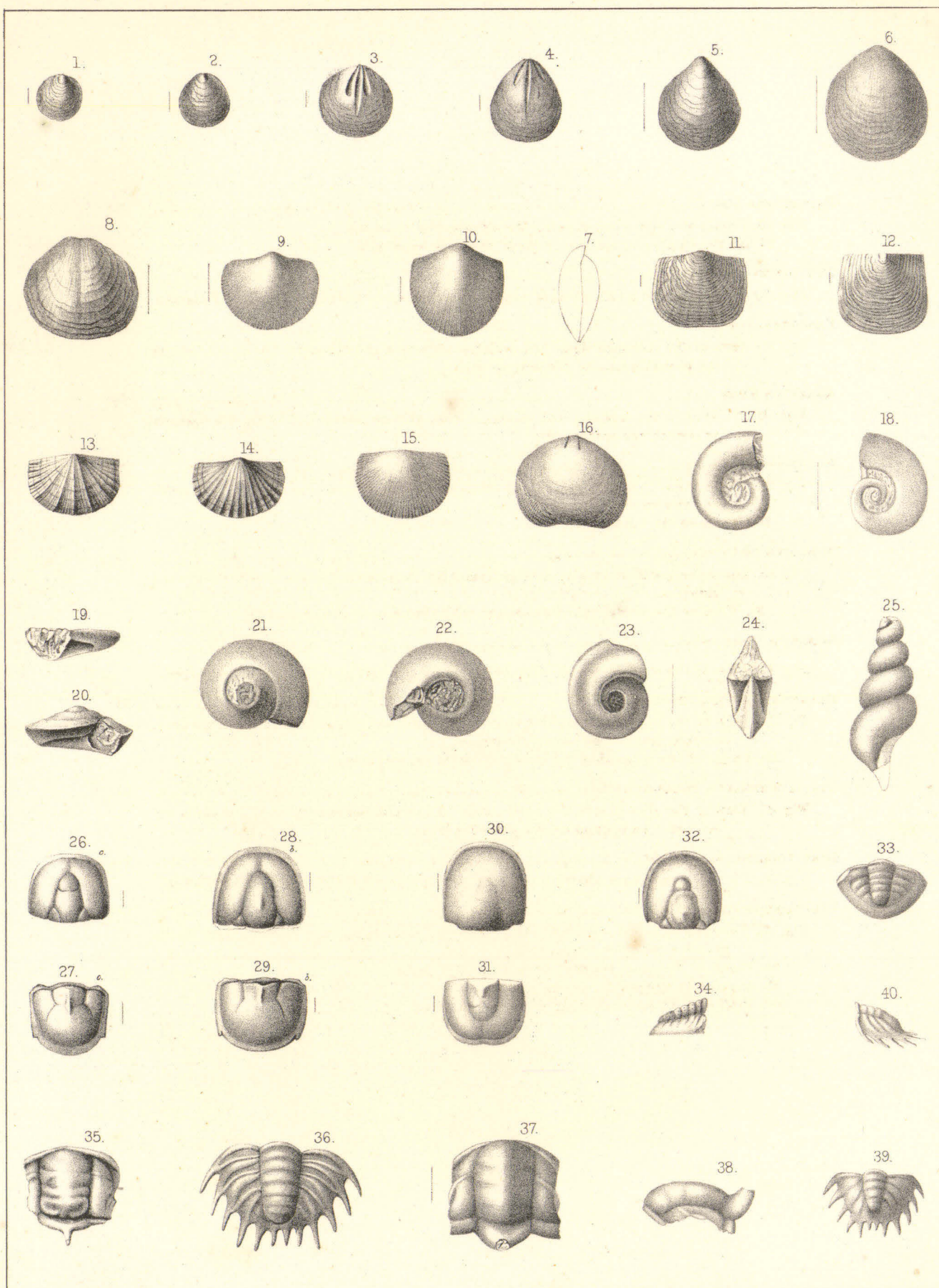
Class.	Order.	Family.	Genus and species.	Formation.
MOLLUSCA.				
Lamellibranchiata.	Monomyaria	Pectinidae	Camptonectes bellistriatus Meek	Jurassic.
Do.	do	do	Camptonectes extenuatus M. & H.	do.
Do.	do	do	Camptonectes pertenuistriatus n. sp.	do.
Do.	do	do	Lima (Plagiostoma) occidentalis n. sp.	do.
Do.	do	Pteriidae	Myalina aviculoides M. & H.	Permo-Carbonif.
Do.	do	do	Myalina Permiana Swallow	do.
Do.	Dimyaria	Nuculanidae	Nuculites triangulatus n. sp.	Devonian.
Do.	do	Trigoniidae	Trigonia quadrangularis n. sp.	Jurassic.
Do.	do	Cardiomorphidae	Cardiomorpha Missouriensis Swallow	Coal-Measures.
Do.	do	do	Edmondia? Myrina n. sp.	Triassic.
Do.	do	Cardiidae	Lunulicardium fragosum Meek	Devonian.
Do.	do	do	Septocardia Carditoidea n. sp.	Jurassic?
Do.	do	do	Septocardia typica n. sp.	do.
Do.	do	Lucinidae	Paracyclus peroccidens n. sp.	Devonian.
Do.	do	Astartidae	Astarte? arenosa n. sp.	Triassic?; loose.
Do.	do	Anatinidae?	Sedgewickia? concava Meek	Permo-Carbonif.
Gastropoda.	Pectinobranchiata	Fasciolaridae	Fusispira compacta n. sp.	Quebec.
Do.	do	Naticidae	Natica? Lelia n. sp.	Triassic?
Do.	do	Solariidae	Raphistoma acuta n. sp.	Quebec.
Do.	do	do	Euomphalus laxus White	Waverly.
Do.	do	do	Euomphalus Utahensis n. sp.	do.
Do.	do	do	Euomphalus (Strap.) Ophirensis n. sp.	do.
Do.	Rhipidoglossa	Maclureidae	Maclurea minima n. sp.	Quebec.
Do.	do	Bellerophonidae	Bellerophon Neleus n. sp.	Devonian.
Do.	do	do	Cyrtolites sinuata n. sp.	Quebec.
Cephalopoda.	Tetrabranchiata	Cyrtoceratidae	Cyrtoceras cessator n. sp.	Coal-Measures.
Do.	do	Goniatiidae	Goniatites Kingii n. sp.	do.
ARTICULATA.				
Crustacea.	Trilobita	Calymenidae	Conocephalites subcoronatus n. sp.	Quebec.
Do.	do	Calymenidae?	Conoceph. (Pterocephalus) laliceps n. sp.	Potsdam group.
Do.	do	Paradoxidae?	Crepicephalus (L.) Anytus n. sp.	do.
Do.	do	do	Crepicephalus (L.) granulatus n. sp.	do.
Do.	do	do	Crepicephalus (L.) Hagueli n. sp.	do.
Do.	do	do	Crepicephalus maculosus n. sp.	do.
Do.	do	do	Crepicephalus nitidus n. sp.	do.
Do.	do	do	Crepicephalus (L.) quadraus n. sp.	Quebec.
Do.	do	do	Crepicephalus (L.) simulator n. sp.	Potsdam group.
Do.	do	do	Crepicephalus (L.) unisulcatus n. sp.	do.
Do.	do	do	Crepic. (Bathyrus?) angulatus n. sp.	do.
Do.	do	Paradoxidae	Ptychaspis pustulosa n. sp.	do.
Do.	do	do	Chariocephalus tumifrons n. sp.	do.
Do.	do	do	Dikellocephalus bilobatus n. sp.	do.
Do.	do	do	Dikellocephalus fiabellifer n. sp.	do.
Do.	do	do	Dikellocephalus gothicus n. sp.	Quebec.
Do.	do	do	Dikellocephalus multicinctus n. sp.	Potsdam group.
Do.	do	do	Dikellocephalus quadriceps n. sp.	Quebec.
Do.	do	do	Dikellocephalus Wahsatchensis n. sp.	do.
Do.	do	Asaphidae	Ogygia parabola n. sp.	Potsdam group.
Do.	do	do	Ogygia producta n. sp.	do.
Do.	do	do	Bathyrus Pogonipensis n. sp.	Quebec.
Do.	do	Proetidae	Proetus Loganensis n. sp.	Waverly.
Do.	do	do	Proetus peroccidens n. sp.	do.
Do.	do	Agnostidae	Agnostus communis n. sp.	Potsdam group.
Do.	do	do	Agnostus Neon n. sp.	do.
Do.	do	do	Agnostus prolongus n. sp.	do.
Do.	do	do	Agnostus tumidosus n. sp.	do.

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* The line drawn by the side of figures indicates the natural size.

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EXPLANATION OF PLATE II.

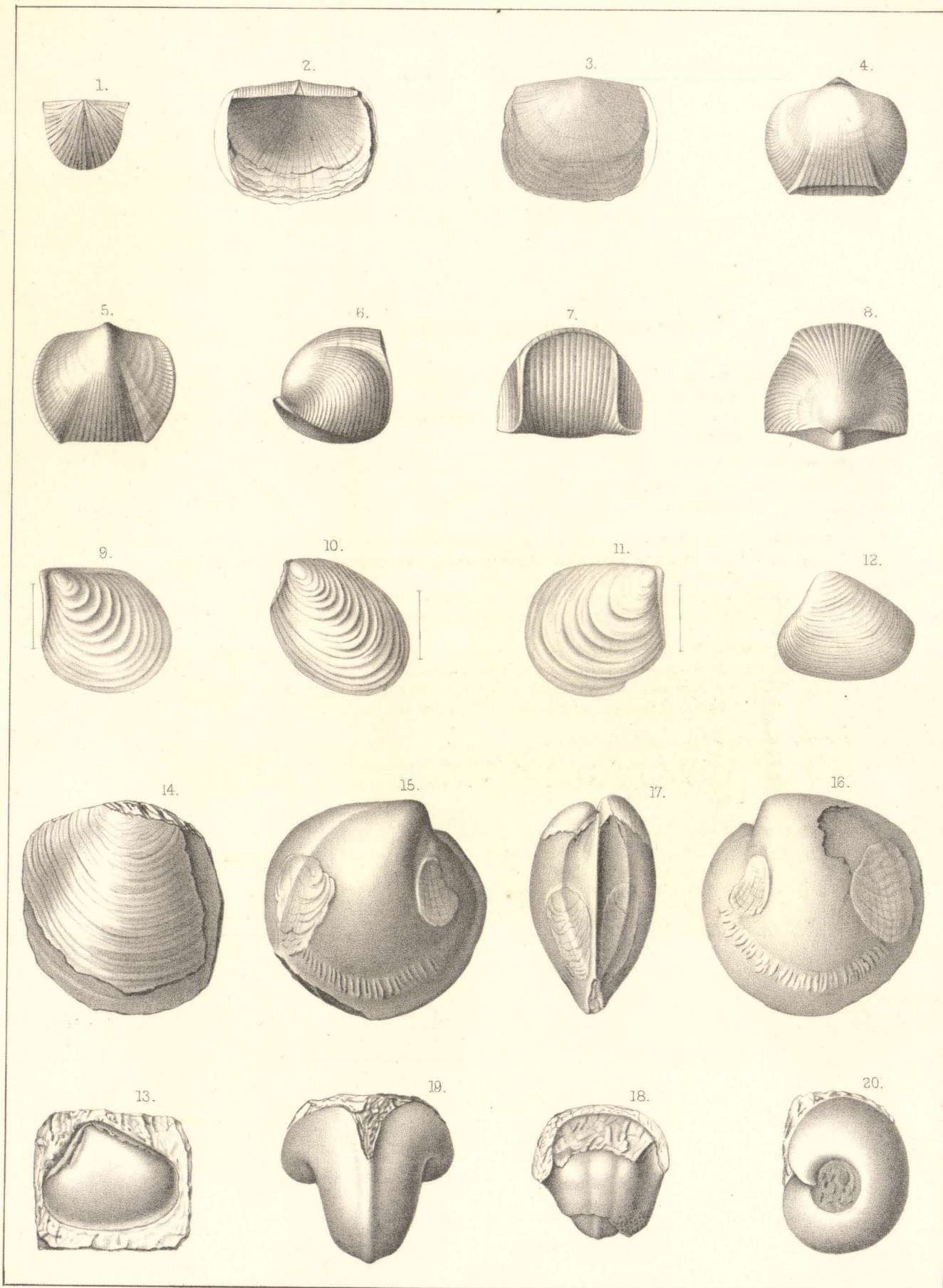
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EXPLANATION OF PLATE III.

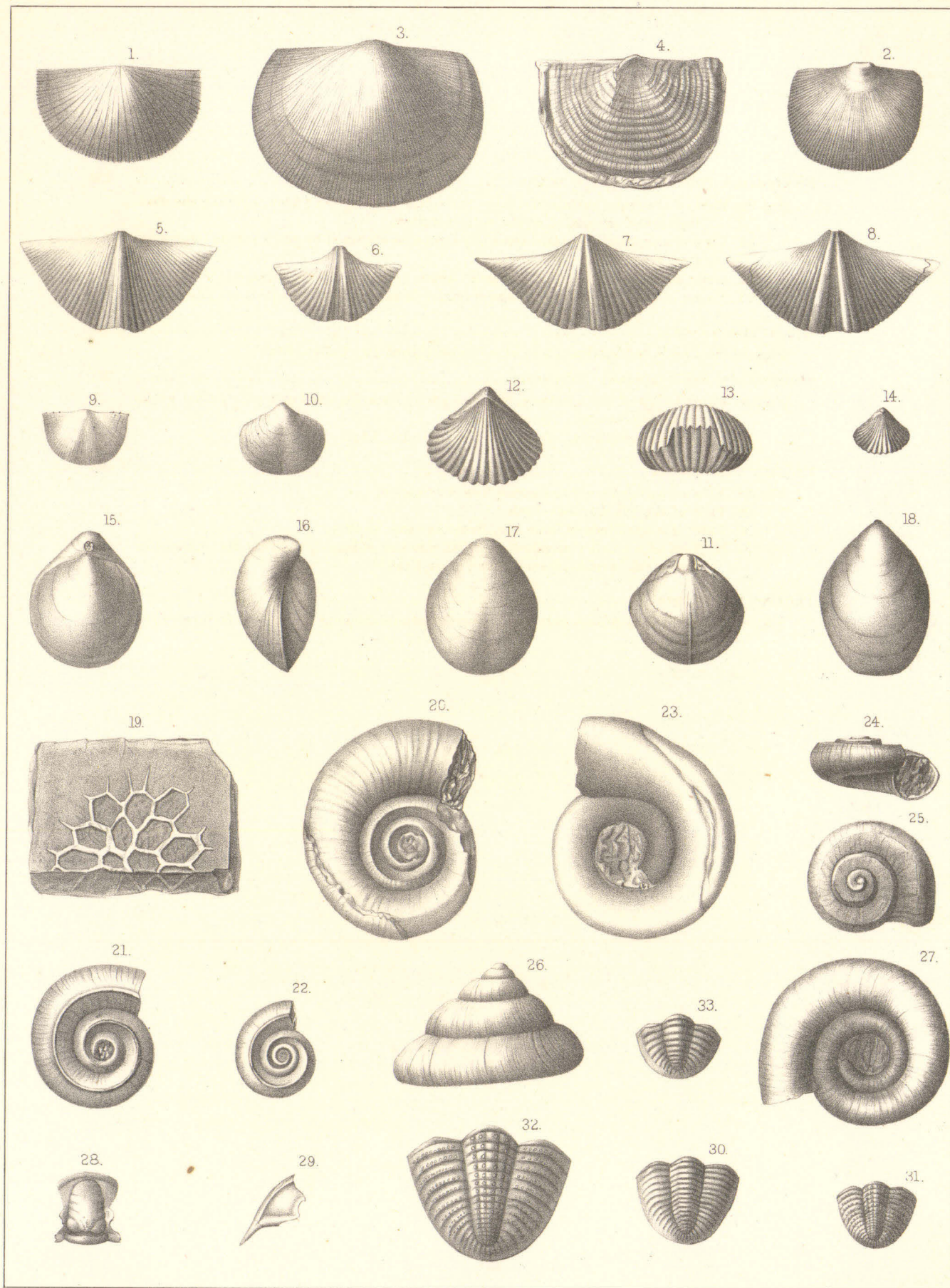
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EXPLANATION OF PLATE IV.

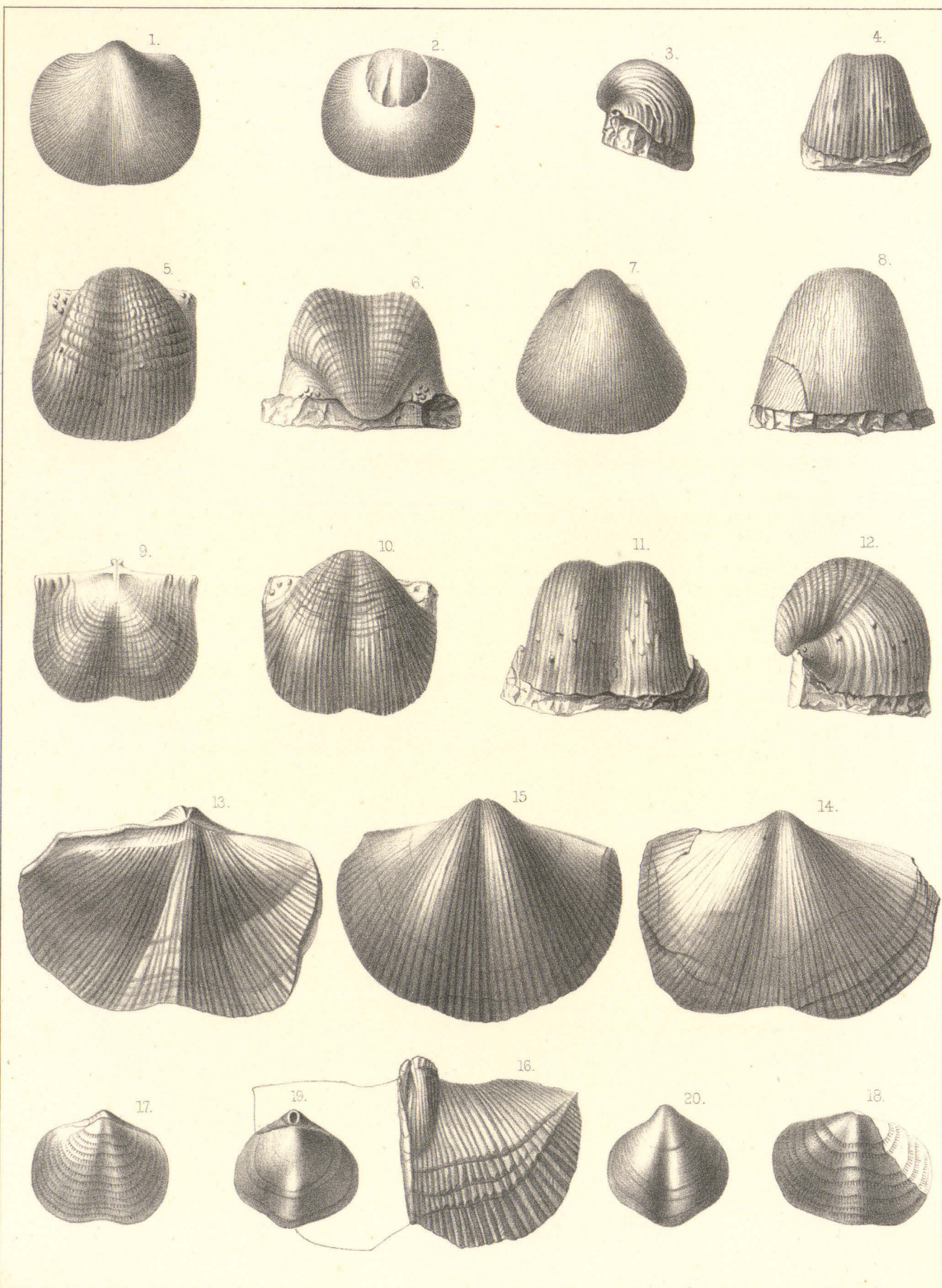
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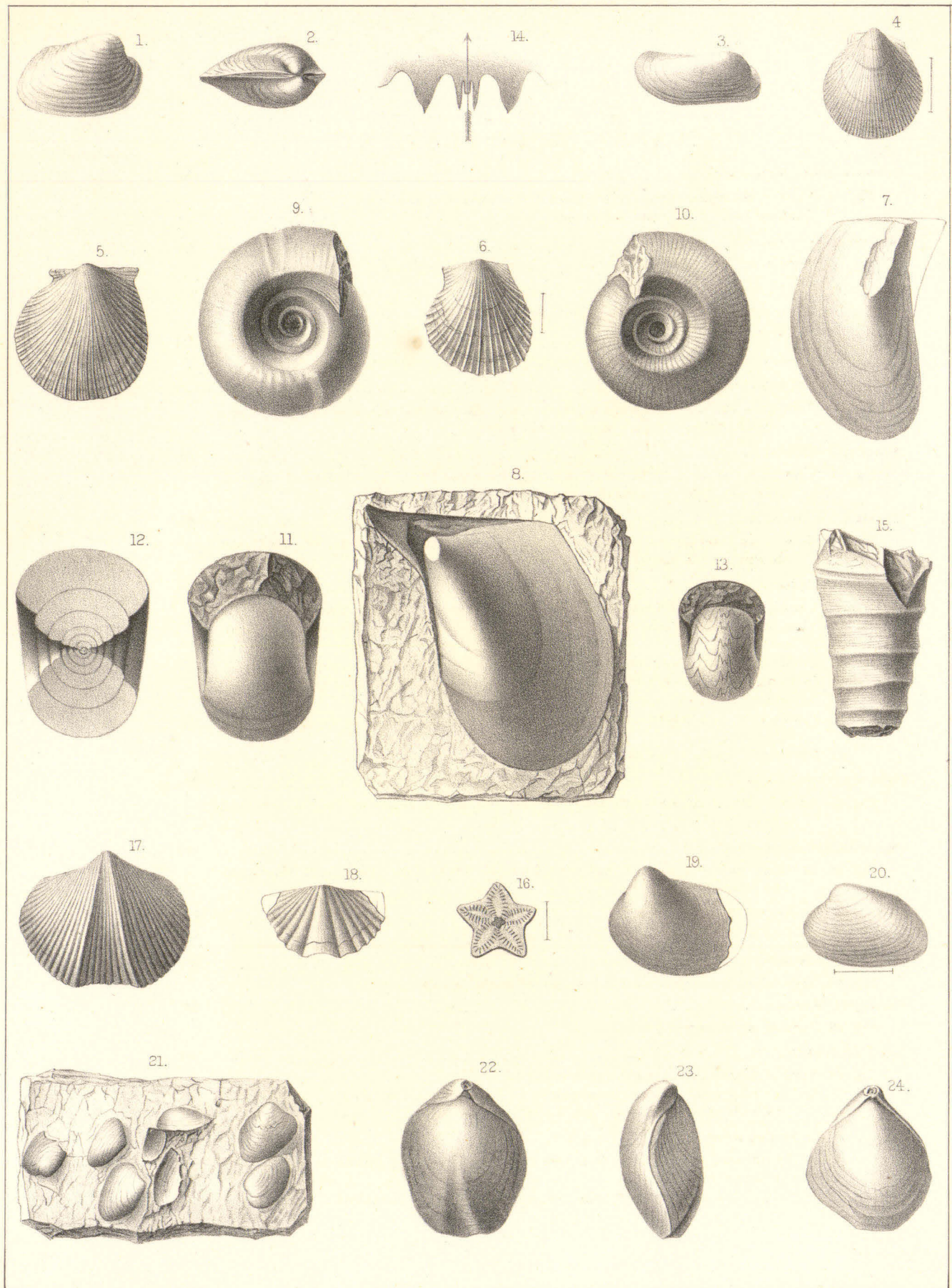
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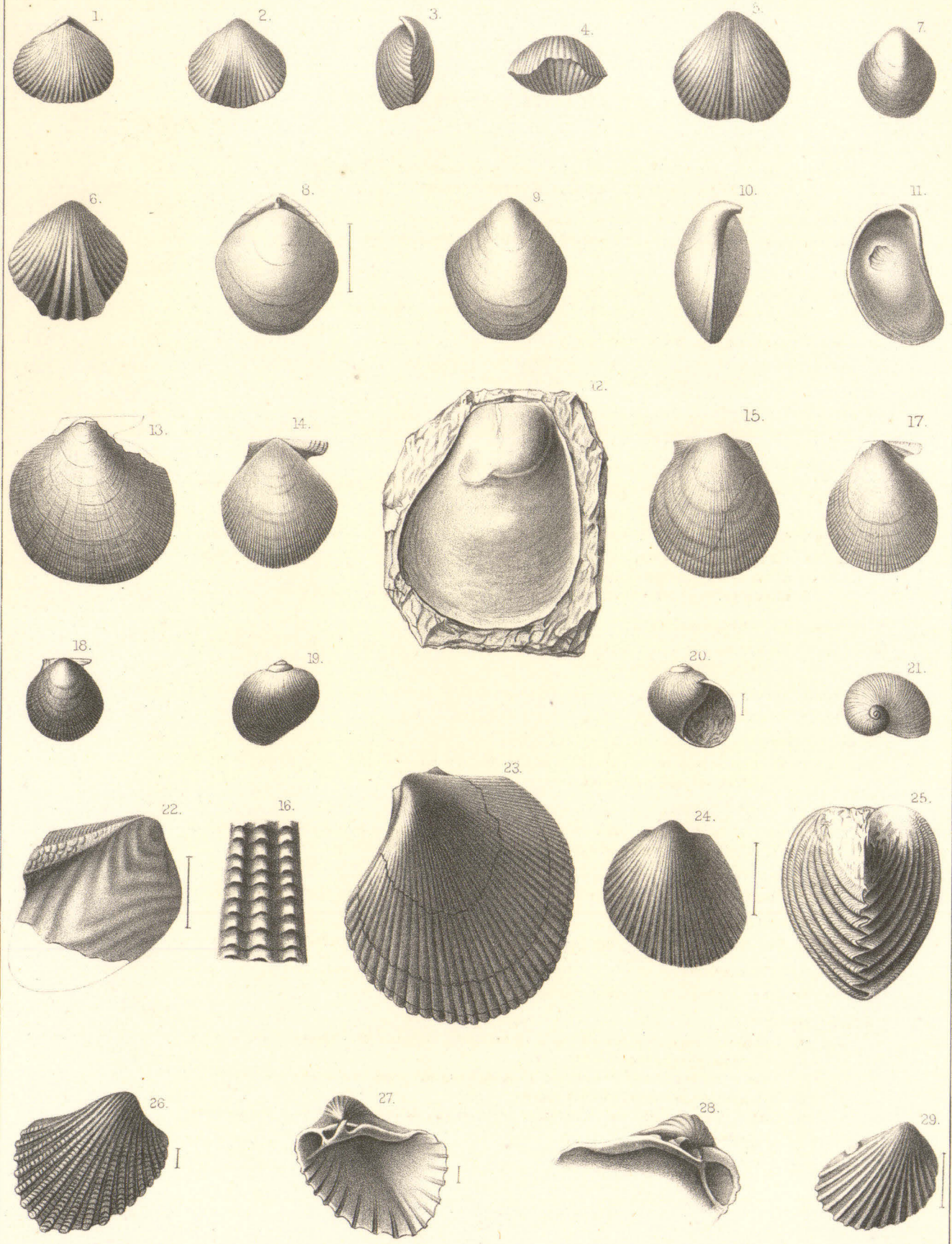
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UNITED STATES GEOLOGICAL EXPLORATION OF THE FORTIETH PARALLEL.
CLARENCE KING, GEOLOGIST-IN-CHARGE.

PART III.

ORNITHOLOGY.

BY

ROBERT RIDGWAY.

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SMITHSONIAN INSTITUTION,

WASHINGTON, D. C., *November 18, 1876.*

SIR: I transmit herewith a report on the ornithology of the route explored by the United States Geological Exploration of the Fortieth Parallel, based upon field-work from June, 1867, to August, 1869, inclusive, the time during which I had the honor to serve in the capacity of zoölogist to the expedition; the region investigated being that directly between Sacramento City, California, and Salt Lake City, Utah, including a few points directly to the eastward of the last-mentioned locality.

The ornithological specimens preserved, and deposited in the National Museum, at Washington, number 1,522, of which 769 are skins, and 753 nests and eggs. This may seem a small collection proportioned to the time employed in its formation, but the making of protracted field-observations and the elaboration of notes therefrom were deemed of greater importance than the amassing of a large duplicate collection. Moreover, almost equal attention was given to other branches of zoölogy, particularly to reptiles and fishes, large series of which, representing very completely the fauna of the country, were placed, according to instructions, in the hands of specialists for identification.¹

The unusual facilities most generously afforded by you, and your kind encouragement at all times, aided very materially the successful operations of the zoölogist; so that whatever is creditable in the results attained by his labors, the merit is mainly due to yourself. Another friend deserves special mention in this connection for his valued assistance—Mr. H. G. Parker, of Carson City, Nevada (at the time of the writer's connection with the expedition Superintendent of Indian Affairs for that State), whose frequent and gratuitous services contributed greatly to the completeness of the natural history collections.

¹The reports on these collections have not been received.

In the preparation of this report, the valued facilities afforded by the Smithsonian Institution were availed of, through the courtesy and kindness of Professor Joseph Henry, the Secretary of the Institution; among the many advantages thus secured being frequent access to a splendid working library and an unrivaled collection of North American birds. The author wishes also to express himself as particularly indebted to Professor Spencer F. Baird, Assistant Secretary of the Smithsonian Institution and Curator of the National Museum, for invaluable assistance kindly rendered throughout the progress of the work.

I have the honor to be,

Very respectfully, your obedient servant,

ROBERT RIDGWAY.

CLARENCE KING, Esq.,

United States Geologist,

In charge of U. S. Geological Explorations, 40th Parallel.

GENERAL REPORT.

DESCRIPTION OF THE ROUTE.

The investigations on which the following report is based, were made almost wholly within the limits of that vast interior region of continental drainage known as the Great Basin, between the parallels of 39° and 42° north latitude, collections having been made at but one outlying locality, the vicinity of Sacramento City, California. As observations were extended along the entire course of travel, however, from San Francisco to points in Utah eastward of Salt Lake City, we shall not confine our treatise to the limited region noted, but shall describe each of the main points where observations were made and notes taken, in regular sequence.¹

All the way from Panama to San Francisco several species of pelagic birds followed our vessel, the Black-footed Albatross (*Diomedea nigripes*) and White-headed Gull (*Blasipus heermanni*) being daily companions until we entered the "Golden Gate." No land-birds made their appearance, however, until, when off the coast of Mexico, between Acapulco and Cape St. Lucas, a solitary Mourning Dove (*Zenædura carolinensis*) made its appearance one day about noon, and, although flying around the vessel for nearly an hour, did not alight, but finally disappeared to the eastward, where no land was in sight.

¹ We reluctantly omit, as too far beyond the geographical province of our subject, some notes on the Isthmus of Panama, where, however, no North American birds were seen, excepting some waders, observed in the pools along the railroad, among which were the Purple Gallinule (*Gallinula martinica*) and the Little White Egret, or Snowy Heron (*Garzetta candidissima*). In the Bay of Aspinwall several Man-o-war Hawks (*Tachypetes aquila*) were observed sailing in circles overhead, much in the manner of Swallow-tailed Kites (*Elanoides forficatus*); and in the Bay of Panama, on the opposite (Pacific) side, Brown Pelicans (*Pelecanus fuscus*) were particularly numerous, and noticeable from their occupation of plunging from the air into the water after their prey.

Arrived in California, no peculiarly western bird was observed until we reached Sacramento City; since, after landing at San Francisco, only Purple Martins (*Progne subis*) and Cliff Swallows (*Petrochelidon lunifrons*), which swarmed about old buildings on certain streets, were seen, while the only notes of other species heard were the familiar songs of caged Canary Birds. The journey up the Sacramento River was equally disappointing in this respect, since, though we kept a vigilant look-out from our post of observation on the hurricane deck of the steamer, none but familiar eastern species, most of which were water-birds (Coots, Florida Gallinules, and various species of ducks), were seen, the only land-birds being an occasional Belted Kingfisher (*Ceryle alcyon*) perched on an overhanging willow. During the first day at Sacramento, however, we became familiarized with several of the species peculiar to the western portion of the continent, but as this locality brings us to the commencement of our observations in the field, we shall begin a *resumé* of the subject in another chapter.

1867.—The first camp of the survey was established at Sacramento City, California, on the 6th of June, from which date collections were made until July 4th, when the plains to the eastward and the Sierra Nevada were crossed into Nevada. It is much to be regretted that no opportunity was afforded for making collections along this route, especially in the western foot-hills and in the pine-region of the western slope, since a number of additional species and many valuable observations were thus lost to the collection and archives of the exploration. After entering Nevada, the Big Bend of the Truckee was selected for the first working-camp, and there we remained from July 24th until August 18th; a portion of the time being devoted to an excursion to Pyramid Lake, which was reached by descending the river in a *batteau*, the party returning on horseback, after about a week's absence. During this trip the main island in the lake was visited. Our investigations from the main camp also included several visits to the dry cañons of the Virginia Mountains, about eight miles to the westward, across a very sandy *mesa*. This camp was abandoned on the 25th of August, when we started across the desert for Humboldt Lake; but upon reaching the latter place the writer became a victim of malarial fever, which for weeks interfered very materially with the prosecution of his duties. We next proceeded

up the Humboldt River to Oreana, where a camp was fixed near the town, but our stay was short on account of the spread of the fever in a very malignant form, compelling the entire party to seek healthier water and purer air in the high mountains to the eastward. A camp was accordingly made in Wright's Cañon, on the western slope of the West Humboldt Mountains, a locality which proved to be well adapted for a collecting-ground. This camp was deserted, however, about the middle of September, for one on the eastern slope of the same range, for which the town of Unionville, in Buena Vista Cañon, was selected. This proved to be the best locality, for birds, yet visited. We left this place about the last of October, and moved westward again, along the same route, toward winter-quarters. At the Humboldt Marshes, on the 31st of October, several new species were added to the collection during the single evening of our stay, but no further collections were made until again at the Truckee Meadows, where we remained from November 7th until the 21st of the same month; and from which place an excursion to the Pea-vine Mountains, near the Sierra Nevada, was made on the 20th inst., in company with Mr. H. G. Parker. From this camp we repaired to Carson City, and remained there until the 5th of December, when, after first spending one day in the pine forests of the Sierra near Genoa, we revisited the Truckee Reservation near Pyramid Lake, through facilities extended by Mr. Parker, who accompanied the writer and assisted him in making his collections. This trip was made *via* the Carson River to below Fort Churchill, whence the desert was crossed to the Big Bend of the Truckee; but in returning the river was followed to the Meadows (at Glendale), thence to Hunter's Station, and across the valley to the Steamboat Springs, and over the Virginia Mountains, to Virginia City and Carson.

1868.—Winter-quarters at Carson City were left early in May, for the Truckee Reservation, which was reached on the 14th inst. Large collections were made here, the most important being from the island and "pyramid" in the lake, which we were enabled to visit through the kindness of Mr. Parker, who placed his handsome yacht "Nettie" at our service, and assisted us to secure large numbers of the previously very rare eggs of several species of water-fowl breeding on these islands. Early in June we repaired to Virginia City, and thence to Austin, in the Toyabe Mountains, which were

reached on the first of July. Collections and valuable notes were made by the way, especially at the Carson River, seven miles above Fort Churchill (June 23d), Fort Churchill (June 24th), Nevada Station (June 25th), Soda Lake, on the Carson Desert, (June 27th), Sand Springs, (June 29th), Fairview Valley, (June 29th), and Edward's Creek (June 30th). At Austin we remained only a few days, when, departing for Ruby Valley, we arrived there July 13th, and camped at the base of the mountains, some four miles northward of Fort Ruby. Toward the last of August we left this place and proceeded northward along the foot of the East Humboldt Mountains, pitching camps of a few days' duration at intervals of the journey. Crossing the range through the pass known as Secret Valley, near Fort Halleck, we approached the upper portion of the Humboldt River, and in continuing northward camped on several of the streams flowing from the lofty Clover Mountains into the Humboldt. The month of September was principally spent in traveling northward to the Humboldt "Wells," thence through Thousand Spring Valley to the Goose Creek Mountains, crossing which we entered the southern portion of Idaho at the "City of Rocks," the most northern locality reached; from whence our course directed eastward toward Salt Lake City, where we arrived early in October. At intervals during the pursuance of the route traced, small collections were made, when opportunity permitted; the principal stations being—"Overland Rancho," Ruby Valley, (August 26-29), "Camp 22," Ruby Valley, (September 4-5), Secret Valley (September 6-8), Dearing's Rancho, Upper Humboldt Valley (September 10-12), Trout Creek, Upper Humboldt Valley, (September 16-20), Thousand Spring Valley (September 21-24), "City of Rocks," southern Idaho (October 3), and Deep Creek, northwestern Utah (October 5).

1869.—On the 20th of May of this year, collecting was begun at Salt Lake City, and continued until June 21st, when we proceeded to Parley's Park, about twenty-five miles to the eastward, in the Wahsatch Mountains. In the meantime, Antelope, Stansbury, and Carrington Islands, in the Great Salt Lake, were visited. On the 2d of July an excursion was made, in company with the botanists of the expedition, eastward to the western spurs of the Uintah Mountains; there we remained from the 3d until the 8th instant, when we returned to the main camp in Parley's Park *via* the Provo

Cañon, Utah Lake, and Salt Lake City. Work was continued at main camp until August 16th, when collections and notes were packed and our field-work ended.

PHYSICAL FEATURES OF THE GREAT BASIN.

While the region traversed by the survey after its equipment embraces the entire distance from Sacramento City, California, to points in Utah eastward of the Salt Lake Valley, the actual field-work began only at the eastern base of the Sierra Nevada, and was thus entirely confined to the interior area of continental drainage known to geographers as the Great Basin, and which we shall frequently refer to in the following pages by this name, as well as by that of the "Interior," a convenient synonymous term. This vast area corresponds almost strictly in its geographical boundaries with the "Middle Province" of zoölogists. The route of the expedition was mainly across the middle portion of the Great Basin proper, so that the fauna encountered was that typical of the Middle Province.

In few regions is the influence directed on the distribution of birds by that of the plants so manifest to the observer as in the one under consideration; and as vegetation is influenced so materially by configuration of the surface, conditions of the soil, elevation, etc., a brief description of the physical features of the country embraced within the limits of our trip is necessary to the intelligent understanding of the nature of the Middle Province avifauna, and the manner in which it is divided into bands of restricted range, according to conditions of environment. Such an excellent description of the field of our investigations has been given by Mr. Watson, the botanist of the expedition, that we cannot do the subject greater justice than to quote the following from "Geographical Notes," on pages xiii-xvii of the Botanical Report:¹—

¹ Professional Papers of the Engineer Department, U. S. Army, No. 18. Report of the Geological Exploration of the Fortieth Parallel, made by order of the Secretary of War according to acts of Congress of March 2, 1867, and March 3, 1869, under the direction of Brig. and B't Major-General A. A. Humphreys, Chief of Engineers, by Clarence King, U. S. Geologist. Volume V, Botany. By Sereuo Watson, aided by Prof. Daniel C. Eaton and others. Submitted to the Chief of Engineers, and published by order of the Secretary of War under authority of Congress. Illustrated by a Map and Forty Plates. Washington: Government Printing Office, 1871.

This region constitutes the northern portion of what was at first designated as the "Great Basin," the high plateau, without outlet for its waters, separated on the north by low divides from the valley of the Snake River and continuing southward until it merges into the desert of the Lower Colorado. Geologically considered, however, as well as botanically, the term is now properly made to include the whole similar arid stretch of country northward to the plains of the Columbia, in latitude 48°.

The lofty and unbroken range of the Sierras bounds this section of the Basin on the one side by its steep eastern slope, entering Nevada at only a single point, where it throws over the border a high flanking-spur, the Washoe Mountains. On the opposite side lies the broad and nearly equally elevated system of the Wahsatch, broken through by the Bear, Weber, and Provo Rivers, which head among the peaks of the adjoining Uintahs. The intervening space, 460 miles broad in latitude 42°, but narrowed by the convergence of the opposing mountains to about 200 miles in latitude 37°, is for the most part occupied by numerous short and somewhat isolated minor ranges, having a general north and south trend, and at average distances of about twenty miles. The bases of these ranges are usually very narrow, even in the most elevated, rarely exceeding eight or ten miles in breadth, the slopes abrupt and the lines of foot-hills contracted, the mesas grading at a low and nearly uniform angle into the broad uninterrupted valleys. Over the larger portion of the territory, and especially in Nevada, the combined areas of the valleys and the area occupied by the mountains and accompanying foot-hills are very nearly equal. The main depressions within this region are two, one at the base of the Sierras at a level of about 3,850 feet above the sea, into which flows all of drainage there is from the whole northern half of Nevada and from the eastern slope of the Sierras, the other the "Great Salt Lake Basin," at an altitude 400 feet greater, close upon the base of the Wahsatch and receiving the waters from that range above latitude 40° and from the northeastern portion of the Uintahs. Into the first flow the Truckee, Carson, Quinn's, and Humboldt Rivers. The Truckee is a clear, cold stream, which issues from Lake Tahoe in the Sierras, and after a rapid descent breaks through the Virginia Mountains and turning north soon empties into Pyramid and Winnemucca Lakes. These are much the deepest of all the lakes of the Basin, being hemmed in by mountains, and are moderately saline. The Carson River also rises in the Sierras farther to the south, but after leaving the base of the mountains is a less rapid stream and gradually becomes somewhat alkaline. Inclining more to the eastward it forms a small shallow lake on the border of Carson Desert, and thence issues in a number of devious channels, and is finally spent in an extensive "sink" or alkaline mud-plain of some twenty or thirty miles in diameter. Of a like character are the "Mud Lakes," lying north of Pyramid Lake and fed by Quinn's River, which has its source in southeastern Oregon. Beyond the limits of the survey to the south are Walker's and some other smaller lakes, supplied by streams from the Sierras, but all strongly saline.

From this western depression the general level of the country rises gradually to the eastward very nearly to the border of Nevada, where the valleys have an altitude of about 6,000 feet. Here in the northeastern part of the State the Humboldt River takes its rise, by far the most important river of the Basin, not only as the longest but as opening a passage for three hundred miles to the Central Pacific Railroad through the mountain ranges, that would otherwise have proved a serious obstruction. It is nowhere a large stream, receives few affluents, and in some parts of its course is very

tortuous. It at length spreads out into Humboldt Lake, shallow and subalkaline, and from this the little remaining surplus water finds its way in a manner similar to the Carson River into the same sink.

The descent of 2,000 feet from eastern Nevada into the Great Salt Lake Basin is almost immediate, nearly the whole northwestern portion of Utah being an alkaline desert, broken by fewer mountain or hill-ranges, and but little above the level of the lake. The lake itself is for the most part very shallow, in no place over 50 feet in depth, the waters a concentrated solution of salt. As with all these sheets of water the shore-line and consequent area vary greatly in different years.

The intermediate ranges of the Basin are very similar to each other in character. They vary in altitude from one to 6,000 feet above the valleys, culminating in occasional peaks scarcely ever so rugged that they cannot be ascended from some direction upon mules. They are cut up by numerous ravines or "cañons," which are narrow, very rarely with an acre of interval or surface approaching to a level, the sides sometimes rocky or precipitous, more frequently sloping to the summits of the lateral ridges. In geological structure these ranges are more or less complicated, showing rocks of all ages from the azoic to the glacial period, here metamorphic rocks, quartzites, slate, and limestones, there an outburst of granite or syenite, volcanic rocks of often the most diverse and picturesque colors, or broad table-lands of lava overflow. The erosion and decomposition of these various rocks have filled the valleys to a monotonous level with a detritus of gravel, sand or silt, and given to them that accumulation of alkaline salts which is so marked a peculiarity of the country.

With few exceptions, also, these mountains are for most of the year wholly destitute of water, with but small rivulets in the principal cañons, frequently with only scanty springs here and there at their bases, irrigating a few square yards of ground. Even where the mountain supply is sufficient to send a stream into the valleys it is usually either soon entirely evaporated, sinks into the porous soil, or becomes demoralized with alkali and is "lost" in the mud of the plain. The lowest portion of nearly every valley is occupied by some extent of alkali flat, where in the winter season the water collects and the softened clay-like mud is bottomless and impassable. As the moisture evaporates under the heat of coming summer the level naked surface becomes hard and pavement-like, or covered with a snowy incrustation or deposit of salt or carbonates. The springs and wells even are often more or less saline, and thermal springs are not rare.

The chief exceptional ranges in northern Nevada, which from their greater altitude receive heavier snowfalls in winter, retained through the year in greater or less quantity in the more sheltered depressions of the higher peaks, and which in summer are subject to more abundant rains, are the West Humboldt Mountains, 100 miles east of the California State line, the East Humboldt Mountains, 75 miles from the Utah line, and the Toyabes, nearly intermediate between the two. Star Peak is the highest point of the first range, with an altitude of nearly 10,000 feet, but with little deposit of snow and the vegetation of the summit scarcely sub-alpine. Several constant streams here flow from the principal eastern cañons and reach the middle of the valley, where they supply irrigation for as many small ranches. The Toyabe Range, especially in its southern portion, is higher, several of its peaks having an altitude of from 10,000 to 12,000 feet, with more snow and fuller streams. The waters of the eastern slope are spent in Smoky Valley. On the western side lies Reese River, flowing northward toward the

Humboldt, of which it is a reputed tributary. In the upper portion of its course of 150 miles it is reënforced to some extent by the drainage of the Shoshone Mountains, a rather high range west of the Toyabes, but as it nears Humboldt Valley it diverges into side-channels and seldom has volume sufficient to reach the main river itself.

The East Humboldt Mountains are by far the most stern and alpine of all these ranges, the main peaks between 11,000 and 12,000 feet in height, precipitous and ragged, the deeper cañons evidently scooped out by glaciers, gemmed with snow-fed lakes beneath the peaks and carrying full streams into the valleys. The southern portion, however, below Frémont's Pass, is less rugged and of different geological structure, mainly of nearly horizontal strata of limestone. The cañons here, often mere gorges, with close precipitous walls, are perfectly dry on the eastern slope, the melting snows sinking almost immediately, but reappearing at the base in bold ice-cold springs. The water from these springs and streams reunites to form Ruby and Franklin Lakes, bodies of nearly fresh water, very shallow, and largely occupied by a dense growth of "Tule" (*Scirpus validus*). As usual in these ranges the western slope is much the more gentle, with a broader line of foot-hills. The streams upon this side form the South Fork of the Humboldt. The 'Clover Mountains' of the Catalogue form the northern extremity of this range, isolated by a depression known as Secret Valley, but of equal height and similar character.

Such is a general description of the country as far east of the foot of the Wahsatch in Utah. These mountains, upon a broad base of nearly fifty miles in width, and with an irregular crest-line 10-12,000 feet high, have a system of long, deep, well-watered cañons, often exceedingly rocky, and sometimes cleft like a gateway to the valley level, with perpendicular mountain-walls on each side, but usually opening out at some part of their course into meadow-like basins or "parks." The prevalent western winds deposit their moisture, which they have gathered in the traverse of the Basin, in abundant snows in winter and at other seasons in frequent and occasionally heavy rains. The upper cañons and mountain slopes are to some extent timbered, much more generally so than in any of the ranges westward, and the naked peaks above have a truly alpine vegetation. The Uintahs, which connect immediately with the Wahsatch and extend eastward on the line of the 41st parallel for a distance of one hundred and fifty miles to Green River, where they meet the outspurs of the Rocky Mountains of Colorado, have more of the character of those mountains, with broad open cañons and extended lines of foot-hills, the peaks overtopping those of the Wahsatch, glacier-scored and polished at the northern base, but the declivity upon the opposite side stretching southward beyond the limits of vision in a high plateau broken only by the deeply-worn channels of numerous rapid streams, tributaries of the Uintah and Green Rivers.

LOCAL AVIFAUNÆ OF THE GREAT BASIN.

We have gone thus into detail with regard to the more prominent characteristic features of the Great Basin for the reason that the distribution of the birds depends so much upon that of the vegetation; and as we know that the latter is separated into several quite distinct groups, whose distribution depends upon altitude, humidity, proportionate amount of

alkaline salts in the soil, and other causes, we may easily correlate the bird-fauna into corresponding sections.

The boundaries between local floras of entirely different character are usually so abrupt in the Great Basin that often a single step will lead from one to the other; thus, the upper limit of the "pine belt" on the mountains marks a given line where the trees disappear almost immediately, and these begin almost as suddenly at the lower edge of the zone; narrow belts of mountain mahogany, western cedar, or cedar and piñon together, may follow in the order given, but there is usually no marked straggling of these trees where they meet the sage-brush, as if disputing possession of the ground. The sage-brush reigns supreme from the base of the foot-hills to the brink of the mesa, or over the elevated plain extending from the foot of the mountains to the narrow valleys of the streams, where only the steep, nearly naked bluffs separate the squalid growth of the higher level from the more thrifty growth of the same plants, first with grease-wood intermingled, which occupies the outer portion of the valley-floor; then follows the green-sward of salt-grass in the moister portion of the valley, while nearer the river are thickets of low willows, or in exceptionally rich valleys buffalo-berry and other shrubs, with cotton-wood trees interspersed. In a like manner the luxuriant shrubbery of the mountains is usually restricted to the margin of the brooks in the bottom of the cañons or ravines, where often the slopes so nearly meet that scarcely room is left for a trail. Such are the main features of the distribution of vegetation in this region, subject, of course, to numerous and sometimes, but not often, complicated local modifications.

The strict correlation between the birds and plants in this matter of distribution was a fact immediately noticed, and the more firmly impressed toward the close of our long period of observations in the field; each locality of particular vegetation being inhabited by its own peculiar set of birds with almost unvarying certainty. In order to familiarize the reader with the local causes which govern the distribution of the birds within the Great Basin the accompanying arrangement of the more distinct types of localities is given, followed by lists of the species of birds characteristic of each. It is of course to be understood that by *characteristic* we do not mean that a bird is found in the sort of locality to which it is assigned, and nowhere

else, but simply that such a place is where it is most abundant, or most likely to be found; and also, that the arrangement presented is based upon the distribution of the species during the breeding-season.

There are, however, certain species whose distribution seems to be in nowise connected with vegetation, the considerations which influence their range being the presence of water, of rocks, or of earth-banks; but these form a small proportion of the summer residents, most of them being the water-fowl, and of these many might be assigned to the meadow series, since they nearly all resort to the meadows to breed.

The main natural subdivisions of the avifauna of the Interior, as above determined, are the following:—

I. Arboreal Avifauna.

1. Birds of the pine-region, or higher coniferous forests. (18 species.)
2. Birds of the cedar or nut-pine groves. (9 species.)
3. Birds of the aspen groves or copses. (7 species.)
4. Birds of the cañon shrubbery. (7 species.)
5. Birds of the wooded river-valleys. (25 species.)

II. Terrestrial Avifauna.

6. Birds of the sage-brush. (10 species.)
7. Birds of the mountain meadows, or parks. (9 species.)
8. Birds of the lowland meadows. (8 species.)

III. Mural Avifauna.

9. Species strictly saxicoline. (2 species.)
10. Species saxicoline only in nesting habits. (5 species.)
11. Species nesting in earth-banks. (3 species.)

IV. Aquatic Avifauna.

12. Water birds. (41 species.)

1. *Birds of the pine-region, or higher coniferous woods.*—Compared with the general extent of the Interior, the wooded portions are exceedingly limited, the only approach to a continuous forest encountered being that clothing the eastern slope of the Sierra Nevada, and the more scant and interrupted forests of the Wahsatch and Uintahs, on the opposite side of the Basin. Between these two distant forest-clad mountain systems no true forests exist, only a few of the loftier ranges supporting an extensive tree-growth on their higher summits, forming islands, as it were, in a sea of desert.

Woods of Coniferæ form by far the greater part of the sylva of the Great Basin, and though differing somewhat in their character have much the same bird-fauna wherever they exist, the only decided difference with locality being the replacing of species of one side by representative forms on the opposite side. On the Sierra Nevada these forests are much more extensive than anywhere to the eastward, and the growth far larger and more dense, consisting chiefly of *Pinus ponderosa*, but with which are mixed *Abies grandis*, *A. menziesii*, *A. douglasii*, *Libocedrus decurrens*, and perhaps some other trees. Of these species, only the latter did not occur to the eastward, where, on the higher ranges, as the East Humboldt, Wahsatch, and Uintahs, *Pinus balfouriana*, *P. flexilis*, *Abies englemanni*, *A. amabilis* (?), and *Juniperus virginianus* occurred as additional species.

The birds peculiar to these dark woods are far less numerous than those found only in the more open and sunny groves of the river valleys, but eighteen species being noted as peculiar to them, exclusive of those restricted to one side of the Basin. The strictly pinicoline species are the following:—

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| 1. <i>Cinclus mexicanus</i> . <i>Not arboreal.</i> | 10. <i>Loxia leucoptera</i> . |
| 2. <i>Regulus calendula</i> . | 11. <i>Carpodacus cassinii</i> . |
| 3. <i>Parus montanus</i> . | 12. <i>Chrysomitris pinus</i> . |
| 4. <i>Sitta aculeata</i> . | 13. <i>Picicorvus columbianus</i> . |
| 5. <i>Sitta canadensis</i> . | 14. <i>Contopus borealis</i> . |
| 6. <i>Sitta pygmæa</i> . | 15. <i>Empidonax difficilis</i> . |
| 7. <i>Certhia americana</i> . | 16. <i>Sphyrapicus thyroideus</i> . |
| 8. <i>Dendroeca auduboni</i> . | 17. <i>Canace obscura</i> . |
| 9. <i>Pyranga ludoviciana</i> . | 18. <i>Bonasa umbelloides</i> . |

The representative and peculiar species of the opposite mountain systems are as follows:—

- | <i>Representative species.</i> | |
|--------------------------------------|--------------------------------|
| <i>Sierra Nevada.</i> | <i>Wahsatch and Uintahs.</i> |
| 1. <i>Junco oregonus</i> . | 1. <i>Junco caniceps</i> . |
| 2. <i>Cyanura frontalis</i> . | 2. <i>Cyanura macrolopha</i> . |
| <i>Peculiar species.¹</i> | |
| 1. <i>Turdus ustulatus</i> . | [None.] |
| 2. <i>Sphyrapicus ruber</i> . | |
| 3. <i>Picus albolarvatus</i> . | |

¹ Of these species the two in italics are represented in the eastern ranges by closely allied forms, *T. swainsoni* and *S. nuchalis*, but they are not inhabitants of the pines, the former being confined to the cañon shrubbery and the latter to the aspen groves.

2. *Birds of the cedar or nut-pine groves.*—These groves are generally found on the lower slopes and foot-hills of the desert ranges, between elevations of about 5,000 and 7,000 feet, and occur even in the most barren and arid districts. In general, two species, the western cedar (*Juniperus occidentalis*) and the nut-pine, or piñon (*Pinus monophyllus*), are mixed together, but often only one species, the former, is the sole constituent of these groves, this being usually the case on the more barren mountains in the absolutely waterless districts; the latter, on the other hand, prevailing on those ranges which have copious streams in the cañons. These trees are of low, compact habit and unshapely form, their height rarely exceeding 15 feet, while the branches are characteristically crooked and the trunks short, rugged, and twisted.¹ Along the upper edge of this belt occur, more or less plentifully, trees of the "mountain mahogany" (*Cercocarpus ledifolius*), equally stunted and scraggy, but with scant, deciduous foliage. These monotonous groves are seldom inhabited by many birds, but, on the other hand, are often so nearly devoid of animal life that an entire day may be spent among the gnarled and stunted trees without a single living thing being seen, or a sound heard except the far-away croak of a solitary raven from some distant hills. Sometimes, however, the profound silence is broken for a moment by the chattering of a Gray Titmouse (*Lophophanes inornatus*) or the twittering of a straggling troop of the diminutive "Fairy Titmice" (*Psaltiriparus plumbeus*), while the intruder may be suddenly startled by the piercing whistle of a little Chipmunk (*Tamias quadrivittatus*). Occasionally, a solitary *Myiadestes townsendi* flies silently by, and more frequently a flock of querulous Piñon Jays (*Gymnokitta cyanocephala*) sweeps overhead, when all is again silent. In case these woods occur on

¹ On the foot-hills or lower slopes of the Wahsatch these woods are represented by the dwarf-oak "scrub"—the western cedar having disappeared far to the westward. This scrub consists of a dense growth of oak bushes about 5–15, rarely 20, feet high, the species being considered by botanists a dwarf form of *Quercus alba*. The birds inhabiting these oaks are much the same as those found in the cedar and nut-pine groves, with the exception of *Gymnokitta cyanocephala* and *Myiadestes townsendi*, the first of which appears to be peculiar to the cedars, while the other occurs elsewhere only in the high coniferous woods. In addition to these species, *Helminthophaga virginiae*, *Pipilo megalonyx*, and *Cyanocitta woodhousii* may be regarded among the most characteristic species of the oak thickets.

the foot-hills and lower slopes of the higher and more fertile ranges, they may be occasionally visited by several species from the pine-region higher up, or from the adjacent cañon shrubbery. The following, however, are particularly characteristic of the cedar and nut-pine groves:—

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|-------------------------------------|--|
| 1. <i>Myiadestes townsendi</i> . | 6. <i>Spizella arizonæ</i> . |
| 2. <i>Sialia arctica</i> . | 7. <i>Scolecophagus cyanocephalus</i> . |
| 3. <i>Lophophanes inornatus</i> . | 8. <i>Gymnokitta cyanocephala</i> . ¹ |
| 4. <i>Lanivireo plumbeus</i> . | 9. <i>Empidonax obscurus</i> . |
| 5. <i>Collurio excubitoroides</i> . | |

3. *Birds of the aspen groves and copses*.—The aspens (*Populus tremuloides*) occur only on the higher, well-watered ranges, commonly in the upper cañons, in moist and sheltered situations just below the fields or patches of perpetual snow. The slender trees composing these groves or copses are seldom large, never, except perhaps on certain of the more eastern ranges, exceeding 30 or 40 feet in height, and usually not more than half so tall. They are of straight, clean habit, however, with a smooth whitish-green bark, and are carpeted underneath by a varied herbaceous growth, among which beautiful ferns are sometimes conspicuous. The characteristic birds of the aspens are not numerous, the following being all that were noted:—

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|-----------------------------------|----------------------------------|
| 1. <i>Turdus migratorius</i> . | 5. <i>Empidonax hammondi</i> . |
| 2. <i>Progne subis</i> . | 6. <i>Picus gairdneri</i> . |
| 3. <i>Helminthophaga celata</i> . | 7. <i>Sphyrapicus nuchalis</i> . |
| 4. <i>Empidonax obscurus</i> . | |

Several of the above, or all with the exception of the last three, and *Helminthophaga celata*, are rather to be considered as species of general and variable range, since they may sometimes be found in very considerable abundance in other wooded localities.

4. *Birds of the cañon shrubbery*.—Several of the higher ranges of the Interior receive sufficient precipitation, or retain throughout the summer snow enough near their summits, to supply the main ravines and cañons with constant streams of water; and these nourish a thrifty or often luxuriant shrubby growth along their banks, where many species of birds resort,

¹This species we believe to be entirely peculiar to these woods, its food apparently consisting exclusively of the seeds and berries of the nut-pine and cedar.

as their favorite haunt. These shrubs are of various species, different ones of which predominate in different localities, the more common kinds being *Cornus pubescens*, upon the berries of which many birds feed almost exclusively in the fall, *Sambucus glauca*, *Prunus demissa*, *Ribes irriguum*, *Alnus incana*, and, more rarely, *Crataegus rivularis*, while in many localities species of *Salix* are also a common component of the thickets along the cañon streams.¹ The birds particularly characteristic of this section are:—

- | | |
|--------------------------------------|-----------------------------------|
| 1. <i>Psaltiriparus plumbeus</i> . | 5. <i>Melospiza fallax</i> . |
| 2. <i>Geothlypis macgillivrayi</i> . | 6. <i>Cyanocitta woodhousii</i> . |
| 3. <i>Hedymeles melanocephalus</i> . | 7. <i>Empidonax pusillus</i> . |
| 4. <i>Cyanospiza amœna</i> . | |

In addition to these, *Turdus swainsoni*,² *Galeoscoptes carolinensis*, *Setophaga ruticilla*,³ and *Passerella schistacea* were found in the Wahsatch region.

5. *The Birds of the wooded river-valleys*.—As a rule, the valleys of the rivers in the Great Basin are destitute of trees, like the adjacent mesas; but in the “western depression” are two notable exceptions in the Truckee and Carson Rivers, both of which are bordered along the lower portion of their course by inviting groves or scattered clumps of large and beautiful cottonwood trees (*Populus monilifera*) and dense copses of a smaller species, *P. trichocarpa*. The buffalo-berry (*Shepherdia argentea*) and willows (*Salix*, species) form the greater part of the shrubbery, but they are associated with numerous other woody plants. In the possession of these features the lower portions of the valleys of both the above-named streams share in common, but the timber along the latter is less regularly distributed, although in places equally extensive.

Localities so inviting as these being extremely rare and distant from each other, it follows as a natural consequence that the birds are found greatly multiplied both in species and individuals in these restricted oases.

¹In the East Humboldt Mountains, but more especially in the Wahsatch, other species, belonging to the Rocky Mountain region, are added, the number being small in the first-named range, but in the latter very considerable, and embracing several eastern species. In the cañons of the Wahsatch, for instance, are found *Betula occidentalis*, *Rhus aromatica*, *R. glabra*, *Acer grandidentatum*, *Negundo aceroides*, and *Sambucus racemosa*. [See Watson, Botanical Report, p. xxxvii.]

²Found also as far west as the East Humboldt Mountains, in September.

³Noticed only in the lower portion of the cañons, and more commonly in the valleys, as was also the case with *Galeoscoptes carolinensis*.

Indeed, to realize how attractive the river-valleys must be to the feathered tribe, one has but to cross the almost limitless desert on either side, with a scorching sun overhead and little else than glaring, heated sand beneath his feet, and after thus suffering all day come suddenly to the verge of one of these lovely valleys, with the fields and groves of verdure close by, while the refreshing breeze brings to the ear the rippling of cooling waters and the glad voices of the birds! The merry little Wood-Wrens (*Troglodytes parkmanni*) gabble and chatter among the trunks and massive branches of the old cotton-wood trees; black-and-orange orioles (*Icterus bullocki*) and crimson-headed linnets (*Carpodacus frontalis*) whistle plaintively or chant a cheerful ditty as they sport among the leafy branches, while from the willows or the more open thickets is heard the mellow flute-like song of the Black-headed Grosbeak (*Hedymeles melanocephalus*).

The birds most characteristic of the wooded river-valleys are the following:—

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|-----------------------------------|------------------------------------|
| 1. <i>Sialia mexicana</i> . | 14. <i>Pica hudsonica</i> . |
| 2. <i>Troglodytes parkmanni</i> . | 15. <i>Tyrannus carolinensis</i> . |
| 3. <i>Dendroeca æstiva</i> . | 16. <i>Tyrannus verticalis</i> . |
| 4. <i>Geothlypis trichas</i> . | 17. <i>Myiarchus cinerascens</i> . |
| 5. <i>Icteria longicauda</i> . | 18. <i>Contopus richardsoni</i> . |
| 6. <i>Myiodioctes pusillus</i> . | 19. <i>Empidonax pusillus</i> . |
| 7. <i>Tachycineta bicolor</i> . | 20. <i>Coccyzus americanus</i> . |
| 8. <i>Vireosylvia swainsoni</i> . | 21. <i>Nephœcetes borealis</i> . |
| 9. <i>Carpodacus frontalis</i> . | 22. <i>Chætura vauxi</i> . |
| 10. <i>Chrysomitris tristis</i> . | 23. <i>Otus wilsonianus</i> . |
| 11. <i>Cyanospiza amœna</i> . | 24. <i>Falco sparverius</i> . |
| 12. <i>Pipilo oregonus</i> . | 25. <i>Zenædura carolinensis</i> . |
| 13. <i>Icterus bullocki</i> . | |

6. *Birds of the sage-brush*.—The term “sage-brush” is the western vernacular for that shrubby growth which prevails over the valleys, mesas, and desert mountain-slopes of the Great Basin to the utter exclusion of all other vegetation, except in isolated and extremely restricted places. One species, the “everlasting sage-brush” (*Artemisia tridentata*), composes by far the larger part of that growth, “covering valleys and foot-hills in broad stretches farther than the eye can reach, the growth never so dense as to seriously obstruct the way, but very uniform over large surfaces, very rarely reaching to the saddle-height of a mule, and ordinarily but half that

altitude." The species just mentioned is not the exclusive component of the "sage-brush" however, for quite a number of other shrubs, belonging to many genera and several widely-different orders, are mingled with it in varying abundance, according to the nature of the soil, some prevailing on the most arid or sandy places, and others thriving best where the soil is strongly alkaline. Those additional to the species given above, are mainly the following, named in the order of their abundance: *Obione confertifolia* ("grease-wood"), *O. canescens*, *Sarcobatus vermiculatus*, *Linosyris viscidiflora*, *Grayia polygaloides*, *Halostachys occidentalis*, *Linosyris graveolens* ("broom-sage"), *Artemisia trifida*, *A. spinescens*, *Eurotia lanata*, *Purshia tridentata*, *Ephedra antisyphilitica*, and *Tetradymia canescens*. [See Botanical Report, p. xxvi.] The genera named above belong to the following orders: *Artemisia*, *Linosyris*, and *Tetradymia* to the Compositæ; *Obione*, *Sarcobatus*, *Grayia*, and *Eurotia* to the Chenopodiaceæ; *Purshia* to the Rosacæ, and *Ephedra* to the Gnetaceæ. The general aspect of these plants is quite the same, however, in the different species, all having a similar scraggy, stunted appearance, with dull-grayish foliage in which there is but the slightest suspicion of green, and a characteristic, disagreeable, pungent odor; and in the utter absence of other shrubs over areas hundreds of square miles in extent, they constitute a most miserable apology for vegetation.

The most numerous animals of these arid wastes are the various species of lizards, which are startled at every step as one walks along, and run nimbly to one side--some kinds disappearing like a flash, so swift are they, while the larger species in their flight scatter the fine gravel and sand so as to make it fairly rattle. These reptiles were most numerous in the western depression, and it was found that they abounded most on the burning deserts, farthest from water.

The birds characteristic of the sage-brush are not numerous, either as to species or individuals, but several of them are peculiar to these districts; the characteristic or peculiar species are these:—

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| 1. <i>Oreoscoptes montanus</i> . | 6. <i>Eremophila alpestris</i> . |
| 2. <i>Amphispiza nevadensis</i> . | 7. <i>Antrostomus nuttalli</i> . |
| 3. <i>Amphispiza bilineata</i> . | 8. <i>Chordeiles henryi</i> . |
| 4. <i>Spizella breweri</i> . | 9. <i>Speotyto hypogæa</i> . |
| 5. <i>Chondestes grammacus</i> . | 10. <i>Centrocercus urophasianus</i> . |

7. *Birds of the mountain-meadows or "parks."*—On the higher ranges of the Interior, the gentle slopes of the upper cañons support the richest or most varied vegetation of the entire region; especially is this the case when they incline so gently as to form broad and nearly level meadows on either side of the main stream, with pine forests and snow-fields on the higher ridges and a copious volume of water in all the brooks and rivulets. Here the streams are bordered for their whole length with a luxuriant shrubbery, the bushes consisting of numerous species, and overtopped here and there by occasional trees of the narrow-leaved cotton-wood (*Populus angustifolia*), sometimes of 50 or 60 feet in height. The higher slopes are densely matted with low but vigorous bushes of "laurel" (*Ceanothus velutinus*, *C. sorediatus*, and, in some ranges, *Arctostaphylos glauca*), with coriaceous, shining, deep- or dark-green foliage. The greater portion of these upper slopes, however, are mainly covered with a rank herbaceous growth, composed of very numerous species, and in season brilliant with a variety of flowers of beautiful or showy appearance, among which the blue spikes or panicles of *Lupinus* and *Pentstemon*, the orange-red bracts of *Castilleja*, and the lovely scarlet blossoms of *Gilia aggregata* are among the most conspicuous. Species of *Geranium* are also very prevalent in places, while, in many localities, low bushes of *Symphoricarpus montanus* are scattered through the herbage.

The birds most characteristic of these flowery slopes are not numerous, but among them are several fine singers, whose clear and musical voices are among the pleasant memories of these salubrious spots. The following are the most characteristic species:—

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|---|-------------------------------------|
| 1. <i>Zonotrichia intermedia</i> . (<i>Western ranges</i> .) | 6. <i>Pipilo chlorurus</i> . |
| 2. <i>Zonotrichia leucophrys</i> . (<i>Eastern ranges</i> .) | 7. <i>Stellula calliope</i> . |
| 3. <i>Passerella schistacea</i> . | 8. <i>Selasphorus platycercus</i> . |
| 4. <i>Pooecetes confinis</i> . | 9. <i>Trochilus alexandri</i> . |
| 5. <i>Melospiza lincolni</i> . | |

8. *Birds of the lowland-meadows.*—The lowland meadows include the bright sward of "salt-grass" (*Brizopyrum spicatum*, var. *strictum*) of the low river-valleys, the "bunch grass" (*Poa tenuifolia* and *Eriocoma cuspidata*), scattered over the foot-hills, the patches of "rye-grass" (*Elymus condensatus*?)

near the entrance to the cañons, and also the sedge and *tule* marshes, in the neighborhood of the lakes and rivers. The birds most characteristic of the meadows are all mostly peculiar to them, being seldom if ever found in other localities. Besides the land-birds here enumerated, a multitude of the water-fowl resort to the meadows during the breeding-season, but these are best given in a separate list. The most characteristic birds of the meadows are the following:—

1. *Telmatodytes paludicola* *Marshes.*
2. *Coturniculus perpallidus* *Dry meadows.*
3. *Passerculus alaudinus* *Wet meadows.*
4. *Agelæus phœniceus* *Marshes.*
5. *Xanthocephalus icterocephalus* .. *Marshes.*
6. *Sturnella neglecta* *Everywhere except in marshes.*
7. *Pediceetes columbianus* *Dry meadows.*
8. *Grus canadensis* *Wet meadows.*

9–11. *Mural Avifauna*.—This group is a rather heterogeneous one, part of the species being saxicoline, while others nest in vertical banks of earth; and of the former only two species keep altogether among the rocks, the others merely breeding there, the greater part of their time being spent in obtaining their food in other localities.

They may be grouped as follows:—

a. Species strictly saxicoline.

1. *Salpinctes obsoletus*.
 2. *Catherpes conspersus*.
- } *Modifying their habits in neighborhood of settlements.*

b. Species saxicoline only in nesting habits.

3. *Tachycineta thalassina*.—(*In other districts said to be arboreal.*)
 4. *Petrochelidon lunifrons*.
 5. *Hirundo horreorum*.
 6. *Sayornis sayus*.
 7. *Panyptila saxatilis*.
- } *Habits modified in settled districts.*

c. Nesting in earth-banks.

8. *Cotyle riparia*.
9. *Stelgidopteryx serripennis*.
10. *Ceryle alcyon*.

To group “*b*” of this list might be added such species as *Aquila canadensis* and *Falco polyagrus*, since these species usually build their eyries on

the narrow ledges or in niches on the face of cliffs, but their nesting-habits are too variable. The same objection might be urged in regard to *Tachycineta thalassina*, since in some localities this species nests in hollow trees, but along our route we found it to be everywhere strictly saxicoline.

12. *Aquatic birds*.—This group includes the vast multitude of water-fowl, both waders and swimmers; these inhabit chiefly the valleys, the following being the species which breed in the interior:—

- | | |
|--------------------------------------|--|
| 1. <i>Ægialitis vociferus</i> . | 22. <i>Branta canadensis</i> . |
| 2. <i>Ægialitis nivosus</i> . | 23. <i>Anas boschas</i> . |
| 3. <i>Steganopus wilsoni</i> . | 24. <i>Chaulelasmus streperus</i> . |
| 4. <i>Recurvirostra americana</i> . | 25. <i>Dafila acuta</i> . |
| 5. <i>Himantopus mexicanus</i> . | 26. <i>Spatula clypeata</i> . |
| 6. <i>Numenius longirostris</i> . | 27. <i>Querquedula discors</i> . |
| 7. <i>Tringoides macularius</i> . | 28. <i>Querquedula cyanoptera</i> . |
| 8. <i>Rhyacophilus solitarius</i> . | 29. <i>Nettion carolinensis</i> . |
| 9. <i>Tringa bairdi</i> . | 30. <i>Mareca americana</i> . |
| 10. <i>Tringa minutilla</i> . | 31. <i>Aix sponsa</i> . |
| 11. <i>Ereunetes pusillus</i> . | 32. <i>Erismatura rubida</i> . |
| 12. <i>Falcinellus guarauna</i> . | 33. <i>Larus californicus</i> . |
| 13. <i>Falcinellus thalassinus</i> . | 34. <i>Sterna regia</i> . |
| 14. <i>Ardea herodias</i> . | 35. <i>Sterna fosteri</i> . |
| 15. <i>Herodias egretta</i> . | 36. <i>Hydrochelidon lariformis</i> . |
| 16. <i>Nyctiardea nævia</i> . | 37. <i>Pelecanus erythrorhynchus</i> . |
| 17. <i>Botaurus minor</i> . | 38. <i>Graculus floridanus</i> . |
| 18. <i>Ardetta exilis</i> . | 39. <i>Podiceps occidentalis</i> . |
| 19. <i>Rallus virginianus</i> . | 40. <i>Podiceps cristatus</i> . |
| 20. <i>Porzana carolina</i> . | 41. <i>Podiceps californicus</i> . |
| 21. <i>Porzana jamaicensis</i> ? | |

In the preceding lists of the species characterizing special faunal sub-districts of the Great Basin, we have included mainly those which are common to the entire breadth of the Province. Other species, which might properly be assigned to these lists with respect to their habitats, are excluded, from the fact that they belong to only one side or the other of the Basin. The western series was lost almost immediately after our departure from the Sierra Nevada, very few being found even so far to the eastward of that range as the West Humboldt Mountains. The eastern series, however, presented itself much more gradually, additional species being met with in each successive high range to the eastward, the first of them appearing on

the lofty Toyabe Mountains, while a more decided accession of Rocky Mountain and Eastern forms was noticed on the Ruby and East Humboldt ranges, where, however, the number was far less than that encountered on the Wahsatch and in the Salt Lake Valley.

DESCRIPTION OF LOCALITIES WHERE COLLECTIONS OR OBSERVATIONS WERE MADE.

1. *Vicinity of Sacramento City, California* (June 6-29, 1867.)—The period of our stay at Sacramento being the midst of the dry season, when the valleys of California are parched by the excessive and protracted drought, the bird-life was found to be comparatively scant, and, as in the Interior, though not to so great an extent, confined within the very restricted limits where the vegetation was nourished by the presence of water—either that of natural streams or that derived from artificial irrigation. But even there the abundance of the birds was due to the number of individuals of each kind, rather than of the species themselves. Away from the vicinity of the city, the country at the time of our sojourn presented a scorched appearance, the rolling plains being destitute of rivulets or pools, all the surface-moisture having been long since extracted by the excessive and prolonged heat; the ground itself was baked to a tile-like hardness except where ground to dust, and what remained of the grass and herbage was burnt to a dingy yellow, while the scant foliage of the scattered oaks was desiccated to a russet-brownness. In the moister locations, near the river, the aspect of the landscape was more inviting, however, for green meadow-lands prevailed, with woods of good-sized trees along the river bank (among which the western plane tree, *Platanus racemosa*, was conspicuous from its white branches), with a pleasing variety of oak, willow, and cotton-wood copses, interspersed with cultivated farms, with here and there isolated large cotton-wood trees left in the fields for shade. Extensive marshes, connected with the river, were filled with tall rushes, or *tule* (*Scirpus validus*), and other aquatics, many of them being hemmed in by skirting jungles of willows and other shrubs, having a dense, often impenetrable, undergrowth. Waste places were overspread by a rank growth of wild chamomile, or dog-fennel (*Maruta cotula*), and large thistles, the latter standing chiefly in the fence-corners, where they presented to the

intruder a repellent front of frightful thorny spines. Upon the whole, but for the blue mass of Monte Diablo looming in the south, the long dim range of the Sierra Nevada bounding the eastern horizon, its crown of snow-fields glittering in the sunlight, and the brown Coast Range visible to the westward, one might readily imagine a familiar scene in the Mississippi Valley, so similar is the general aspect of the vegetation, in all its characteristic features, to that of a semi-prairie district, during the corresponding season. Not less striking was the likeness between the bird-fauna of the vicinity of Sacramento and that of a locality in the same latitude in the Mississippi Valley, although, as regards the number of species, the latter is by far the richer, since in Illinois, Missouri, or Iowa, an area having a relative proportion of prairie and woodland corresponding to the locality under consideration, will be found to possess at least one hundred species of birds during the breeding-season, many more having been found in certain districts.¹

Our camp was established in a very favorable locality, the outskirts of the city, where the surroundings were a pleasing variety of meadow and thicket, with the best collecting spots at convenient distance. The characteristic birds were the Red-head Linnet (*Carpodacus frontalis*), Gold-Finch (*Chrysomitris tristis*), Yellow Warbler (*Dendraeca æstiva*), Chipping Sparrow (*Spizella arizonæ*), and Wood Pewee (*Contopus richardsoni*), among the oaks; the Black-headed Grosbeak (*Hedymeles melanocephalus*), Traill's Flycatcher (*Empidonax pusillus*), and Least Vireo (*Vireo pusillus*), in the willow and cotton-wood copses; the Blue Grosbeak (*Guiraca cærulea*), Lazuli Bunting (*Cyanospiza amæna*), Brewer's Sparrow (*Spizella breweri*), and Lark Bunting (*Chondestes grammaca*), in the fields; Western King Bird (*Tyrannus verticalis*) and Bullock's Oriole (*Icterus bullocki*), in the large isolated cotton-wood trees; the Long-tailed House Wren (*Thryomanes spilurus*), and, if near water, the Black Pewee (*Sayornis nigricans*), about dwellings, with a great variety of water-fowl, identical in species with those inhabiting similar places in the Eastern States, found in the tule sloughs.

¹ In the lower Wabash Valley, of Indiana or Illinois, more than one hundred and fifty species are known to breed. [See Proc. Boston Soc. Nat. Hist., XVI, 1874.]

The following is a complete list of the birds found breeding at Sacramento between June 6th and July 4th:—

1. <i>Thryomanes spilurus</i>	<i>Common. ?</i>
2. <i>Dendroeca æstiva</i>	<i>Abundant.</i>
3. <i>Geothlypis trichas</i>	<i>Abundant.</i>
4. <i>Icteria longicauda</i>	<i>Abundant.</i>
5. <i>Hirundo horreorum</i>	<i>Abundant.</i>
6. <i>Progne subis</i>	<i>Abundant.</i>
7. <i>Petrochelidon lunifrons</i>	<i>Abundant.</i>
8. <i>Cotyle riparia</i>	<i>Common.</i>
9. <i>Stelgidopteryx serripennis</i>	<i>Common.</i>
10. <i>Vireosylvia swainsoni</i>	<i>Common.</i>
11. <i>Vireo pusillus</i>	<i>Common.</i>
12. <i>Collurio excubitoroides</i>	<i>Common.</i>
13. <i>Carpodacus frontalis</i>	<i>Abundant.</i>
14. <i>Chrysomitris tristis</i>	<i>Abundant.</i>
15. <i>Coturniculus perpallidus</i>	<i>Common.</i>
16. <i>Chondestes grammaca</i>	<i>Abundant.</i>
17. <i>Melospiza heermanni</i>	<i>Common.</i>
18. <i>Spizella breweri</i>	<i>Common.</i>
19. <i>Spizella arizonæ</i>	<i>Common.</i>
20. <i>Hedymeles melanocephalus</i>	<i>Common.</i>
21. <i>Guiraca cærulea</i>	<i>Common.</i>
22. <i>Cyanospiza amcæna</i>	<i>Common.</i>
23. <i>Pipilo oregonus</i>	<i>Common.</i>
24. <i>Agelæus gubernator</i>	<i>Abundant.</i>
25. <i>Agelæus tricolor</i>	<i>Abundant.</i>
26. <i>Xanthocephalus icterocephalus</i>	<i>Abundant.</i>
27. <i>Sturnella neglecta</i>	<i>Common.</i>
28. <i>Icterus bullocki</i>	<i>Abundant.</i>
29. <i>Tyrannus verticalis</i>	<i>Abundant.</i>
30. <i>Sayornis nigricans</i>	<i>Rare.</i>
31. <i>Contopus richardsoni</i>	<i>Abundant.</i>
32. <i>Empidonax pusillus</i>	<i>Abundant.</i>
33. <i>Coccyzus americanus</i>	<i>Rare.</i>
34. <i>Calypte annæ</i>	<i>Common.</i>
35. <i>Trochilus alexandri</i>	<i>Common.</i>
36. <i>Colaptes mexicanus</i>	<i>Rare.</i>
37. <i>Otus wilsonianus</i>	<i>Common.</i>
38. <i>Speotyto hypogæa</i>	<i>Abundant.</i>
39. <i>Falco sparverius</i>	<i>Abundant.</i>
40. <i>Zenædura carolinensis</i>	<i>Abundant.</i>
41. <i>Ægialitis vociferus</i>	<i>Abundant.</i>
42. <i>Ardea herodias</i>	<i>Common.</i>
43. <i>Herodias egretta</i>	<i>Rare.</i>

44. Butorides virescens.....	Abundant.
45. Nyctiardea nævia.....	Common.
46. Gallinula galeata.....	Abundant.
47. Fulica americana.....	Abundant.
48. Anas boschas	Abundant.
49. Chaulelasmus streperus.....	Abundant.
50. Querquedula cyanoptera	Abundant.
51. Aythya — sp.? 52. Larus — sp.?	Abundant.
53. Sterna forsteri ?	Abundant.
54. Hydrochelidon lariformis.....	Abundant.

Having alluded to the close similarity between the bird-fauna of the vicinity of Sacramento City and that of a locality of corresponding latitude in the Mississippi Valley, we select from the above list the species not belonging to the latter locality, they being as follows:—

1. Vireo pusillus.	9. Tyrannus verticalis.
2. Carpodacus frontalis.	10. Sayornis nigricans.
3. Spizella breweri.	11. Contopus richardsoni.
4. Cyanospiza amœna.	12. Calypte annæ.
5. Hedymeles melanocephalus.	13. Trochilus alexandri.
6. Pipilo oregonus.	14. Colaptes mexicanus.
7. Agelæus tricolor.	15. Speotyto hypogæa.
8. Icterus bullocki.	16. Querquedula cyauoptera.

Twelve of the above species are represented east of the Rocky Mountains by species so similar in appearance or habits that, to the common observer, they might readily pass for the same birds. These representative species are the following:—

<i>Western representatives.</i>	<i>Eastern representatives.</i>
Vireo pusillus, <i>representing</i>	Vireo belli.
Spizella breweri, <i>representing</i>	Spizella pallida.
Hedymeles melanocephalus, <i>representing</i>	Hedymeles ludovicianus.
Cyanospiza amœna, <i>representing</i>	Cyanospiza cyanea.
Pipilo oregonus, <i>representing</i>	Pipilo erythrophthalmus.
Icterus bullocki, <i>representing</i>	Icterus baltimore.
Tyrannus verticalis, <i>representing</i> ...	Tyrannus carolinensis.
Sayornis nigricans, <i>representing</i>	Sayornis fuscus.
Contopus richardsoni, <i>representing</i>	Contopus virens.
Trochilus alexandri, <i>representing</i>	Trochilus colubris.
Colaptes mexicanus, <i>representing</i>	Colaptes auratus.
Querquedula cyanoptera, <i>representing</i>	Querquedula discors.

It will thus be observed that the general *facies* of the avian-fauna of the two remote regions is so similar that out of a total of 54 species noted at Sacramento, only 4 are unrepresented in the eastern locality!¹

2. *From the Sacramento River to the foot-hills of the Sierra Nevada* (July 4-5).—This route lay across a rolling plain, of a character similar to that described before, except that the monotony of the dusty landscape was more frequently relieved by groves of low, spreading oaks, while occasional spots near springs or along running streams were quite refreshing from the cool shade they afforded. Such places were usually the site of a ranche, and called to mind a country-place in one of the less-thickly wooded portions of the Eastern States, the oak trees which, almost exclusively, composed the groves being exceedingly similar in size and general appearance to the white oak (*Quercus alba*). Among these trees sported the California and Nuttall's Woodpeckers (*Melanerpes formicivorus* and *Picus nuttalli*), whole troops of chattering Yellow-billed Magpies (*Pica nuttalli*), and an occasional screeching Valley Jay (*Cyanocitta californica*). The other species seen in these groves were the Ash-throated Flycatcher (*Myiarchus cinerascens*), Lewis's Woodpecker (*Melanerpes torquatus*), Black-capped Chickadee (*Parus occidentalis*), House Wren (*Troglodytes parkmanni*), Common Crow (*Corvus americanus*), Barn Owl (*Strix pratincola*), Mottled Owl (*Scops asio*), and Red-breasted Hawk (*Buteo elegans*); while on the plains, the Horned Lark (*Eremophila chrysolaema*), Burrowing Owl (*Speotyto hypogaea*), and Turkey Buzzard (*Rhinogryphus aura*) were observed. Nearly all these

¹ The winter fauna would, of course, be considerably different from that observed by us, on account of accessions from the ranks of species which spend the summer in the mountains or farther northward, as well as by the absence of some of the summer visitors. An esteemed correspondent, Mr. Gilbert R. Lansing, of San Francisco, has furnished a list of birds collected by him at Sacramento in March, 1873, which includes the following species not in our enumeration of summer birds:—

- | | |
|---|--|
| 1. <i>Chamæa fasciata</i> . March 23. | 5. <i>Cyanocitta californica</i> . |
| 2. <i>Hesperiphona vespertina</i> . March 16. | 6. <i>Zonotrichia intermedia</i> . |
| 3. <i>Junco oregonus</i> . | 7. <i>Zonotrichia coronata</i> . March 23. |
| 4. <i>Corvus carnivorus</i> . | 8. <i>Melospiza guttata</i> . March 16. |

Of the above, specimens were sent of Nos. 1, 2, 6, 7, and 8.

species were noticed from the very beginning of the open country, on the outskirts of the city, to the first foot-hills of the Sierra Nevada.

3. *The Sierra Nevada* (July 6-12).—The rolling plains became so gradually modified into more pronounced undulations, and these so imperceptibly into decided hills, that there was no abrupt change noticeable in either the fauna or the flora. With the first pine trees, however, were observed the Robin (*Turdus migratorius*), the California Bluebird (*Sialia mexicana*), and Brown Creeper (*Certhia americana*); while among the thick chaparral of the ravines and hill-sides the following species were seen for the first time:—

a. *Western foot-hills* (July 6-7).

- | | |
|------------------------------------|------------------------------------|
| 1. <i>Psaltirparus minimus</i> . | 4. <i>Pipilo crissalis</i> . |
| 2. <i>Poliopitila (cærulea?)</i> | 5. <i>Lophortyx californicus</i> . |
| 3. <i>Chrysomitris lawrencii</i> . | |

These species were not seen near the summit, but were gradually left behind as we ascended the now steeper slopes and entered a denser forest, where large and lofty coniferæ became exclusive. The three species previously mentioned, however, continued with us during the journey. As was the change from the plains to the foot-hills a very gradual one, so did the mixed woods and chaparral of the latter, in which deciduous trees and shrubs abounded, become as imperceptibly transformed into denser and loftier forests, where coniferæ first greatly prevailed and then constituted the entire sylvæ. The change was indeed so gradual that we could detect no well-defined point where there was a marked difference in the birds observed; one species after another being left behind, while one by one new ones made their appearance, so that it was found impossible to fix a boundary-line between two regions. The "Mountain Jay" (*Cyanura frontalis*) was met with long before we lost sight of the "Valley Jay" (*Cyanocitta californica*), and the "Valley Quail" (*Lophortyx californicus*) was common, and leading its young, in ravines, beside which the pines resounded with the screams of the Mountain Jay and Nutcracker (*Picicorvus columbianus*) and the tapping of pinicoline Woodpeckers (*Sphyrapicus ruber* and *Picus albolarvatus*).

b. The western slope.

At an altitude of about 5,000 feet, all the species characteristic of the foot-hills were lost sight of, the Louisiana Tanager (*Pyrrhula ludoviciana*) and Audubon's Warbler (*Dendroica auduboni*) made their first appearance, the Mountain Jay and Nutcracker and the Woodpeckers above mentioned became more numerous, while the dark ravines below the road echoed with the carols of Townsend's Solitaire (*Myiadestes townsendi*) and the Oregon Thrush (*Turdus ustulatus*), and the chattering of the Dippers (*Cinclus mexicanus*).

c. The summit (July 9).

At an altitude of about 7,000 feet snow lay, even at this season of the year, in situations protected from the sun. The pine forests continued, but were more interrupted, with occasional park-like openings, in one of which, known as the "Summit Meadows," we established our camp. Snow-capped peaks were in sight on every hand, while around the borders of the broad meadow snow-banks lay, protected by the shade of the majestic pines; and a strange sight it was to see, almost touching the snow, beds of flowers which, in variety of form and splendor of coloring, might vie with the choicest to be seen in our gardens or conservatories; while the park itself was so overspread by a plant bearing bright-yellow blossoms, that this was the prevailing color of the surface. Scattered over this meadow were clumps of low spreading dwarf-willow bushes, from the tops of which numerous White-crowned Sparrows (*Zonotrichia intermedia*) were singing beautifully during the evening, and now and then throughout the night. The other more conspicuous birds of this charming spot were the Common Robin (*Turdus migratorius*), the California Bluebird (*Sialia mexicana*), and the Oregon Snow-bird (*Junco oregonus*).¹

¹Owing to the unsatisfactory nature of our opportunities for studying the avifauna of this interesting and exceedingly rich district, our notes are necessarily meager. It is therefore with great pleasure that we avail ourselves of the experience of Mr. E. W. Nelson, of Chicago, who made collections on the western slope of the Sierra Nevada, chiefly in the vicinity of Nevada City. We quote from Mr. Nelson what is of direct interest in this connection: [See Proc. Boston Soc. Nat. Hist., Vol. XVII, Jan. 20, 1875, pp. 355-365. "Notes on Birds observed in portions of Utah, Nevada, and California." "IV. Notes on Birds observed in the vicinity of Nevada City, Cal., between

d. The eastern slope (July 10-12).

The descent from the summit down the eastern slope was much more rapid than had been our ascent of the other side. The forest, however, continued much the same, but the trees were appreciably smaller, becoming more so as we descended. The only new bird detected during our hurried

August 15 and December 15, 1872."] "This locality has an intermediate situation between the lofty peaks and the foot-hills of the Sierra Nevadas, and is in the midst of the gold-mining region. My visit being in the last of the dry season, when the vegetation is dried up by the hot sun, probably many of the spring and early summer residents had gone farther down, where the farms are more numerous and less parched than the uncultivated hills surrounding Nevada.

In November, while collecting twenty miles farther down, we found many species abundant which were rare at Nevada; among which may be mentioned, *Sturnella neglecta*, *Zonotrichia coronata*, and *Glaucidium californicum*, which assembled in numbers around our camp-fires every night and serenaded us with their curious notes; [Note.—Mr. Henshaw suggests that this owl may have been *Scops flammeola*, which has this habit, while the *Glaucidium* is diurnal and crepuscular.] also, *Lophortyx californicus*, *Oreortyx pictus*, and many others, were observed on the cultivated flats, which were rare at Nevada." We give below a full list of the species found by Mr. Nelson at Nevada City, those which we did not see in ascending the western slope in July being distinguished by an asterisk:—

1. *Turdus migratorius*. Aug.—Oct.
2. *Turdus ustulatus*. Common; Aug.—Nov.
- *3. *Oreoscoptes montanus*. Oct.; two pairs.
4. *Sialia mexicana*. Last of Sept.—last of Nov.
5. *Regulus calendula*. Last Sept.—first Dec.
- *6. *Chamæa fasciata*. Nov.; one pair.
- *7. *Lophophanes inornatus*. First Oct.—Nov.
- *8. *Parus occidentalis*. Nov.; high mountains.
- *9. *Psaltriparus minimus*. Oct.—Dec.; very abundant.
10. *Certhia americana*. Aug.—Dec.
- *11. *Thryomanes spilurus*. Aug.—Nov.
- *12. *Troglodytes parkmanni*. Oct.; one spec.
- *13. *Helminthophaga ruficapilla*. Last Sept.; one spec.
14. *Dendroæca æstiva*.
- *15. *Dendroæca nigrescens*. Sept.—1st Nov.; common.
16. *Dendroæca auduboni*. Abundant after Oct. 1st.
- *17. *Geothlypis macgillivrayi*. Sept.; two specs.
- *18. *Myiodioctes pusillus*. Last Sept.; one spec.
19. *Pyrranga ludoviciana*. Oct.; rare.
20. *Hirundo horreorum*. Aug.—Sept.
- *21. *Carpodacus californicus*. First two weeks in October; common.
22. *Chrysomitris pinus*. Last Sept.—first Nov.
- *23. *Chrysomitris psaltria*. Aug.—Sept.; very abundant.

trip was a solitary Rock Wren (*Salpinctes obsoletus*) perched upon a boulder, in a rather open region, soon after passing the summit of the Pass.

4. *Glendale, or Truckee Meadows* (July 16–20; November 7–21. *Altitude 4,372 feet*).—The Truckee Meadows, so called from the fact that hay

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- 24. *Passerculus alaudinus*. Oct. 1st.
 - *25. *Melospiza heermanni*. Not common.
 - 26. *Junco oregonus*. Aug.–last Nov.
 - 27. *Spizella arizonæ*. Abundant.
 - *28. *Spizella breweri*. Sept.–Oct.; abundant.
 - *29. *Zonotrichia coronata*. Last of October; common.
 - *30. *Chondestes grammacus*. Aug.–Oct.; very abundant.
 - *31. *Passerella townsendi*. Aug.–last Oct.; abundant.
 - 32. *Hedymeles melanocephalus*. Aug.–last Sept.
 - 33. *Pipilo oregonus*. Aug.–middle Nov.
 - 34. *Pipilo crissalis*. Oct. 1st; one spec.
 - *35. *Pipilo chlorurus*. Common.
 - 36. *Sturnella neglecta*. Common.
 - 37. *Icterus bullocki*. Oct.; one spec. (♀).
 - 38. *Scolecophagus cyanocephalus*. First November.
 - 39. *Corvus americanus* (given as *C. caurinus*, but probably not). Last Nov.; 1 flock.
 - 40. *Cyanura frontalis*. Very abundant.
 - 41. *Cyanocitta californica*. Very abundant.
 - *42. *Sayornis nigricans*. Aug.–last Nov.; common in Sept.
 - 43. *Contopus richardsoni*. Sept.; rare.
 - 44. *Empidonax pusillus*. Last Sept.; one spec.
 - 45. *Antrostomus nuttalli*. Last Oct.; one spec.
 - *46. *Calypte annæ*. Aug.–middle Oct.; common.
 - *47. *Geococcyx californianus*. Rare; not seen.
 - *48. *Hylatomus pileatus*. Not common.
 - 49. *Picus albolarvatus*. Common until last Nov.
 - *50. *Picus nuttalli*. Common.
 - 51. *Picus harrisi*. Rare.
 - *52. *Picus gairdneri*. Common until last Nov.
 - 53. *Sphyrapicus ruber*. Oct.–Dec.; common.
 - *54. *Melanerpes formicivorus*. Very common.
 - *55. *Melanerpes torquatus*. Middle Oct.–Dec.
 - 56. *Colaptes mexicanus*. Abundant.
 - *57. ? *Scops asio*. Not seen.
 - *58. *Glaucidium gnoma*. Rare.
 - *59. *Nisus fuscus*. Common from Aug.–Dec. 1st.
 - 60. "Buteo, sp." [Probably *B. borealis calurus* or *B. swainsoni*].
 - *61. *Haliaeetus leucocephalus*. Nov.; one spec.
 - 62. "Cathartes, sp." [Probably *Rhinogryphus aura* Oct.].
 - *63. *Columba fasciata*. Oct.; one flock.
 - 64. *Zenaidura carolinensis*. Common until middle Nov.

for the Virginia City market is the chief production of the settlement, lie on the eastern side of the valley, between the Sierra Nevada and the Comstock, or Virginia Mountains, the first of the desert ranges. Through the middle portion of these extensive meadows the Truckee River courses, its banks being fringed with dense thickets of rather tall willows, growing about fifteen feet high. During the summer these luxuriant meadows were the abode of numerous water-fowl, while in the thickets Magpies (*Pica hudsonica*) and smaller birds were abundant. The species found in this locality were the following:—

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|--|--------------------------------------|
| 1. <i>Telmatoctes paludicola</i> . | 23. <i>Pica hudsonica</i> . |
| 2. <i>Dendroica æstiva</i> . | 24. <i>Empidonax pusillus</i> . |
| 3. <i>Geothlypis trichas</i> . | 25. <i>Chordeiles henryi</i> . |
| 4. <i>Icteria longicauda</i> . | 26. <i>Ceryle alcyon</i> . |
| 5. <i>Pyranga ludoviciana</i> . | 27. <i>Colaptes mexicanus</i> . |
| 6. <i>Hirundo horreorum</i> . | 28. <i>Circus hudsonius</i> . |
| 7. <i>Petrochelidon lunifrons</i> . | 29. <i>Zenaidura carolinensis</i> . |
| 8. <i>Stelgidopteryx serripennis</i> . | 30. <i>Ægialitis vociferus</i> . |
| 9. <i>Cotyle riparia</i> . | 31. <i>Recurvirostra americana</i> . |
| 10. <i>Vireosylva swainsoni</i> . | 32. <i>Himantopus mexicanus</i> . |
| 11. <i>Collurio excubitoroides</i> . | 33. <i>Rhyacophilus solitarius</i> . |
| 12. <i>Passerculus alaudinus</i> . | 34. <i>Tringoides macularius</i> . |
| 13. <i>Poocetes confinis</i> . | 35. <i>Botaurus minor</i> . |
| 14. <i>Melospiza heermanni</i> . | 36. <i>Porzana carolina</i> . |
| 15. <i>Chondestes grammacus</i> . | 37. <i>Anas boschas</i> . |
| 16. <i>Hedymeles melanocephalus</i> . | 38. <i>Chaulelasmus streperus</i> . |
| 17. <i>Cyanospiza amœna</i> . | 39. <i>Mareca americana</i> . |
| 18. <i>Pipilo oregonus</i> . | 40. <i>Dafila acuta</i> . |
| 19. <i>Xanthocephalus icterocephalus</i> . | 41. <i>Spatula clypeata</i> . |
| 20. <i>Agelæus phœniceus</i> . | 42. <i>Querquedula cyanoptera</i> . |
| 21. <i>Sturnella neglecta</i> . | 43. <i>Nettion carolinensis</i> . |
| 22. <i>Icterus bullocki</i> . | |

*65. ? *Canace obscura*. ["*Canace canadensis*, var. *franklini*." Probably *C. obscura*, which is abundant on the Sierra Nevada.]

*66. *Oreortyx pictus*. Abundant after Oct. 1st.

67. *Lophortyx californicus*. Abundant.

68. *Ægialitis vociferus*. Oct.

*69. *Gallinago wilsoni*. Nov.; two specs.

*70. *Branta canadensis*. Nov.

*71. *Anas boschas*. Not seen.

*72. *Pelecanus erythrorhynchus*. Oct.; one flock passing over.

The more noteworthy of the above species are *Chamaea fasciata*, *Sayornis nigricans*, and *Calypte annæ*, which would hardly have been supposed to occur so high up among these mountains.

In November, the following additional species were found, while many of the above were wanting:—

<i>Anthus ludovicianus.</i>	<i>Colaptes</i> (?) [a yellow-shafted species, probably <i>C. auratus</i> .]
<i>Turdus migratorius.</i>	<i>Falco columbarius.</i>
<i>Cinclus mexicanus.</i>	<i>Archibuteo sancti-johannis.</i>
<i>Spizella monticola.</i>	<i>Gallinago wilsoni.</i>
<i>Eremophila alpestris.</i>	<i>Columba fasciata.</i> ¹
<i>Agelæus gubernator.</i>	<i>Branta hutchinsi.</i>
<i>Corvus carnivorus.</i>	<i>Podilymbus podiceps.</i>
<i>Corvus americanus.</i>	

The most abundant of these were *Anthus ludovicianus*, *Agelæus phæniceus*, *A. gubernator*, *Archibuteo sancti-johannis*, and *Branta hutchinsi*.

5. *Big-Bend of the Truckee* (altitude, 3,995 feet; July 24–August 18.)—After emerging from its deep, narrow gorge through the Virginia Mountains, the Truckee River bends abruptly to the left, and flows toward the north-west into Pyramid Lake, about thirty miles distant. The vicinity of our camp at this place proved a rich locality for birds, for the narrow valley of the river was very fertile, supporting a rich and varied vegetation, while the arid sage-brush plain stretched off on one side to the Humboldt Desert, and in the opposite direction to the Virginia Mountains. Only the very few birds characteristic of the desert could exist upon the surrounding sandy wastes, and, as a consequence, the fertile valley was rich in the number of species and individuals crowded within the narrow limits embraced between the steep earth-walls. Along the bank of the river, and surrounding the sloughs connected with the stream, were exceedingly dense willow-jungles, the sloughs themselves being filled with rushes, flags, and other aquatic plants; but most of the valley consisted of meadow-land, interspersed with velvety swards of “salt-grass” and acres of beautiful sun-flowers (*Helianthus giganteus*), studded with fine large cotton-wood trees (*Populus monilifera* and *P. trichocarpa*), which were here and there grouped into delightful groves, sometimes unincumbered, but generally with a shrubby undergrowth, amongst which the “buffalo-berry” (*Shepherdia argentea*) was conspicuous. No birds, excepting Mourning Doves

¹ A single specimen of what was probably this species was observed, flying over, on the 19th of November.

(*Zenædura carolinensis*), were breeding at the time of our sojourn; nor was the fauna particularly interesting, except from the occurrence of swarms of the Rufous Hummer (*Selasphorus rufus*) among the sun-flowers, and of several pairs of the Eastern Kingbird (*Tyrannus carolinensis*), which appeared to have bred in the cotton-wood trees, a few individuals of *Coccyzus americanus* and *Myiodiocetes pusillus*, and several families of *Sialia mexicana*, being the only other birds of note which came under our observation.

6. *Truckee Reservation, near Pyramid Lake* (August 10–16, 1867; December 9–19, 1867; May 15–June 6, 1868).—Investigations along the lower portion of the Truckee Valley extended from the shore of Pyramid Lake several miles up the river, and embraced several trips across the desert mesa to the northern end of the Virginia range, fronting on the southern shore of the lake, besides occasional visits to the islands within the lake. The fertile valley of the river received the principal attention, however, on account of the abundance of its birds; and, as respects the character of the locality where our observations were mostly made, there was no material difference from the surroundings of our former camp at the Big-Bend, twenty-five miles above, except that the valley was considerably broader and the cotton-wood groves proportionately more extensive. During our sojourn here, from May 15th to June 6th, one hundred and two species were observed in the valley of the river, most, if not all, of them breeding in the locality. The following are the species observed:—

1. *Turdus ustulatus*..... *One specimen.*
2. *Oreoscoptes montanus*..... *Common.*
3. *Troglodytes parkmanni*..... *Abundant.*
4. *Telmatodytes paludicola*..... *Abundant.*
5. *Dendræca æstiva*..... *Abundant.*
6. *Geothlypis trichas*..... *Common.*
7. *Icteria longicauda*..... *Common.*
8. *Pyrrhuloxia ludoviciana*..... *Common.*
9. *Hirundo horreorum*..... *Common.*
10. *Tachycineta bicolor*..... *Abundant.*
11. *Tachycineta thalassina*..... *Common.*
12. *Progne subis*..... *Rare.*
13. *Stelgidopteryx serripennis*..... *Abundant.*
14. *Cotyle riparia*..... *Abundant.*
15. *Petrochelidon lunifrons*..... *Abundant.*
16. *Vireosylva swainsoni*..... *Abundant.*

17. <i>Collurio excubitoroides</i>	<i>Common.</i>
18. <i>Carpodacus frontalis</i>	<i>Common.</i>
19. <i>Chrysomitris tristis</i>	<i>Rare.</i>
20. <i>Passerculus alandinus</i>	<i>Common.</i>
21. <i>Poocetes gramineus</i>	<i>Rare.</i>
22. <i>Melospiza heermanni</i>	<i>Abundant.</i>
23. <i>Amphispiza bilineata</i>	<i>Common.</i>
24. <i>Amphispiza nevadensis</i>	<i>Abundant.</i>
25. <i>Spizella arizonæ</i>	<i>Abundant.</i>
26. <i>Spizella breweri</i>	<i>Abundant.</i>
27. <i>Chondestes grammaca</i>	<i>Abundant.</i>
28. <i>Hedymeles melanocephalus</i>	<i>Common.</i>
29. <i>Cyanospiza amœna</i>	<i>Rare.</i>
30. <i>Pipilo oregonus</i>	<i>Common.</i>
31. <i>Pipilo chlorurus</i>	<i>Rare.</i>
32. <i>Molothrus ater</i>	<i>Rare.</i>
33. <i>Agelæus phœniceus</i>	<i>Abundant.</i>
34. <i>Xanthocephalus icterocephalus</i>	<i>Abundant.</i>
35. <i>Sturnella neglecta</i>	<i>Abundant.</i>
36. <i>Icterus bullocki</i>	<i>Abundant.</i>
37. <i>Pica hudsonica</i>	<i>Abundant.</i>
38. <i>Tyrannus verticalis</i>	<i>Abundant.</i>
39. <i>Myiarchus cinerascens</i>	<i>Rare.</i>
40. <i>Sayornis sayus</i>	<i>Rare.</i>
41. <i>Contopus richardsoni</i>	<i>Abundant.</i>
42. <i>Empidonax pusillus</i>	<i>Abundant.</i>
43. <i>Chordeiles henryi</i>	<i>Common.</i>
44. <i>Nephœetes borealis</i>	<i>Rare.</i>
45. <i>Chætura vauxi</i>	<i>Common.</i>
46. <i>Trochilus alexandri</i>	<i>Abundant.</i>
47. <i>Ceryle alcyon</i>	<i>Common.</i>
48. <i>Picus harrisi</i>	<i>Common.</i>
49. <i>Colaptes mexicanus</i>	<i>Abundant.</i>
50. <i>Bubo subarcticus</i>	<i>Common.</i>
51. <i>Otus wilsonianus</i>	<i>Common.</i>
52. <i>Circus hudsonius</i>	<i>Abundant.</i>
53. <i>Falco sparverius</i>	<i>Abundant.</i>
54. <i>Falco nævus</i>	<i>One pair.</i>
55. <i>Buteo calurus</i>	<i>Common.</i>
56. <i>Buteo swainsoni</i>	<i>Common.</i>
57. <i>Haliaëtus leucocephalus</i>	<i>Rare.</i>
58. <i>Pandion carolinensis</i>	<i>Rare.</i>
59. <i>Rhinogryphus aura</i>	<i>Abundant.</i>
60. <i>Zenædura carolinensis</i>	<i>Extremely abundant.</i>
61. <i>Ægialitis vociferus</i>	<i>Common.</i>
62. <i>Recurvirostra americana</i>	<i>Common.</i>
63. <i>Himantopus mexicanus</i>	<i>Common.</i>

64. <i>Steganopus wilsoni</i>	<i>Rare.</i>
65. <i>Tringa americana</i>	<i>Rare.</i>
66. <i>Tringa bairdi</i>	<i>Rare.</i>
67. <i>Tringa minutilla</i>	<i>Abundant.</i>
68. <i>Ereunetes pusillus</i>	<i>Abundant.</i>
69. <i>Rhyacophilus solitarius</i>	<i>Rare.</i>
70. <i>Tringoides macularius</i>	<i>Common.</i>
71. <i>Numenius longirostris</i>	<i>Common.</i>
72. <i>Symphemia semipalmata</i>	<i>Rare.</i>
73. <i>Ardea herodias</i>	<i>Abundant.</i>
74. <i>Herodias egretta</i>	<i>Rare.</i>
75. <i>Nyctiardea naevia</i>	<i>Rare.</i>
76. <i>Botaurus minor</i>	<i>Common.</i>
77. <i>Ardetta exilis</i>	<i>Rare.</i>
78. <i>Falcinellus thalassinus</i>	<i>Rare.</i>
79. <i>Grus canadensis</i>	<i>Rare.</i>
80. <i>Rallus virginianus</i>	<i>Rare.</i>
81. <i>Porzana carolina</i>	<i>Common.</i>
82. <i>Fulica americana</i>	<i>Very abundant.</i>
83. <i>Branta canadensis</i>	<i>Common.</i>
84. <i>Anas boschas</i>	<i>Abundant.</i>
85. <i>Chaulelasmus streperus</i>	<i>Abundant.</i>
86. <i>Mareca americana</i>	<i>Abundant.</i>
87. <i>Querquedula discors</i>	<i>Rare. ?</i>
88. <i>Querquedula cyanoptera</i>	<i>Common.</i>
89. <i>Dafila acuta</i>	<i>Rare.</i>
90. <i>Spatula clypeata</i>	<i>Common.</i>
91. <i>Aythya vallisneria</i>	<i>Rare.</i>
92. <i>Aix sponsa</i>	<i>Rare.</i>
93. <i>Lophodytes cucullatus</i>	<i>Rare.</i>
94. <i>Erismatura rubida</i>	<i>Rare.</i>
95. <i>Pelecanus erythrorhynchus</i>	<i>Very abundant.</i>
96. <i>Graculus floridanus</i>	<i>Abundant.</i>
97. <i>Larus californicus</i>	<i>Very abundant.</i>
98. <i>Sterna regia</i>	<i>Rare.</i>
99. <i>Sterna forsteri</i>	<i>Rare.</i>
100. <i>Podiceps occidentalis</i>	<i>Abundant.</i>
101. <i>Podiceps californicus</i>	<i>Common.</i>
102. <i>Podilymbus podiceps</i>	<i>Common.</i>

In the above list are the following species which were not observed during the preceding July and August at the Big Bend:—

- | | |
|----------------------------------|---------------------------------|
| 1. <i>Turdus ustulatus</i> . | 4. <i>Nephæcetes borealis</i> . |
| 2. <i>Carpodacus frontalis</i> . | 5. <i>Chætura vauxi</i> . |
| 3. <i>Molothrus pecoris</i> . | 6. <i>Trochilus alexandri</i> . |

All of these were undoubtedly breeding, except the first, a mountain bird, of which only a single individual was seen, probably the last lingering one from the spring migration. It is also a noteworthy fact that *Tyrannus carolinensis*, *Myiodiocetes pusillus*, and *Selasphorus rufus*, found at the Big Bend in July and August, were not observed in the lower portion of the valley in May and the early part of June.

As the above list embraces only those species found within the valley proper of the river, including the marshes at its mouth, other localities produced additional species; thus, on the mesa stretching from the valley to the Virginia Mountains, *Eremophila alpestris*, *Antrostomus nuttalli*, *Speotyto hypogæa*, and *Centrocerus urophasianus* were found.

This locality was visited the previous winter, when the fauna was quite different, the following species, not in the summer-list, having been observed:—

1. <i>Regulus calendula</i>	<i>Abundant.</i>
2. <i>Anthus ludovicianus</i>	<i>Very abundant.</i>
3. <i>Dendroeca auduboni</i>	<i>Abundant.</i>
4. <i>Sialia arctica</i>	<i>Rare.</i>
5. <i>Troglodytes pacificus</i>	<i>Rare.</i>
6. <i>Certhia americana</i>	<i>Rare.</i>
7. <i>Zonotrichia intermedia</i>	<i>Abundant.</i>
8. <i>Junco oregonus</i>	<i>Abundant.</i>
9. <i>Spizella monticola</i>	<i>Common.</i>
10. <i>Falco columbarius</i>	<i>Rare.</i>
11. <i>Archibuteo sancti-johannis</i>	<i>Rare.</i>
12. <i>Cygnus (buccinator?)</i>	<i>Abundant.</i>
13. <i>Anser albatus</i>	<i>Abundant.</i>
14. <i>Branta hutchinsi</i>	<i>Abundant.</i>
15. <i>Branta nigricans</i>	<i>Rare. ?</i>
16. <i>Aythya americana</i>	<i>Common.</i>
17. <i>Aythya vallisneria</i>	<i>Common.</i>
18. <i>Fulix marila</i>	<i>Abundant.</i>
19. <i>Fulix affinis</i>	<i>Abundant.</i>
20. <i>Fulix collaris</i>	<i>Abundant.</i>
21. <i>Bucephala albeola</i>	<i>Abundant.</i>
22. <i>Bucephala americana</i>	<i>Abundant.</i>
23. <i>Mergus americanus</i>	<i>Common.</i>
24. <i>Mergus serrator</i>	<i>Common.</i>
25. <i>Erismatura rubida</i>	<i>Common.</i>
26. <i>Larus delawarensis</i>	<i>Common.</i>

Besides the land-birds marked as abundant in the above list, the other more characteristic winter residents were *Amphispiza nevadensis*, *Melospiza heermanni*, and *Pipilo oregonus*. *Turdus migratorius*, *Troglodytes parkmanni*, *Ceryle alcyon*, *Nettion carolinensis*, and *Mareca americana* were also among the winter residents.

7. *Islands of Pyramid Lake* (August, 1867, and May, 1868).—The two islands investigated ornithologically are the main island and the one known as "The Pyramid," from the latter of which the lake receives its name. The former is about ten miles distant from the mouth of the Truckee River and about two miles from the nearest point on the eastern shore. Its shores are, for the most part, abrupt and precipitous, though not high, there being but two convenient landing-places, each a pointed beach of sand extending far out into the water. The island is about three miles in circuit, while in the middle it rises into two bold peaks, each about five hundred feet in height. In May, 1868, we found the limited shore near the southern beach thickly covered with remarkably large grease-wood bushes, on the top of each of which, at the height of about five feet from the ground, was the immense, elaborate nest of a pair of Great Blue Herons (*Ardea herodias*). Not a hundred yards distant, in an oven-like recess in the face of the precipitous rock forming the shore, and inaccessible, was the deserted eyrie of a Bald Eagle (*Haliaeetus leucocephalus*); on the elevated portion of the northern beach several hundreds of Pelicans (*P. erythrorhynchus*) were breeding; on a rocky plateau between the northern peak and the shore an immense colony of Gulls (*Larus californicus*) had their nests, while swarms of Violet-green Swallows (*Tachycineta thalassina*) were passing into and out of the crevices of the high cliffs near by. "The Pyramid" is close to the eastern shore, and appears as a huge rock of very regular pyramidal shape, rising about three hundred feet above the surface of the lake. Its base is a nearly perfect triangle, each side being a sheer precipice from the water to the height of a hundred and fifty feet, while only one of the three corners was found to be easily accessible from the boat. Tempted by the sight of numerous nests near the top, among them being one belonging to a pair of Falcons (*F. naevius*), which flew, clamoring, around, we ascended this corner, and, after a careful climb without looking about, reached the almost

pointed summit. The view toward the water was a frightful one. In no direction could be seen more than the upper third of the rock, and thus the only one possible path by which we had ascended was lost to view. Looking down into the depths of the deep-blue water, three hundred feet below, we could see the pointed ends of similar pyramidal rocks submerged many feet below the surface, and only visible from this height. The descent was finally accomplished by exercising the utmost caution in selecting the path, in which indispensable aid was furnished by our boatmen, who, having watched us ascend, often directed us when we were at a loss which way to proceed. The only species breeding on this isolated cliff were the Great Blue Heron and Peregrine Falcon, there being of the latter but one pair in the vicinity.

Along the neighboring shore were many rocks of peculiar form and structure, styled by our geologists "tufa-domes;" these usually had rounded or domed tops, and were thickly incrustated with calcareous-tufa, while beneath they were honey-combed with winding passages and deep grottoes. Among these rocks several birds were nesting, conspicuous among which were the Barn Swallow, Say's Pewee, and the "House Finch" (*Carpodacus frontalis*), the nests of the latter, placed on shelves of projecting rock inside of caverns, affording another, and very remarkable, instance of the ease with which this species accommodates itself to circumstances in selecting a site for its nest.

8. *Comstock or Virginia Mountains, near Pyramid Lake* (December 24–27, 1867).—From the south end of Pyramid Lake a wide cañon leads up into these mountains, and this was ascended for a considerable distance on three occasions—twice in December and once in June. The slopes of this cañon were dotted with scattered cedar and piñon groves, and in many places were covered with bunch-grass meadows, while along the stream was the fringe of shrubbery usual to the banks of mountain-streams in the Great Basin. In December, *Myiadestes townsendi* was found in the cedar groves, while *Oreortyx pictus* was common in the open portions.

9. *Washoe Valley* (April 25–May 9, 1868).—This valley is one of the most beautiful in Nevada. Its form is that of an amphitheater inclosed

on all sides by mountains, the lofty, snow-capped, and pine-clad Washoe spur of the Sierra Nevada on the west, and the high desert range known as the Comstock or Virginia Mountains on the east, with ranges of elevated hills connecting the two on the north and south sides of the valley. Entering this park from the south, Washoe Lake is seen, shining like silver, to the right, while the steep slopes of the dark-green Sierra form an abrupt wall on the left, the pine forests projecting, in places, upon the grassy valley in beautiful groves, destitute of undergrowth and carpeted by a clean green-sward. In these groves Purple Finches (*Carpodacus cassini*) sweetly warbled, and the Robins sang their mellow carols, while Magpies and Woodpeckers (*Pica hudsonica* and *Melanerpes torquatus*) sported among the trees. Higher up in one of these groves, where alder thickets grew along the stream, the Thick-billed Sparrow (*Passerella megarhyncha*) delighted us with its rich and powerful song, while Blue Jays (*Cyanura frontalis*) and Woodpeckers (*Picus albolarvatus* and *Sphyrapicus thyroideus*) were seen on every hand. After leaving these pine groves and crossing the valley to the edge of the lake, we noticed numbers of Terns (*Sterna regia*, *S. fosteri*, and *Hydrochelidon lariformis*) flitting and hovering over the water, while the surface of the lake itself was dotted with swimming-birds, among which were identified the Coot (*Fulica americana*), Grebes (*Podiceps occidentalis* and *P. californicus*), besides several of the commoner ducks.

10. *Steamboat Valley* (January 3-5, 1867; May 9, 1868).—On account of an accident to our vehicle while returning from Pyramid Lake, we were obliged to stop at the way-side hotel in this valley for repairs. The delay, however, was compensated by the pleasure of making some desirable additions to our collection. The ground was covered with snow, so that many birds flocked to the neighborhood of the buildings for food, and from among these were obtained specimens of *Eremophila alpestris*, *Sialia arctica*, *Colaptes mexicanus*, *C. "hybridus"* (one specimen), and *Pica hudsonica*; while from a willow thicket in the meadow near by were secured a pair of *Otus wilsonianus*.

Another portion of this valley, the narrow cañon of a stream flowing from Washoe Peak, we passed through on the 9th of May, 1868, after

leaving Washoe Valley, and observed, for the first time that spring, *Dendræca æstiva*, *Cyanospiza amœna*, and *Icterus bullocki*.¹

11. *Carson City, Nevada* (November 25–December 4, 1867; January 13–April 29, 1868).—Carson City (altitude 4,700 feet) constituted a central point from which investigations radiated to localities of very dissimilar character; the pine-forests of the Sierra Nevada to the west, and the scant groves of low gnarled cedars and piñon on the otherwise bare ranges to the eastward; the grassy valley of the Carson River, with its thickets of small willows; the cultivated fields, and the general open waste of sage-brush plain.

a. Pines of the Sierra Nevada.

The pine-forests of the eastern slope of the Sierra Nevada had originally extended from the timber-line, near the summits of these high mountains, down to their very base, ceasing abruptly where the valley began, except in a few places where they stood out in scattered groves upon the edge of the gentle slope at their foot; and, although composed of trees far less tall and massive than those on the western slope, were yet quite as dense and continuous, where left untouched by the hand of man. But,

¹ The dates of arrival of spring birds in western Nevada, in 1868, were as follows, so far as noted :—

Along the shore of Washoe Lake.

1. *Fulica americana*..... May 9.
2. *Sterna regia* May 9.
3. *Hydrochelidon lariformis* May 9.

In Steamboat Valley.

4. *Dendræca æstiva*..... May 9.
5. *Cyanospiza amœna*..... May 9.
6. *Icterus bullocki* May 9.

Along the Truckee, at Truckee Meadows.

7. *Geothlypis trichas*..... May 10.
8. *Icteria longicauda*..... May 10.
9. *Pyrrhuloxia ludoviciana* May 10.

In the lower Truckee Valley.

10. *Carpodacus frontalis*..... May 13.
11. *Amphispiza bilineata* May 13.
12. *Rhyacophilus solitarius*..... May 13.
13. *Hedymeles melanocephalus* May 14.

unfortunately, the most accessible portions of this forest had been almost completely destroyed by the incessant cutting of timber to supply the market of western Nevada. These woods were composed of several species of pines and spruces, but the *Pinus ponderosa* was the prevailing growth. We have no notes respecting the size of the largest timber, but probably few trees exceeded 150 feet in height, and we saw none of more than four feet in diameter. The undergrowth was in places very dense, and consisted mainly of a shining-leaved evergreen *Ceanothus* and other bushes of similar appearance. Owing to the distance to the base of the mountains and the difficulty of ascending to the dense pine timber of the higher portions of the mountains, we seldom penetrated farther than to the edge of the uncut forest, where the characteristic birds of the pines were found to be abundant. The most common species were the Mountain Jay (*Cyanura frontalis*), Clarke's Nutcracker (*Picicorvus columbianus*), Nuthatches (*Sitta aculeata* and *S. pygmæa*), Mountain Chickadees (*Parus montanus*), and, in the early spring, *Carpodacus cassini*. The winter residents of the pines, besides those named above, were the following:—

<i>Sialia mexicana</i>	<i>Common.</i>	<i>Colaptes mexicanus</i>	<i>Common.</i>
<i>Certhia americana</i>	<i>Common.</i>	<i>Bubo subarcticus</i>	<i>Common.</i>
<i>Regulus satrapa</i>	<i>Rare.</i>	<i>Falco sparverius</i>	<i>Common.</i>
<i>Lophophanes inornatus</i>	<i>Common.</i>	<i>Nisus cooperi</i>	<i>Rare.</i>
<i>Picus harrisi</i>	<i>Common.</i>	<i>Aquila canadensis</i>	<i>Common.</i>
<i>Picus albolarvatus</i>	<i>Common.</i>	<i>Archibuteo sancti-johannis</i>	<i>Abundant.</i>
<i>Picoides arcticus</i>	<i>Rare.</i>	<i>Buteo calurus</i>	<i>Common.</i>
<i>Sphyrapicus thyroideus</i>	<i>Common.</i>	<i>Oreortyx pictus</i>	<i>Common.</i>
<i>Sphyrapicus nuchalis</i>	<i>One spec.</i>		

In the spring, besides *Carpodacus cassini*, the following species were added to the list:—

<i>Pipilo chlorurus</i> (<i>ravines</i>).....	April 25.
<i>Melanerpes torquatus</i> (<i>scattered pines</i>).....	April 25.
<i>Cyanocitta californica</i> (<i>foot-hills</i>).....	April 29.
<i>Melospiza lincolni</i> (<i>foot-hills</i>).....	April 29.
<i>Myiadestes townsendi</i> (<i>pine forests</i>).....	May 4.

b. Cedar and piñon groves of the desert mountains.

The scant groves of stunted cedars and piñon on several ranges to the eastward are the only approach to woods on the desert mountains. In

these scattered groves the two trees above named are mingled, their relative abundance varying with the locality, one or the other of them sometimes alone constituting the entire growth, the greater sterility of the soil being indicated by the prevalence of the *Juniperus*. These trees are usually diminutive, rarely exceeding fifteen feet in height, while their average is hardly more than ten or twelve feet; their trunks are usually large in proportion, however, and twisted and gnarled into an unsightly shape. In such woods, near Carson City, we found only the Blue Nutcracker (*Gymnokitta cyanocephala*), *Sialia arctica*, *Pica hudsonica*, *Lophophanes inornatus*, and *Oreortyx pictus*, with an occasional *Spizella breweri*, *Collurio excubitoroides*, and *Colaptes mexicanus*, with now and then a straggling flock of *Psaltriparus plumbeus*, the latter, however, most usually seen in the ravines. The *Empidonax obscurus* was an additional summer resident, arriving about April 20.

c. *The meadows and sage-brush plains.*

The plain upon which Carson City is situated consists of the usual sage-brush waste, changing, however, to meadows along the foot of the Sierra Nevada, where the soil is watered by brooks and rivulets from the mountains. The winter residents of this section were: *Anthus ludovicianus*, *Collurio excubitoroides*, *Plectrophanes lapponicus*, *Eremophila alpestris*, *Amphispiza nevadensis*, *Sturnella neglecta*, *Speotyto hypogæa* in the sage-brush and meadows of the plain, and *Turdus migratorius*, *Sialia mexicana*, *Regulus calendula*, *Troglodytes parkmanni*, *Collurio borealis*, *Zonotrichia intermedia*, *Junco oregonus*, *Spizella monticola*, and *Pipilo oregonus* among the more bushy fields at the base of the Sierra. Besides the foregoing, *Corvus carnivorus* and *Pica hudsonica* were abundant about the slaughter-houses, while *Xanthocephalus icterocephalus* and *Scolecophagus cyanocephalus* frequented the vicinity of corrals. In the spring, the following species were added to this fauna:—

<i>Sayornis sayus</i> (about buildings).....	March 12.
<i>Salpinctes obsoletus</i> (rocky places).....	March 20.
<i>Oreoscoptes montanus</i> (sage-brush).....	March 24.
<i>Tachycineta bicolor</i> (about buildings).....	March 25.
<i>Passerculus alaudinus</i> (meadows).....	March 28.
<i>Poocetes confinis</i> (sage-brush and meadows).....	April 1.

<i>Rhinogryphus aura</i> (everywhere).....	April 2.
<i>Hirundo horreorum</i> (about barns).....	April 8.
<i>Spizella breweri</i> (sage-brush).....	April 9.
<i>Stelgidopteryx serripennis</i> (ravine banks).....	April 15.
<i>Progne subis</i> (about buildings).....	April 23.
<i>Zenædura carolinensis</i> (everywhere).....	April 23.
<i>Chondestes grammaca</i> (sage-brush).....	May 3.
<i>Petrochelidon lunifrons</i> (about barns).....	May 4.

d. Valley of Carson River.

The prominent characteristics of the valley proper of the Carson River consisted of meadow-lands, with dense willow thickets near the river. In the latter, the winter birds were the following species: *Turdus migratorius*, *Regulus calendula*, *Certhia americana*, *Troglodytes parkmanni*, *T. hyemalis*, *Dendroica auduboni*, *Zonotrichia intermedia*, *Melospiza heermanni*, *Passerella schistacea*, *Pipilo oregonus*, *Pica hudsonica*, *Picus harrisi*, *Colaptes mexicanus*, and *Otus wilsonianus*. The marshes were inhabited by *Telmatodytes paludicola*, *Melospiza heermanni*, *Circus hudsonius*, and *Botaurus minor*. The water-fowl of the valley were, *Branta canadensis*, *B. hutchinsi*, *Anas boschas*, *Aythya americana*, *A. vallisneria*, *Bucephala americana*, *B. albeola*, *Fulix marila*, *F. collaris*, *Erismatura rubida*, *Podiceps occidentalis*, *P. californicus*, and *Podilymbus podiceps*; while along the streams were found *Ægialitis vociferus* and *Cinclus mexicanus*, with the addition of *Tringoides macularius* after April 29.

12. *Virginia City, Nevada*, (January 5, 6, and June 10–20, 1868).—Virginia City is situated on the southern slope of Mount Davidson, one of the highest peaks of the Virginia or Comstock range, about midway between the base and summit of the mountain, at a total altitude of near 6,200 feet. The surrounding mountains are of an arid nature, the nearest timber being the few cotton-woods along the bank of the Carson River, several miles distant. The birds observed in the town or its vicinity were exceedingly few in number, those occurring during the breeding-season being species which build their nests in caves, old buildings, or similar places. The most common species was the House Finch (*Carpodacus frontalis*), which was abundant about all old buildings, even in the most populous portions of the city; while the Rock Wren (*Salpinctes obsoletus*) was

to be found about every abandoned shaft or dilapidated building. *Sialia arctica* was also frequently seen on the houses, particularly in the outskirts of the town, and nested in the eaves or in any suitable place, in company with the House Finch. All the Swallows were extremely rare, but one individual, a solitary Purple Martin (*Progne subis*), having been seen or heard during the time of our residence, although it is said to be common at times. During winter time, all these birds disappear, by descending to the milder valleys, excepting the *Sialia*, which itself leaves during severe storms. Snow Birds (*Junco oregonus*) and Sparrows (*Spizella monticola* and *Zonotrichia intermedia*) resort to the door-yards for crumbs, and on one occasion (January 6, 1868) we observed a large flock of Gray-headed Purple Finches (*Leucosticte littoralis*) gleaning over the snow in the outskirts of the city.

13. *Carson River, seven miles above Fort Churchill* (June 23, 1868).—The valley of the river was here heavily wooded with cotton-woods (*Populus monilifera* and *P. trichocarpa*), with the usual undergrowth of willows, buffalo-berry bushes, etc. Near by, a range of hills fronted the river in a bold cliff of basaltic rock, while the general surroundings were the usual sagebrush plains, hills, and mountains. The birds observed here were the following:—

<i>Turdus migratorius.</i>	<i>Amphispiza nevadenses.</i>
<i>Sialia mexicana.</i>	<i>Sturnella neglecta.</i>
<i>Salpinctes obsoletus.</i>	<i>Icterus bullocki.</i>
<i>Catherpes conspersus.</i>	<i>Contopus richardsoni.</i>
<i>Troglodytes parkmanni.</i>	<i>Myiarchus cinerascens.</i>
<i>Dendroica æstiva.</i>	<i>Tyrannus verticalis.</i>
<i>Icteria longicauda.</i>	<i>Picus harrisi.</i>
<i>Petrochelidon lunifrons.</i>	<i>Colaptes mexicanus.</i>
<i>Collurio excubitoroides.</i>	<i>Antrostomus nuttalli.</i>
<i>Carpodacus frontalis.</i>	<i>Nephæcetes borealis.</i>
<i>Chondestes grammaca.</i>	<i>Falco sparverius.</i>
<i>Cyanospiza amœna.</i>	<i>Buteo swainsoni.</i>
<i>Pipilo oregonus.</i>	<i>Tringoides macularius.</i>
<i>Amphispiza bilineata.</i>	

Nephæcetes borealis was the most abundant species, flying over the cotton-wood trees in the morning in immense numbers. *Antrostomus nuttalli* and *Icteria longicauda* both sang throughout the night.

14. *Fort Churchill, Carson River*¹ (June 24, 1868).—In general character the valley at this point resembled the place just described. The species observed here were as follows:—

<i>Troglodytes parkmanni</i> .	<i>Sturnella neglecta</i> .
<i>Sialia mexicana</i> .	<i>Scolecophagus cyanocephalus</i> .
<i>Dendroeca æstiva</i> .	<i>Tyrannus verticalis</i> .
<i>Icteria longicauda</i> .	<i>Myiarchus cinerascens</i> .
<i>Myiodioctes pusillus</i> .	<i>Contopus richardsoni</i> .
<i>Vireo swainsoni</i> .	<i>Picus harrisi</i> .
<i>Amphispiza bilineata</i> .	<i>Colaptes mexicanus</i> .
<i>Amphispiza nevadensis</i> .	<i>Falco sparverius</i> .
<i>Spizella breweri</i> .	<i>Buteo swainsoni</i> .
<i>Cyanospiza amœna</i> .	<i>Buteo calurus</i> .
<i>Pipilo oregonus</i> .	

All these species seemed to be breeding, but, owing to the fact that the valley was mostly inundated from a late freshet, it was found to be impossible to explore the locality for nests.

15. *Nevada Station* (June 25, 1868).—This place was merely a stage-station in the midst of an inhospitable desert, upon which a few stunted grease-wood bushes constituted the only vegetation in the immediate vicinity. The only birds seen about the station were the ever-present Mourning Doves (*Zenaidura carolinensis*) and a single pair of *Sayornis sayus*, the latter having a nest in one of the out-buildings. The former was particularly abundant about a hill of calcareous tuff, containing many caverns, some distance from the house, the *Salpinctes obsoletus* being also common there. On the plain, only *Eremophila alpestris*, *Amphispiza bilineata*, and *Rhinogryphus aura* were found.

16. *Soda Lake, Carson Desert* (June 27, 1868. *Altitude, 3,906 feet*).—This most remarkable spot consisted of a cistern-like depression in the midst of the desert, containing a nearly circular lake of about a mile in circuit, and with nearly vertical walls seventy-five, or perhaps a hundred, feet high. Seen from the top of this wall the water appeared very clear, while the bottom was distinctly visible far out toward the center, where the depth seemed to be immense, since the floor of pure white borate of soda ended abruptly, after which the water was a deep, dark blue. Springs of fresh

¹ Altitude, 4,284 feet.

water issued from the walls at several places, and upon their borders the vegetation was excessively luxuriant, in consequence of protection from winds by their great distance below the general surface of the desert, as well as the constant moisture of the spot; this vegetation consisted chiefly of tall *tule*, rank grasses and sedges, and rose-briers. Elsewhere, the entire country was a sandy waste, with a scant growth of the ordinary desert shrubs, which within the walls of the lake were more thrifty than elsewhere. The most abundant bird of this place was a very small, and clamorous, grebe (perhaps *Podiceps californicus*), which kept out of gunshot from the shore; next in numbers were the Avocets (*Recurvirostra americana*), multitudes of which ran along the beach, scooping up the dead insects which blackened the water around the margin of the lake; mixed with these were a few Stilts (*Himantopus mexicanus*). A few pairs of Gulls (*Larus californicus*), which were nesting on a large rock away out in the lake, completed the list of water-birds of this locality. Among the land-birds we noticed only the *Oreoscoptes montanus*, *Amphispiza bilineata*, and a remarkable species, probably *Phænopepla nitens*, which we tried in vain to secure.

A few rods distant was another somewhat similar, but smaller and shallower, lake, where large numbers of Avocets and a few Stilts were breeding on the numerous islands of borax in the shallow water.

17. *Sand Springs Station* (June 29, 1868).—This locality is in the midst of the desert, the country being extremely barren, with an immense hill of shifting sand near the station. Only the ordinary desert birds were found here, the following being the species: *Amphispiza bilineata*, *Eremophila alpestris*, *Corvus carnivorus*, *Zenædura carolinensis*, and *Rhinogryphus aura*.

18. *Fairview Valley* (June 29, 1868).—This locality presented the usual characteristics of a sage-brush valley, with no conspicuous or interesting features. The entire region was so dry that water for the use of the station had to be hauled in wagons the distance of twelve miles. The only birds observed were the following: *Amphispiza bilineata*, *A. nevadensis*, *Chondestes grammacus*, *Eremophila alpestris*, and *Speotyto hypogæa*.

19. *Edwards Creek* (June 30, 1868).—At this camp, where there was no shrubbery along the stream other than a more thrifty growth of sage-brush

and grease-wood than that elsewhere upon the plain, only the following species of birds were observed: *Oreoscoptes montanus*, *Spizella breweri*, and *Speotyto hypogaea*.

20. *Humboldt Marshes, near the "Sink"* (Altitude, 3,893 feet; August 26–October 31, 1867).—Although a week was spent at this camp, the state of our health permitted the use of but one day for collecting, which is much to be regretted, since we have never seen another locality where water-fowl so abounded. The writer was a victim of malarial fever, which was only aggravated by the nature of the surroundings. The marshes were miles in extent and almost entirely covered by a dense growth of *tule*, except where the river meandered through, now and then expanding into a small lake. These marshes were surrounded by a bare plain, consisting in the winter season of mud, but at this time baked perfectly dry and hard by the heat of the sun, except in the more depressed portions, which were covered by a deep deposit of snow-white "alkali." From these extensive flats, desert plains lead away to the barren mountains on either side, whose summits are bare and rugged eruptive rocks, of weird forms and strange colors. Upon the whole, the entire region was one of the most desolate and forbidding that could be imagined, and in these respects is probably not surpassed by any other portion of the land of "alkali" and the "everlasting sage-brush." The effluvium from the putrid water and decaying vegetation of the marshes was at times sickening, while at night the torments of millions of the most voracious mosquitoes added to the horrors of the place.¹ The land-birds of this desolate locality were very few, a solitary raven, hoarsely croaking, being now and then seen winging his way to or from the distant mountains, an occasional Desert Lark (*Eremophila chrysolaema*) in the scanty sage-brush or on the bare plain, or a few Savanna Sparrows in the salt-grass of the meadows, comprising all that were seen. The water-fowl, however, were extremely numerous, and consisted of many species, of which the following were identified: *Tringa bairdi*, *T. minutilla*, *Ereunetes pusillus*, *Symphemia semipalmata*, *Recurvirostra americana*, *Himantopus mexicanus*, *Falcinellus*

¹ The reader may be surprised, if not incredulous, when told that the mosquitoes and other insects sometimes came in such swarms about the candles in the camp as to extinguish the lights in a few moments!

thalassinus (extremely abundant), *Fulica americana*, *Erismatura rubida*, *Sterna regia*, and *S. forsteri*. This, however, is but a small proportion of the species inhabiting these marshes, since without a boat we had no means of invading the haunts of the more wary kinds. On the 31st of October the same place was again visited, and several birds not seen during our summer stay were noted. Crows (*Corvus americanus*) were walking about the door-yard with the familiarity of domesticated birds; a Falcon (*Falco polyagrus*) was seen to dash into a flock of tame pigeons belonging to the station, while from an Indian we obtained the fresh skin of a Lesser Snow-Goose (*Anser albatus*).

21. *Humboldt River, at Oreana* (August 30–September 3. *Altitude, 4,036 feet*).—At this place the valley of the Humboldt was, as usual, destitute of trees, the only woody vegetation near the river being the thick clumps of small willows on the points and around the sloughs. The greater portion of the valley consisted of meadows of salt-grass, but back toward the mesa this gradually gave way to an unusually tall and vigorous growth of grease-wood and sage-brush. In the latter, the most common bird was the *Oreoscoptes montanus*, another abundant species being *Amphispiza nevadensis*; on the meadows, *Xanthocephalus icterocephalus*, *Molothrus ater*, *Agelaius phœniceus*, and *Sturnella neglecta*; in the willows, *Melospiza fallax*, *Dendroica æstiva*, *Vireosylva swainsoni*, and *Collurio excubitoroides*; Swallows, particularly *H. horreorum*, were common in the air, while large flocks of the Green Ibis, or “Black Curlew” (*Falcinellus thalassinus*), were almost constantly passing up and down the river, now and then alighting to feed for awhile in a slough hidden among the willows. This camp was finally abandoned on account of a severe form of malarial fever having attacked nearly the entire party, the disease having been contracted at our previous camp—the Humboldt marshes.

22. *Wright's Cañon, West Humboldt Mountains* (September 3–13, 1867. *Altitude, 4,881 feet*).—Wright's Cañon was supplied with a brook, which, though of considerable volume during the rainy season, was intermittent through the dry summer months. The water ran briskly at night and in the cool hours of morn and evening, but during the hotter

portion of the day could be found only in pockets of the rocks, the bed of the stream, or cool nooks completely shaded by overhanging bushes. Bordering this stream, in its entire extent, the vegetation was luxuriant, compared to that of other sections, the shrubbery consisting principally of a thick growth of a small cornel (*Cornus pubescens*), from six to ten feet high, often canopied by the trailing stems and delicate foliage of a species of *Clematis*. There were also clumps of wild roses and a few willows, interspersed at intervals with patches of elder (*Sambucus glauca*) and thickets of choke-cherries (*Prunus andersoni* and *P. virginianus*). No woods were in sight, but on the slopes of the cañon were small, scattered cedars (*Juniperus occidentalis*), while a few isolated small aspens were distributed far apart along the stream. During midday the water of the brook being confined to small pools where shaded by the overhanging shrubbery, or in "pockets" of the rocks in the bed of the stream, the birds resorted to these little reservoirs to refresh themselves in the shade of the thickets or by bathing in the cool water. The characteristic birds of this cañon were Woodhouse's Jay (*Cyanocitta woodhousii*), Little Titmouse (*Psaltiriparus plumbeus*), and Swainson's Vireo (*Vireosylva swainsoni*). Besides these, the following species were found: *Salpinctes obsoletus*, *Icteria longicauda*, *Myiodioctes pusillus*, *Amphispiza bilineata*, *Pipilo chlorurus*, *Troglodytes parkmanni*, *Zonotrichia intermedia*, *Hedymeles melanocephalus*, *Lanivireo cassini*, *Geothlypis macgillivrayi*, *Pica hudsonica*, *Ectopistes migratoria* (!), and *Sayornis sayus*. The most abundant birds of the locality were the *Psaltiriparus*, *Vireosylva*, *Myiodioctes*, and *Zonotrichia*, above mentioned, the specimen of *Ectopistes* being the only one observed during the entire exploration.

23. Buena Vista Cañon, West Humboldt Mountains (September 17–October 23. Altitude, 5,169 feet).—The general aspect of this locality was that of Wright's Cañon, on the opposite side of the range, except that its stream was constant and much larger, with a wider extent of level land on each side, and correspondingly more extensive shrubbery, which, at the same time, was more vigorous and varied. This consisted chiefly of a thick growth of buffalo-berry bushes, willows, and wild-rose briars in the lower portion of the cañon, and higher up of choke-cherry and rose bushes, mixed with extensive copses of small aspens. The slopes on each side

were sparingly covered with scattered groves of "cedar," piñon, and "mountain mahogany," while the summits of the mountains were for the most part bare and rocky, but not sufficiently high to retain snow during summer, their elevation ranging from 8,000 to 10,000 feet. The birds found at this locality during our stay were the following:—

<i>Turdus migratorius</i>	<i>Abundant.</i>	<i>Passerculus alaudinus</i>	<i>Common.</i>
<i>Cinclus mexicanus</i>	<i>Common.</i>	<i>Pipilo oregonus</i>	<i>Rare.</i>
<i>Regulus calendula</i>	<i>Common.</i>	<i>Pipilo megalonyx</i>	<i>Common.</i>
<i>Regulus satrapa</i>	<i>Rare.</i>	<i>Scolecophagus cyanocephalus</i>	<i>Very abund't.</i>
<i>Sialia arctica</i>	<i>Abundant.</i>	<i>Agelæus phœniceus</i>	<i>Common.</i>
<i>Salpinctes obsoletus</i>	<i>Abundant.</i>	<i>Agelæus gubernator</i>	<i>Rare.</i>
<i>Psaltirparus plumbeus</i>	<i>Abundant.</i>	<i>Icterus bullocki</i>	<i>Rare.</i>
<i>Anthus ludovicianus</i>	<i>Rare.</i>	<i>Sturnella neglecta</i>	<i>Common.</i>
<i>Helminthophaga celata</i>	<i>Abundant.</i>	<i>Pica hudsonica</i>	<i>Abundant.</i>
<i>Helminthophaga lutescens</i>	<i>Rare.</i>	<i>Cyanocitta woodhousii</i>	<i>Common.</i>
<i>Dendroæca auduboni</i>	<i>Abundant.</i>	<i>Corvus carnivorus</i>	<i>Common.</i>
<i>Myiodiocytes pusillus</i>	<i>Abundant.</i>	<i>Eremophila alpestris</i>	<i>Common.</i>
<i>Lanivireo solitarius</i>	<i>Rare.</i>	<i>Sayornis sayus</i>	<i>Common.</i>
<i>Lanivireo cassini</i>	<i>Rare.</i>	<i>Empidonax obscurus</i>	<i>Rare.</i>
<i>Carpodacus frontalis</i>	<i>Common.</i>	<i>Colaptes mexicanus</i>	<i>Common.</i>
<i>Zonotrichia coronata</i>	<i>One specimen.</i>	<i>Colaptes auratus?</i>	<i>One specimen.</i>
<i>Zonotrichia intermedia</i>	<i>Very abund't.</i>	<i>Nisus cooperi</i>	<i>Rare.</i>
<i>Junco oregonus</i>	<i>Very abund't.</i>	<i>Zenædura carolinensis</i>	<i>Rare.</i>
<i>Melospiza fallax</i>	<i>Very abund't.</i>	<i>Centrocerus urophasianus</i>	<i>Rare.</i>
<i>Melospiza guttata</i>	<i>Very rare.</i>		

The most abundant of these was the *Scolecophagus cyanocephalus*.

24. *Toyabe Mountains, near Austin* (July 2-5, 1868).—On the western slope of this lofty range, near its northern extremity, at an altitude of about 6,500 feet, our camp was established in a cañon adjoining the outskirts of the above-named town. The cañons and principal ravines in this neighborhood were well watered by brooks and rivulets, whose course was followed by shrubbery from their sources to the valleys. At the heads of these cañons extensive copses of small aspens and choke-cherry bushes prevailed, while 2,000 feet below, or near our camp, thrifty bushes of *Symphoricarpus montanus* were the predominating growth. Corresponding in altitude with the aspens, were scant groves of stunted mountainmahogany, growing upon the summits or ridges of the mountains; but on the lower slopes a thin wood of cedar and piñon prevailed. In sight, to the south-

ward, the magnificent snow-capped peaks of the higher portion of the range were seen to be timbered with pine and fir forests, but no opportunity was afforded to visit these.

The species observed in the neighborhood of our camp were the following: In the lower portions of the cañon, *Pipilo chlorurus* among the snow-berry bushes, *Poocetes confinis* on the weed-clad and grassy slopes, *Spizella breweri*, *Cyanospiza amœna*, *Antrostomus nuttalli*, *Oreoscoptes montanus*, *Eremophila alpestris*, *Chondestes grammacus*, *Amphispiza nevadensis*, and *Sturnella neglecta* in the sage-brush—from the valley-level to 2,000 feet above camp; *Empidonax obscurus* and *Vireosylva swainsoni* in the aspen copses; *Hedymeles melanocephalus*, *Icterus bullocki*, and *Pipilo megalonyx* in the shrubbery along the streams; *Tyrannus verticalis*, *Myiarchus cinerascens*, *Spizella arizonæ*, *Scolecophagus cyanocephalus*, and *Gymnokitta cyanocephala* in the cedar and piñon groves, while *Turdus migratorius* occurred in all wooded localities; *Sialia arctica*, *Hirundo horreorum*, *Tachycineta thalassina*, *Petrochelidon lunifrons*, and *Salpinctes obsoletus* nested about out-buildings or in old mining-shafts, while species of indiscriminate distribution were *Rhinogryphus aura*, *Buteo calurus*, *B. swainsoni*, *Archibuteo* (*ferrugineus*?), *Aquila canadensis*, *Chordeiles henryi*, *Collurio excubitoroides*, *Corvus carnivorus*, and *Zenaidura carolinensis*. It was here that we met with the first specimen of *Panyptila saxatilis*, a solitary individual having been observed to pass swiftly over one of the higher hills.

25. "Camp 19," *Ruby Valley and Ruby Mountains* (July 12–September 5.) *Altitude of Camp*, 6,300 feet.—This camp was the base of extensive researches in all directions, both the mountains upon whose foot-slope we were encamped and the valley below us being included within the field of investigation. The valley was of the same character that sage-brush valleys usually are, except that its depressed center was occupied by an extensive marsh, known as "Ruby Lake," the receptacle of the numerous springs of pure, cold water which burst from the base of the limestone mountains on the western side of the valley. This marsh is so filled with tule that the meandering channels of clear water can only be seen from the mountains, from which they appear as narrow silver threads in the dark-green rush-

meadows. The birds observed in the valley adjacent to this camp were the following species: In the sage-brush, *Oreoscoptes montanus*, *Chondestes grammacus*, *Spizella breweri*, *Amphispiza nevadensis*, *Anthus nuttalli*, *Chordeiles henryi*, and *Zenaidura carolinensis*; on the meadows, *Passerculus alaudinus*, *Coturniculus perpallidus*, and *Grus canadensis*; in the brier thickets, *Geothlypis trichas*; and in the marshes, *Telmatodytes paludicola*, *Xanthocephalus icterocephalus*, *Fulica americana*, *Anas boschas*, and *Sterna forsteri*. The mountains above this camp are exceedingly complicated in their varied characteristics and in the distribution of their bird-life. The main cañons, at right-angles with the trend of the range, become contracted in their lower portion, where their sides consist of vertical limestone cliffs, many of which are 200 to 300 feet in height; similar cliffs also crop out, in places, near the summit of the range, standing singly, like immense walls, from each side of which the slopes lead down to the bottom of the cañons. The altitude of the valley at the base of the mountains is about 6,000 feet above sea-level, while the summits of the range are from 9,000 to upwards of 12,000 feet high. The cañons here support nearly all the shrubbery and herbaceous vegetation, while only the spurs and higher slopes are wooded. The lower portion of the streams within the cañon is followed by the usual shrubbery of cañon streams, which here consisted chiefly of choke-cherry, snow-berry (*Symphoricarpos*), and service-berry (*Amelanchier canadensis*) bushes, the remainder of the cañon, where not occupied by rocks, being covered with the ordinary sage-brush plants. About half way to the summit, however, the cliffs cease, the cañon sides gradually become less abrupt and wider apart, and at this elevation the gently-inclined slopes are overspread with a luxuriant meadow in which various plants with showy flowers abound. The sage-brush still predominates, however, until the lower edge of the side-slopes of the "saddles" between the peaks of the range are reached, when the vegetation is transformed into a garden, as it were, so numerous and showy are the flowers, among which the scarlet Castillejas and Gilias, and blue Pentstemons and Delphineums are most conspicuous, from the circumstance that they give the prevailing hues to the meadows. These flowery slopes reach up to the fields of snow, which are found in all shaded spots, and, at a proper elevation, even in places

constantly exposed to the sun. The woods of this range begin at the base of the "spurs" between the cañons, and continue, in successive belts, to the timber-line, as follows: From the valley level, thick and extensive woods, composed exclusively of cedar and piñon, extend for 2,000 or 2,500 feet, when they gradually give way to more scant groves of mountain mahogany (*Cercocarpus ledifolius*), which, however, scarcely extend higher than 3,500 feet above the valley. Beyond this altitude no trees of these species are met with, for on the higher peaks they are replaced by forests of pines (*Pinus flexilis* and *P. balfouriana*), with an undergrowth of hardy shrubs. These pine trees are not tall, the highest not exceeding thirty or forty feet, but they have trunks of comparatively large size; and it was observed that when growing in situations where exposed to the wind, which here constantly blows from one direction, all the branches of these trees are bent away from the wind, or, indeed, grow only upon that side, while the shrubs underneath are pressed flat to the ground in the same direction. During our investigations among these mountains, the following species were observed, between July 12 and the 5th of September:—

Shrubbery of cañon streams.

<i>Icteria longicauda</i>	<i>Rare.</i>	<i>Cyanospiza amœna</i>	<i>Common.</i>
<i>Geothlypis macgillivrayi</i> ...	<i>Abundant.</i>	<i>Pipilo megalonyx</i>	<i>Very rare.</i>
<i>Myiodioctes pusillus</i>	<i>Rare.</i>	<i>Pipilo chlorurus</i>	<i>Common.</i>
<i>Dendroeca æstiva</i>	<i>Common.</i>	<i>Icterus bullocki</i>	<i>Common.</i>
<i>Melospiza fallax</i>	<i>Rare.</i>	<i>Empidonax pusillus</i>	<i>Common.</i>
<i>Hedymeles melanocephalus</i> .	<i>Common.</i>		

Lower woods.

<i>Turdus migratorius</i>	<i>Common.</i>	<i>Icterus bullocki</i>	<i>Common.</i>
<i>Parus montanus</i>	<i>Rare.</i>	<i>Scolecophagus cyanocephalus</i>	<i>Common.</i>
<i>Psaltiriparus plumbeus</i>	<i>Rare.</i>	<i>Picicorvus columbianus</i> ...	<i>Rare.</i>
<i>Psaltiriparus melanotis</i> ? ...	<i>One specimen.</i>	<i>Gymnokitta cyanocephala</i> ...	<i>Rare.</i>
<i>Troglodytes parkmanni</i> ...	<i>Common.</i>	<i>Cyanocitta woodhousii</i>	<i>Rare.</i>
<i>Helminthophaga virginia</i> ...	<i>Common.</i>	<i>Tyrannus verticalis</i>	<i>Abundant.</i>
<i>Dendroeca nigrescens</i>	<i>Common.</i>	<i>Myiarchus cinerascens</i>	<i>Common.</i>
<i>Pyrranga ludoviciana</i>	<i>Common.</i>	<i>Contopus richardsoni</i>	<i>Common.</i>
<i>Lanivireo plumbeus</i>	<i>Common.</i>	<i>Empidonax obscurus</i>	<i>Common.</i>
<i>Vireosylvia swainsoni</i>	<i>Common.</i>	<i>Chordeiles henryi</i>	<i>Abundant.</i>
<i>Collurio excubitoroides</i>	<i>Common.</i>	<i>Picus harrisi</i>	<i>Rare.</i>
<i>Carpodacus cassinii</i> (Aug. 10)	<i>Abundant.</i>	<i>Colaptes mexicanus</i>	<i>Rare.</i>
<i>Loxia leucoptera</i> (Aug. 12).	<i>One specimen.</i>	<i>Zenaidura carolinensis</i>	<i>Abundant.</i>
<i>Spizella arizonæ</i>	<i>Very abundant.</i>		

Alpine woods.

<i>Turdus migratorius</i>	<i>Common.</i>	<i>Chrysomitris pinus</i>	<i>Abundant.</i>
<i>Sialia arctica</i>	<i>Abundant.</i>	<i>Spizella arizonæ</i>	<i>Common.</i>
<i>Carpodacus cassinii</i>	<i>Abundant.</i>	<i>Pipilo chlorurus</i>	<i>Common.</i>

Cliffs and rocky places.

<i>Salpinctes obsoletus</i>	<i>Abundant.</i>	<i>Falco polyagrus</i>	<i>Common.</i>
<i>Catherpes conspersus</i>	<i>Common.</i>	<i>Falco naevius</i>	<i>Rare.</i>
<i>Tachycineta thalassina</i>	<i>Abundant.</i>	<i>Falco sparverius</i>	<i>Abundant.</i>
<i>Hirundo horreorum</i>	<i>Common.</i>	<i>Aquila canadensis</i>	<i>Common.</i>
<i>Petrochelidon lunifrons</i>	<i>Very abund't.</i>	<i>Buteo calurus</i>	<i>Common.</i>
<i>Sayornis sayus</i>	<i>Rare.</i>	<i>Buteo swainsoni</i>	<i>Common.</i>
<i>Panyptila saxatilis</i>	<i>Very abund't.</i>		

Open meadows.

<i>Poocetes confinis</i>	<i>Common.</i>	<i>Trochilus alexandri</i>	<i>Common.</i>
<i>Chondestes grammaca</i>	<i>Common.</i>	<i>Selasphorus platycercus</i> ...	<i>Very abund't.</i>
<i>Stellula calliope</i>	<i>Abundant.</i>		

26. *Overland Rancho, Ruby Valley* (August 28–September 3).—The characteristics of both valley and mountains were quite different from those at "Camp 19," although both were a continuation of the same. The limestone formations of the southern portion of the range had become transformed to steeper and more rugged granite peaks, the highest of which towered to an altitude of about 12,000 feet, while, owing to their granitic structure and extreme ruggedness, their slopes and spurs were almost destitute of vegetation. The cañons, however, supported a luxuriant growth of shrubs and other plants, with here and there small copses or groves of aspen and narrow-leaved cotton-wood (*Populus angustifolia*), the copses and thickets having usually an undergrowth of briery rosaceous shrubs, but these, in places, were replaced by a carpeting of beautiful ferns. Unlike localities farther southward in this valley, this shrubbery was continued across the valley, on the borders of the stream, to the meadows which extend to the shores of Franklin Lake. The meadow-lands of the valley had become transformed by cultivation into broad fields of grain, more than a thousand acres of the valley being thus reclaimed. The lake, which occupied the more depressed portion of the valley, was simply an enlargement of Ruby Lake, containing in its central portion a wide expanse of open water, in which thousands of water-fowl dwelt secure from the gunner—

the lack of a boat rendering them inaccessible. During the short season of our stay at this locality the following species were identified:—

In the marshes and meadows.

Geothlypis trichas	Common.	Grus canadensis	Common.
Passerculus alaudinus	Very abund't.	Botaurus minor	Common.
Coturniculus perpallidus	Common.	Falcinellus guarauna	Abundant.
Dolichonyx oryzivorus	Abundant.	Fulica americana	Abundant.
Xanthocephalus icterocephalus	Abundant.	Branta canadensis	Common.
Agelæus phœniceus	Abundant.	Anas boschas	Common.
Sturnella neglecta	Abundant.	Sterna forsteri	Common.
Circus hudsonius	Common.	Hydrochelidon lariformis	Abundant.
		Podiceps cristatus	Common.

Along the stream.

Ægialitis vociferus	Abundant.	Tringoides macularius	Common.
Gallinago wilsoni	Common.		

In the sage-brush.

Spizella breweri	Abundant.	Oreoscoptes montanus	Common.
Chondestes grammacus	Common.	Zenædura carolinensis	Abundant.
Poocetes confinis	Common.		

In the cañon.

Turdus migratorius	Abundant.	Melospiza fallax	Common.
Turdus swainsoni	Common.	Cyanospiza amœua	Common.
Troglodytes parkmanni	Common.	Pipilo chlorurus	Common.
Dendroeca æstiva	Common.	Icterus bullocki	Common.
Dendroeca occidentalis	Rare.	Cyanocitta woodhousii	Rare.
Dendroeca townsendi	Rare.	Tyrannus verticalis	Abundant.
Myiodioctes pusillus	Common.	Contopus richardsoni	Common.
Geothlypis macgillivrayi	Common.	Empidonax pusillus	Common.
Geothlypis trichas	Rare.	Empidonax hammondi	Common.
Icteria longicauda	Rare.	Selasphorus platycercus	Abundant.
Vireosylva swainsoni	Abundant.	Ceryle alcyon	Rare.
Loxia americana	Common.	Nisus cooperi	Rare.
Loxia leucoptera	Common.		

All of the species in the latter list were found along the entire length of the stream, from the lower end of the shrubbery away out in the valley to the upper portion of the cañon, with the exception of *Dendroeca occidentalis*, *D. townsendi*, *Loxia leucoptera*, and *Empidonax hammondi*, which we found only in the aspen copses, far up the cañon. *Turdus migratorius*, *T. swainsoni*, *Loxia americana*, and *Selasphorus platycercus* were also more abundant high up the cañon than elsewhere.

On the foot-hills of the range, on each side the cañon, were a few scattered mountain mahogany and cedar trees, and among these we found *Helminthophaga virginica*, *Contopus borealis*, *Empidonax obscurus*, and *Picicorvus columbianus*.

A decided step toward a different faunal district, besides the addition of *Dolichonyx oryzivorus*, *Podiceps cristatus*, *Turdus swainsoni*, *Dendroica townsendi*, *D. occidentalis*, *Loxia americana*, *L. leucoptera*, *Empidonax hammondi*, and *Contopus borealis* to our list of birds, was the circumstance that the large white-tailed hare, *Lepus campestris*, replaced the black-tailed *L. callotis*, which, up to this time, had been the only one observed.

Species of general distribution observed at this locality were as follows:

<i>Rhinogryphus aura</i>	<i>Common.</i>	<i>Hirundo horreorum</i>	<i>Common.</i>
<i>Aquila canadensis</i>	<i>Common.</i>	<i>Scolecophagus cyanocephalus.</i>	<i>Abundant.</i>
<i>Buteo swainsoni</i>	<i>Common.</i>	<i>Colaptes mexicanus.</i>	<i>Common.</i>
<i>Archibuteo sancti-johannis.</i> . .	<i>Common.</i>	<i>Corvus carnivorus</i>	<i>Common.</i>
<i>Collurio excubitoroides</i>	<i>Common.</i>	<i>Zenaidura carolinensis</i>	<i>Abundant.</i>

27. "Camp 22," Ruby Valley (September 4-5, 1868).—The surroundings of this camp were much the same as those at the Overland Rancho, except that the valley was uncultivated, while the foot-hills were higher; besides, we had left the marshes behind. The stream was bordered with willows entirely across the valley, while in a marshy spot stood quite an extensive grove of very tall willows and alders. In the latter, considerable numbers of *Loxia americana* and *L. leucoptera* were found, besides *Dendroica æstiva*, *Empidonax pusillus*, and *Contopus richardsoni*, while *Gallinago wilsoni* was abundant on marshy ground, where was also a small black Rail, supposed to be *Porzana jamaicensis*. In the sage-brush were *Collurio excubitoroides*, *Oreoscoptes montanus*, *Spizella breweri*, *Poocetes confinis*, and *Chondestes grammacus*, while along the stream we found *Passerculus alaudinus* and *Melospiza fallax*. In an elevated park, at the head of the main cañon in the foot-hills, the following species were observed: *Empidonax hammondi*, *Contopus richardsoni*, *Chrysomitris pinus*, *Canace obscura*, *Ceryle alcyon*, *Colaptes mexicanus*, *Buteo swainsoni*, *Falco sparverius*, *Zenaidura carolinensis*, *Selasphorus platycercus*, *Poocetes confinis*, *Chondestes grammacus*, *Spizella breweri*, and *Pipilo chlorurus*.

28. *Secret Valley, East Humboldt Mountains* (September 6–8, 1868).—Secret Valley is a small park nestled among high hills, with the East Humboldt Mountains proper on the west, and the equally lofty portion of that range known as the “Clover Mountains” to the eastward. The higher slopes of this valley, especially near the sources of the streams, were clothed with by far the most varied and extensive vegetation we had yet seen east of the Sierra Nevada. The aspens along the streams were from 40 to 70 feet high, some of them being $1\frac{1}{2}$ to 2 feet in diameter; while in places they were so numerous as to form considerable groves. Accompanying these aspens, were dense thickets of varied and luxuriant shrubbery, tall alders and willows predominating in the swampy spots, while the slopes were covered with a nearly impenetrable growth of “laurel” bushes (*Ceanothus velutinus*). On the ridges the mountain mahogany formed groves, while in the lower valleys *Amelanchier canadensis*, or service berry, grew in great abundance, furnishing food for many species of birds. The birds observed at this place were the following: Among the aspens, *Melanerpes torquatus*, *Colaptes mexicanus*, *Turdus migratorius*, *Chrysomitris pinus*, *Loxia americana*, *L. leucoptera*, *Contopus richardsoni*, and *Empidonax hammondi*. In the shrubbery along the streams, *Selasphorus rufus* (!), *S. platycercus*, *Turdus swainsoni*, *Troglodytes parkmanni*, *Geothlypis trichas* (lower portions), *G. macgillivrayi*, *Myiodioctes pusillus*, *Dendroica æstiva*, *D. townsendi*, *Empidonax hammondi*, *Helminthophaga ruficapilla*, *H. lutescens*, *H. celata*, *Vireosylvia swainsoni*, *Chrysomitris tristis*, *Melospiza fallax*, *Zonotrichia intermedia*, *Cyanospiza amæna*, and *Pipilo chlorurus*. In the sage-brush, *Oreoscoptes montanus*, *Collurio excubitoroides*, *Eremophila alpestris*, *Pooecetes confinis*, *Chondestes grammaca*, *Spizella breweri*, *Sturnella neglecta*, *Zenædura carolinensis*, and *Centrocercus urophasianus*. Among the mahoganies, *Empidonax obscurus* was the most common species. *Salpinctes obsoletus* was found in all rocky places, particularly on the ridges; a single individual of *Ceryle alcyon* was seen along the brook, while *Corvus carnivorus*, *Buteo calurus*, *Circus hudsonius*, and *Falco polyagrus* were species of irregular distribution.

29. *Dearing's Rancho, Upper Humboldt Valley* (September 10–14).—After crossing the East Humboldt range through the pass called Secret

Valley, we found the country along the western base of the Clover Mountains to be similar to the upper portion of Ruby Valley in its general characteristics. As along the eastern base of the East Humboldt range, the streams from the main cañons were of considerable volume, while their bordering shrubbery continued with them across the valley to the river. The shrubbery along the main streams of the Upper Humboldt valley was more extensive and vigorous, however, the cotton-woods and aspens being more numerous, and constituting extensive groves, other spots being occupied by dense thickets of thorn-apple (*Cratægus rivularis*), wild-cherry (*Prunus andersoni*?), and willows (*Salix*, species). At this place the following species were observed:—

<i>Turdus migratorius</i>	<i>Common.</i>	<i>Passerella schistacea</i>	<i>Common.</i>
<i>Turdus swainsoni</i>	<i>Common.</i>	<i>Corvus carnivorus</i>	<i>Common.</i>
<i>Regulus calendula</i>	<i>Common.</i>	<i>Pica hudsonica</i>	<i>Common.</i>
<i>Troglodytes parkmanni</i>	<i>Common.</i>	<i>Contopus richardsoni</i>	<i>Common.</i>
<i>Sitta canadensis</i>	<i>Common.</i>	<i>Empidonax hammondi</i>	<i>Common.</i>
<i>Helminthophaga celata</i>	<i>Abundant.</i>	<i>Ceryle alcyon</i>	<i>Rare.</i>
<i>Helminthophaga lutescens</i> ...	<i>Rare.</i>	<i>Colaptes mexicanus</i>	<i>Common.</i>
<i>Dendroeca æstiva</i>	<i>Common.</i>	<i>Melanerpes torquatus</i>	<i>Rare.</i>
<i>Dendroeca auduboni</i>	<i>Abundant.</i>	<i>Picus gairdneri</i>	<i>Rare.</i>
<i>Myiodioctes pusillus</i>	<i>Abundant.</i>	<i>Otus wilsonianus</i>	<i>Rare.</i>
<i>Ampelis cedrorum</i>	<i>Common.</i>	<i>Falco sparverius</i>	<i>Common.</i>
<i>Vireosylva swainsoni</i>	<i>Abundant.</i>	<i>Falco columbarius</i>	<i>Rare.</i>
<i>Lanivireo solitarius</i>	<i>Common.</i>	<i>Circus hudsonius</i>	<i>Rare.</i>
<i>Pyrranga ludoviciana</i>	<i>Common.</i>	<i>Nisus cooperi</i>	<i>Rare.</i>
<i>Zonotrichia intermedia</i>	<i>Abundant.</i>	<i>Nisus fuscus</i>	<i>Common.</i>
<i>Melospiza fallax</i>	<i>Abundant.</i>	<i>Buteo calurus</i>	<i>Rare.</i>
<i>Spizella breweri</i>	<i>Abundant.</i>	<i>Buteo swainsoni</i>	<i>Rare.</i>
<i>Cyanospiza amœna</i>	<i>Common.</i>	<i>Aquila canadensis</i>	<i>Rare.</i>
<i>Pipilo chlorurus</i>	<i>Common.</i>	<i>Rhinogryphus aura</i>	<i>Rare.</i>
<i>Scolecophagus cyanocephalus</i> .	<i>Abundant.</i>	<i>Zenædura carolinensis</i>	<i>Abundant.</i>

30. *Trout Creek, Upper Humboldt Valley* (September 16–20, 1868).—

This locality was very similar to the last, a large brook, with an accompanying growth of shrubbery and thickets of small trees, extending across the valley from the Clover Mountains to the Humboldt River, the plain itself being covered by the usual sage-brush plants; but the upper portion, next to the lower foot-hills of the mountains, was clothed with rye-grass meadows, interspersed with willow and aspen copses. In these rye-grass meadows

the Sharp-tailed Grouse (*Pediæcetes columbianus*) was very abundant. The principal species met with along this creek were, besides that above-named, the following:—

Turdus guttatus.....	One specimen.	Passerculus alaudinus.....	Abundant.
Parus septentrionalis.....	Rare.	Empidonax obscurus.....	Common.
Zonotrichia intermedia.....	Abundant.	Sphyrapicus nuchalis.....	Rare.
Junco oregonus.....	Abundant.	Picus harrisi.....	Rare.
Melospiza fallax.....	Abundant.	Picus gairdneri.....	Rare.
Melospiza lincolni.....	Abundant.	Antrostomus nuttali.....	Common.
Pipilo chlorurus.....	Common.		

31. *Clover Mountains* (September 19, 1868).—On the above date, a trip was made to near the summit of the main peak of this range by following Trout Creek from our camp up the cañon to its head, returning by another cañon to the southward. The summit of this peak is very lofty, rising considerably above the timber-line, or to an altitude of near 12,000 feet. Large fields of perpetual snow lay in the ravines and behind masses of rock, and in several places below the bare summit were quite extensive pine woods. Nothing of interest, ornithologically, resulted from this exceedingly laborious day's work, however, only the usual species being observed. The commoner species of the alpine woods were *Sitta canadensis*, *Parus montanus*, and *Junco oregonus*, while at the head of one of the cañons, where pines and aspens were intermingled, *Canace obscura* was very abundant.

32. *Holmes's Creek, near Thousand Spring Valley* (September 22–26. *Altitude, about 6,000 feet*).—Observations at this camp were confined chiefly to a small valley nestled among a range of low hills separating the valley of the upper Humboldt from Thousand Spring Valley. Around a spring, which supplied the camp with water, grew a thicket of tall willows and aspens, while along the rivulet from this spring grew willow bushes. Elsewhere, only the ordinary sage-brush plants flourished. In the thickets above mentioned, *Dendræca townsendi*, *Sphyrapicus nuchalis*, and *Nyctale acadica* were obtained.

33. "*City of Rocks*,"¹ *Southern Idaho* (October 2, 1868).—The hills

¹This locality derives its name from a remarkable valley among the mountains close by, where immense piles of granite, rising from the floor of the valley, vaguely represent a city of castles, domes, and mosques.

about this locality were extensively covered with unusually luxuriant woods of cedar and piñon, among which *Gymnokitta cyanocephala* and *Cyanocitta woodhousii* were more abundant than we had ever seen them elsewhere. *Corvus carnivorus* and *Centrocercus urophasianus* were also abundant.

34. *Deep Creek, Northwestern Utah* (October 5, 1868).—At this point of our route, the nearly level sage-brush plain was intersected by a narrow valley considerably below the general level, through which flowed, with a sluggish current, a very narrow but remarkably deep creek, a tributary of the Great Salt Lake. The banks of this creek were lined with rushes, while in the valley itself were willow thickets. The principal birds observed here were the following:—

<i>Amphispiza nevadensis.</i>	<i>Melospiza lincolni.</i>
<i>Zonotrichia intermedia.</i>	<i>Telmatodytes paludicola.</i>
<i>Melospiza fallax.</i>	<i>Geothlypis trichas.</i>

35. *Vicinity of Salt Lake City, Utah*¹ (May 20–June 1, and June 14–21, 1869).—Owing to its diversified character, the vicinity of Salt Lake City proved exceedingly favorable to the objects of the exploration; the scrub-oaks of the hill-sides, the luxuriant and varied shrubbery along the stream in City-Creek Cañon, the meadow-lands, both wild and cultivated, between the city and the lake, the tule sloughs, along the Jordan River, and the extensive marshes about the lake-shore, having each their peculiar species, besides those found in the sage-brush, and others of general distribution. The species noted in the vicinity of Salt Lake City during the months of May and June were those given in the annexed list, most, if not all, of them having been found breeding in the neighborhood. The asterisk placed in one or more columns after the name of a species indicates its center of abundance, the columns representing the following types of localities:—

1. Sage-brush plains and mesas.
2. Meadows, chiefly toward the lake.
3. Tule sloughs and marshes near Jordan River.
4. Open ponds, shore of the lake, etc.
5. Thickets along the streams, valley, and lower part of City Creek Cañon.
6. Scrub-oaks, slopes of City Creek Cañon.
7. Rocky places, City Creek Cañon.
8. Of general distribution.
9. Mountain mahoganies and scattered cedars on lower spurs of mountains.

¹ Altitude about 4,000 feet.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. <i>Turdus migratorius</i>					*	*			*
2. <i>Turdus auduboni</i>					*				
3. <i>Turdus swainsoni</i>					*				
4. <i>Oreoscoptes montanus</i>	*								
5. <i>Galeoscoptes carolinensis</i>					*				
6. <i>Cinclus mexicanus</i>					*				
7. <i>Sialia arctica</i>								*	*
8. <i>Troglodytes parkmanni</i>								*	
9. <i>Telmatodytes paludicola</i>			*						
10. <i>Dendroeca æstiva</i>								*	
11. <i>Helminthophaga virginiaë</i>						*			
12. <i>Geothlypis trichas</i>		*							
13. <i>Geothlypis macgillivrayi</i>						*			
14. <i>Icteria longicauda</i>					*				
15. <i>Setophaga ruticilla</i>					*				
16. <i>Pyranga ludoviciana</i>									*
17. <i>Progne subis</i>								*	
18. <i>Petrochelidon lunifrons</i>							*	*	
19. <i>Hirundo horreorum</i>							*	*	
20. <i>Tachycineta thalassina</i>							*	*	
21. <i>Tachycineta bicolor</i>								*	
22. <i>Cotyle riparia</i>								*	
23. <i>Stelgidopteryx serripennis</i>								*	
24. <i>Vireosylva swainsoni</i>					*				
25. <i>Lanivireo plumbeus</i>						*			*
26. <i>Carpodacus cassini</i>									*
27. <i>Carpodacus frontalis</i>								*	
28. <i>Chrysomitris tristis</i>					*				
29. <i>Chrysomitris psaltria</i>					*				
30. <i>Chrysomitris pinus</i>									*
31. <i>Passerculus alaudinus</i>		*							
32. <i>Coturniculus perpallidus</i>		*							
33. <i>Zonotrichia leucophrys</i>						*			
34. <i>Melospiza fallax</i>					*				
35. <i>Amphispiza bilineata</i>	*								
36. <i>Spizella breweri</i>	*								

	1.	2.	3.	4.	5.	6.	7.	8.	9.
37. <i>Spizella arizonæ</i>						*			*
38. <i>Chondestes grammaca</i>	*								
39. <i>Hedymeles melanocephalus</i>					*				
40. <i>Cyanospiza amœna</i>					*	*			
41. <i>Pipilo megalonyx</i>						*			
42. <i>Pipilo chlorurus</i>						*			
43. <i>Dolichonyx oryzivorus</i>		*							
44. <i>Molothrus ater</i>								*	
45. <i>Xanthocephalus icterocephalus</i>			*						
46. <i>Agelæus phœniceus</i>			*						
47. <i>Scolecophagus cyanocephalus</i>									*
48. <i>Sturnella neglecta</i>		*							
49. <i>Icterus bullocki</i>					*				
50. <i>Cyanocitta woodhousii</i>					*	*			
51. <i>Corvus carnivorus</i>								*	
52. <i>Tyrannus verticalis</i>								*	
53. <i>Tyrannus carolinensis</i>								*	
54. <i>Myiarchus cinerascens</i>									*
55. <i>Sayornis sayus</i>								*	
56. <i>Contopus richardsoni</i>								*	
57. <i>Empidonax pusillus</i>					*				
58. <i>Antrostomus nuttalli</i>	*								
59. <i>Chordeiles henryi</i>	*							*	
60. <i>Panyptila saxatilis</i>							*		
61. <i>Selasphorus platycercus</i>						*			
62. <i>Trochilus alexandri</i>						*			
63. <i>Ceryle alcyon</i>								*	
64. <i>Melanerpes erythrocephalus</i>								*	
65. <i>Colaptes mexicanus</i>								*	
66. <i>Speotyto hypogæa</i>	*								
67. <i>Circus hudsonius</i>		*							
68. <i>Falco polyagrus</i>								*	
69. <i>Falco sparverius</i>								*	
70. <i>Buteo swainsoni</i>								*	
71. <i>Zenædura carolinensis</i>								*	
72. <i>Centrocerus urophasianus</i>	*								

	1.	2.	3.	4.	5.	6.	7.	8.	9.
73. <i>Pediæcetes columbianus</i>	*								
74. <i>Ægialitis vociferus</i>								*	
75. <i>Ægialitis nivosus</i>				*					
76. <i>Recurvirostra americana</i>				*					
77. <i>Himantopus mexicanus</i>				*					
78. <i>Steganopus wilsoni</i>				*					
79. <i>Ereunetes pusillus</i>				*					
80. <i>Tringa minutilla</i>				*					
81. <i>Tringoides macularius</i>								*	
82. <i>Symphemia semipalmata</i>				*					
83. <i>Numenius longirostris</i>		*		*					
84. <i>Falcinellus guarauna</i>				*					
85. <i>Ardea herodias</i>				*					
86. <i>Herodias egretta</i>				*					
87. <i>Botaurus minor</i>		*	*	*					
88. <i>Grus canadensis</i>		*	*	*					
89. <i>Rallus virginianus</i>		*	*	*					
90. <i>Porzana carolina</i>		*	*	*					
91. <i>Fulica americana</i>			*	*					
92. <i>Anas boschas</i>		*	*	*					
93. <i>Dafla acuta</i>		*	*	*					
94. <i>Chaulelasmus streperus</i>		*	*	*					
95. <i>Mareca americana</i>		*	*	*					
96. <i>Spatula clypeata</i>		*	*	*					
97. <i>Querquedula cyanoptera</i>		*	*	*					
98. <i>Querquedula discors</i>		*	*	*					
99. <i>Nettion carolinensis</i>		*	*	*					
100. <i>Erismatura rubida</i>		*	*	*					
101. <i>Graculus floridanus</i>				*					
102. <i>Sterna regia</i>			*	*					
103. <i>Sterna forsteri</i>			*	*					
104. <i>Hydrochelidon lariformis</i>			*	*					
105. <i>Podiceps occidentalis</i>			*	*					
106. <i>Podiceps californicus</i>			*	*					
107. <i>Podilymbus podiceps</i>			*	*					

36. *Antelope Island, Great Salt Lake* (June 4–8, 1869).—Antelope Island, the largest of the islands in the Great Salt Lake, appears as a long range of barren mountains, rising from the water. The island is about fifteen miles in length, by about three in width at the broadest part, while its longitudinal axis culminates in a broken rocky ridge, the highest peak of which is, perhaps, some 1,500 to 2,000 feet above the surface of the lake. Some years ago, when the Salt Lake Valley was first settled by the Mormons, this island was indeed a part of the mainland, a strip of low ground then connecting it with the shore. The gradually increased annual rain-fall, brought about by the careful cultivation of the country by the early settlers, first by artificial irrigation, but in time aided by more and more frequent showers, wrought, among other notable changes in the character of the country, a great difference in the level of the lake, which grew higher, year by year, until the isthmus above mentioned became entirely submerged. The entire island presents the usual desert aspect, through the general absence of water, save at one place on the eastern shore, where springs of pure, fresh water irrigate the soil. This spot had been selected by representatives of the Mormon church as the site of a ranche; and it was here that our camp was established. In the thrifty orchard of this thriving little farm were found, nesting, the Cat-bird (*Galeoscoptes carolinensis*), Redstart (*Setophaga ruticilla*), Traill's Flycatcher (*Empidonax pusillus*), Bullock's Oriole (*Icterus bullocki*), and Warbling Vireo (*Vireosylva swainsoni*); while about the buildings a pair of Mountain Blue-birds (*Sialia arctica*) had their abode, as did also several pairs of the House Finch (*Carpodacus frontalis*). The former were feeding a family of full-fledged young, and were the first of this species we ever saw at so low an altitude during the breeding-season, although they were observed later, under similar circumstances, in Salt Lake City.

In the sage-brush, *Oreoscoptes montanus*, *Amphispiza bilineata*, *Spizella breweri*, *Chondestes grammacus*, *Carpodacus frontalis*, *Eremophila chrysolaema*, *Collurio excubitoroides*, *Zenaidura carolinensis*, *Agelaius phoeniceus*, and *Ægialitis vociferus* were nesting; while, in a wet meadow, *Passerculus alaudinus*, *Agelaius phoeniceus*, and *Numenius longirostris* had young. The only additional species noticed among the mountains, were *Cyanospiza amœna*

and *Pipilo megalonyx*, in a ravine, and *Corvus carnivorus*, about the rocky peaks.

37. *Stansbury Island, Great Salt Lake* (June 12, 1869).—This island, like the one just described, was formerly connected with the mainland at its southern extremity; but it is now far out in the lake. No water could be found upon it, and consequently the birds were very scarce. The only species obtained was *Galeoscoptes carolinensis*, of which a single individual, probably a straggler, was secured.

38.—*Carrington Island, Great Salt Lake* (June 17, 1869).—The writer did not visit this island, but two members of the party, Messrs. Watson and Davis, who were there, brought with them on their return eggs of *Recurvirostra americana*, *Branta canadensis*, and *Larus californicus*, and reported various other water-fowl as breeding upon this island and a smaller one near by.

39. "*Rabbit Island*," *Great Salt Lake* (June 11, 1869).—This island was, at the time of our visit, merely a remnant of that portion of the southern shore of the lake which is now submerged. It consisted of merely a low knoll, occupying scarcely an acre in extent, and was named by our party "Rabbit Island" on account of the large numbers of hares (*Lepus callotis*) which were found on it. The latter were so numerous that when our boat landed they were seen rushing frantically around, several of them leaping into the water in their efforts to escape. The surface of this small island was covered with a thrifty growth of sage-brush and grease-wood, in which several pairs of *Oreoscoptes montanus* and *Spizella breweri* had their nests. A single nest of *Mareca americana*, containing ten eggs, was also found beneath a grease-wood bush.

40. *Parley's Park, Wahsatch Mountains, Utah* (June 23–July 2, and July 16–August 16, 1869).—This locality is an elevated park, or broad valley, lying at the eastern base of the main chain of the Wahsatch, and 25 miles distant from Salt Lake City. From the latter it was approached by the cañon of Jordan Creek, a considerable brook, whose sources are among the mountains surrounding this park, while along the eastern side

flowed Silver Creek, a tributary of the Weber. The average altitude of this park is about 6,500 feet, while some of the neighboring peaks of the main range rise 4,000 feet or more higher, and on whose bare, rocky summits spots of snow linger all the summer in the sheltered places. The general character of this park is that of a luxuriant meadow, parts of it under cultivation, the hill-sides being covered with a thick scrub of dwarf-oaks (*Quercus alba*, var.?), while the higher slopes are covered by a dense forest of Coniferæ, composed of several species (*Pinus flexilis*, *P. ponderosa*, *P. contorta*, *Abies menziesii*, *A. englemanni*, *A. douglassi*, *A. grandis*, *A. amabilis*, and *Juniperus virginiana*). The higher portions of the ravines are occupied by shady groves of tall aspens (*Populus tremuloides*), while bordering the lower portions of the streams grow scattered trees of the narrow-leaved cotton-wood (*Populus angustifolia*), and luxuriant shrubbery, of varied species. Indeed, the desert character of the country to the westward of the Great Salt Lake was here almost entirely wanting. As a natural consequence of increased prevalence and luxuriance of vegetation, the birds were much more numerous than we had found them at any previous camp, and while we found eastern trees and shrubs replacing their western representatives, or added as new elements to the western sylvæ, we also found many birds of the Eastern Region as common here as at any point in the Atlantic States. Such species were the Cat-bird (*Galeoscoptes carolinensis*) Swainson's Thrush (*Turdus swainsoni*), Redstart (*Setophaga ruticilla*), and White-crowned Sparrow (*Zonotrichia leucophrys*). A species of the plains, or the Campestrian Province (*Calamospiza bicolor*), was also here met with for the first time, while several birds characteristic of the Rocky Mountains proper were more or less common, as *Turdus auduboni*, *Helminthophaga virginicæ*, *Passerella schistacea*, *Junco caniceps*, and *Cyanura macrolopha*. In this beautiful park three species of Humming-birds were found, viz: *Selasphorus platycercus*, *Stellula calliope*, and *Trochilus alexandri*, the flowery meadows of the upper portion of the cañons being especially attractive to these "feathered gems."

The following is a complete list of the species found at this locality during the period indicated above, their distribution being explained by the annexed columns:—

	Sage-brush.	Meadows.	Marshes and brooks.	Shrubbery along streams.	Higher flow- ery slopes.	Scrub-oaks.	Aspen groves.	Coniferous woods.	Rocks, banks, etc.
1. <i>Turdus migratorius</i>					*		*	*	
2. <i>Turdus swainsoni</i>				*					
3. <i>Turdus auduboni</i>								*	
4. <i>Galeoscoptes carolinensis</i>				*					
5. <i>Sialia arctica</i>						*		*	*
6. <i>Cinclus mexicanus</i>								*	
7. <i>Regulus calendula</i>								*	
8. <i>Parus montanus</i>								*	
9. <i>Sitta aculeata</i>								*	
10. <i>Sitta canadensis</i>								*	
11. <i>Sitta pygmæa</i>								*	
12. <i>Certhia americana</i>								*	
13. <i>Troglodytes parkmanni</i>				*		*	*		
14. <i>Telmatodytes paludicola</i>			*						
15. <i>Eremophila alpestris</i>	*								
16. <i>Helminthophaga celata</i>							*	*	
17. <i>Helminthophaga virginiae</i>						*			
18. <i>Dendræca æstiva</i>				*		*			
19. <i>Dendræca auduboni</i>								*	
20. <i>Dendræca nigrescens</i>						*			
21. <i>Geothlypis macgillivrayi</i>				*					
22. <i>Geothlypis trichas</i>			*						
23. <i>Icteria longicauda</i>				*					
24. <i>Myiodioctes pusillus</i>				*			*?		
25. <i>Setophaga ruticilla</i>				*					
26. <i>Pyranga ludoviciana</i>						*?	*?	*	
27. <i>Progne subis</i>							*		
28. <i>Petrochelidon lunifrons</i>									*
29. <i>Hirundo horreorum</i>									*
30. <i>Tachycineta bicolor</i>							*		
31. <i>Tachycineta thalassina</i>							*		
32. <i>Cotyle riparia</i>									*
33. <i>Stelgidopteryx serripennis</i>									*
34. <i>Vireosylvia swainsoni</i>				*		*?	*		

	Sage-brush.	Meadows.	Marshes and brooks.	Shrubby along streams.	Higher flow- ery slopes.	Scrub-oaks.	Aspen groves.	Coniferous woods.	Rocks, banks, etc.
35. <i>Lanivireo plumbeus</i>						*			
36. <i>Collurio excubitoroides</i>	*					*			
37. <i>Carpodacus cassini</i>							*	*	
38. <i>Carpodacus frontalis</i>				*			*		*
39. <i>Chysomitris tristis</i>				*					
40. <i>Chysomitris psaltria</i>				*					
41. <i>Chysomitris pinus</i>							*	*	
42. <i>Passerculus alaudinus</i>		*	*						
43. <i>Poecetes confinis</i>		*			*				
44. <i>Coturniculus perpallidus</i>		*							
45. <i>Melospiza lincolni</i>					*				
46. <i>Melospiza fallax</i>				*					
47. <i>Junco caniceps</i>								*	
48. <i>Spizella arizonæ</i>				*		*			
49. <i>Spizella breweri</i>	*								
50. <i>Zonotrichia leucophrys</i>					*				
51. <i>Chondestes grammaca</i>	*								
52. <i>Passerella schistacea</i>				*					
53. <i>Calamospiza bicolor</i>		*							
54. <i>Hedymeles melanocephalus</i>				*					
55. <i>Cyanospiza amcena</i>				*					
56. <i>Pipilo megalonyx</i>				*		*			
57. <i>Pipilo chlorurus</i>					*				
58. <i>Molothrus ater</i>		*		*					
59. <i>Agelæus phœniceus</i>		*	*						
60. <i>Xanthocephalus icterocephalus</i>			*						
61. <i>Icterus bullocki</i>				*					
62. <i>Sturnella neglecta</i>	*	*							
63. <i>Scolecophagus cyanocephalus</i>				*		*			
64. <i>Corvus carnivorus</i>									*
65. <i>Cyanocitta woodhousii</i>				*		*			
66. <i>Cyanura macrolopha</i>								*	
67. <i>Picicorvus columbianus</i>								*	
68. <i>Tyrannus verticalis</i>				*					

	Sage-brush.	Meadows.	Marshes and brooks.	Shrubbery along streams.	Higher flow- ery slopes.	Scrub-oaks.	Aspen groves.	Coniferous woods.	Rocks, banks, etc.
69. <i>Tyrannus carolinensis</i>				*					
70. <i>Myiarchus cinerascens</i>				*		*			
71. <i>Contopus borealis</i>								*	
72. <i>Contopus richardsoni</i>				*		*	*		
73. <i>Empidonax obscurus</i>						*	*		
74. <i>Empidonax difficilis</i>								*	
75. <i>Empidonax pusillus</i>				*					
76. <i>Antrostomus nuttalli</i>	*								
77. <i>Chordeiles henryi</i>	*					*			
78. <i>Trochilus alexandri</i>				*	*				
79. <i>Stellula calliope</i>				*	*				
80. <i>Selasphorus platycercus</i>				*	*				
81. <i>Ceryle alcyon</i>			*						
82. <i>Picus harrisi</i>							*	*	
83. <i>Picus gairdneri</i>							*	*	
84. <i>Sphyrapicus nuchalis</i>				*			*		
85. <i>Sphyrapicus thyroideus</i>								*	
86. <i>Colaptes mexicanus</i>				*		*	*	*	*
87. <i>Bubo subarcticus</i>				*		*	*	*	
88. <i>Falco polyagrus</i>	*								*
89. <i>Falco sparverius</i>				*		*	?	?	*
90. <i>Circus hudsonius</i>		*	*						
91. <i>Nisus cooperi</i>				*		?	*		
92. <i>Nisus fuscus</i>				*		*	*		
93. <i>Buteo calurus</i>								*	
94. <i>Buteo swainsoni</i>				*		*			
95. <i>Archibuteo sancti-johannis</i>								*	*
96. <i>Aquila canadensis</i>								*	*
97. <i>Rhinogryphus aura</i>									
98. <i>Zenædura carolinensis</i>	*			*		*			
99. <i>Canace obscura</i>					*	*	*	*	
100. <i>Bonasa umbelloides</i>						*?	*	*	
101. <i>Centrocercus urophasianus</i>	*								
102. <i>Pediocetes columbianus</i>	*	*							

	Sage-brush.	Meadows.	Marshes and brooks.	Shrubby along streams.	Higher flow- ery slopes.	Scrub-oaks.	Aspen groves.	Coniferous woods.	Rocks, banks, etc.
103. <i>Ægialitis vociferus</i>	*
104. <i>Gallinago wilsoni</i>	*	*
105. <i>Ereunetes pusillus</i>	*
106. <i>Actodromus minutilla</i>	*
107. <i>Symphemia semipalmata</i>	*
108. <i>Tringoides macularius</i>	*
109. <i>Rhyacophilus solitarius</i>	*
110. <i>Numenius longirostris</i>	*	*
111. <i>Grus canadensis</i>	*	*
112. <i>Porzana carolina</i>	*
113. <i>Porzana jamaicensis</i> ?	*
114. <i>Fulica americana</i>	*
115. <i>Anas boschas</i>	*	*
116. <i>Querquedula cyanoptera</i>	*	*

41. *Pack's Cañon, Uintah Mountains* (July 3-8, 1869).—This cañon is the valley of a considerable stream, flowing from the higher regions of one of the western peaks of the Uintah range into the Weber River, *via* Kamas Prairie. In its upper portion both valley and mountains are densely covered with a coniferous forest, while along the banks of the stream the extensive and vigorous growth of shrubbery consists of many species. The birds found in this locality were, in part, the following:—

Turdus migratorius.
Turdus swainsoni.
Galeoscoptes carolinensis.
Cinclus mexicanus.
Geothlypis macgillivrayi.
Dendroeca nigrescens.
Helminthophaga virginiae.
Setophaga ruticilla.
Pyranga ludoviciana.
Chrysomitris tristis.
Chrysomitris psaltria.

Chrysomitris pinus.
Melospiza fallax.
Cyanura macrolopha.
Picicorvus columbianus.
Selasphorus platycercus.
Antrostomus nuttalli.
Chordeiles henryi.
Canace obscura.
Zenaidura carolinensis.
Tringoides macularius.

42.—*Kamas Prairie, Utah* (July 9, 1869).—Kamas Prairie is a grassy valley, lying between the western spur of the Uintahs and the rolling eastern foot-hills of the Wahsatch. We noticed there the ordinary species of meadow localities, with the addition of *Actiturus bartramius*, which seemed to be quite common.

43. *Provo River, Utah* (July 10–11, 1869).—We followed this river, from the valley in which Heber City is situated, to Provo, near the shore of Utah Lake, through the deep and picturesque cañon cleft between two high peaks of the Wahsatch range. Among the dense and extensive willow thickets along this river we first found *Turdus fuscescens* and *Parus septentrionalis* (the former in great abundance), and the Magpie again numerous. The other species noticed along this river were, mainly, the following: *Galeoscoptes carolinensis* (abundant), *Setophaga ruticilla* (abundant), *Zenaidura carolinensis* (abundant), *Dendroica aestiva*, *Melospiza fallax*, *Icterus bullocki*, etc.

GENERAL REMARKS ON THE AVIFAUNA OF THE GREAT BASIN.

The total number of species of birds observed during the exploration is 262, of which only 24 were not seen east of the western slope of the Sierra Nevada; thus leaving a total of 238 species noticed in the Great Basin, including the approximate slopes of the Sierra Nevada and Wahsatch ranges, which form the boundary of the district on the west and east. This number includes both winter and summer birds, as well as the transient species, or those which merely pass through in the spring and fall; the latter were comparatively very few, however, since the complicated topography of the country afforded such a diversity of climate, with variations of altitude, that extreme northern and southern species passed the summer at different elevations on the same mountain ranges. Although the Great Basin forms a natural "Province" of the Western Region, the Sierra Nevada and main Rocky Mountain ranges forming its longitudinal boundaries, the mountains form much less of an actual barrier to the distribution of the species than might be supposed, as is clearly attested by the occurrence of a large proportion of the Californian species on the eastern slope of the

former, down to the very verge of the desert, and the presence of so many eastern birds on the Wahsatch and other extreme western ranges of the latter system. It is, therefore, evident that not the mountains, but the deserts, check the species in their range away from their centers of distribution. It was also noticed that the species having a general range throughout the Interior were those particularly characteristic of, if not peculiar to, the Basin Province, and that their distribution was regulated less by mere topographical features than by other local conditions, the presence or absence of water and vegetation being the main agents.

As stated in the chapter on the local avifaunæ of the Great Basin (see pp. 316-328), certain groups of birds not only characterize particular zones of vegetation, but, also, isolated spots of a particular description, no matter at what altitude. An excellent example in illustration of this case is afforded by the humming-birds of the Interior, which are found wherever flowers grow in profusion, either in the valleys or on the mountains; they abound most on the upper slopes of the cañons, where numerous flowering plants bloom in such abundance as to form natural gardens; but on one day, in August, we observed an individual of *Selasphorus platycercus* in the doorway of a ranche, in Ruby Valley, the altitude of which was between 6,000 and 7,000 feet, while a few hours later, as we stood on the summit of one of the lofty peaks of the East Humboldt range, at an elevation of about 12,000 feet above sea-level, and far above the fields of perpetual snow, an individual of the same species flew rapidly by, bound for the slopes of an adjoining cañon. The extreme vertical range of this species was thus shown to be nearly 6,000 feet, or more than one mile! In all cases where farms had been established in the valleys, humming-birds were noticed in the dooryards, though had not careful cultivation, with the aid of artificial irrigation, produced these oases in the desert, it is needless to say these birds would not have been seen there. Other cases in point are those of the birds frequenting the cañon shrubbery, which have a vertical range almost equal to that of the humming-birds, the same species following the streams from the valleys up to the snow-fields, provided the shrubbery continues so far. Certain birds which frequent woods, of whatsoever kind, are almost sure to be found wherever trees occur; thus *Colaptes mexicanus* or *Picus harrisi* may

be observed the same day among the cotton-woods of the lowest valleys, less than a hundred feet above sea-level (as in California), and in the alpine woods, 10,000–12,000 feet above the sea.

Independent of these local modifications of the fauna, as controlled by conditions of environment, important changes were noticed in proceeding eastward, which are of a truly geographical nature. Thus, although the character of the country changed completely with the termination of the coniferous forests of the eastern slope of the Sierra Nevada, the change in the fauna was by no means so abrupt. New forms of course immediately made their appearance, or even predominated in number of species and individuals, over those we had met with before, but still many of the latter were not lost sight of completely until we had penetrated many miles into the desert country, but reappeared on the higher ranges of the western depression. This was particularly the case with the West Humboldt Mountains, where *Lanivireo cassini*, *Pipilo oregonus*, *Melospiza guttata*, *Zonotrichia coronata*, and *Agelaius gubernator* were found in the fall, all being birds of the Pacific Province; while on the desert ranges, within sight of the Sierra, *Oreortyx pictus* was more or less plentiful. Along the eastern base of the Sierra Nevada, near Carson City, *Cyanocitta californica*—the "Valley Jay" of California—was found in place of *C. woodhousii*, which was the only species from the West Humboldt Mountains eastward, and the form characteristic of the Middle Province.

As we approached the eastern border of the Basin we met with species characteristic of the Eastern Region or the Rocky Mountain District of the Middle Province, as gradually as on the western side we had left the Californian forms behind; each successive high range introducing a larger number to the list. But even in this district, where so many eastern forms were met with, there was still a sprinkling of the extreme western element, which, however, seemed to have reached nearly to its eastern limit in the upper Humboldt valley or the neighboring mountains, where such birds as *Turdus guttatus*, *Helminthophaga lutescens*, *Dendroica occidentalis*, *D. townsendi*, and *Selasphorus rufus* were noticed as autumnal migrants.

It seems to be a general rule, that western birds have a tendency to extend eastward during their fall migrations, thus spreading over the whole

of the Western Region at this season, though in summer their habitat may be confined strictly to the area of Pacific-coast drainage. This circumstance we have previously alluded to, in these words:—¹

“Another very remarkable peculiarity of the Wahsatch region, which I wish particularly to mention in this connection, is the fact that in the case of representative species or races, the Eastern or Rocky Mountain forms breed there, while the more Western forms replace them in winter. Thus, *Zonotrichia leucophrys* and *Junco hyemalis*, var. *caniceps*, are the only species of these two genera which breed on the Wahsatch, and they nest there very numerously; but in the fall their place is taken by the western *Z. leucophrys*, var. *gambeli* [= *intermedia*] and *J. hyemalis*, var. *oregonus*, which are unknown in summer. *Lanivireo solitaria*, var. *plumbea*, breeds there, while var. *solitaria*, coming from the northwestward, replaces it in autumn. The same is the case with *Turdus pallasi*, var. *auduboni* (summer resident), and var. *nanus* (autumnal migrant); and apparently the case also with *Helminthophaga virginiae* (summer), and *H. ruficapilla* (autumn).”²

The eastern species occurring within the Basin were found to have reached their maximum in the Salt Lake Valley and adjacent country to the eastward, but, as was the case with the western series, some of them had intruded so far within the western domain as to reach the opposite side. Thus, *Tyrannus carolinensis* was not rare during the breeding-season in the lower Truckee Valley, almost at the foot of the Sierra Nevada. *Ectopistes migratoria* was obtained in the West Humboldt Mountains, although the only individual seen was a young one, and evidently a straggler. In the East Humboldt Mountains, *Turdus swainsoni*, *Helminthophaga ruficapilla*, and

¹ Proc. Essex Inst., Vol. V, Nov., 1873, pp. 170, 171. [“Notes on the Bird Fauna of the Salt Lake Valley and the adjacent portions of the Wahsatch Mountains.”]

² Other examples of species which have an extreme western or northwestern distribution during the breeding-season, but which migrate in fall both eastward and southward, are, *Helminthophaga lutescens*, *Dendroica occidentalis*, *D. townsendi*, and *Selasphorus rufus*, found as far east as the Clover Mountains, with the addition of *Lanivireo cassini*, *Melospiza guttata*, *Pipilo oregonus*, *Zonotrichia coronata*, and *Agelaius gubernator*, which in September and October were obtained in the West Humboldt range. The most plausible explanation of this eastward migration would appear to be found in the supposition that nearly, if not all, these migrants were from the Valley of the Columbia River, whose main tributary, the Snake River, heads almost directly north of the Great Salt Lake; the birds of the Columbia basin would naturally follow the valleys of these upper tributaries as the route offering the least obstacle to their southward passage, many species which do not breed eastward of the lower Columbia thus regularly reaching the eastern border, if not the whole extent, of the Great Basin. Whether their return northward is by the same route, remains to be determined.

Dolichonyx oryzivorus were more or less common in the fall. In the Wahsatch district, including the Salt Lake Valley, were *Turdus fuscescens*, *Galeoscoptes carolinensis*, *Setophaga ruticilla*, and *Zonotrichia leucophrys* as abundant summer residents, and *Melanerpes erythrocephalus* as a summer straggler; while on Kamas Prairie, between the Wahsatch and the Uintahs, *Actiturus bartramius* was common in July.

Another result of our investigations was the discovery of the fact that several species, supposed to be peculiarly eastern, are in reality among those which inhabit the entire breadth of the continent. Among these were *Coccyzus americanus*, which was found both at Sacramento, California, and in the Truckee Valley, in June and July, and *Coturniculus passerinus*, which was as abundant in the vicinity of Sacramento as at any eastern locality; also, *Spizella monticola*, heretofore supposed to be of casual or accidental occurrence in the West, but which was found to be an abundant winter resident in suitable localities. There was also seen at two places in the western depression—the West Humboldt Mountains (October) and the Truckee Valley (November)—a *Colaptes*, which was probably the eastern *C. auratus*, though it may possibly have been *C. chrysoides* of the Gila and Saint Lucas districts, since it is certain that the individuals in question were not the form intermediate between *C. auratus* and *C. mexicanus*, known as *C. "hybridus."*¹

Somewhat of an anomaly was noticed in the distribution of several species in the region indicated, in their abundance on the two opposite

¹In addition to these species, the following are known to occur westward of the main divide of the Rocky Mountains:—

1. *Dendroeca blackburniæ*; Ogden, Utah, Sept.—*Allen*.
2. *Dendroeca coronata*; Fort Bridger, Wyoming.—*Baird*.
3. *Seiurus noveboracensis*; Fort Bridger, Wyoming.—*Baird*.
4. *Cistothorus stellaris*; Utah Lake; breeding.—*Henshaw*.
5. *Vireosylvia olivacea*; Ogden, Utah, September.—*Allen*. ["More or less common"]; Fort Bridger, Wyoming.—*Baird*.
6. *Junco hyemalis*; Iron Springs, Utah, October 4.—*Henshaw*.
7. *Melospiza palustris*; Washington, Utah, October 23.—*Henshaw*.
8. *Quiscalus æneus*; Fort Bridger, Wyoming.—*Baird*.
9. *Empidonax minimus*; Fort Bridger, Wyoming.—*Baird*.
10. *Rallus elegans*; Ogden, Utah, September.—*Allen*.
11. *Ibis alba*; Ogden, Utah, September.—*Allen*. ["Said to be frequent in summer."]
12. *Anas obscura*; Rush Lake, Utah, November.—*Yarrow*.

mountain ranges and their apparent absence from the entire intervening territory. Such was particularly conspicuous regarding *Sialia mexicana* and *Lophophanes inornatus*, which, if occurring at all in the Basin proper, were so rare that they were not noticed. An apparent explanation of this exceptional range is the general absence of suitable localities over the greater portion of this vast area; but the circumstance that the species named were still wanting on the Wahsatch and Uintahs, where the conditions of environment are in every way favorable, would seem to suggest other causes. The partial or entire absence of certain woodland species from the sufficiently extensive forests of the higher interior ranges was indeed a subject of continual speculation, since they were searched for in vain, after leaving the Sierra Nevada, until the Wahsatch or Uintah woodlands were reached, when many of them reappeared, while others did not, although they are known to occur in the same latitudes on the main Rocky Mountain ranges. Besides the species named above, we may mention *Scops flammeola*, *Glauucidium gnoma*, and *Columba fasciata*, which are common to the two widely-separated districts named, but which have not yet been recorded from any intermediate locality; while other species, found both on the Sierra Nevada and Wahsatch, were found to be either extremely rare or apparently not existing at all on any ranges between. These species are the following: *Regulus calendula*, *Parus montanus*, *Sitta aculeata*, *S. pygmaea*, *Certhia americana*, and *Sphyrapicus thyroideus*. All of these, it may be observed, are of pinicoline habits.

It seems to us that the most reasonable explanation of the abundance of these birds on the Sierra Nevada and Rocky Mountains, and their rarity in or absence from the intervening region, is to be found in the fact that the two great mountain systems named approximate closely along the northern and southern borders of the United States, thus allowing short and scarcely interrupted passage from one to the other, without being obliged to cross the wide expanse of desert which intervenes along the line of our route.

The following tables are intended to show more briefly the changes noticed in the bird-fauna during our transit of the Basin, as well as the main local peculiarities noted by the way:—

SPECIES OF THE GREAT BASIN NOT OBSERVED IN CALIFORNIA.

<i>Species.</i>	<i>Range within the Basin.</i>
1. <i>Turdus auduboni</i>	Eastern side.
2. <i>Oreoscoptes montanus</i>	Entirely across.
3. <i>Sialia arctica</i>	Entirely across.
4. <i>Psaltiriparus plumbeus</i>	Entirely across.
5. <i>Psaltiriparus melanotis</i>	Eastern side; straggler.
6. <i>Salpinctes obsoletus</i>	Entirely across.
7. <i>Catherpes conspersus</i>	Entirely across.
8. <i>Helminthophaga virginiae</i>	Eastern side.
9. <i>Lanivireo plumbeus</i>	Eastern side.
10. ? <i>Phænopepla nitens</i>	Western side.
11. <i>Carpodacus cassinii</i>	Entirely across.
12. <i>Junco caniceps</i>	Eastern side.
13. <i>Amphispiza bilineata</i>	Entirely across.
14. <i>Amphispiza nevadensis</i>	Entirely across.
15. <i>Melospiza fallax</i>	Entirely across, except western border.
16. <i>Passerella schistacea</i>	Eastern side, chiefly.
17. <i>Calamospiza bicolor</i>	Eastern side; straggler.
18. <i>Pipilo megalonyx</i>	Entirely across, except western border.
19. <i>Pipilo chlorurus</i>	Entirely across.
20. <i>Gymnokitta cyanocephala</i>	Western side.
21. <i>Pica hudsonica</i>	Entirely across.
22. <i>Cyanura macrolopha</i>	Eastern side.
23. <i>Cyanocitta woodhousii</i>	Entirely across.
24. <i>Sayornis sayus</i>	Entirely across.
25. <i>Empidonax obscurus</i>	Entirely across.
26. <i>Empidonax hammondi</i>	Entirely across.
27. <i>Panyptila saxatilis</i>	Eastern side.
28. <i>Selasphorus platycercus</i>	Eastern side.
29. <i>Stellula calliope</i>	Entirely across.
30. <i>Sphyrapicus nuchalis</i>	Entirely across.
31. <i>Sphyrapicus thyroideus</i>	Entirely across.
32. <i>Colaptes hybridus</i>	Entirely across.
33. <i>Colaptes auratus</i> ?	Western side.
34. <i>Canace obscura</i>	Entirely across.
35. <i>Bonasa umbelloides</i>	Entirely across.
36. <i>Pediocetes columbianus</i>	Entirely across.
37. <i>Centrocercus urophasianus</i>	Entirely across.
38. <i>Falcinellus guarauna</i>	Eastern side.
39. <i>Falcinellus thalassinus</i>	Western side.

SPECIES OF THE EASTERN REGION FOUND IN THE BASIN.

1. *Turdus swainsoni*
2. *Turdus fuscescens*
3. *Galeoscoptes carolinensis*

<i>Species.</i>	<i>Range within the Basin.</i>
4. <i>Helminthophaga celata</i>	Eastern side.
5. <i>Setophaga ruticilla</i>	Eastern side.
6. <i>Lanivireo solitarius</i>	Entirely across.
7. <i>Zonotrichia leucophrys</i>	Eastern side.
8. <i>Dolichonyx oryzivorus</i>	Eastern side.
9. <i>Tyrannus carolinensis</i>	Entirely across.
10. <i>Melanerpes erythrocephalus</i>	Eastern side.
11. <i>Ectopistes migratoria</i>	West Humboldt Mts.; straggler.
12. <i>Actiturus bartramius</i>	Eastern side.
13. <i>Querquedula discors</i>	Entirely across.

LOCALITIES WHERE CERTAIN SPECIES WERE FIRST MET WITH IN JOURNEYING
EASTWARD.

Eastern slope of Sierra Nevada.

1. *Oreoscoptes montanus*. July.
2. *Sialia arctica*. December–April 25.
3. *Carpodacus cassinii*. March 21–April 4.
4. *Salpinctes obsoletus*. Summer resident.
5. *Catherpes conspersus*. Constant resident.
6. *Amphispiza nevadensis*. Constant resident.
7. *Amphispiza bilineata*. Summer resident.
8. *Spizella monticola*. Winter resident.
9. *Passerella megarhyncha*. From April 25 through summer.
10. *Passerella schistacea*. February and March; scarce.
11. *Pipilo chlorurus*. Summer resident.
12. *Scolecophagus cyanocephalus*. Winter resident in valleys, breeding on mountains.
13. *Gymnokitta cyanocephala*. Constant resident.
14. *Pica hudsonica*. Constant resident.
15. *Sayornis sayus*. Summer resident.
16. *Empidonax obscurus*. Summer resident.
17. *Antrostomus nuttalli*. Summer resident.
18. *Chordeiles henryi*. Summer resident.
19. *Picoides arcticus*. Winter resident; rare.
20. *Sphyrapicus thyroideus*. Constant resident.
21. *Sphyrapicus nuchalis*. Casual (April 4).
22. *Falco polyagrus*. Constant resident.
23. *Canace obscura*. Constant resident.
24. *Centrocercus urophasianus*.

Truckee Valley (below Virginia Mountains).

1. *Troglodytes hyemalis*. December.
2. *Tachycineta thalassina*. Summer resident.
3. *Tyrannus carolinensis*. Summer resident.

4. *Nephæcetes borealis*. Summer resident.
5. *Chætura vauxi*. Summer resident.
6. *Selasphorus rufus*. August; excessively abundant.
7. *Steganopus wilsoni*. May; rare.

West Humboldt Mountains.

1. *Psaltiriparus plumbeus*. September–October.
2. *Lanivireo cassini*. September 9–25.
3. *Lanivireo solitarius*. September.
4. *Melospiza guttata*. One specimen; October 3.
5. *Zonotrichia coronata*. One specimen; October 7.
6. *Cyanocitta woodhousii*. September–October.
7. *Ectopistes migratoria*. One specimen; September 10.
8. *Colaptes auratus*. ? One specimen; October.

Soda Lake, Carson Desert.

1. ? *Phænopoela nitens*. June 27; rare.

Toyabe Mountains (near Austin).

1. *Panyptila saxatilis*. July 4; one specimen.

Ruby Mountains (eastern slope).

1. *Psaltiriparus melanotis*. ? One specimen; August 4.
2. *Dendroeca nigrescens*. Summer resident.
3. *Helminthophaga virginiae*. Summer resident.
4. *Lanivireo plumbeus*. Summer resident.
5. *Loxia leucoptera*. One specimen; August 12.
6. *Selasphorus platycercus*. Summer resident.
7. *Stellula calliope*. Summer resident.

East Humboldt Mountains (eastern slope).

1. *Turdus swainsoni*. September 1–11.
2. *Dendroeca townsendi*. September 8–24.
3. *Dendroeca occidentalis*. August 29.
4. *Helminthophaga ruficapilla*. September 6.
5. *Empidonax hammondi*. September 5–8. [Also found on eastern slope of the Sierra Nevada.]

Here were seen the most eastern individuals of *Selasphorus rufus*, a pair having been observed, and the male secured, September 8.

Ruby Valley (west side, near Franklin Lake).

1. *Dolichonyx oryzivorus*. August and September.
2. *Falcinellus guarauna*. August and September.

From here northward, *Lepus callotis* was found to be replaced by *L. campestris*.

Upper Humboldt Valley (west of Clover Mountains).

1. *Turdus guttatus*. September 16.
2. *Sitta canadensis*. September 10.
3. *Ampelis cedrorum*. September 10.
4. *Picus gairdneri*. September 12-17.
5. *Nisus fuscus*. September 10.
6. *Pedicecetes columbianus*. September 16.

Thousand Spring Valley.

1. *Nyctale acadica*. September 24; one specimen.

Vicinity of Salt Lake City (including shores and islands of the lake, City Creek Cañon, etc.).

1. *Galeoscoptes carolinensis*. Common summer resident.
2. *Setophaga ruticilla*. Common summer resident.
3. *Chrysomitris psaltria*. Rare summer resident.
4. *Pipilo megalonyx*. Abundant summer resident.
5. *Melanerpes erythrocephalus*. One specimen, June.
6. *Ægialitis nivosus*. Very abundant summer resident.

Parley's Park (Wahsatch Mountains).

1. *Junco caniceps*. Common summer resident.
2. *Zonotrichia leucophrys*. Common summer resident.
3. *Calamospiza bicolor*. One specimen, July 30.
4. *Cyanura macrolopha*. Common resident.
5. *Bonasa umbelloides*. Rare resident.

Kamas Prairie.

1. *Actiturus bartramius*. July.

Provo Cañon.

1. *Turdus fuscescens*. Very abundant summer resident.
2. *Parus septentrionalis*. Summer resident.

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¹ For the sake of convenience, we adopt a strictly binomial nomenclature, even in case of forms which are unquestionably mere geographical races. Species distinguished by an asterisk are those which were observed during the breeding-season; those in italics were seen only in California, while those not in the collection are inclosed in brackets.

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REPORT PROPER.

[EMBRACING BIOGRAPHICAL AND OTHER NOTES ON THE SPECIES OBSERVED.]

FAMILY TURDIDÆ—THRUSHES.

TURDUS MIGRATORIUS.¹

Robin-Thrush; American Robin.

Turdus migratorius, LINN., S. N., I, 1766, 292.—BAIRD, B. N. Am., 1858, 218; Cat. N. Am. B., 1859, No. 155; Rev. Am. B., 1864, 28.—COOPER, B. Cal., I, 1870, 7.—COUES, Key, 1872, 71, fig. 13; Check List, 1873, No. 1; B. N.W., 1874, 1. *Turdus migratorius* var. *migratorius*, B. B. & R., Hist. N. Am. B., I, 1874, 25, pl. II, fig. 3.—HENSHAW, 1875, 143.

The Common Robin was not found at Sacramento in June, nor was it seen anywhere in the Sacramento Valley until we neared the foot-hills of

¹ For obvious reasons, we have abstained from burdening this report with numerous references, and have confined the citations to the more important *general* works, including, of course, the original description of the species, and the first authority for the binomial combination as adopted. Those desiring other references are advised to consult Dr. Coues's "Birds of the Northwest," and Mr. Henshaw's report, cited below, where may be found in the very complete synonymatic tables almost any reference required. The general works quoted in this report are the following:—

(1.) "BAIRD, B. N. Am., 1858."—Vol. IX, Pacific R. R. Reports.—Birds: by Spencer F. Baird, Assistant Secretary Smithsonian Institution, with the coöperation of John Cassin and George N. Lawrence. Washington, D. C., 1858.

(2.) "BAIRD, Catal. N. Am. B., 1859."—Catalogue of North American Birds, chiefly in the Museum of the Smithsonian Institution. [First octavo edition.] Washington: Smithsonian Institution [Smithsonian Miscellaneous Collections, No. 108], 1859.

(3.) "BAIRD, Rev. Am. B."—Review of American Birds, in the Museum of the Smithsonian Institution. Part I. Washington: Smithsonian Institution [Smithsonian Miscellaneous Collections, No. 181], 1864–1866. [Edition with indices, published 1872.]

(4.) "B. B. & R., Hist. N. Am. B."—History of North American Birds, by S. F. Baird, T. M. Brewer, and R. Ridgway [etc.], 3 vols. Boston: Little, Brown & Co., 1874.

(5.) "COUES, Key."—Key to North American Birds [etc.]. By Elliott Coues, Assistant Surgeon United States Army. Salem: Naturalists' Agency, 1872.

(6.) "COUES, Check List."—Check List of North American Birds. By Dr. Elliott Coues, U. S. A. Salem: Naturalists' Agency, 1874.

(7.) "COUES, B. N.W."—Birds of the Northwest [etc.]: Miscellaneous Publica-

the Sierra Nevada, where the first individuals of the species were noticed among the scattered pines which formed the outposts of the continuous forest of the mountains. From the Sierra Nevada eastward, however, it was continually met with in all wooded localities, the aspen groves of the higher cañons being its favorite resort during the summer, while in winter it descended to the lower valleys, and passed the season among the willows or cotton-woods and attendant shrubbery along the streams. In the vicinity of Carson City it was extremely abundant from the middle of March until the middle of April, and assembled in large flocks among the scrubby thickets of dwarf-plum bushes along the base of the Sierra. In August they were quite plentiful in the valley of the Truckee, below the "Big Bend," being attracted thither by the abundance of fruit of the buffalo-berry bushes (*Shepherdia argentea*), which at this time formed an important portion of their food; and later in the season they were observed feeding on service-berries (the fruit of *Amelanchier canadensis*) along the foot-hills of the eastern ranges.

In their manners and notes we could not detect the minutest difference between the western and eastern Robins, although climatic or other geographical influences have perceptibly modified their plumage.¹ In all respects it seems the same bird, the song and other notes being identical.

tions, No. 3, U. S. Geological Survey of the Territories, F. V. Hayden, U. S. Geologist-in-charge. Washington: Government Printing Office, 1874.

(8.) "COOPER, Orn. Cal., I."—[Reports Geological Survey of California. J. D. Whitney, State Geologist.] Ornithology. Vol. I. Land Birds. Edited by S. F. Baird, from the manuscript and notes of J. G. Cooper. Published by authority of the Legislature. Cambridge: [Printed by Welch, Bigelow & Co.,] 1870.

(9.) "HENSCHAW, 1875."—Report upon Geographical and Geological Explorations and Surveys west of the One Hundredth Meridian, in charge of First Lieut. Geo. M. Wheeler, Corps of Engineers, U. S. Army [etc.]. Chapter III, Vol. V.—Zoology. Washington: Government Printing Office, 1875.

[NOTE.—In the *History of North American Birds*, *Birds of the Northwest*, and other recent publications, occasional reference is made to a "Zoology of the 40th Parallel [in press]," or "Rep. 40th Parallel [in press]." It is to be understood that these citations do *not* apply to the present report, but to the original one, stereotyped in 1870, but suppressed on account of unavoidable delay in its publication. In its present form the report is substantially the same, but the changes necessary to bring it up to date render the citations of pages and names frequently inapplicable.]

¹The western birds of this species may be distinguished as a geographical race, for which the name *Turdus migratorius propinquus*, Ridgway, is proposed. See [*Bulletin of the Nuttall Ornithological Club*, Vol. II, January, 1877, p. 9.]

*List of specimens.*¹

226, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, October 4, 1867. $10\frac{3}{8}$ —16— $5\frac{5}{16}$ — $4\frac{5}{16}$ — $\frac{7}{16}$ — $1\frac{1}{8}$ — $4\frac{1}{4}$ — $1\frac{3}{4}$. Bill, brownish-black, more yellowish-brown along commissure, and on lower mandible; iris, brown; tarsi and toes, brownish-black.

269, ♂ *ad.*; Truckee meadows, Nevada, November 8. 11 — $16\frac{7}{8}$ — $5\frac{1}{2}$ — $4\frac{1}{2}$ — $\frac{7}{8}$ — $1\frac{1}{4}$ — $4\frac{3}{8}$ — $1\frac{7}{8}$. Upper mandible, dilute yellowish horn-color; tip and culmen, blackish; lower, more yellowish; gonys and tip, black; iris, brown; tarsi and toes, deep black.

358, ♀ *ad.*; Truckee Valley, December 16. $10\frac{3}{8}$ — $15\frac{1}{2}$ — $5\frac{1}{2}$ — $4\frac{1}{2}$ — $\frac{7}{8}$ — $1\frac{1}{8}$ — $4\frac{1}{4}$ —2. Same remarks.

359, ♂ *ad.*; same date and locality. $10\frac{1}{8}$ — $16\frac{1}{4}$ — $5\frac{1}{2}$ — $4\frac{1}{2}$ — $\frac{27}{32}$ — $1\frac{1}{8}$ — $4\frac{1}{4}$ —2. Bill, nearly uniform blackish; yellowish on upper edge of lower mandible; iris, brown; interior of mouth, deep yellow-orange; tarsi and toes, intense black.

803, nest and eggs (4); Truckee Valley, June 6, 1868. Nest in cotton-wood tree.

820, nest and eggs (4); Toyabe Mountains, 7,500 feet altitude, July 3, 1868. Nest in a copse along stream, about six feet from ground, in choke-cherry bush.

851, nest and eggs (4); Camp 19, East Humboldt Mountains, July 22. Nest on piñon tree, about fifteen feet from ground. (8,000 feet altitude.)

1265, 1266, 1267, 1268, nest and eggs; 1269, single egg; Parley's Park (Wahsatch Mountains), Utah, June 23, 1869. Nests in cotton-woods along a stream.

1287, nest and eggs (4); Parley's Park, June 25. Bushes along stream.

1301, nest and eggs (2); Parley's Park, June 27. Nest in aspen.

1338, nest and eggs (4); Parley's Park, June 28. Willows along stream.

1367, nest and eggs (3); Uintah Mountains (Pack's Cañon), Utah, July 3, 1869. Nests in thorn-apple bushes along stream.

1368, nest and eggs (3); same locality and date.

1395, nest and eggs (4); Parley's Park, July, 1869.

TURDUS GUTTATUS.

Hermit Thrush.

α. guttatus—Dwarf Hermit Thrush.

Muscicapa guttata, PALL., Zoog. Rosso-As., I, 1811, 465. [*Juv.*]

Turdus nanus, AUD., Orn. Biog., V, 1839, 201, pl. cci (doubtful whether this form!).

BAIRD, Birds N. Am., 1858, 213; Cat. N. Am. Birds, 1859, No. 150; Review, 1864, —COOPER, Orn. Cal., I, 1870, 4.

Turdus pallasi var. *nanus*, COUES, Key, 1872, 72; Check List, 1873, No. 4 b.—B.

B. & R., Hist. N. Am. B., I, 1874, 20, pl. I, fig. 7.

Turdus pallasi. b. *nanus*, COUES, B. Northwest, 1874, p. 3.—HENSHAW, 1875, 146.

But one individual of the Dwarf Thrush was met with, this one being secured. It is probably more or less common, however, during the migra-

¹In the enumeration of specimens certain figures require explanation. The first number denotes the current number of the specimen as registered in the Field Catalogue. The measurements are as follows, in regular sequence: (1), length; (2), ex-

tions, particularly in the fall, in all suitable localities embraced within the country traversed by the expedition. The specimen in question was obtained on Trout Creek, a tributary of the Humboldt River, and when observed was perched on a low twig in a willow copse, silently watching us as we reclined on the grassy bank of the brook. It uttered no note whatever, and exhibited no fear at our presence.

List of specimens.

928, ♀ *ad*; Trout Creek, Upper Humboldt Valley, Nevada, September 16, 1868. $6\frac{11}{16}$ — $10\frac{13}{16}$ — $2\frac{5}{16}$. Bill, black; basal half of the lower mandible, lilaceous-white; interior of the mouth, rich yellow; iris, dark bister; tarsi and toes, pale purplish-brown—the toes darkest, the tarsi paler along their posterior edge.

β. auduboni—*Rocky Mountain Hermit Thrush*; *Audubon's Hermit Thrush*.

Merula silens, SWAINS., Phil. Mag., I, 1827, 369 (not *Turdus silens*, VIEILL, 1823 = *T. fuscescens*). *Turdus silens*, BAIRD, B. N. Am., 1858, 213, 922; Cat. N. Am. Birds, 1859, No. 149a.

Turdus auduboni, BAIRD, Rev. Am. Birds, 1864, 16.

Turdus pallasi var. *auduboni*, COUES, Key, 1872, 72; Check List, 1873, No. 4a. —B. B. & R., Hist. N. Am. B., I., 1874, 21, pl. I, fig. 8.—HENSHAW, 1875, 144.

Turdus pallasi. b. auduboni, COUES, Birds N.W., 1874, 3.

The large Mountain Thrush was first met with in the Wahsatch range, where it inhabited chiefly the deep ravines of the pine region. The first specimen seen was shot May 26, in City Creek Cañon, near Salt Lake City; but this was probably a mere straggler from the higher portions of the mountains. In its manner of flight, which is gliding and noiseless, this Thrush greatly resembles Townsend's Solitaire (*Myiadestes townsendi*), the resemblance being increased by the pale ochraceous band across the base of the remiges, which shows as a very conspicuous feature on both birds when flying. The haunts of this bird were so difficult of access from our

pause of wings when fully stretched; (3), length of wing from tip of the longest primary to the carpal joint; (4), the same measurement to the metacarpo-phalangeal articulation; (5), length of the culmen (not including the cere, and if the bill is curved, the chord, and not the arc, of the curve); (6), length of the tarsus *in front*; (7), length of the tail to the base of the coccyx; (8), length of the tail to the tip of the longest upper coverts. If a measurement is wanting, *its place is supplied by an interrogation point, the order being invariably the same.* All measurements, and notes on color of eyes, etc., are from fresh specimens, before skinning.

camp, and its manners so reserved, that we could not learn much regarding its habits, nor did we hear its song. The latter, however, is probably little different from that of the eastern bird, *T. guttatus pallasii*.

List of specimens.

1051, ♂ *ad.*; City Creek Cañon (near Salt Lake City), Wahsatch Mountains, Utah, May 26, 1869. $7\frac{3}{4}$ — $12\frac{3}{4}$. Bill, black; basal half of lower mandible, dull yellow; iris, brown; tarsi and toes, pale brown.

1487, ♀ *juv.*; Parley's Park, August 5, 1869. $7\frac{1}{2}$ — $12\frac{1}{2}$. Bill, black, the lower mandible purplish basally; interior and angle of the mouth, yellow; iris, dark brown; tarsi and toes, lilaceous-white; claws, brown.

1488, ♂ *juv.*; same locality and date. $7\frac{7}{8}$ —13. Same remarks.

1489, ♂ *juv.*; same locality and date. $7\frac{5}{8}$ — $12\frac{1}{2}$. Same remarks.

1498, ♀ *ad.*; Parley's Park, August 10. $7\frac{1}{2}$ —12. Bill, black; basal half of lower mandible, whitish; interior of mouth, deep yellow; iris, brown; tarsi and toes, very pale brownish flesh-color.

1499, ♂ *juv.*; $7\frac{7}{8}$ — $12\frac{5}{8}$. 1500, ♂ *juv.*; 7— $12\frac{3}{8}$. Same date and remarks.

TURDUS USTULATUS.

Olive-backed Thrush.

α. ustulatus—Oregon Thrush; Russet-backed Thrush.

Turdus ustulatus, NUTT., Man., I, 1840, 400 ("*cestulatus*").—BAIRD, B. N. Am., 1858, 215, pl. 81, fig. 1; Cat. N. Am. B., 1859, No. 152; Rev. Am. B., 1864, 18.—COOPER, Orn. Cal., 4 (part).

Turdus swainsoni var. *ustulatus*, COUES, Key, 1872, 73; Check List, 1873, No. 5 b.—B. B. & R., Hist. N. Am. B., I, 1874, pl. I, fig. 2.

Turdus swainsoni. c. ustulatus, COUES, B. N.W., 1874, 4.

Turdus nanus, COOPER, Orn. Cal., I, 4 (part).

The Russet-backed or Oregon Thrush, which we consider a mere geographical form of the same species as Swainson's Thrush, or at most a very closely related species, was first met with in the pine-region of the Sierra Nevada, on the western slope of that range, at an altitude of about 4,000 or 5,000 feet above the Sacramento Valley. It inhabited there the deep ravines, where the undergrowth was extremely dense and overtopped by a thick growth of gigantic Coniferæ, extending in a vast unbroken forest for hundreds of miles over the mountains to the North and South. Eastward

of that range it was met with but once, a single individual having been obtained, on the second of June, in the Truckee Valley, not far from the eastern base of the Sierra Nevada, the individual in question being no doubt a last lingering one, since no others were observed after that date, all having departed for the mountains to the westward. The species is known to migrate in winter southward along the Pacific slope as far as Costa Rica, but its summer-home is chiefly among the forest-clad mountains and wooded valleys from California to British Columbia and Sitka.

The song of this Thrush much resembles that of the *T. swainsoni*, but is different in some important respects, conspicuous among which is its finer quality. Its modulation is quite correctly expressed by Mr. Nuttall [*Manual of the Ornithology of the United States and Canada*, I, 1840, p. 401], who describes it as resembling the syllables "*wit-wit, t'villia-t'villia*"; but to convey to the reader even the slightest idea of its tone and effect would be the vainest endeavor. We heard the enchanting songs of these birds under circumstances calculated to make a lasting impression. It was in the midst of the dense and lofty forests of the Sierra Nevada, about half way up the western slope, that we rested for the Sabbath from our journey across the mountains. Hemmed in and overshadowed by giant forest trees, we halted, with rippling and sparkling brooks from the snow-fields far above dashing through the ferns and varied herbage, the roadside bedecked with the gay and lovely flowers so characteristic of Californian glades, while below yawned the depths of a dark ravine, through which dashed and roared a mountain torrent. In the tall pines, overhead, skulked the noisy Jays and Nutcrackers (*Cyanura frontalis* and *Picicorvus columbianus*), mingling their discordant notes with the twittering of the woodpeckers, who sported about the branches of the dead trees. But certain outbursts of rarest melody, heard at intervals from the dark recesses of the deep ravine, drew the attention of every one in camp; notes of exceeding simplicity, yet full of tenderest expression and thrilling effect, far finer than the softest and sweetest notes of the flute. These harmonious carols would be taken up first by one, then by another, musician, then answered from a distant portion of the dell. It was long before the author of these wild melodies could be seen, but patient search revealed a little brown bird,

afterward determined to be this species, shyly flitting into the gloomy maze of foliage at our approach.

List of specimens.

779, ♀ *ad.*; Truckee Reservation, Nevada, June 2, 1868. $7\frac{5}{8}$ —12— $3\frac{1}{4}$. Bill, black, basal half of lower mandible, pale brownish-lilac; iris, sepia; tarsi, dilute lilaceous-brown; toes, darker.

β. swainsoni—*Swainson's Thrush; Olive-backed Thrush.*

Turdus swainsoni, CABANIS, Tschudi's Fauna Peruana, 1844-'46, 188.—BAIRD, B. N. Am., 1858, 216; Cat. N. Am. B., No. 153; Rev. Am. B., 1864, 19.—COOPER, Orn. Cal., 6.—COUES, Key, 1872, 72; Check List, 1873, No. 5.—B. B. & R., Hist. N. Am. B., I, 1874, 14, pl. I, fig. 4.—HENSHAW, 1875, 147.

Turdus swainsoni. a. swainsoni, COUES, B. N. W., 1874, 4.

After leaving the Sierra Nevada, not a single individual of any species of the smaller Thrushes was met with until we arrived at the East Humboldt Mountains, in eastern Nevada, where the Olive-backed Thrush was encountered, in considerable numbers, in the eastern cañons of that range. It was during the season of their southward migration, and it is uncertain whether they came from the northward, or whether they had bred in the cañons where they were observed. During the ensuing spring and summer they were found in still greater abundance among the Wahsatch Mountains, on the opposite side of the Salt Lake Basin, in the thickets bordering the cañon streams, particularly in the elevated "parks," thus occupying a region intermediate between that of the Rocky Mountain Hermit Thrush (*T. auduboni*) of the pine-region, and that of the Tawny Thrush (*T. fuscescens*) of the lower valleys.

The song of this species is simple and brief, but very sweet, though less so than that of either *T. fuscescens* or *T. ustulatus*.

List of specimens.

886, ♂ *ad.*; East Humboldt Mountains, Nevada, September 1, 1868. $7\frac{1}{4}$ —12 $\frac{1}{4}$ —3 $\frac{3}{8}$. Bill, black, the basal half of lower mandible, pale lilaceous-brown; interior of mouth, rich yellow; iris, dark brown; tarsi and toes, dilute lilaceous-brown, with a slight plumbeous cast—the tarsi whitish on the posterior edge.

918, ♂ *ad.*; East Humboldt Mountains, September 11. $7\frac{1}{2}$ —11 $\frac{1}{2}$ —3 $\frac{5}{16}$. Same remarks as to preceding.

1262, nest and eggs (4); Parley's Park (Wahsatch Mountains), Utah Territory, June 23, 1869. Nest on bush near stream; female shot on nest.

1271, ♀ ad. 7 $\frac{1}{4}$ —11 $\frac{5}{8}$. Bill, black, basal half of lower mandible, lilaceous; interior of mouth, deep yellow; iris, brown; tarsi, pale brown; toes, darker.

1296, 1297, nest and eggs (4); 1298, nest; 1299, single egg; Parley's Park, June 27. Nests in willows along the stream.

1302, nest and eggs (4); Parley's Park, June 27. Nest in clump of willows near stream.

1339, nest and 1 egg; Parley's Park, June 27. Nest in willows. (Contained also three young.)

1404, nest; Cash Valley, Utah, July, 1869. [J. C. Olmstead.]

TURDUS FUSCESCENS.

Tawny Thrush; Wilson's Thrush.

Turdus fuscescens, STEPHENS, Shaw's Gen. Zool., X, 1817, 182.—BAIRD, B. N. Am., 1858, 214; Cat. N. Am. B., 1859, No. 151.—COUES, Key, 1872, 73; Check List, 1873, No. 6; B. N. W., 1874, 5.—B. B. & R., Hist. N. Am. B., I, 1874, 9, pl. I, fig. 5.—HENSHAW, 1875, 148.

The Tawny Thrush, although essentially an eastern species, was found to be more or less common in the Wahsatch district of Utah, where it inhabited only the vicinity of the streams in the lower valleys. It was extremely abundant along the Provo River, especially just above the *debouché* of that stream through its picturesque cañon between two lofty snow-clad peaks of the main range of the Wahsatch Mountains; and it was also seen in the valleys of the Bear and Weber Rivers, farther northward. In all these localities it frequented the dense willow-thickets in the immediate vicinity of the rivers, where it was extremely difficult to discover, and next to impossible to secure specimens after they were shot.

We never tired of listening to the thrilling songs of these birds, for they were truly inspiring through their exceeding sweetness and beautiful expression. The modulation of their notes was somewhat similar to that expressed by the syllables *ta-weél-ah*, *ta-weél-âh*, *twil'-ah*, *twil'-ah*, the latter portion subdued in tone, thus seeming like an echo of the first. In the valley of the Provo it was not unusual to hear a dozen or more of these exquisite songsters uniting in their rivalry, the most favorable time being the afternoon and evening. Considerable resemblance in tone to the song of the *T. ustulatus* was noted, but it was observed that the modulation was distinctly different.

GALEOSOPTES CAROLINENSIS.

Cat-bird.

Muscicapa carolinensis, LINN, S. N., I, 1766, 328.

Mimus carolinensis, BAIRD, B. N. Am., 1858, 346; Cat. N. Am. B., 1859, No. 254.—COOPER, Orn. Cal., I, 23.—COUES, Key, 1872, 74; Check List, 1873, No. 9; B. N.W., 1874, 8.

Galeoscoptes carolinensis, CABANIS, Mus. Hein., I, 1850, 82.—BAIRD, Review, 1864, 54; B. B. & R., I, 1874, 52, pl. III, fig. 5.—HENSHAW, 1875, 152.

Like many species considered to be characteristically eastern, the Cat-bird is likewise one of the most abundant summer residents of the Wahsatch region. Indeed, we found it not uncommon on the large islands in the Great Salt Lake, specimens being shot in an orchard on Antelope Island in the month of June, while another was obtained, during the same month, on Stansbury Island, where few other birds were found. Among the mountains it was more abundant, its favorite haunts being the shady thickets along the streams which descend the cañons or course across the meadow-like "parks." It was thus an associate of the Olive-backed Thrush and the Redstart (*Setophaga ruticilla*), but while it did not ascend to as high an altitude as the former, we found the latter with it only in the lower portions of its range. No differences from the eastern birds of the same species were detected, in either manners or notes.

List of specimens.

1105, ♂ *ad.*; Antelope Island, Great Salt Lake, Utah, June 4, 1869. (Too badly mutilated for measurement.)

1163, ♀ *ad.*; Stansbury Island, Great Salt Lake, June 12. 8½—11. Bill and feet, black; iris, brown.

1263, 1264, nests; Parley's Park (Wahsatch Mountains), Utah, June 23. Nest in willows along stream.

1323, nest and eggs (2); Parley's Park, June 28. Nest in willows.

1384, nest and eggs (4); Provo River, Utah, July 10, 1869. Nest in willow-thicket.

OREOSOPTES MONTANUS.

Sage Thrasher; Mountain Mocking-bird.

Orpheus montanus, TOWNSEND, Journ. Ac. Nat. Sci., Philad., 1837, 192.

Oreoscoptes montanus, BAIRD, B. N. Am., 1858, 347; Cat. N. Am. B., 1859, No. 255; Review, 1864, 42.—COOPER, Orn. Cal., 12.—COUES, Key, 1872, 74; Check List, 1873, No. 7; B. N.W., 1874, 7.—B. B. & R., I, 1874, 32, pl. III, fig. 6.—HENSHAW, 1875, 149.

Before beginning our account of this interesting species, we pause to

protest against the name "Mountain Mocking-Bird," the appellation usually given it in books. This name is objectionable from the fact that it is doubly a misnomer, and therefore likely to convey an entirely erroneous idea of its distribution and song. A more appropriate term would be that of "Sage Thrasher," which is descriptive of both its habitat, and its relationship to the better-known species of the sub-family to which it belongs.

The Sage Thrasher is a widely-distributed species, since it occurs throughout that extensive portion of the West where the "everlasting sage-brush" forms the prevailing growth. It seems to be strictly governed in its range by the growth of these plants, and is consequently chiefly an inhabitant of the valleys and mesas, rarely extending farther up the mountains than the foot-hills, to the commencement of the juniper or mahogany woods. It is a migratory species, arriving from the South, in the latitude of Carson City, about the 20th of March, and departing in October or November. Its presence has been noted at but few Mexican localities, but it winters in such great numbers along our southern border that its abundance in northern and central Mexico at this season may be taken for granted.

At Carson City, very favorable opportunity was afforded for observing the habits of this interesting species during the breeding-season. The males began singing about the 24th of March, or immediately after their arrival, but their notes were then subdued, while their manners were reserved in the extreme. They soon became numerous in the sage-brush around the outskirts of the city, and were often seen perched upon the summit of a bush, turning the head from side to side in a watchful manner, even while singing; when approached, disappearing by diving into the bush, and, after a long circuitous flight near the ground, reappearing some distance in the rear of the pursuer. This peculiar, concealed flight we found to be a constant habit of the species. As the pairing-season approached, with the advance of spring, the songs of the males became greatly improved, both in strength and quality; their manners also became changed, for they had lost their former shyness. About the 10th of April, the males were engaged in eager rivalry, each vying with the other as he sang his sweetest notes, his wings being at intervals raised vertically so as to almost touch over the

back, and quivering with the ecstasy that agitated the singer. The first eggs were laid about the 20th of April, the nests having been commenced a week or more earlier; and by this time the males had become perfectly silent, their main occupation being that of sentinel on guard for the approach of an intruder. In fact, we know of no oscine bird so completely mute as the present one during the period of incubation, and throughout the summer and fall, at which time one unacquainted with their habits earlier in the season might think they had no voice. Even when a nest is disturbed, the parent birds do not protest, but merely run anxiously about the meddler, in the manner of a Robin, now and then halting, and with outstretched necks closely observing his actions. When the young are hatched, however, they become more solicitous, and signify their concern by a low *chuck*.

The song of this bird possesses no remarkable attributes, but it is extremely pleasing when heard under favorable circumstances. It is most deficient in power and energy, being comparable to the subdued, subtile warbling of the Ruby-crowned Kinglet (*Regulus calendula*) rather than to the vigorous songs of the Brown Thrasher (*Harporhynchus rufus*) or Mocking-bird (*Mimus polyglottus*), its nearer kindred. It is not, however, lacking in sweetness or variety, while at times it is characterized by considerable vivacity.

List of specimens.

144, ♂ *ad.*; Camp 17, Valley of the Humboldt River (Oreana), August 31, 1867. 9—12 $\frac{1}{4}$ —4—3 $\frac{5}{16}$ —1 $\frac{1}{8}$ —1 $\frac{1}{8}$ —3 $\frac{1}{2}$ —2. Bill, black, basal half of lower mandible, pale pinkish-gray, with a faint yellowish tinge; rictus and interior of mouth, deep yellow; iris, gamboge-yellow; tarsi, grayish olive-green; toes, darker, their soles deep yellow.

145, ♂ *juv.*; Camp 17, Aug. 31, 1867. 9—12 $\frac{1}{4}$ —3 $\frac{3}{4}$ —3 $\frac{1}{4}$ —1 $\frac{1}{8}$ —1 $\frac{1}{8}$ —3 $\frac{9}{16}$ —(?). Bill, black; basal half of the lower mandible, yellowish-ash, with a lilac cast; *interior, and angle of the mouth, greenish or ashy yellow*; iris, lemon-yellow; tarsi, dark greenish horn-yellow, deepest greenish along the posterior edge; toes, nearly black, their soles yellow; claws, black.

152 ♀ *juv.*; (same locality and date). 8 $\frac{5}{8}$ —12 $\frac{1}{4}$ —4—3 $\frac{5}{16}$ —1 $\frac{1}{8}$ —1 $\frac{1}{8}$ —3 $\frac{1}{2}$ —(?). Bill, dull black; basal half of lower mandible, pinkish ashy-white; interior and angle of the mouth, yellow; iris, greenish-yellow; tarsi, dark yellowish horn-green; toes, darker, their soles yellow.

451, ♂ *ad.*; Carson City, Nevada, March 24, 1868. 9—12 $\frac{1}{2}$ —4 $\frac{3}{16}$ —3 $\frac{1}{4}$. Bill, black, becoming pinkish ashy-brown on basal half of lower mandible; *interior of the mouth* (except corneous portions), *lilaceous flesh-color*; iris, chrome-yellow; tarsi, yellowish-olive, with a tinge of sepia-brown; toes, blackish sepia, straw-yellow beneath.

452 ♂ *ad.*; 8 $\frac{1}{8}$ —12 $\frac{3}{8}$ —4 $\frac{1}{8}$ —3 $\frac{1}{4}$.

453, ♂ *ad.*; $8\frac{3}{4}$ — $12\frac{3}{8}$ — $4\frac{1}{16}$ — $3\frac{5}{16}$. Same remarks, etc.

517, eggs (4); Carson City, April 24. Nest in brush-heap, in cemetery.

518, eggs (5); Carson City, April 24. Nest in sage-bush, about 18 inches from ground.

519, eggs (4); Carson City, April 24. Nest on ground beneath sage-bush.

520, eggs (3); Carson City, April 24. Nest in sage-bush, about two feet from ground.

521, eggs (3); Carson City, April 24.

554, 555, nest and eggs (5); Carson City, April 28. Nests in brush-heaps, in cemetery.

821, eggs (3); Austin, Nevada, July 3, 1868. Nest in small bush of *Symphoricarpus montanus*, about two feet from ground.

1123, 1124; single eggs, from nests containing young. Antelope Island, Great Salt Lake, June 7, 1869.

1125, nest; Antelope Island, Great Salt Lake, June 7, 1869. Nest in sage-bush, situated as usual.

1135, nest and eggs (3); Antelope Island, June 8.

1153, nest; Antelope Island, June 8. Nest in sage-bush.

1158, nest and eggs (4); "Rabbit Island" (near Stansbury Island), Great Salt Lake, June 11. Nest in grease-wood bush, near shore.

FAMILY SAXICOLIDÆ—STONE-CHATS.

SIALIA MEXICANA.

California Blue-bird.

Sialia mexicana, SWAINS., Fauna Bor. Am., I, 1831, 202.—BAIRD, B. N. Am., 1858, 223; Cat. N. Am. B., 1859, No. 159; Review, 1864, 63.—COOPER, Orn. Cal., 28.—COUES, Key, 1872, 76; Check List, 1873, No. 17, B. N.W., 1874, 14.—B. B. & R., Hist. N. Am. B., I, 1874, 65, pl. v, fig. 2.—HENSHAW, 1875, 161.

The Western Blue-bird is known to have a range nearly co-extensive with the limits of the Western Region, it being abundant throughout the main ranges of the Rocky Mountains, north to Colorado, and also in the same parallels of latitude, or even farther northward, on the Pacific coast. Yet we lost sight of this species entirely after we left the eastern water-shed of the Sierra Nevada, and never saw nor heard of it in the Wahsatch or Uintah Mountains, notwithstanding the latter country appeared equally adapted to the requirements of the species. The last individuals seen, as we journeyed eastward, were a few families of young birds, with their parents, in the wooded valley of the Truckee River, near the Big

Bend. Although these birds appeared to have been bred at that locality, and though we saw an equally small number in the similar valley of the Carson River in the breeding-season, the center of abundance of the species, so far as the Interior is concerned, seemed to be the pine-region of the Sierra Nevada, where they were observed in summer from the lower limit of these forests up to an altitude of more than 6,000 feet, or near the summit of Donner Lake Pass, where these Blue-birds, the Robin, the Oregon Snow-bird, and the Western White-crowned Sparrow (*Zonotrichia intermedia*) were the characteristic or dominant species.

This beautiful Blue-bird seemed to be a perfect counterpart of the eastern species (*S. sialis*) in its habits, while it resembled it closely in appearance; but we listened in vain for that lovely warbling which so justly renders the latter bird a universal favorite; neither did we hear it utter any note comparable to the plaintive call of the eastern bird, so often heard in autumn. This lack of sweetness of voice is, however, somewhat compensated by its superior beauty of plumage, for the richness of its coloring is decidedly superior to that of its eastern representative.

List of specimens.

413, ♂ *ad.*; Carson City, Nevada, February 21, 1868. 7—13—4½—3½. Bill, tarsi, and toes, deep black; interior of mouth, chrome-yellow; iris, bistre.

414, ♂ *ad.*; same locality and date. 7½—13½—4½—3¾. Same remarks.

428, ♂ *ad.*; San Francisco, California; H. G. Parker. ("Oaks.") "7—13—(?)—3¾." Same remarks.

469, ♂ *ad.*; Carson City, March 28. 6½—12½—4½—3½. Same remarks.

SIALIA ARCTICA.

Rocky Mountain Blue-bird.

Sialia arctica, SWAINS., Fauna Bor. Am., II, 1831, 209, pl. 39.—BAIRD, B. N. Am., 1858, 224; Cat. N. Am. B., 1859, No. 160; Review, 1864, 64.—B. B. & R., Hist. N. Am. B., I, 1874, 67, pl. v, fig. 4.—COOPER, Orn. Cal., 29 —COUES, Key, 1872, 76; Check List, 1873, No. 18; B. N.W., 1874, 14.—HENSHAW, 1875, 162.

This is the characteristic Blue-bird of the Interior, and it is most numerous where the other species is rarest. Its favorite haunts are the higher portions of the desert ranges of the Great Basin, where there is little water, and no timber other than the usual scant groves of stunted cedars, piñon, or

mountain mahogany. In these elevated regions it is abundant during summer, and even remains in winter, except when violent storms or severe cold drive it to the more clement valleys, where it may be seen, either singly or in considerable but scattered flocks, whenever a snow-storm prevails on the mountains. At such times we have seen both this species and the other one (*S. mexicana*) together in the fields around Carson City, and remarked the striking difference in their manners; the *S. mexicana* being often observed perched upon a fence-post or a willow-bush, descending to the ground only to pick up some insect, and immediately returning to its post of observation, while the individuals of *S. arctica* were usually seen flitting restlessly over the ground, now and then, but rarely, an individual alighting for a moment on some prominent object, as a fence-post or telegraph-wire. The visits of this species to the lower valleys are only occasional, however, for as soon as a storm in the upper regions subsides, they return to their own haunts; and when spring has fairly set in they are seen no more, while the "Valley Blue-bird" remains during the summer. In June, the "Mountain Blue-bird" was observed to be common in Virginia City, Nevada, where it nested in the manner of the Eastern species, in suitable places about buildings in the town, the old mills and abandoned shafts of the mines being its favorite haunts, which it shared with the House Finch (*Carpodacus frontalis*) and the Rock Wren (*Salpinctes obsoletus*). But while it thus commended itself to the hospitality of the people by its familiarity, it was never heard to utter any note except a weak chirp, when startled from its perch. It was also common under similar circumstances at Austin, in the Toyabe Mountains, while on the higher portions of the West Humboldt, Ruby, and East Humboldt Mountains it was still more abundant. On the Ruby Mountains it was found in July and August only in the upper portion of the timber-belt, or at an altitude of 9,000 to 11,000 feet, where it nested both among the rocks and in the deserted holes of woodpeckers among the stunted pines, cedar, or mahogany trees. In the West Humboldt Mountains it was observed that they seldom if ever alighted on the bushes in the bottom of the cañon, although they constantly frequented the adobe houses of the deserted town near by.

This species is usually much more shy than either the eastern Blue-

bird or its western representative, being at all times, according to our experience, a rather difficult bird to procure. In the fall, they rove about in restless companies over the barren slopes, scattering among the low cedars, only the straggling or lingering individuals permitting a near approach. Their manners during the winter season are most interesting to witness, for they seem to enjoy the playing of the snow-flakes, as they hover in the air over some object on the ground which attracts their attention; then, after alighting to examine it more closely, they flit off to a tall weed-stalk, never thinking, apparently, to enter the cosy copses where the Snow-birds have taken refuge.

A subject of interesting and profitable speculation is the influence of spreading civilization upon the habits of animals in their native haunts. In all well-settled districts, the Purple Martins, the Barn Swallows, and the Chimney Swifts have forsaken the hollow trees and caves as nesting-places, and availed themselves of the superior accommodations and protection afforded by civilized man and his surroundings, with a readiness that is indeed remarkable. The Blue-birds and certain Wrens, even in the most recently-settled sections of the country, are gradually, but rapidly, making the same revolution in their habits, and so are many others of our native birds, too numerous to mention; and every one knows how the Cliff Swallows have abandoned the precipices of mountainous districts and overspread the entire country, even to places remote hundreds of miles from the original haunts of the species, when they discovered how well suited for their nests were the eaves of barns and churches. The present species is one of this class whose habits are undergoing such modification, for although it is naturally a bird of the high mountains, we noticed that at Salt Lake City they were quite numerous, although, were the locality unreclaimed from its primitive state, they would not have been found there except during their vertical migrations, influenced by changes in the climate. Even on Antelope Island, in the Great Salt Lake, a few pairs were seen about the buildings of the ranche.

List of specimens.

228, ♂ *ad.*; West Humboldt Mountains, Nevada, October 4, 1867. $7\frac{11}{16}$ —14—5— $4\frac{1}{8}$ — $\frac{1}{2}$ — $\frac{13}{16}$ — $3\frac{1}{8}$ — $1\frac{7}{16}$. Bill, deep black; interior of mouth, light naples-yellow; iris, hazel; tarsi and toes, black.

229, ♂ *ad.*; same locality and date. $7\frac{5}{16}$ — $13\frac{1}{2}$ — $4\frac{7}{8}$ — 4 — $\frac{1}{2}$ — $1\frac{3}{16}$ — 3 — $1\frac{1}{4}$. Interior of mouth, delicate light greenish-yellow.

243, ♀ *ad.*; West Humboldt Mountains, October 8. $7\frac{3}{16}$ — $13\frac{3}{16}$ — $4\frac{1}{2}$ — $3\frac{3}{4}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{1}{16}$ — $1\frac{1}{4}$. Same remarks.

244, ♀ *ad.*; same date. 7 — $12\frac{5}{8}$ — $4\frac{7}{16}$ — $3\frac{11}{16}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{1}{16}$ — $1\frac{1}{4}$. Same remarks.

375, ♂ *ad.*; Truckee Bottom, December 21. $7\frac{1}{4}$ — $13\frac{5}{8}$ — $4\frac{3}{4}$ — $3\frac{1}{16}$. Iris, vandyke-brown.

376, ♂ *ad.*; same locality and date. $7\frac{3}{16}$ — $13\frac{1}{4}$ — $4\frac{3}{8}$ — $3\frac{1}{16}$. Same remarks.

399, ♂ *ad.*; Steamboat Valley, Nevada, January 4, 1868. 7 — $13\frac{5}{8}$ — $4\frac{3}{4}$ — $3\frac{1}{16}$. Same remarks.

416, ♂ *ad.*; Carson City, Nevada, March 5. $7\frac{1}{2}$ — $13\frac{5}{8}$ — $4\frac{1}{16}$ — $3\frac{1}{16}$.

467, ♂ *ad.*; Carson City, March 28. $7\frac{1}{4}$ — $13\frac{1}{2}$. Same remarks.

468, ♀ *ad.*; same locality and date. $7\frac{1}{4}$ — $13\frac{1}{8}$. Same remarks.

533, ♂ *ad.*; Washoe Valley, Nevada, April 25. $7\frac{3}{4}$ — 14 . Same remarks.

862, ♂ *juv.*; East Humboldt Mountains, Nevada, August 6, 1868.

1103, ♀ *juv.*; Antelope Island, Great Salt Lake, June 4, 1869.

1108, ♂ *ad.*; Antelope Island, Great Salt Lake, June 5, 1869. $7\frac{3}{4}$ — $13\frac{7}{8}$. Bill, tarsi, and toes, pure black; iris, brown; interior of mouth, rich yellow.

1508, ♂ *juv.*; $7\frac{1}{8}$ — $13\frac{5}{8}$. 1509, ♂ *juv.*; $7\frac{1}{4}$ — $13\frac{1}{2}$. 1510, ♀ *juv.*; 7 — 13 . 1511, ♀ *juv.*; $7\frac{1}{4}$ — $13\frac{1}{8}$. Parley's Park (Wahsatch Mountains), Utah, August 14, 1869.

FAMILY CINCLIDÆ—WATER OUZELS.

CINCLUS MEXICANUS.

Dipper; Water Ouzel.

Cinclus mexicanus, SWAINS., Phil. Mag., I, 1827, 368.—BAIRD, Review Am. B., 1864, 60.—B. B. & R., Hist. N. Am. B., 1874, I, 55, pl. v, fig. 1.—COOPER, Orn. Cal., 25.—COUES, Key, 1872, 77; Check List, 1873, No. 10; B. N.W., 1874, 10.—HENSHAW, 1875, 159.

Hydrobata mexicana, BAIRD, B. N. Am., 1858, 229; Cat. N. Am. Birds, 1859, No. 164.

This remarkable bird, so characteristic an element of the western avifauna, was found in all localities where the summer rains or melting snows on the mountains were sufficient to supply the cañons with rushing streams. It was noticed to be abundant only where the torrents were impetuous and the country generally forest-clad, and was therefore most frequently seen on the Sierra Nevada and among the western ranges of the Rocky Mountain system, as the Wahsatch and Uintahs, being rarely observed in the intermediate area of the Great Basin, although it was encountered at intervals on the higher of the intervening ranges. The habits and manners of this bird are most strikingly peculiar, it being one of

the very few Passeres which are strictly aquatic. Its movements while walking in the shallow water, or as it stands upon a rock in the bed of a stream, remind one very much of the "Teeters" or "Tilt-ups" (*Tringoides* and *Rhyacophilus*), for, whether moving or stationary, its body tilts up and down with an incessant motion. It is more often observed, however, flying rapidly along a stream, with a buzzing flight, following with the greatest ease the tortuous windings of its course without in the least checking its speed; or dashing swiftly through the spray or foam of a water-fall. Its flight is usually accompanied by a sharp chattering, especially when one is chased by another, as is often the case during the breeding-season; and when they alight they descend by a sudden drop, much after the manner of the "Gutter Snipes" (*Gallinago*). Nor are their movements confined to the surface of the water or its neighborhood, for they have been observed to dive into the aqueous element and perform various and dextrous evolutions in its depths, as they pursue their insect-food, propelling themselves by the rapid beating of the wings, in the well-known manner of Grebes and other water-fowl.

We heard the song of this bird on but one occasion, in October, at Unionville, Nevada. It was a pleasing warble, but not sufficiently distinctive, at least on that occasion, to admit of particular description.

List of specimens.

230, ♂ *ad.*; West Humboldt Mountains, Nevada, October 4, 1867. $7\frac{1}{4}$ — $11\frac{1}{4}$ — $3\frac{1}{8}$ — $2\frac{7}{8}$ — $\frac{5}{8}$ — 1 — $1\frac{5}{16}$ — $\frac{3}{8}$. Upper mandible, horn-color, darker terminally; lower, paler, dull light yellowish basally; iris, burnt-umber; tarsi and toes, clear, glossy, livid white, with a sepia tinge between the scutellæ and on joints of toes.

231, ♀ *ad.*; (mate of preceding). $7\frac{3}{8}$ — $11\frac{1}{8}$ — $3\frac{3}{4}$ — $2\frac{3}{4}$ — $\frac{9}{16}$ — 1 — $2\frac{1}{16}$ — $\frac{1}{4}$. Same remarks.

248, *ad.*; West Humboldt Mountains, October 11. $7\frac{1}{16}$ — $11\frac{1}{2}$ — $3\frac{1}{8}$ — $3\frac{1}{8}$ — $\frac{5}{8}$ — 1 — 2 — $\frac{3}{8}$. Same remarks.

300, ♀ *ad.*; Truckee River (east of Sierra), November 19. $7\frac{7}{8}$ — $11\frac{5}{8}$ — $3\frac{3}{4}$ — $2\frac{1}{16}$ — $1\frac{3}{8}$ — $1\frac{1}{8}$ — 2 — $\frac{1}{4}$. Bill, plumbeous-black; extreme basal portion of lower mandible, and small space on upper below nostril, brownish-white; iris, bright hazel; tarsi and toes, clear, bright, lilaceous-white; divisions of scutellæ, and sides of toes, abruptly, sepia.

324, *ad.*; 325, *ad.*; near source of American River, California, November. [H. G. Parker.]

1378, ♂ *juv.*; Pack's Cañon, Uintah Mountains, Utah, July 7, 1869. $7\frac{5}{8}$ — $12\frac{1}{4}$. Upper mandible, and tip of lower, dark plumbeous; lower mandible, *salmon-orange*, this color tinging the upper at the base, and along commissure; iris, grayish-brown; tarsi and toes, whitish-lilaceous; under side of toes, dusky, the pellets yellow.

FAMILY SYLVIIDÆ—TRUE WARBLERS.

MYIADESTES TOWNSENDI.

Townsend's *Ptilogonys*.

Ptilogonys townsendi, AUDUBON, Orn., Biog., V, 1839, 206, pl. 419, fig. 2.

Myiadeses townsendi, CABANIS, Weigm. Archiv, I, 1847, 208.—BAIRD, Birds N. Am., 1858, 321; Cat. N. Am. B., 1859, No. 235; Review, 1866, 429.—COOPER, Orn. Cal., 134.—COUES, Key, 1872, 117, fig. 57; Check List, 1873, No. 121; Birds N.W., 1874, 93.—B. B. & R., Hist. N. Am. Birds, I, 1874, 409, pl. XVIII, figs. 5, 6.—HENSHAW, 1875, 231.

We first met with this curious species on the western slope of the Sierra Nevada, in a dense pine forest, at an altitude of about 5,000 feet. The first individual seen was one which had a nest near by, as was apparent from its anxious manner, for as we walked along the embankment of a mining-slalice it flitted before us, now and then alighting upon the ground, and, with drooping and quivering wings, running gracefully, in the manner of a Robin, then flying up to a low branch, and, after facing about, repeating the same maneuvers—evidently trying to entice us away from the spot. So much were its actions like those of various Thrushes under similar circumstances that not once did we suspect the species, although perfectly familiar with it in museums, but immediately concluded that a new species of Thrush had been found. Indeed, many times afterward, when an individual would be seen to glide noiselessly before us, in the characteristic manner of the Thrushes, displaying the ochraceous mark across the wing, was the same illusion entertained. Patient watching and a careful search finally revealed the nest, which was built in the upper bank of the sluice, a foot or two above the water, and in a recess of the rocks. The nest was bulky for the size of the bird, being nearly as large as that of *Harporhynchus rufus*, which it nearly resembled, and was composed externally of coarse sticks, laid in a mass upon the floor of the cave. It contained four half-fledged young, and was consequently left undisturbed.

The species was afterward seen, at various times, among the cedar groves of the interior ranges, but it was nowhere common. It appeared to feed largely on the berries of the *Juniperus occidentalis*, and lived mostly among these trees, where, as observed, it combined the manners of the Thrushes and Blue-birds. Its song was not heard, or else it was confounded

with that of *Turdus ustulatus*, dozens of which were singing at the first locality mentioned above.

List of specimens.

377, ♂ *ad.*; Virginia Mountains, near Pyramid Lake, December 21, 1867. 9—13½—4¾—4—5—¾—4½—2¾. Bill, tarsi, and toes, deep black; iris, dark brown.

POLIOPTILA CÆRULEA. ?

Blue-gray Gnatcatcher.

Motacilla cærulea, LINN., S. N., I, 1766, 43.

Polioptila cærulea, SCLATER, Proc. Zool. Soc. Lond., 1855, 11.—BAIRD, B. N. Am., 1858, 380; Cat. N. Am. B., 1859, No. 282; Review, 1864, 74.—B. B. & R., Hist. N. Am. B., I, 1874, 78, pl. VI, fig. 5.—COOPER, Orn. Cal., 35.—COUES, Key, 1872, 78; Check List, 1873, No. 23; B. N.W., 1874, 17.—HENSHAW, 1875, 166.

In the chaparral of the western foot-hills of the Sierra Nevada, we observed, in July, a species of this genus, in considerable plenty. To all appearance it was the same species as that found in the East, but as no specimens were obtained we cannot be positive that the individuals in question were not *P. plumbea*. They were certainly not *P. melanura*, which would have been recognized by its black crown.

REGULUS CALENDULA.

Ruby-crowned Kinglet.

Motacilla calendula, LINN., S. N., I, 1766, 337.

Regulus calendula, LICHT., Verzeichn., 1823, No. 408.—BAIRD, B. N. Am., 1858, 226; Cat. N. Am. B., 1859, No. 161; Review, 1864, 66.—B. B. & R., Hist. N. Am. B., I, 1874, 75, pl. v, fig. 9.—COOPER, Orn. Cal., 33.—COUES, Key, 1872, 78; Check List, 1873, No. 21; B. N.W., 1874, 15.—HENSHAW, 1875, 164.

While the Golden-crowned Kinglet was extremely rare, the Ruby-crown was directly the opposite, for it was a common winter resident in all the lower valleys, while in early spring it became abundant to such an extent as to exceed all other birds in numbers. During the coldest portion of the winter they dwelt among the willows along the river-banks, where the dense cover afforded them a suitable shelter from the cold winds, and a cosy retreat at night. As spring advanced, they spread themselves over the foot-hills and up the ravines of the mountains, gradually working upward, until the commencement of the summer found them in the pine-forests, where they remained during the season, again descending to the valleys when the cold

weather began. At Carson City they were most numerous in April, and at that time the thickets along the foot-hills were literally alive with these restless, sprightly little creatures, who hopped briskly among the budding branches, nervously twitching their wings in their characteristic manner, the males now and then warbling their low, soft song, so liquid and indescribably sweet, at the same time displaying the red patch ordinarily concealed beneath the overlying feathers of the crown.

List of specimens.

225, ♀ *ad.*; West Humboldt Mountains, Nevada, October 3, 1867. $4\frac{1}{2}$ — $6\frac{3}{4}$ — $2\frac{3}{8}$ — $1\frac{1}{16}$ — $\frac{3}{8}$ — $\frac{5}{8}$ — $1\frac{3}{4}$ — $1\frac{3}{16}$. Bill, horn-black; iris, brown; tarsi and toes, brownish-yellow, the latter, deep yellow beneath. [*No red on the crown.*]

371, ♂ *ad.*; Truckee Bottom, near Pyramid Lake, December 25. $4\frac{1}{2}$ —7— $2\frac{5}{16}$ — $1\frac{5}{16}$ — $\frac{5}{16}$ — $\frac{3}{4}$ — $1\frac{3}{4}$ —1. Bill, deep black; iris, very dark brown; tarsi, brownish-black; toes, deep brownish-yellow, purer yellow beneath.

REGULUS SATRAPA.

Golden-crowned Kinglet.

Regulus satrapa, LICHT., Verzeichn., 1823, No. 410.—BAIRD, B. N. Am., 1858, 227; Cat. N. Am. B., 1859, No. 162; Review, 1864, 65.—B. B. & R., I, 1874, 73, pl. v, fig. 8.—COOPER, Orn. Cal., 32.—COUES, Key, 1872, 78, fig. 19; Check List, 1873, No. 22; B. N.W., 1874, 16.

This sprightly little bird, so common in our eastern groves and orchards in early spring and in the autumn, and, except the Hummers, the most diminutive of all our species, was very rarely observed by us in the Great Basin. A very few individuals, however, were noticed in the cañons of the West Humboldt Mountains, among the thick bushes along the streams. It is probably nowhere a common bird in the Interior.

FAMILY PARIDÆ—TITMICE or CHICKADEES.

LOPHOPHANES INORNATUS.

Gray Titmouse.

Parus inornatus, GAMBEL, Pr. Ac. Nat. Sci. Phila., 1845, 265.

Lophophanes inornatus, CASSIN, Ill. B. Cal., Tex., etc., 1853, 19.—BAIRD, B. N. Am., 1858, 386; Cat. N. Am. B., 1859, No. 287; Review, 1864, 78.—B. B. & R., I, 1874, 20, pl. VI, fig. 3.—COOPER, Orn. Cal., 42.—COUES, Key, 1872, 80, fig. 22; Check List, 1873, No. 28; B. N.W., 1874, 20.—HENSHAW, 1875, 167.

In the pine forests of the eastern slope of the Sierra Nevada, especially

in their lower portion, and among the cedar and piñon groves on the desert ranges immediately adjacent to the eastward, the Gray Titmouse was a rather common species; but it did not seem to be abundant anywhere. Its manners and notes were quite the same as those of the eastern species (*L. bicolor*), but weaker and less varied, though still retaining the vehement character of utterance apparently common to all the birds of this genus.

List of specimens.

272, ♀ *ad.*; cedars of Pea-vine Mountains, near the Sierra Nevada, November 14, 1867. 6—8 $\frac{3}{4}$ —3—2 $\frac{1}{2}$ —1 $\frac{7}{8}$ —1 $\frac{1}{8}$ —2 $\frac{9}{16}$ —1 $\frac{3}{16}$. Bill, plumbeous, deepening into horn-black terminally; iris, umber; tarsi and toes, plumbeous-ash.

PARUS MONTANUS.

Mountain Chickadee.

Parus montanus, GAMBEL, Pr. Ac. Nat. Sci. Phila., I, 1843, 259.—BAIRD, B. N. Am., 1858, 394; Cat. N. Am. B., 1859, No. 294; Review, 1864, 82.—B. B. & R., Hist. N. Am. B., I, 1874, 95, pl. VII, fig. 5.—COOPER, Orn. Cal., 46.—COUES, Key, 1872, 81; Check List, 1873, No. 32; B. N.W., 1874, 22.—HENSHAW, 1875, 169.

The distribution of this species seems to be governed entirely by that of the coniferous woods; consequently, we found it in all pine forests, as well as the more extensive of the piñon and cedar woods on the interior ranges. It was much less numerous on the Wahsatch and Uintah Mountains than on the Sierra Nevada, however, as indeed were nearly all species of pinicoline habits. This species is quite a counterpart of the Carolina Chickadee (*P. carolinensis*) in manners and notes, although it differs so much in size and markings; and we consider it as much more closely allied to that species than to the common Black-cap (*P. atricapillus*). In its notes we could discover no difference from those of *P. carolinensis* beyond the noticeable fact that the ordinary ones were louder and more emphatically enunciated, while the spring song, so pleasing in *P. carolinensis*, and sounding like a clear, fife-like whistling of the syllables *tsip'adee*, *tsip'adee*, *tsip'adee*, was appreciably more feeble and less musical.

List of specimen.

333, ♂ *ad.*; $5\frac{5}{8}$ — $8\frac{5}{8}$ — $2\frac{3}{4}$ — $2\frac{1}{2}$ — $\frac{3}{8}$ — $\frac{5}{8}$ — $2\frac{5}{8}$ — $1\frac{1}{2}$. 334, ♀ *ad.*; $5\frac{5}{8}$ — $8\frac{3}{4}$ — $2\frac{1}{2}$ — $2\frac{1}{2}$ — $\frac{7}{16}$ — $\frac{5}{8}$ — $2\frac{1}{2}$ — $1\frac{1}{4}$. 335, ♂ *ad.*; $5\frac{9}{16}$ — $8\frac{5}{8}$ — $2\frac{7}{8}$ — $2\frac{1}{2}$ — $\frac{3}{8}$ — $1\frac{1}{16}$ — $2\frac{1}{2}$ — $1\frac{5}{8}$. Carson City, Nevada, November 27, 1867. Bill, plumbeous-black; iris, deep hazel; tarsi and toes, dull plumbeous.

450, ♂ *ad.*; Carson City, March 21, 1868. $5\frac{7}{16}$ — $8\frac{5}{8}$ — 3 — $2\frac{1}{2}$. Bill, black; iris, burnt-sienna; tarsi and toes, plumbeous-black.

PARUS ATRICAPILLUS.

Black-capped Chickadee.*β. septentrionalis*—Long-tailed Chickadee.

- Parus septentrionalis*, HARRIS, Pr. Ac. Nat. Sci. Philad., 1845, 300.—BAIRD, B. N. Am., 1858, 389; Cat. N. Am. B., 1859, No. 289; Review, 1864, 79.
- Parus atricapillus* var. *septentrionalis*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 174.—COUES, Key, 1872, 81; Check List, 1873, No. 31a; B. N.W., 1874, 21.—B. B. & R., I, 1874, 99, pl. VII, fig 2.—HENSHAW, 1875, 170.
- Parus septentrionalis* var. *albescens*, BAIRD, B. N. Am., 1858, p. xxxvii; Cat. N. Am. Birds, 1859, No. 289a.

γ. occidentalis—Western Chickadee.

- Parus occidentalis*, BAIRD, B. N. Am., 1858, 391; Cat. N. Am. B., 1859, No. 291; Review, 1864, 81.—ELLIOT, Illustr. Am. B., I, pl. VIII.—COOPER, Orn. Cal., 45.
- Parus atricapillus* var. *occidentalis*, COUES, Key, 1872, 81; Check List, 1873, No. 31c.—B. B. & R., Hist. N. Am. B., I, 1874, 101, pl. VII, fig. 3.

The common Black-capped Chickadee was apparently wanting in all portions of the western depression of the Great Basin, and even on the eastern side it was so extremely rare that none were seen except in the valley of the Provo River, where but a few families, with their full-grown young, were met with. They kept in the willow thickets, and seemed very gregarious, in marked contrast to the Mountain Chickadee (*P. montanus*) and that eastern species, the Southern Black-cap, or Carolina Chickadee (*P. carolinensis*). Their notes were also very different, the usual utterances being a sort of twittering, resembling but little the distinct and sharp notes of the species named.

List of specimens.

1392, ♀ *juv.*; $5\frac{5}{16}$ — $7\frac{3}{4}$. 1393, ♂ *juv.*; $5\frac{5}{16}$ — $7\frac{7}{8}$. 1394, ♂ *juv.*; $5\frac{1}{4}$ — $8\frac{3}{8}$. Provo River, Utah, July 11, 1869. Bill, black; interior of mouth, yellow; iris, dark brown; tarsi and toes, fine ashy-blue.

PSALTRIPARUS MINIMUS.

Least Titmouse.

Parus minimus, TOWNSEND, Journ. Ac. Nat. Sci. Philad., 1837, 190.

Psaltiriparus minimus, BONAP., Comp. Rend., 1854, 62.—BAIRD, B. N. Am., 1858, 397; Cat. N. Am. B., 1859, No. 298; Review, 1864, 84.—COOPER, Orn. Cal., 48.—COUES, Key, 1872, 82; Check List, 1873, No. 35.

Psaltiriparus minimus var. *minimus*, B. B. & R., Hist. N. Am. B., I, 1874, 109, pl. VII, fig. 9.

Of this delicate little bird we had but a mere glimpse, while passing through the western foot-hills of the Sierra Nevada. It was there seen in small straggling companies, among the brushwood of the ravines, appearing much like the *P. plumbea* of the Interior in its manners and notes.

PSALTRIPARUS PLUMBEUS.

Lead-colored Titmouse.

Psaltia plumbea, BAIRD, Pr. Ac. Nat. Sci. Philad., 1854, 118.

Psaltiriparus plumbeus, BAIRD, B. N. Am., 1858, 398; Cat. N. Am. B., 1859, No. 299; Review, 1864, 79.—COOPER, Orn. Cal., 49.—COUES, Key, 1872, 82; Check List, 1873, No. 36; B. N.W., 1874, 23.

Psaltiriparus minimus var. *plumbeus*, B. B. & R., Hist. N. Am. B., I, 1874, 110, pl. VII, fig. 10.—HENSHAW, 1875, 171.

Of late years, the known range of this species has been greatly extended by the more recent field-observations of the Government surveys. It was at first supposed to be one of those birds characteristic of the southwestern portion of the country, but it is now known to have a range co-extensive with the Middle Province, having been obtained by the naturalists of Dr. Hayden's survey as far to the northeastward as Green River and Bitter Creek, Wyoming Territory, while Captain Charles Bendire, U. S. A., found it a winter resident at Camp Harney, in eastern Oregon. How much farther northward it may extend is not known, but its range in that direction is probably limited by the Columbia Valley. We met with this species on several occasions from the very base of the Sierra Nevada eastward to the Wahsatch Mountains, but the localities where it occurred in abundance were few and remote from each other, while its habits are so erratic that it was seldom met with twice at one place. In the cañons of

the West Humboldt Mountains it was very numerous in September. It was found there in ever-restless companies, continually twittering as they flew from bush to bush, at which time the flocks became greatly scattered, the individuals straggling, or "stringing out," one behind another. In all their movements they were remarkably restless, in this respect even surpassing the Gnat catchers (*Poliophtila*), to which they bear considerable resemblance in their movements and appearance. In November many of these birds were seen in company with the Gray Titmice (*Lophophanes inornatus*) among the cedars on the Pea-vine and Virginia Mountains, and adjacent ranges in western Nevada, and in the spring one or two flocks, supposed to be this species, were observed in the gorge of the Carson River, near Carson City. On the eastern side of the Great Basin a few individuals in City Creek Cañon, near Salt Lake City, comprised all that were seen.

Among the numerous specimens killed in September, we noticed that many had the iris blackish, while in others it was clear light sulphur-yellow, and in some intermediate, or yellowish outwardly, and brownish next the pupil. A close examination, however, of these specimens, showed that this difference apparently depended on age, those having the darkest eyes being unmistakably young birds, while those in which the iris was clear yellow were all old birds, as was readily detected by the difference in the texture of their plumage. Even the youngest specimens had a yellowish outer ring to the iris, concealed by the eyelids, so that it seems that this color gradually spreads from the outside to the pupil, with advancing age, until, when fully mature, the iris becomes wholly clear light yellow.

List of specimens.

171, ♂ *juv.*; West Humboldt Mountains, Nevada, September 7, 1867. $4\frac{1}{8}$ —6—2— $1\frac{1}{16}$ — $\frac{5}{16}$ — $\frac{9}{16}$. Bill, black; iris, sepia-black, very narrow outer yellowish ring; tarsi and toes, black.

184, ♀ *ad.*; West Humboldt Mountains, September 11. $4\frac{1}{4}$ — $5\frac{7}{8}$ —2— $1\frac{1}{16}$ — $\frac{1}{4}$ — $\frac{9}{16}$ — $2\frac{3}{8}$ — $1\frac{3}{8}$. Bill, black; iris, light yellow; tarsi and toes, black.

185, ♂ *juv.*; $4\frac{1}{8}$ —6—2— $1\frac{1}{16}$ — $\frac{1}{4}$ — $\frac{9}{16}$ — $2\frac{1}{16}$ —1. Iris, light yellow, brownish next pupil.

250, *ad.*; West Humboldt Mountains (east side), October 12, 1867. $4\frac{3}{16}$ —6— $2\frac{1}{8}$ — $1\frac{3}{8}$ — $\frac{1}{4}$ — $\frac{9}{16}$ — $2\frac{1}{4}$ — $1\frac{3}{8}$. Bill, tarsi, and toes, deep black; iris, sulphur-yellow.

PSALTRIPARUS MELANOTIS.?

Black-eared Titmouse.

Parus melanotis, HARTLAUB, Rev. Zool., 1844, 216.

Psaltriparus melanotis, BONAP., Comp. Rend., 1854, —. — BAIRD, B. N. Am., 1858, 386, pl. LIII, fig. 3; Cat. N. Am. B., 1859, No. 297; Review, 1864, 84.—B. B. & R., Hist. N. Am. B., I, 1874, 108, pl. VII, fig. 8.

On the 4th of August, 1868, we saw near our camp, on the eastern slope of the Ruby Mountains, what was unquestionably a bird of this species, since the black patch on the ear-coverts was distinctly visible. Its restless movements made ineffectual our attempt to shoot it, and before we were prepared for another shot it disappeared among the cedar trees, and could not be found again. This we believe is the first known instance of its occurrence within the limits of the United States, though it has been obtained near our border, and is a common bird of the high mountain portions of northern Mexico; but it probably occurs in greater or less numbers, in suitable places, throughout our southern Rocky Mountains.

FAMILY SITTIDÆ—NUTHATCHES.

SITTA CAROLINENSIS.

White-bellied Nuthatch.

β. aculeata—*Slender-billed Nuthatch*.

Sitta aculeata, CASSIN, Pr. Ac. Nat. Sci. Philad., 1856, 254.—BAIRD, B. N. Am., 1858, 375, pl. xxxiii, fig. 3; Cat. N. Am. B., 1859, No. 278; Review, 1864, 86.—COOPER, Orn. Cal., 54.

Sitta carolinensis var. *aculeata*; ALLEN, Bull. Mus. Comp. Zool., 1872, 174.—COUES, Key, 1872, 83; Check List, 1873, No. 38a; B. N.W., 1874, 24.—B. B. & R., Hist. N. Am. B., I, 1874, 117, pl. VIII, fig. 2 (bill only).—HENSHAW, 1875, 173.

Being strictly a pinicoline species, this Nuthatch was observed in abundance only on the Sierra Nevada, being comparatively rare on the Wahsatch and Uintah mountains, while none were seen in the intervening region, not even among the most extensive cedar and piñon woods. In its manners it is a counterpart of the eastern form, but its notes are markedly different, being much weaker, and some of them of another character

altogether. It is with hesitation that we refer this bird to *S. carolinensis*, as a geographical race.

List of specimens.

439, ♂ *ad.*; Carson City, Nevada, March 10, 1868. $6-10\frac{7}{8}-3\frac{3}{4}-3$. Bill, pure blackish-plumbeous, basal half of lower mandible, opaque, bluish, or milky-white; iris, very dark bister; tarsi and toes, sepia-black.

448, ♂ *ad.*; Carson, March 21. $6\frac{1}{8}-10\frac{1}{4}-3\frac{3}{4}-3$. Same remarks.

449, ♀ *ad.*; (mate of preceding.) $5\frac{7}{8}-10\frac{5}{8}-3\frac{1}{16}-3$. Same remarks. Tarsi and toes, sepia-slate.

487, ♀ *ad.*; Carson, April 3. $6-11-3\frac{3}{4}-3$. Same remarks.

491, ♂ *ad.*; Carson, April 4. $6-10\frac{3}{4}-3\frac{1}{16}-3$. Same remarks.

SITTA CANADENSIS.

Red-bellied Nuthatch.

Sitta canadensis, LINN., Syst. Nat., I, 1766, 177.—BAIRD, B. N. Am., 1858, 376; Cat. N. Am. B., 1859, No. 279; Review, 1864, 86.—B. B. & R., Hist. N. Am. B., I, 1874, 118, pl. VIII, figs. 7, 8.—COOPER, Orn. Cal., 54.—COUES, Key, 1872, 83, fig. 27; Check List, 1873, No. 39; B. N.W., 1874, 25.—HENSHAW, 1875, 174.

An inhabitant in summer of the pine woods exclusively, this species was met with, at that season, only in the thickest or most extensive coniferous forests, such as those on the Sierra Nevada, Wahsatch, and Uintah ranges. In all localities where observed it was much less common, however, than either *S. aculeata* or *S. pygmaea*, but wherever found made its presence known by the loud, penny-trumpet *toot*, so peculiar and so characteristic of the species. Unlike the other two species, this one appears to make more or less of a vertical migration, since in September we found it common in the aspen groves along the streams in the upper Humboldt Valley. Later in the same month it was also common among the pines of the lofty Clover Mountains, at an altitude of near 11,000 feet.

List of specimens.

914, ♀ *ad.*; Camp 24, head of Humboldt Valley, September 10, 1868. $4\frac{5}{8}-8\frac{3}{16}-$ (?)— $2\frac{1}{4}$. Bill, uniform blackish-plumbeous, basal half of lower mandible, abruptly, bluish white; iris, umber-brown; tarsi, dull wax-green; toes, more yellowish.

SITTA PYGMÆA.

Pigmy Nuthatch.

Sitta pygmæa, VIGORS, Zool. Beechey's Voy., 1839, 29, pl. 4.—BAIRD, B. N. Am., 1858, 378; Cat. N. Am. B., 1859, No. 281; Review, 1864, 88.—B.B. & R., Hist. N. Am. B., I, 1874, 120, pl. VIII, fig. 10.—COOPER, Orn. Cal., 55.—COUES, Key, 1872, 83, fig. 27; Check List, 1873, No. 41; B. N.W., 1874, 25.—HENSLOW, 1875, 175.

This curious little Nuthatch was always a companion of the larger species (*S. aculeata*), the same local conditions being favorable or unfavorable to their presence. They appear to live together on the best of terms, since we have often seen individuals of each pass and re-pass one another as they searched the same branch or trunk. The manners of this diminutive Nuthatch partake in their general nature of those common to the genus, and present no marked peculiarities worthy of note. It is extremely noisy, its shrill notes being uttered almost continually, whether the bird is engaged in creeping among the branches or in flying from the top of one tree to that of another; and although one may be making a din greater than that of any other bird in the forest, it is generally hard to discover him, on account of his diminutive size. The notes of this species greatly resemble in their high pitch the "peet" or "peet-weet" of certain Sandpipers (as *Tringoides* and *Rhyacophilus*), but they are louder and more piercing. When once paired, these birds seem to possess a strong attachment to their mates, since on one occasion, after a female had been killed, the male made loud and continued complaint, and after being followed from tree to tree, was finally shot from the same one where his mate had been secured.

List of specimens.

410, ♂ *ad.*; Carson City, Nevada, February 19, 1868. $4\frac{1}{2}$ — $8\frac{1}{8}$ — $2\frac{3}{4}$ — $2\frac{3}{16}$. Bill, slate-black, basal half of lower mandible (abruptly), milk-white; iris, very dark vandyke-brown; tarsi and toes, plumbeous-black.

411, ♀ *ad.*; mate of preceding. $4\frac{3}{8}$ — $7\frac{3}{4}$ — $2\frac{5}{8}$ — $2\frac{3}{16}$. Same remarks. White of bill with delicate bluish tinge.

488, ♀ *ad.*; Carson, April 3. $4\frac{3}{8}$ —8— $2\frac{5}{8}$ — $2\frac{1}{8}$. Same remarks.

492, ♂ *ad.*; Carson, April 4. $4\frac{9}{16}$ —8— $2\frac{11}{16}$ — $2\frac{3}{16}$. Same remarks.

FAMILY CETHIIDÆ—CREEPERS

CETHIA FAMILIARIS.

Brown Creeper.*β. americana.*

Cethia americana, BONAP., Comp. & Geog. List, 1838, 11.—BAIRD, B. N. Am., 1858, 372, pl. 83, fig. 2; Cat. N. Am. B., 1859, No. 275; Review, 1864, 89.

Cethia familiaris var. *americana*, B. B. & R., Hist. N. Am. B., I, 1874, 125, pl. VIII, fig. 11.—HENSHAW, 1875, 177.

"*Cethia familiaris*," COUES, Key, 1872, 84, fig. 28; Check List, 1873, No. 42; B. N.W., 1874, 26.

"*Cethia mexicana*," COOPER, Orn. Cal., I, 1870, 58.

The distribution of this species corresponds with that of *Regulus calendula*, the pine forests being its home in summer, while in winter it performs a partial migration to the timbered portions of the lower valleys, or to the lower edge of the coniferous belt. It was first observed among the western foot-hills of the Sierra Nevada, where it was seen early in July, at the very commencement of the pine forest. In winter it was more or less common among the cotton-woods in the lower portion of the valleys of the Truckee and Carson Rivers, but eastward of those localities it was not again met with at any season, except on the Wahsatch and Uintah Mountains, where it was a rather common summer resident in the pine-region.

List of specimens.

349, ♀ ad.; Truckee Reservation, near Pyramid Lake, December 7, 1867. $5\frac{9}{16}$ — $7-2\frac{1}{2}-2\frac{1}{16}-\frac{9}{16}-\frac{1}{2}-2\frac{3}{8}-1\frac{7}{8}$. Upper mandible, black; lower, dilute brownish-white, with pinkish tinge; iris, hazel; tarsi and toes, dilute horn-color.

FAMILY TROGLODYTIDÆ—WRENS.

SALPINCTES OBSOLETUS.

Rock Wren.

Troglodytes obsoletus, SAY, Long's Exped., II, 1823, 4.

Salpinctes obsoletus, CABANIS, Wieg. Archiv, 1847, 323.—BAIRD, B. N. Am., 1858, 357; Cat. N. Am. B., 1859, No. 264; Review, 1864, 110.—B. B. & R., Hist. N. Am. B., I, 1874, 135, pl. VIII, fig. 3.—COOPER, Orn. Cal., 65.—COUES, Key, 1872, 85; Check List, 1873, No. 45; B. N.W., 1874, 27.—HENSHAW, 1875, 179.

The Rock Wren is by far the most common and generally distributed species of the family in the Western Region, since the prevailing character

of that country is so well suited to its habits. It was first met with near the summit of the Donner Lake Pass of the Sierra Nevada, but this was on the eastern slope, and in a district where the pine forests were interrupted by considerable tracts of open country, of a more or less rocky nature. Eastward of this point, as far as we journeyed, it was found in suitable localities on all the desert ranges. Its favorite resorts are piles of rocks, where it may be observed hopping in and out among the recesses or interstices between the boulders, or perched upon the summit of a stone, usually uttering its simple, guttural notes. It is not strictly rupicoline, however, for along the eastern base of the Sierra Nevada, where the pine forest reaches to the very base of the mountains, it was common in cleared tracts where there was much rubbish of old stumps, prostrate logs, and piles of brush, seeming as much at home there as among the rocks. At that place the males were occasionally observed to fly up to a naked branch of some dead tree, and remain there while they sang their simple trill. This species also freely accepts of the accommodations and protection afforded by man, for in many towns, notably those among the mountains, it nests about the old buildings and inside the entrance to mining-shafts, displaying as much familiarity and confidence as the little House Wren, or Bewick's Wren. It is an exceedingly unsuspicious little bird, if unmolested, always greeting an intruder to its haunts by its cheerful note of *turée*, while it bows and scrapes most politely at each utterance; but if too closely observed, or pursued, it manages, by hopping through the interstices, to keep always on the opposite side of the rock-pile, while it changes the note of welcome to an admonishing, guttural *turrrrr*. In its general appearance, except color, and in many of its movements, the Rock Wren bears a somewhat close resemblance to the Carolina Wren (*Thryothorus ludovicianus*) of the Eastern Region, being of almost exactly the same size and shape; the notes, too, are somewhat similar in their general nature, particularly the ordinary ones, which have the same guttural character; but the song is a simple monotonous trill, very much like that of the Snow-birds (*Junco*), and though often varied indefinitely, lacks any particular merit, from want of power and sweetness, while it is in no wise comparable to the superb whistling song of the species above mentioned.

At Carson City the Rock Wren was migratory, not making its appearance during the season of our stay until the 20th of March, and first singing on the 30th of that month. Indeed, we saw it nowhere during the winter, and thus infer that it makes a complete migration southward.

List of specimens.

163, ♂ *ad.*; $6\frac{5}{16}-9\frac{1}{16}-2\frac{7}{8}-2\frac{7}{16}-1\frac{1}{16}-\frac{3}{4}-2\frac{1}{4}-1\frac{3}{8}$. 164, ♀ *ad.*; $6-9-2\frac{7}{8}-2\frac{7}{16}-1\frac{1}{16}-1\frac{1}{16}-2\frac{3}{8}$. West Humboldt Mountains (Camp 18), September 4, 1867. Upper mandible, uniform slaty horn-color, with lilaceous cast; end of the lower mandible similar, fading on middle portion into ashy-lilac—pale-yellowish basally and on angle of mouth; iris, olive; tarsi and toes, deep black.

253, ♂ *ad.*; West Humboldt Mountains (Camp 19), October 23. $6-9-2\frac{1}{2}-2\frac{7}{8}-1\frac{1}{16}-\frac{3}{4}-2\frac{3}{8}-1\frac{1}{16}$. Upper mandible, purplish-slaty; lower, pale slaty-lilaceous, darker terminally, more pinkish at base; iris, olivaceous-drab; tarsi and toes, slate-black.

458, ♂ *ad.*; Carson, March 25. $6-9-3-2\frac{1}{2}$. Bill, uniform slate, lower mandible, paler; iris, grayish-umber; tarsi and toes, black.

478, ♂ *ad.*; Carson City, Nevada, March 30, 1868. $5\frac{7}{8}-9-2\frac{7}{8}-2\frac{5}{16}$. Bill, uniform plumbeous-slate, lower mandible, paler, except terminally; iris, grayish-umber; tarsi and toes, black.

486, ♂ *ad.*; Carson City, April 3. $6\frac{1}{4}-9\frac{1}{4}-3\frac{1}{16}-2\frac{1}{2}$. Bill, uniform dull-slate, basal half of lower mandible, slaty bluish-white; iris, raw-umber; tarsi and toes, deep black.

CATHERPES MEXICANUS.

White-throated Wren.

β. conspersus—Cañon Wren.

Catherpes mexicanus, BAIRD, B. N. Am., 1858, 356; Cat. N. Am. B., 1859, No. 263; Review, 1864, 111.—COOPER, Orn. Cal., 66.—COUES, Key, 1872, 85; B. N. W., 1874, 28. [Not *Thryothorus mexicanus*, Swains.]

Catherpes mexicanus var. *conspersus*, Ridgway, Am. Nat., 1872, 2.—B. B. & R., Hist. N. Am. B., I, 1874, 139, pl. VIII, fig. 4.—COUES, Check List, 1873, No. 46, p. 125.—HENSHAW, 1875, 181.

Somewhat similar to the common Rock Wren (*Salpinctes*) in its distribution and habits, this remarkable species differs in many noteworthy respects, the principal of which are its appearance and notes. We found it everywhere more rare than the other species, and apparently confined to the more secluded portions of the mountains, where it frequented rocky gorges and the interior of caves more often than the piles of loose rocks on the open slopes. It was generally observed to be rather shy, and prone to elude

pursuit by retreating to the deeper recesses of the rocks, now and then slyly peeping from some crevice but an instant, and then very unexpectedly reappearing at some distant place. While thus engaged, or while hopping about, examining each crevice for a spider or other insect, it utters a simple ringing note, which sounds somewhat like *dink*, uttered in a metallic tone; while now and then he pauses to pour forth his piercing song, which is of such volume as to fill the surrounding cañons with its reverberations. In many of its movements it greatly resembles the common Rock Wren, particularly in its manner of bowing and swinging oddly from side to side, when its attention becomes attracted by the presence of an intruder. It was frequently seen to cling to the roof or sides of a cave with the facility of a Creeper, and on one occasion to fly perpendicularly up the face of a cliff for a considerable height.

It seems, however, that in other sections of the country, where it is probably more numerous, this species is not always thus shy and retired in its habits; for Mr. Dresser (see "The Ibis," 1865, p. —) mentions an interesting instance where a pair built a nest in the wall of a dilapidated printing-office in San Antonio, Texas, and were so tame that they became great favorites with the workmen. He also states that at Dr. Heermann's ranche, on the Medina, they often built in cigar-boxes placed for their accommodation.

As stated above, the song of this bird is one of remarkable power; it is also unique in its tone and modulation to such an extent that no other song we ever heard resembles it at all. It consists of a series of clear, sharp, whistling, detached notes, beginning in the highest possible key, and descending the scale with perfect regularity through an octave or more. These notes are occasionally heard echoed and reëchoed against the walls of the cañons, with continued reverberations, such is their power and distinctness.

List of specimens.

345, ♂ *ad.*; near Fort Churchill, December 7, 1867. 5.75—7.50—2.58—2.00—0.83—0.56—2.25—1.18. Bill, slate-color, paler, and with a lilaceous tinge toward base of lower mandible; iris, brown; tarsi and toes, black. [Type of var. *consversus*, Ridgway, l. c.]

THRYOMANES BEWICKI.

Bewick's Wren.*γ. spilurus.*

Troglodytes spilurus, VIGORS, Zool. Beechey's Voy., 1839, 18, pl. 4, fig. 1.

Thryothorus spilurus. COOPER, Orn. Cal., 1870, 69.

Thryothorus bewicki var. *spilurus*, BAIRD, Review, 1864, 126.—B. B. & R., Hist. N. Am. B., I, 1874, 147, pl. IX, fig. 4.—COUES, Key, 1872, 86; Check List, 1873, No. 48b.

Thryothorus bewicki. c. spilurus, COUES, B. N.W., 1874, 31.

Thryothorus bewickii, BAIRD, Birds N. Am., 1858, 363 (part).

The "Long-tailed House Wren," or Bewick's Wren, was observed frequently at Sacramento, where, as in certain portions of the East, it frequented the out-houses in the city, in company with the Barn Swallow and Black Pewee. After leaving there, we nowhere identified it with certainty, although a single individual of what seemed to be this species was noticed at Glendale, Nevada, in November, 1867. The specimen in question was seen among the willows bordering the river, and disappeared before we could decide whether it was this species or the Wood Wren (*Troglodytes parkmanni*).

TROGLODYTES AËDON.

House Wren; Wood Wren.*β. parkmanni*—*Parkman's Wren.*

Troglodytes parkmanni, AUD., Orn. Biog., V, 1839, 310.—BAIRD, B. N. Am. 1858, 367; Cat. N. Am. B., 1859, No. 271; Review, 1864, 140.—COOPER, Orn. Cal., 71.

Troglodytes aëdon var. *parkmanni*, COUES, Key, 1872, 87; Check List, 1873, No. 49a; B. N.W., 1874, 32.—B. B. & R., Hist. N. Am., I, 1874, 153.—HENSHAW, 1875, 184.

The range of this Wren is apparently co-extensive with the distribution of the timber, or governed strictly by the presence or absence of trees, without special regard to their kind. Its vertical range, like that of the Robin, Louisiana Tanager, and many other species, was consequently very considerable, it being equally abundant among the cotton-woods of the river-

valleys and the aspen copses of the higher cañons of the mountains. Indeed it is the only strictly arboreal species of this family which resides in summer in the Middle Province, and there much more rarely seeks the society of man or the protection of his presence than the Rock or Bewick's Wrens. That they are somewhat inclined to do so, however, we saw occasional evidence, particularly in one instance, where a pair had a nest somewhere about the trading-house on the Indian Reservation near Pyramid Lake. This pair had become so familiar and confiding that the constant presence or passing in and out of persons did not alarm them in the least. Among the large cotton-wood trees near by, which extended in scattered groves or clumps for several miles along the river, they were extremely abundant, and their lively, agreeable songs were continually heard. They were equally abundant in the high cañons of the East Humboldt and Wahsatch Mountains, their favorite resort in the latter being the aspen copses of the pine-region, where they and the Robins were the most abundant birds. Very numerous nests of this species were found, their situation being various, although most of them were similar in this respect; the prevailing character being that of a large mass of rubbish filled in behind the loosened bark of the trunk of a tree, usually only a few feet from the ground, the entrance a natural crevice or a woodpecker's hole; it was always warmly lined with feathers, and very frequently possessed the ornamental addition of a cast-off snake-skin. One nest was placed behind a flat mass of a small shrub (*Spiræa cæspitosa*), which grew in moss-like patches against the face of a cliff. Another one, and the only one not concealed in some manner, was built in the low crotch of an aspen, having for its foundation an abandoned Robin's nest. It consisted of a somewhat conical pile of sticks, nearly closed at the top, but with a small opening just large enough to admit the owner. Including its bulky base, the total height of this structure was about fifteen inches.

List of specimens.

170, ♂ *ad.*; West Humboldt Mountains, September 7, 1867. $5\frac{1}{4}$ — $6\frac{3}{4}$ — $2\frac{3}{16}$ — $1\frac{13}{16}$ — $\frac{1}{2}$ — $\frac{5}{8}$ — $1\frac{7}{8}$ — $1\frac{1}{16}$. Upper mandible, horn-black, the tomium lilaceous-white; lower, lilaceous-whitish, deepening into purplish-slaty at end; iris, umber; tarsi and toes, brownish-whitish.

360, ♀ *ad.*; Truckee Bottom, December 17. $5-6\frac{1}{2}-2\frac{1}{6}-1\frac{1}{6}-\frac{1}{2}-\frac{5}{8}-2-\frac{7}{8}$. Bill, black, lilaceous-whitish on basal half of lower mandible and along commissure; interior of mouth, deep Naples-yellow; iris, raw-umber; tarsi and toes, livid brownish-white.

839, ♂ *ad.*; East Humboldt Mountains, July 13, 1868. $5-6\frac{1}{2}-1\frac{3}{4}$. Bill, black; commissure, with basal half of lower mandible, deep pinkish-lilac; iris, grayish chocolate-brown; tarsi and toes, dilute ashy-sepia.

864, ♂ *juv.*; East Humboldt Mountains, August 7. $5\frac{1}{8}-6\frac{3}{4}-(?) -1\frac{1}{6}$. Upper mandible, dull black; commissure and lower mandible, pale lilaceous; rictus, pale yellow; interior of mouth, intense yellow; tarsi and toes, delicate pale ashy-sepia.

903, ♂ *ad.*; Secret Valley, Nevada, September 7. $5\frac{1}{4}-6\frac{3}{4}-(?) -1\frac{3}{4}$. Upper mandible, olivaceous-black; lower mandible and commissure, lilaceous-white, the former more dusky terminally; iris, olivaceous-umber; tarsi and toes, pale lilaceous-sepia.

1260, nest and eggs (6); Parley's Park (Wahsatch Mountains), Utah, June 23, 1869. Built on an old Robin's nest, in crotch of aspen, deep woods.

1261, nest and eggs (7); nest in hollow aspen-snag.

1286, nest and eggs (7); Parley's Park, June 25. Nest in hollow snag, entrance through knot-hole.

1308, nest and eggs (6); Parley's Park, June 27. Nest in deserted woodpecker's hole.

1309, nest and eggs (6); same locality and date. Nest behind loosened bark of dead aspen.

1421, eggs (3); Parley's Park, July 17, 1869. Nest in hollow of tree.

TROGLODYTES HYEMALIS.

Winter Wren.

β. pacificus—Western Winter Wren.

Troglodytes hyemalis var. *pacificus*, BAIRD, Review, 1864, 145.

Troglodytes parvulus var. *pacificus*, B. B. & R., Hist. N. Am. B., I, 1874, 155, pl. IX, fig. 10.

Anorthura troglodytes var. *hyemalis*, COUES, Key, 1872, 351 (part); Check List, 1873, No. 50 (part); B. N.W., 1874, 33 (part).

Troglodytes hyemalis (part), BAIRD, B. N. Am., 1858, 369; Cat. N. Am. B., 1859, No. 273.—COOPER, Orn. Cal., 73.

The Winter Wren seemed to be quite rare in the Interior, since but one individual, the one obtained, was observed.

List of specimens.

369, ♂ *ad.*; Truckee Bottom, near Pyramid Lake, Nevada, December 25, 1867. $4-6-2-1\frac{1}{2}-\frac{7}{8}-(?) -1\frac{5}{8}-\frac{9}{8}$. Upper mandible, black, tomium dilute brown; lower, dilute brown, dusky along the side; iris, deep burnt-umber; tarsi and toes, deep brown.

TELMATODYTES PALUSTRIS.

Long-billed Marsh Wren.

β. paludicola—Tule Wren.

Cistothorus palustris var. *paludicola*, BAIRD, Review Am. B., 1864, 148.—B. B. & R., Hist. N. Am. B., I, 1874, 161.—HENSHAW, 1875, 185.

Telmatodytes palustris, COUES, Key, 1872, 87 (part); Check List, 1873, No. 51; B. N.W., 1874, 35 (part).

Cistothorus (Telmatodytes) palustris (part), BAIRD, B. N. Am., 1858, 364; Cat. N. Am. B., 1859, No. 268 (part).—COOPER, Orn. Cal., 75.

In all marshy localities where there existed even a limited growth of tules, the Long-billed Marsh Wren was more or less abundant. It was consequently found in numerous places, but it abounded most in those extensive marshes adjoining the lower portions of the Truckee, Humboldt, and Jordan Rivers, it being so abundant at the latter locality that several nests were often visible at one time in the thick growth of reeds. The song of this Wren is very peculiar, being a confused sputtering, scolding harangue, somewhat similar to, but harsher and less pleasing than, the song of *Troglodytes aëdon*.

List of specimens.

273, ♂ *ad.*; Truckee Meadows, Nevada, November 15, 1867. $5\frac{1}{16}$ — $6\frac{5}{8}$ — $2\frac{3}{16}$ — $1\frac{11}{16}$ — $\frac{9}{16}$ — $1\frac{1}{16}$ — $1\frac{3}{14}$ — $1\frac{5}{16}$. Upper mandible, slaty-black; commissure and lower mandible, lilaceous-white, the latter more dusky terminally; iris, umber; tarsi and toes, delicate brownish-white, strongly tinged with bluish-lilaceous.

370, ♂ *ad.*; Truckee Bottom, near Pyramid Lake, December 25. $5\frac{1}{8}$ — $6\frac{5}{8}$ — $2\frac{3}{16}$ — $1\frac{3}{4}$ — $\frac{1}{2}$ — $1\frac{1}{16}$ — 2 — $\frac{7}{8}$. Same remarks. Tarsi and toes, deep light-brown, with yellowish tinge.

737, nest and five eggs; Truckee Bottom, near Pyramid Lake, May 18, 1868. Nest among reeds in deep water, near lake-shore.

738, nest. Same remarks as to preceding.

950, ♂ *ad.*; Deep Creek, Utah, October 5, 1868. $5\frac{3}{8}$ — 7 —(?)— $1\frac{13}{16}$. Bill, black; commissure and basal two-thirds of lower mandible, pure lilaceous; iris, umber; tarsi and toes, deep sepia, the latter darkest.

951, ♂ *ad.*; 952, ♀ *ad.*; $5\frac{3}{8}$ — $7\frac{1}{8}$ —(?)— $1\frac{13}{16}$. Same remarks.

1010, 1011, 1012, 1013, 1014, 1015, May 21, 1869; 1079, 1080, 1081, 1082, June 2, 1869; nests and eggs; Jordan River (near Salt Lake City), Utah. Nests each attached to several stalks of upright reeds, or *tules*, standing in the water, near nests of *Xanthocephalus icterocephalus*. Maximum number of eggs four, but the number probably sometimes exceeds this.

1459, ♂ *juv.*; Parley's Park (Wahsatch Mountains), Utah, July 26, 1869. $4\frac{1}{8}$ — $6\frac{1}{4}$.

Upper mandible, sepia-black; commissure and lower mandible, pale lilaceous; iris, brown; tarsi, dark sepia-plumbeous; toes, paler, whitish beneath.

1467, ♂ *juv.*; Parley's Park, July 28. $4\frac{5}{8}$ — $6\frac{5}{8}$. Same remarks.

1476, ♂ *juv.*; July 29. $5\frac{1}{4}$ —7.

1494, ♂ *juv.*; $5\frac{3}{8}$ — $6\frac{7}{8}$. 1495, ♂ *juv.*; $5\frac{1}{4}$ — $6\frac{7}{8}$. August 7. Same remarks as to 1459.

FAMILY MOTACILLIDÆ—WAGTAILS and TIT-LARKS, or PIPITS.

ANTHUS LUDOVICIANUS.

Tit-lark.

Alauda ludoviciana, GMELIN, Syst. Nat., I, 1788, 793.

Anthus ludovicianus, LICHT., Verz., 1823, 27.—BAIRD, B. N. Am., 1858, 232; Cat. N. Am. B., 1859, No. 165; Review, 1864, 153.—B. B. & R., Hist. N. Am. B., I, 1874, 171, pl. x, fig. 3.—COOPER, Orn. Cal., 78.—COUES, Key, 1872, 90, fig. 34; Check List, 1873, No. 55; B. N.W., 1874, 40.—HENSHAW, 1875, 187.

Perhaps no bird of the Interior is more abundant in winter than the Tit-lark is, at times, in localities of a nature calculated to attract them. At the Truckee Meadows they came in immense flocks in November, and spread over the soggy meadows, where they remained during the moderately cold weather for the greater portion of the winter, occasionally congregating by thousands about the haystacks and corrals. They were equally abundant at Carson City, particularly in the vicinity of the warm springs, where the high temperature of the water kept the meadow soft and comparatively green, even during the coldest weather. In April, just before their departure for the North, we observed them in their more highly-colored plumage.

List of specimens.

193, ♀ *ad.*; West Humboldt Mountains, Nevada, September 17, 1867. (Stream, in garden.) 6 — 10 — $3\frac{3}{16}$ — $2\frac{5}{8}$ — $\frac{7}{16}$ — $1\frac{3}{16}$ — $2\frac{7}{16}$ — 1 . Upper mandible, dark horn-color, darker terminally; lower, paler, nearly straw-yellow at base; iris, hazel; tarsi and toes, dark horn-color.

270, ♀ *ad.*; Truckee Meadows, November 8. $6\frac{1}{16}$ — $10\frac{7}{8}$ — $3\frac{9}{16}$ — $2\frac{7}{8}$ — $\frac{1}{2}$ — $\frac{1}{16}$ — $2\frac{3}{4}$ — $1\frac{3}{16}$. Bill, black; basal half of lower mandible, light-brown; iris, hazel; tarsi and toes, very dark blackish-brown.

274, ♀ *ad.*; Truckee Meadows, November 15. $6\frac{1}{2}$ — 10 — $3\frac{5}{16}$ — $2\frac{11}{16}$ — $\frac{1}{2}$ — $\frac{1}{16}$ — $2\frac{1}{2}$ — $1\frac{5}{16}$. Upper mandible and tip of lower, nearly black, remaining portion dull wax-yellow, deepest basally—almost lemon-yellow on rictus; iris, deep vandyke; tarsi and toes, uniform blackish, toes *not* darker—dull light-yellowish beneath.

275, ♂ *ad.*; Truckee Meadows, November 15. $6\frac{7}{8}$ — $11\frac{1}{16}$ — $3\frac{5}{8}$ — $2\frac{1}{16}$ — $\frac{1}{2}$ — $\frac{1}{16}$ — $2\frac{7}{8}$ — $1\frac{1}{8}$. Toes more blackish than tarsus.

- 276, ♂ ad.; $6\frac{3}{4}$ — $10\frac{7}{8}$ — $3\frac{9}{16}$ — $2\frac{7}{8}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{13}{16}$ — $1\frac{1}{8}$. Same remarks.
 277, ♂ ad.; $6\frac{3}{4}$ — $10\frac{3}{4}$ — $3\frac{1}{2}$ — $2\frac{11}{16}$ — $\frac{1}{2}$ — $\frac{13}{16}$ — $2\frac{7}{8}$ — $1\frac{1}{8}$. Same remarks.
 278, ♂ ad.; 7 — $10\frac{3}{4}$ — $3\frac{1}{2}$ — $2\frac{13}{16}$ — $\frac{1}{2}$ — $\frac{13}{16}$ — $2\frac{3}{4}$ — 1 . Same remarks.
 279, ♂ ad.; $6\frac{5}{8}$ — $10\frac{1}{2}$ — $3\frac{7}{16}$ — $2\frac{11}{16}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{9}{16}$ — 1 . Tarsi, dark sienna-brown; toes, more blackish, distinctly pale yellowish beneath.
 280, ♂ ad.; $6\frac{11}{16}$ — $10\frac{7}{8}$ — $3\frac{1}{2}$ — $2\frac{13}{16}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{3}{4}$ — 1 . Same remarks.
 281, ♂ ad.; $6\frac{9}{16}$ — $10\frac{1}{2}$ — $3\frac{1}{2}$ — $2\frac{15}{16}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{3}{4}$ — $1\frac{1}{4}$. Same remarks.
 282, ♂ ad.; $6\frac{1}{2}$ — $10\frac{3}{8}$ — $3\frac{3}{8}$ — $2\frac{13}{16}$ — $\frac{1}{2}$ — $\frac{3}{4}$ — $2\frac{5}{8}$ —(?) . Same remarks.
 283, ♂ ad.; $6\frac{5}{8}$ — $10\frac{3}{4}$ — $3\frac{5}{8}$ — $2\frac{15}{16}$ — $\frac{1}{2}$ — $\frac{13}{16}$ — $2\frac{3}{4}$ —(?) . Same remarks.

FAMILY MNIOTILTIDÆ—AMERICAN WARBLERS.

HELMINTHOPHAGA RUFICAPILLA.

Nashville Warbler.

Sylvia ruficapilla, WILS., Am. Orn., III, 1811, 120, pl. 27, fig. 3.

Helminthophaga ruficapilla, BAIRD, B. N. Am., 1858, 256; Cat. N. Am. B., 1859, No. 183; Review, 1864, 175.—B. B. & R., Hist. N. Am. B., I, 1874, 196, pl. XI, figs. 7, 8.¹—COOPER, Orn. Cal., 82.—COUES, Key, 1872, 94; Check List, 1873, No. 67; B. N.W., 1874, 50.—HENSHAW, 1875, 188.

Although not observed in summer, this bird was more or less common in September in the thickets along the streams in the lower portion of the cañons. It is not as yet definitely known whether this species breeds anywhere within the Western Region, or whether, on the other hand, the individuals which have been obtained at so many localities west of the Rocky Mountains were migrants from the Eastern Region, which, near the northern boundary of the United States, extends so much farther toward the Pacific coast. The same doubt exists in the case of *Lanivireo solitarius*. It is well known, however, that toward our northern border the Rocky Mountains form much less of a barrier to the westward range of eastern species, many of which, following the head-waters of the Yellowstone and other tributaries of the Missouri River, have but a short flight to reach the head-streams of the Columbia, and thus reach the Pacific coast in Oregon and Washington Territory, by passing down the valley of the latter stream.

¹On p. 191 a "var. *gutturalis*" is characterized, supposed to be distinguished by having the yellow of the throat confined strictly within the maxillæ, and not, as in true *ruficapilla*, covering the cheeks; the race being based on No. 901 of this catalogue, = No. 53,354, National Museum catalogue. Should this peculiarity prove constant, the western birds may be distinguished by that name. Figure 8, Hist. N. Am. Birds, quoted above, represents this form.

These same individuals, in the case of non-resident species, during their autumnal migration, probably follow the bases of the mountain ranges directly southward, instead of returning by the devious route by which they reached the western portions of the country. The occasional capture of such species as those named above, and the more accidental occurrence of others, as *Ectopistes migratoria* (see pp. 355, 380, 385, and 596), at localities in the Western Region, may thus be accounted for.

List of specimens.

901, ♂ *ad.*; East Humboldt Mountains (Secret Valley), Nevada, September 6, 1868. 4 $\frac{1}{2}$ —7 $\frac{7}{8}$ —2 $\frac{1}{8}$. Upper mandible, plumbeous-black, the tomium slightly paler; lower, plumbeous-white, with lilaceous glow; iris, burnt-umber; tarsi, bluish-plumbeous; toes, stained with yellow. [Type of *Helminthophaga ruficapilla* var. *gutturialis*, Baird, Brewer, and Ridgway, History of North American Birds, Vol. I, 1874, p. 191, pl. xi, fig. 8.]

HELMINTHOPHAGA VIRGINIÆ.

Virginia's Warbler.

Helminthophaga virginia, BAIRD, B. N. Am., ed. 1860, p. xi, pl. 79, fig. 1; Cat. N. Am. B., 1859, No. 183a; Review, 1865, 177.—B. B. & R., Hist. N. Am. B., I, 1874, 199, pl. xi, fig. 12.—COOPER, Orn. Cal., 85.—COUES, Key, 1872, 94; Check List, 1873, No. 66; B. N. W., 1874, 51.—HENSHAW, 1875, 189.

This interesting little Warbler was first observed among the cedar and piñon groves on the eastern slope of the Ruby Mountains. It was not met with west of this locality, but eastward it occurred on all those ranges having a similar or equally extensive growth. At the first-named locality it was rather common in July and August, and was found in the same groves with the Black-throated Gray Warbler (*Dendræca nigrescens*) and the Lead-colored Vireo (*Lanivireo plumbeus*). On the Wahsatch and Uintah Mountains it was more abundant, being particularly plentiful among the scrub-oaks on the foot-hills near Salt Lake City. They lived entirely among the bushes, which there were so dense that the birds were difficult to obtain, even when shot. The usual note of this species is a soft *pit*, very different from the sharp *chip* of *H. celata*, while its song is so exceedingly similar to that of the Summer Yellow-bird (*Dendræca æstiva*) that we often found it difficult to distinguish them.

List of specimens.

859, *juv.*; East Humboldt Mountains, Nevada, August 5, 1868. 5—7 $\frac{1}{8}$ —(?)—2. Upper mandible, plumbeous-black, the tomium yellowish-white; lower mandible, dull light-ashy, darker terminally; tarsi and toes, yellowish-plumbeous, the latter pale yellow beneath.

1040, ♂ *ad.*; Salt Lake City, Utah (City Creek Cañon), May 24, 1869. 5—8. Bill, lilaceous-blue, the upper mandible nearly black; iris, brown; tarsi, hepatic-slate; toes, yellowish.

1041, ♀ *ad.* (mate of preceding); 4 $\frac{3}{4}$ —7 $\frac{1}{4}$. Same remarks.

1053, ♀ *ad.*; Salt Lake City, May 26. 5—7 $\frac{1}{8}$. Same remarks.

1192, ♂ *ad.*; Salt Lake City, June 21. 4 $\frac{5}{8}$ —7 $\frac{5}{8}$. Same remarks.

1188, nest and eggs (4); Salt Lake City, June 19. Nest imbedded in the layer of dead leaves covering the ground under oak-thicket, on side of ravine; female shot.

HELMINTHOPHAGA CELATA.

Orange-crowned Warbler.

α. celata—Common Orange-crowned Warbler.

Sylvia celata, SAY, Long's Exped., I, 1823, 169.

Helminthophaga celata (part), BAIRD, B. N. Am., 1858, 257; Cat., 1859, No. 184 (part); Review, 1865, 176.—COOPER, Orn. Cal., 83.—COUES, Key, 1872, 95; Check List, 1873, No. 68 (part); B. N.W., 1874, 52.—B. B. & R., Hist. N. Am. B., I, 1874, 202, pl. XI, fig. 5.—HENSHAW, 1875, 191.

β. lutescens.—Yellow Orange-crowned Warbler.

Helminthophaga celata var. *lutescens*, RIDGWAY, Am. Jour. Sci. & Arts, Jan., 1872, 457; Am. Nat., VII, Oct., 1873, p.—B. B. & R., Hist. N. Am. B., I, 1874, 204, pl. XI, fig. 4.

Helminthophaga celata. b. *lutescens*, COUES, B. N.W., 1874, 52.

Helminthophaga celata (part), BAIRD, B. N. Am., and Rev.—COUES, Key, and Check List.—COOPER, Orn. Cal., 83.

The Orange-crowned Warbler was most frequently met with during its autumnal migration, at which time it was the most abundant of all the species of the family; it was also not uncommon in summer in the high aspen woods of the loftier mountains. In the fall, the thickets and lower shrubbery along the streams, particularly those of the lower cañons, would fairly swarm with them during the early portion of the mornings, as they busily

sought their food, in company with various insectivorous birds, especially the Black-capped Green Warbler (*Myiodioides pusillus*) and Swainson's Vireo (*Vireosylva swainsoni*). At such times they uttered frequently their sharp note of *chip*. The brightly-colored specimens representing *H. lutescens* were prevalent in the western depression of the Basin, but were not observed eastward of the upper portion of the Valley of the Humboldt, nor at any locality during the summer; and wherever found, were associated with individuals of the other form, which is the only one found breeding on the mountains. It is therefore inferred that all these individuals were migrants from the northern Pacific Coast region and the Sierra Nevada, while those of *H. celata* proper were from the higher portions of the more eastern mountains, or from farther northward in the Rocky Mountain ranges; full-fledged young birds being numerous in the high aspen woods of the Wahsatch Mountains in July and August.

List of specimens.

a. celata.

921, ♂ *ad.*; "Dearing's Creek," Upper Humboldt Valley, September 11, 1868. $5-7\frac{5}{8}-(?)=2\frac{1}{8}$. Upper mandible, brownish plumbeous-black, the tomium whitish; lower, pale lilaceous-plumbeous, darker terminally; iris, bright sienna; tarsi and toes, plumbeous, with yellow cast.

922, ♀ *ad.*; "Dearing's Creek," Upper Humboldt Valley, September 11, 1868. $4\frac{3}{4}-7\frac{1}{8}-(?)=1\frac{1}{6}$. Bill rather more lilaceous.

1425, ♂ *juv.*; Parley's Park, Wahsatch Mountains, Utah, July 17, 1869. $4\frac{1}{8}-7\frac{5}{8}$. Upper mandible, black; commissure and lower mandible, dark lilaceous, latter paler basally; iris, brown; tarsi, plumbeous; toes, olive.

1505, ♂ *ad.*; Parley's Park, August 12, 1869. $5-7\frac{1}{2}$. Same remarks.

1516, ♂ *ad.*; Parley's Park, August 16, 1869. $5\frac{3}{8}-5\frac{7}{8}$. Upper mandible, black, paler along tomium; lower, lilaceous-blue, whitish basally, blackish terminally; iris, brown; tarsi, dull plumbeous; toes, more greenish.

β. lutescens.

215, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, September 24, 1867. $4\frac{7}{8}-7\frac{3}{8}-2\frac{3}{8}-2-\frac{3}{8}-1\frac{1}{6}-1\frac{1}{6}-1\frac{3}{8}-1\frac{3}{8}$. Bill, blackish horn-color, the lower mandible, paler; iris, brown; tarsi and toes, deep horn-color.

907, ♂ *ad.*; "Secret Valley," East Humboldt Mountains, Nevada, September 8, 1868. $4\frac{7}{8}-7\frac{5}{8}-(?)=2$. Upper mandible, purplish-black, the tomium deep lilac; lower mandible, bluish-lilac, more pinkish basally, more dusky toward tip; iris, vandyke-brown; tarsi and toes, plumbeous, the latter stained with yellow.

926, ♂ *ad.*; "Dearing's Creek," Upper Humboldt Valley, Nevada, September 12. $41\frac{5}{6}$ — $7\frac{3}{8}$ —(?)—2. Upper mandible, plumbeous-black, the tomium edged with paler; lower, plumbeous-white, darker terminally; iris, burnt-sienna; tarsi and toes, plumbeous, latter with a yellowish tinge.

DENDRÆCA ÆSTIVA.

Summer Yellow-bird; Golden Warbler.

Motacilla æstiva, GMELIN, Syst. Nat., I, 1788, 996.

Dendræca æstiva, BAIRD, B. N. Am., 1858, 282; Catal., 1859, No. 203; Review, 1865, 195.—COOPER, Orn. Cal., 87.—COUES, Key, 1872, 97; Check List, 1873, No. 70; B. N.W., 1874, 54.—B. B. & R., Hist. N. Am. B., I, 1874, 222, pl. xiv, fig. 1.—HENSHAW, 1875, 192.

This common and familiar little bird was met with everywhere, except during the winter season; and in all wooded localities, with the exception of the higher forests, which it gave up chiefly to *D. auduboni*, was the most abundant and generally distributed member of the family. At Sacramento it was one of the commonest birds, inhabiting every copse, whether of willow, cotton-wood, or oak; and throughout the Interior it was equally plentiful in every locality producing a growth of willows or other shrubbery, being most multiplied in the river-valleys or lower cañons, and gradually decreasing in numbers toward the summits of the mountains. No difference whatever exists, apparently, between the western and eastern birds of this species.

List of specimens.

11, nest and eggs (3); Sacramento, California, June 8, 1867. Nest on small oak, in grove.

24, 25, 26, 27, nest and eggs; Sacramento, California, June 11, 1867. Nests in a small oak-grove, nearly similarly situated, being generally placed on a high branch near the top of the trees, about fifteen or twenty feet from the ground.

121, ♂ *juv.*; valley of the Truckee, Nevada, August 6, 1867. $5\frac{5}{6}$ — $7\frac{3}{8}$ — $2\frac{3}{8}$ — $2\frac{3}{8}$ — $\frac{1}{2}$ — $\frac{5}{8}$ — $1\frac{3}{4}$ — $\frac{5}{8}$. Upper mandible, leaden-black, the tomium whitish; lower, leaden-bluish; iris, hazel; tarsi and toes, yellowish horn-color, latter yellowish beneath.

158, ♀ *ad.*; valley of the Humboldt (Camp 17), September 2. $5\frac{3}{6}$ — $7\frac{1}{8}$ — $2\frac{7}{8}$ — $2\frac{7}{8}$ — $\frac{7}{8}$ — $\frac{5}{8}$ — $1\frac{3}{4}$ — $1\frac{3}{8}$. Upper mandible, black, the tomium pale ashy-lilac; lower mandible, pale ashy-lilac; iris, hazel; tarsi and toes, liver-brown, scutellæ margined with ashy-blue.

881, ♀ *juv.*; East Humboldt Mountains, Nevada, August 29, 1868. $4\frac{7}{8}$ — $7\frac{1}{4}$ —(?)—2. Upper mandible, olive-brown, edged with paler; lower, uniform greenish-white; iris, bister; tarsi and toes, dilute sepia, strongly washed with yellow.

1254, 1255, 1256, nests and eggs; Parley's Park, Utah, June 23, 1869. Nests in willows along stream.

1306, nest and eggs (4); Parley's Park, June 27. Nest in rose-bush near stream.

1415, nest and egg (1); Parley's Park, July 16, 1869. Nest in willows.

DENDRÆCA OCCIDENTALIS.

Western Warbler.

Sylvia occidentalis, TOWNSEND, Journ. Ac. Nat. Sci. Philad., VII, ii, 1837, 190.

Dendræca occidentalis, BAIRD, B. N. Am., 1858, 268; Catal., 1859, No. 190; Review, 1865, 183.—COOPER, Orn. Cal., 92.—COUES, Key, 1872, 98; Check List, 1873, No. 72.—B. B. & R., Hist. N. Am. B., I, 1874, 266, pl. XII, fig. 5.—HENSHAW, 1875, 201.

On the 29th of August, 1868, a single individual of this strongly-marked species was seen in the lower portion of one of the eastern cañons of the East Humboldt Mountains. It was busily engaged in searching for its insect food, in a thicket along the stream, during which occupation it uttered an occasional note, sounding like a lisped and faint enunciation of *pzeet*.

DENDRÆCA TOWNSENDI.

Townsend's Warbler.

"*Sylvia townsendi*, NUTTALL," TOWNSEND, Journ. Ac. Nat. Sci. Philad., VII, ii, 1837, 191.

Dendræca townsendi, BAIRD, B. N. Am., 1858, 269; Catal., 1859, 191; Review, 1865, 185.—COOPER, Orn. Cal., 91.—COUES, Key, 1872, 98; Check List, 1873, No. 73.—B. B. & R., Hist. N. Am. B., I, 1874, 265, pl. XII, fig. 7.—HENSHAW, 1875, 200.

This Warbler, like the *D. occidentalis*, was exceedingly rare along our route, only one other specimen besides that obtained having been seen. The one in question was observed on the 8th of September, in an alder-thicket high up one of the eastern cañons of the East Humboldt Mountains. The manners and notes of this species, as observed at this season, seemed much like those of *D. occidentalis*, neither possessing any strikingly distinctive trait, so far as could be observed.

List of specimens.

942, ♂ *ad.*; Thousand Spring Valley, Nevada, September 24, 1868. (Specimen badly mutilated; no measurements.)

DENDRÆCA NIGRESCENS.

Black-throated Gray Warbler.

Sylvia nigrescens, TOWNSEND, Journ. Ac. Nat. Sci. Philad., VII, ii, 1837, 191.

Dendræca nigrescens, BAIRD, B. N. Am., 1858, 270; Catal., 1859, No. 192; Review, 1865, 186.—COOPER, Orn. Cal., 90.—COUES, Key, 1872, 98; Check List, 1873, No. 75; B. N.W., 1874, 55.—B. B. & R., Hist. N. Am. B., I, 1874, 258, pl. XII, fig. 8.—HENSCHAW, 1875, 188.

The Black-throated Gray Warbler doubtless breeds on all the higher mountains of the Western Region, since Mr. C. E. Aiken has discovered it to be a summer resident on the most eastern ranges in Colorado, while it has long been known as a summer bird of the Pacific Coast district; but the mountains of the Great Basin having sufficient timber-growth—a condition essential to the presence of this species—are very few, and so far between, that we met with it at few localities. On the eastern slope of the Ruby Mountains, it was abundant in July and August, in the piñon and cedar woods, never entering the brushwood in the cañons. A few individuals were also seen in Pack's Cañon, Uintah Mountains, where they inhabited the lower slopes which were covered with a scattered growth of scrub-oaks and mountain-mahogany. At the former locality, several families of full-grown young were observed still following their parents. Their song was not heard, but their ordinary note greatly resembled the sharp *chip* of the eastern Yellow-rump (*D. coronata*).

List of specimens.

840, ♂; East Humboldt Mountains, Nevada, July, 14, 1868. $4\frac{3}{4}$ — $7\frac{3}{4}$ —(?)— $2\frac{3}{16}$. Bill, deep black; iris, dark sepia; tarsi and toes, sepia-black.

855, ♂; East Humboldt Mountains, August 4, 1868. $5\frac{3}{8}$ — $7\frac{7}{8}$ —(?)— $2\frac{1}{4}$. Same remarks.

863, ♂; August 7, 1868. $5\frac{1}{8}$ — $7\frac{5}{8}$ —(?)— $2\frac{1}{8}$. Same remarks.

866, ♀; August 10, 1868. 5 — $7\frac{5}{8}$ —(?)— 2 . Bill, black, slightly lilaceous at base of lower mandible.

DENDRÆCA AUDUBONI.

Audubon's Warbler.

Sylvia audubonii, TOWNSEND, Journ. Acad. Nat. Sci. Philad., VII, ii, 1837, 190.

Dendræca audubonii, BAIRD, B. N. Am., 1858, 273; Catal., 1859, No. 195; Review, 1865, 188.—COOPER, Orn. Cal., 88.—COUES, Key, 1872, 100; Check List, 1873, No. 79; B. N.W., 1874, 58.—B. B. & R., Hist. N. Am. B., I, 1874, 229, pl. XIII, fig. 1.—HENSCHAW, 1875, 194.

As is the case with the eastern Yellow-rumped Warbler (*D. coronata*),

except in the southern portion of its habitat, Audubon's Warbler, the western representative of that species, is the only one of the family which remains during the winter. Its migrations seem to be mainly, if not entirely, vertical, its summer-home being the pine forests of the mountains, while in winter it dwells among the cotton-woods of the river-valleys, or the brushwood of the lower cañons. In its habits and manners it is an exact counterpart of *D. coronata*, which it also resembles so strikingly in plumage; but its notes are markedly different, the usual one being a feeble *wit*, very unlike the sharp *chip* of the eastern species.

List of specimens.

218, ♂ *ad.*; West Humboldt Mountains, Nevada, September 25, 1867. $5\frac{7}{8}$ —9— $3\frac{1}{8}$ — $2\frac{1}{6}$ — $\frac{3}{2}$ — $\frac{1}{6}$ — $2\frac{1}{2}$ —1. Bill, tarsi, and toes, deep black; iris, hazel.

245, ♂ *ad.*; West Humboldt Mountains, October 8, 1867. $5\frac{7}{8}$ — $9\frac{1}{8}$ — $3\frac{1}{2}$ — $2\frac{5}{8}$ — $\frac{3}{8}$ — $\frac{1}{2}$ — $2\frac{7}{16}$ — $1\frac{1}{16}$. Same remarks.

346, ♀ *ad.*; Truckee Valley, Nevada, December 7, 1868. $5\frac{1}{2}$ — $8\frac{3}{4}$ — $2\frac{7}{8}$ — $2\frac{3}{8}$ — $\frac{7}{16}$ — $\frac{11}{16}$ — $2\frac{3}{8}$ — $\frac{7}{8}$. Same remarks.

493, ♂ *ad.*; Carson City, Nevada, April 4, 1868. 6— $9\frac{5}{8}$ — $3\frac{5}{16}$ — $2\frac{3}{4}$. Iris, burnt-umber.

500, ♂ *ad.*; Carson, April 18, 1868. 6— $9\frac{1}{2}$ — $3\frac{1}{4}$ — $2\frac{5}{8}$. Bill, jet-black; iris, burnt-umber; tarsi and toes, sepia-black.

1257, single egg; Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nest near extremity of horizontal branch of pine tree, about ten feet from ground; contained, besides, three young.

GEOTHYLPIS TRICHAS.

Maryland Yellow-throat.

Turdus trichas, LINN., Syst. Nat., I, 1766, 293.

Geothlypis trichas, CABANIS, Mus. Hein., 1850, 16.—BAIRD, B. N. Am., 1858, 241; Catal., 1859, No. 170; Review, 1865, 220.—COOPER, Orn. Cal., 95.—COUES, Key, 1872, 107, fig. 47; Check List, 1873, 97; B. N. W., 1874, 74.—B. B. & R., Hist. N. Am. B., I, 1874, 297, pl. XV, figs. 7, 8.—HENSHAW, 1875, 204.

In all bushy places contiguous to water, this little bird was invariably to be found; but it was confined to the valleys, being replaced among the mountains, even in the lower cañons, by the *G. macgillivrayi*. Clumps of wild-rose briars and the banks of the sloughs seemed to be its favorite resorts, and in such localities near Pyramid Lake it was one of the most abundant species in May, and all day long enlivened the vicinity of one of our camps by its pleasant song of *witch'ity, witch'ity, witch'ity*—often from several rival males at the same time.

List of specimens.

750, eggs (4); mouth of Truckee River, May 19, 1868. Nest in sage-bush, in moist depression.

883, *juv.*; Ruby Valley, Nevada, August 29, 1868. $5\frac{1}{8}$ — $6\frac{3}{4}$ —(?)— $1\frac{3}{4}$. Upper mandible, sepia-black, the tomium pale brownish-yellow; lower, dilute lilaceous-sepia; iris, plumbeous-brown; tarsi and toes, dilute pinkish-sepia, the toes strongly washed with yellow.

899, ♀ *juv.*; Secret Valley, Nevada, September 23, 1868. $5\frac{1}{8}$ —7—(?)— $1\frac{7}{8}$. Same remarks.

953, ♂ *ad.*; Deep Creek, Utah, October 5, 1868. $5\frac{7}{16}$ —7—(?)— $1\frac{7}{8}$. Bill, black; commissure and basal half of lower mandible, dilute brownish-lilac; iris, bister; tarsi and toes, uniform sepia.

1400, nest and eggs; valley of Weber River, June, 1869. [J. C. Olmsted.]

GEOTHYLPIS MACGILLIVRAYI.

McGillivray's Warbler.

Sylvia macgillivrayi, AUDUBON, Orn. Biog., V, 1839, 75, pl. 399, figs. 4, 5.

Geothlypis macgillivrayi, BAIRD, B. N. Am., 1858, 244, pl. 99, fig. 4; Catal., 1859, No. 173; Review, 1865, 227.—COOPER, Orn. Cal., 96.—COUES, Key, 1872, 107; Check List, 1873, No. 99.—B. B. & R., Hist. N. Am. B., I, 1874, 303, pl. xv, figs. 4, 5.—HENSHAW, 1875, 205.

Geothlypis philadelphia var. *macgillivrayi*, ALLEN, Bull. Mus. Comp. Zool., III, July, 1872, 175.—RIDGWAY, Am. Journ. Sci. & Arts, Dec., 1872, 459.

Geothlypis philadelphia. a. *macgillivrayi*, COUES, B. N.W., 1874, 75.

Representing the Maryland Yellow-throat in the mountains, this species was found in all the fertile cañons from the Sierra Nevada to the Uintahs. It inhabited the rank herbage near the streams, or the undergrowth of the thickets and aspen copses. We did not hear the song of this species, but were very familiar with its ordinary note, a strong *chip*, greatly resembling that of the Indigo-bird, or its western representative (*Cyanospiza cyanea* and *C. axæna*), the notes of both old and young being alike.

List of specimens.

175, ♀ *juv.*; West Humboldt Mountains, Nevada, September 9, 1867. $5\frac{1}{2}$ — $7\frac{7}{16}$ — $2\frac{7}{16}$ — $2\frac{1}{16}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{1}{4}$ — $1\frac{1}{4}$. Upper mandible, brownish-black; commissure and lower mandible, brownish lilaceous-white, the latter darker terminally; iris, hazel; tarsi and toes, brownish-white.

900, ♂ *juv.*; East Humboldt Mountains, Nevada (Camp 23), September 6, 1868. $5\frac{1}{2}$ — $7\frac{1}{2}$ —(?)— $2\frac{1}{16}$. Iris, grayish-sepia; tarsi and toes, pinkish-white.

906, ♂ *ad.*; East Humboldt Mountains, September 8, 1868. $5\frac{5}{16}$ — $7\frac{5}{8}$ —(?)— $2\frac{1}{2}$. Upper mandible, brownish-plumbeous, paler toward commissure; lower, paler brownish, lilaceous-white, darker terminally; iris, grayish-sepia; tarsi and toes, sepia-white.

1258, 1259, nests and eggs; Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nests about eighteen inches above the ground, in small briers or bushes, in weedy undergrowth near stream. (Parents of both shot.)

1307, nest and eggs (4); Parley's Park, June 27, 1869. Nest in bush, about a foot from ground.

1365, nest and eggs (3); Uintah Mountains, July 3, 1869. Nest among undergrowth of aspen-grove, in bush, a foot from ground.

1380, ♂ *juv.*; Uintah Mountains, July 7, 1869. $5\frac{3}{8}$ — $7\frac{7}{8}$. Bill, black, the commissure and basal two-thirds of lower mandible, deep lilaceous; iris, brown; tarsi, light lilaceous-brown; toes, darker.

1432, ♂ *juv.*; Parley's Park, July 19, 1869. $5\frac{1}{2}$ — $7\frac{3}{4}$. Upper mandible, black, the tomium white; lower, lilaceous-white, the terminal third dusky; iris, brown; tarsi, purplish-brown; toes, dark brown.

ICTERIA VIRENS.

Yellow-breasted Chat.

β. longicauda—Long-tailed Chat.

Icteria longicauda, LAWRENCE, ANN. LYE. N. H., N. Y., VI, April, 1853, 4.—BAIRD, B. N. AM., 1858, 249, pl. 34, fig. 2; Catal., 1859, No. 177; Review, 1865, 230.—COOPER, ORN. CAL., 98.

Icteria virens var. *longicauda*, COUES, Key, 1872, 108; Check List, 1873, No. 100a.—B. B. & R., Hist. N. AM. BIRDS, I, 1874, 309.—HENSCHAW, 1875, 206.

Icteria virens. b. longicauda, COUES, BIRDS N.W., 1874, 77.

The distribution of the Yellow-breasted Chat corresponds so nearly with that of the Maryland Yellow-throat, that they were generally to be found in the same thicket; but its vertical range is somewhat greater, it being frequently met with in the lower portion of the cañons. It was equally common in California and the Interior, and appeared to be in all respects the same bird as the eastern race. Its song during the breeding-season, like that of the eastern bird, is conspicuous from its extreme oddity, as well as for its power and variety; and we were often awakened at midnight by its notes, when, but for the yelping of the prowling Coyotes (*Canis latrans*), the stillness would have been unbroken. It was also observed that they were particularly musical on bright moonlight nights.

List of specimens.

23, nest and eggs (3); Sacramento, California, June 11, 1867. Nest in wild-rose brier, among undergrowth of oak-grove.

49, ♂ *ad.* (parent of No. 48); Sacramento, California, June 17, 1867. $7\frac{7}{8}$ — $10\frac{1}{8}$ — $3\frac{5}{16}$ — $2\frac{3}{4}$ — $\frac{5}{8}$ — $\frac{5}{16}$ — $3\frac{5}{8}$ — $1\frac{7}{8}$. Bill, entirely pure black; whole inside of mouth, intense black; iris, hazel; tarsi and toes, pale slate-blue.

165, ♀ *ad.*; West Humboldt Mountains (Camp 18), September 4, 1867. $7\frac{7}{8}$ — $10\frac{1}{2}$ — $3\frac{1}{2}$ — $2\frac{1}{16}$ — $\frac{5}{8}$ — 1 — $3\frac{1}{2}$ — $1\frac{1}{16}$. Upper mandible, horn-black, *tomium bluish-white*; lower mandible, *lilaceous-white*, point of gonys, black; iris, hazel; tarsi and toes, *plumbeous*, without any shade of blue.

168, ♂ *ad.*; West Humboldt Mountains, September 7, 1867. 8 — 10 — $3\frac{3}{8}$ — $2\frac{1}{16}$ — $\frac{9}{16}$ — $\frac{1}{16}$ — $3\frac{5}{16}$ — $1\frac{5}{8}$. Upper mandible, horn-black, *tomium bluish-white*; lower mandible, *pearl-white*, tip of gonys, black; tarsi and toes, *dull plumbeous*.

48, nest and eggs (3); Sacramento, June 17, 1867. Nest about three feet from ground, in thorny bush in dense thicket.

568, ♂ *ad.*; Truckee Reservation, May 15, 1868. $7\frac{7}{8}$ — 10 — $2\frac{3}{4}$. Bill, and whole interior of mouth, intense black; iris, blackish-brown; tarsi and toes, plumbeous.

MYIODIOCTES PUSILLUS.

Black-capped Yellow Warbler.

α. pusillus.

Muscicapa pusilla, WILSON, Am. Orn., III, 1811, 103, pl. 26, fig. 4.

Myiodiocytes pusillus, BONAP., Consp. Av., I, 1850, 315.—BAIRD, B. N. Am., 1858, 293 (part); Catal., 1859, No. 211; Review, 1865, 240 (part).—COOPER, Orn. Cal., 101.—COUES, Key, 1872, 109, fig. 50 (part); Check List, 1873, No. 102; B. N.W., 1874, 79 (part).—B. B. & R., Hist. N. Am. B., I, 1874, 317, pl. XVI, figs. 3, 4.—HENSHAW, 1875, 207.

Myiodiocytes pusillus var. *pusillus*, RIDGWAY, Am. Journ. Sci. & Arts, Dec., 1872, 457.

β. pileolata.

Myiodiocytes pusillus (part), AUCT.

Motacilla pileolata, PALLAS, Zoog. Rosso-As., I, 1811, 497.

Myiodiocytes pusillus var. *pileolata*, RIDGW., Am. Journ. Sci. & Arts, Dec., 1872, 457.—B. B. & R., Hist. N. Am. B., I, 1874, 319.

This sprightly Warbler was not seen at Sacramento, but in the valley of the Truckee, and in many suitable localities to the eastward, it was a rare summer resident, becoming exceedingly numerous in autumn. Its haunts during the breeding-season were much the same as those of the Summer Yellow-bird (*Dendroica aestiva*), but in September it was most abundant in the shrubbery along the cañon streams.

*List of specimens.**a. pusillus.*

203, ♂ *ad.*; West Humboldt Mountains, September 20, 1867. $4\frac{1}{8}$ — $6\frac{7}{8}$ — $2\frac{3}{8}$ — $1\frac{1}{6}$ — $\frac{3}{8}$ — $1\frac{1}{6}$ — $1\frac{1}{6}$ — $\frac{3}{8}$. Upper mandible, blackish horn-color edged with pale brownish; lower mandible, pale lilaceous-brown; iris, brown; tarsi and toes, yellowish-brown, the former strongly stained with yellow posteriorly.

880, ♂ *ad.*; East Humboldt Mountains, August 29, 1868. $5\frac{1}{8}$ — $6\frac{7}{8}$ —(?)— $1\frac{7}{8}$. Upper mandible, deep-black, tomium edged with lilaceous; lower, dilute-lilac, more whitish beneath; iris, sepia; tarsi and toes, dilute brownish-yellow, the tarsi more sulphury, the toes deeper.

887, ♂ *ad.*; East Humboldt Mountains, September 1, 1868. 5 — 7 —(?)— 2 . Upper mandible, blackish-olivaceous, tomium and lower mandible, dilute reddish lilaceous-brown; iris, sepia; tarsi and toes, pale olivaceous-yellow.

888, ♀ *ad.*; same locality and date. $4\frac{7}{8}$ — $6\frac{7}{8}$ — $1\frac{7}{8}$. Tarsi, pale purplish-brown; toes, olive-yellow.

1039, ♀ *ad.*; Antelope Island, Great Salt Lake, May 24, 1869. $4\frac{3}{4}$ — 7 . Upper mandible, brownish-black; lower, paler, basal two-thirds, pale wood-brown; iris, brown; tarsi and toes, dilute-brown.

β. pileolata.

120, ♂ *ad.*; valley of the Truckee, Nevada, August 6, 1867. 5 — $6\frac{5}{16}$ — $2\frac{1}{16}$. Bill, delicate pinkish horn-color, darker on the culmen; iris, hazel; tarsi and toes, dilute horn-color, stained with yellow.

166, ♀ *ad.*; valley of the Lower Humboldt, Nevada, September 5, 1867. $4\frac{3}{4}$ — $6\frac{1}{16}$ — $2\frac{1}{4}$. Bill, dark horn-color, lower mandible paler, dilute brown basally; iris, dark hazel; tarsi and toes, horn-color, latter yellowish beneath.

176, ♂ *ad.*; West Humboldt Mountains, September 9, 1867. $5\frac{1}{8}$ — $6\frac{3}{4}$ — $2\frac{5}{16}$. Bill, dark horn-color, paler beneath, the lower mandible inclining to lilaceous; iris, hazel; tarsi and toes, pale livid horn-color.

SETOPHAGA RUTICILLA.

American Redstart.

Muscicapa ruticilla, LINN., Syst. Nat., I, 1766, 326.

Setophaga ruticilla, SWAINS., Zool. Jour., III, 1827, 358.—BAIRD, Birds N. Am., 1858, 297; Catal., 1859, No. 217; Review, 1865, 256.—COUES, Key, 1872, 110; Check List, 1873, No. 104; Birds N.W., 1874, 81.—B. B. & R., Hist. N. Am. Birds, I, 1874, 319, pl. XVI, figs. 1, 5.—HENSLOW, 1875, 209.

This beautiful little bird was common in summer throughout the Wahsatch district, being one of several eastern species which have their westward range limited only by the commencement of the arid and treeless region of the Great Basin. It was abundant in the valleys and the lower portion of the cañons, but it did not extend far up into the mountains. A few were seen, in June, in the orchard of the "Church Rancho," on Antelope Island.

List of specimens.

1104, ♂ *ad.*; Antelope Island, Great Salt Lake, Utah, June 4, 1869. 5 $\frac{3}{8}$ —7 $\frac{3}{8}$. Bill, tarsi, and toes, deep black; iris, brown.

FAMILY HIRUNDINIDÆ—SWALLOWS.

PROGNE SUBIS.

Purple Martin.

Hirundo subis, LINN., Syst. Nat. (10th ed.), 1758, 192.

Progne subis, BAIRD, Review Am. B., 1865, 274.—B. B. & R., Hist. N. Am. B., I, 1874, 329, pl. XVI, figs. 7, 10.—HENSHAW, 1875, 213.

Hirundo purpurea, LINN., Syst. Nat. (12th ed.), 1766, 344.

Progne purpurea, BOIE, Isis, 1826, 971.—BAIRD, B. N. Am., 1858, 314; Catal., 1859, No. 231.—COOPER, Orn. Cal., 113.—COUES, Key, 1872, 114; Check List, 1873, No. 117; B. N.W., 1874, 91.

In the more thickly-populated districts of California, the handsome Purple Martin has become, as it has long since in the Eastern States, semi-domesticated, and almost entirely allured from its original haunts, the forests, by the superior advantages afforded by the surroundings of civilized man; but in the more scantily-settled Interior it was found still retaining its primitive habits. In the cities of San Francisco and Sacramento it was a very abundant species, while eastward of the Sierra Nevada it was rare, except among the aspen woods of the pine-region on certain of the higher mountain ranges. In Carson City it was not common, while in Virginia City but a single individual was seen, the date being June 18, 1868. Among the aspens of the Wahsatch, near Parley's Park, however, it was extremely abundant, and nested in the deserted or captured excavations of the Red-naped Woodpecker (*Sphyrapicus nuchalis*), most of which were bored into the trunks of living trees, these holes being freely shared with the White-bellied Swallows (*Tachycineta bicolor*).

As a rule, the Swallows, although true Oscines, are not considered singers; the present species, however, is at least one notable exception, since it is a warbler of high merit. Often have we reclined on some mossy or fern-covered bank beneath the aspens, and given respectful attention to the performance of a voluble male Purple Martin, as, with glossy violet head

thrust from the entrance to his nest, he entertained his mate with liquid warblings, varied by sweet cadences, his throat swelling and vibrating with the volume of his song. .

PETROCHELIDON LUNIFRONS.

Cliff Swallow.

Hirundo lunifrons, SAY, Long's Exped., II, 1823, 47.—BAIRD, B. N. Am., 1858, 309; Catal., 1859, No. 226.—COOPER, Orn. Cal., 104.

Petrochelidon lunifrons, SCLATER, Cat. Am. B., 1862, 40.—BAIRD, Review, 1865, 288.—COUES, Key, 1872, 114; Check List, 1873, No. 114; B. N.W., 1874, 88.—B. B. & R., Hist. N. Am. B., I, 1874, 334, pl. XVI, 13.—HENSHAW, 1875, 215.

The first land-bird observed after arriving at San Francisco, was this familiar and widely-diffused species, multitudes of which were observed to swarm about certain old buildings along with smaller numbers of Purple Martins (*Progne subis*). It was also noticed along every portion of our route across the Great Basin, especially in the vicinity of rivers or lakes, or at the settlements, whether large or small. The species may be considered the most abundant one of the family throughout the West, the next in order being the White-bellied and Rough-winged Swallows (*Tachycineta bicolor* and *Stelgidopteryx serripennis*). In localities most remote from settlements it of course built its nest only on the face of overhanging cliffs, but if near a settlement, any large building, as a barn or church, was almost sure to be selected; in either case, vast numbers congregating together and fixing their peculiar gourd-shaped nests side by side or upon each other, the same as in the east. It was not observed to build in any other way, and it is probable that the nesting-habits of this species are less variable than those of its kindred, excepting, perhaps, the common Barn Swallow (*Hirundo horreorum*), which differs chiefly in selecting caves or the interior of dwellings, and in being not gregarious.

List of specimens.

852, ♂ ad.; East Humboldt Mountains, Nevada, July 22, 1868. 6—12½—(?)—37. Bill, deep black; interior of mouth, pinkish-dusky; iris, dark claret-brown; tarsi and toes, dark horn-color.

871, egg (1); East Humboldt Mountains, August 25, 1868. Nest attached to side of a rafter, underneath roof of a shed, at rancho.

HIRUNDO ERYTHROGASTER.

Barn Swallow.*β. horreorum*.¹

Hirundo horreorum, BARTON, Frag. Nat. Hist. Penn'a, 1799, 17.—BAIRD, Birds N. Am., 1858, 308; Catal., 1859, No. 225; Review, 1865, 294.—COOPER, Orn. Cal., 103.—COUES, Key, 1872, 113, fig. 54; Check List, 1873, No. 111; Birds N.W., 1874, 85.—B. B. & R., Hist. N. Am. Birds, I, 1874, 339, pl. xvi, fig. 9.—HENSHAW, 1875, 217.

Although inhabiting the same localities as the Cliff Swallow, the present species was observed to be everywhere much less numerous. It was most common along the shore and on the islands of Pyramid Lake, where it nested among the tufa domes, each nest being attached to the ceiling of a cave among the rocks. In few instances were more than a single pair found in one cave. Several nests were also found in caverns among the limestone cliffs on the eastern side of the Ruby Mountains.

List of specimens.

408, ♂ *ad.*; valley of the Humboldt, September, 1867.
1451, nest and eggs (3); Parley's Park, Wahsatch Mountains, Utah, July 26, 1869.
Nest in stable, attached to rafter.

TACHY CINETA BICOLOR.

White-bellied Swallow.

Hirundo bicolor, VIEILLOT, Ois. Am. Sept., I, 1807, 61, pl. 31.—BAIRD, Birds N. Am., 1858, 310; Catal., 1859, No. 227; Review, 1865, 297.—COOPER, Orn. Cal., 106.—B. B. & R., Hist. N. Am. B., I, 1874, 344, pl. xvi, fig. 8.
Tachycineta bicolor, CABANIS, Mus. Hein., 1850, 48.—COUES, Key, 1872, 113; Check List, 1873, No. 112; Birds N.W., 1874, 86.—HENSHAW, 1875, 217.

This species and the Purple Martin were the only Swallows which were

¹ It is not yet satisfactorily determined whether the North American birds of this species differ constantly from South American examples to the extent that the two series may be separated as geographical races. In case they should not prove thus constantly different, the proper name of the North American bird is *H. erythrogaster*, Boddaert, while the following synonyms are to be added to the above citations:—

Hirundo erythrogaster, BODD., Tabl. Pl. enl. (724, fig. 1), 1783, 45 (Cayenne).—SCLATER, Catal. Am. Birds, 1861, 39 (Brazil).

Hirundo rufa, GM., Syst. Nat., I, 1788, 1018 (Pl. enl., 724, fig. 1).—BURM., Ueb., III, 148 (Brazil).

Hirundo cyanopyrrha, VIEILL., Nouv. Dict., XVI, 1817, 510.

confined strictly to wooded districts or to settlements, their distribution being much the same, except that, in the case of wooded localities, the former was most abundant in the river-valleys, while the latter occurred oftenest on the mountains. Among the cotton-woods of the Lower Truckee, near Pyramid Lake, in May, the White-bellied Swallow abounded more than elsewhere, and every knot-hole or other cavity among the trees seemed to have been taken possession of by a pair. They were then engaged in building their nests, and throughout the day would come to the doorway of the Reservation-house to pick up the feathers, or bits of rag or paper, scattered about the ground, after hurriedly seizing which they would fly with the article selected in a direct line to their nests. As they sat on the ground, they were beautiful little birds, and though they squatted somewhat awkwardly, on account of the smallness of their feet, they raised their heads so proudly, and glanced so sharply, yet timidly, about them, that they seemed graceful in their motions; while each movement caused the sunlight to glance from their burnished backs of lustrous steel-blue, with which the snowy white of their breasts contrasted so strikingly. Although the object picked up was most often a feather, it occasionally happened that one would take hold of a string, or a long shred of cloth, perhaps a yard or more in length, in which case, so conspicuous an object was certain to be seized upon by others, as the bearer labored to carry it to his nest, thus becoming the subject of quite a struggle, and much twittering.

The White-bellied Swallow was by no means confined to the wooded river-valleys, however, but it was equally abundant among the aspen woods, high up in the Wahsatch Mountains, at an altitude of 8,000 or 9,000 feet; it was also common in the Sacramento Valley, but a few feet above sea-level, among the oak trees of the plain. Neither is it invariably arboreal, for it seems to have become, in certain localities, more "civilized," like its cousin, the Purple Martin, and to have taken advantage of the abode of man in localities where there are no trees to accommodate them. Such was conspicuously the case at Carson City, where they were quite numerous, and built their nests under the eaves, behind the weather-boarding, or about the porches of dwellings or other buildings, and were quite familiar. The specimens in the collection were shot on the wing; and when one was

brought down the rest would exhibit great concern, circling about the victim, and uttering a plaintive twitter, as their suffering companion lay fluttering on the ground.

List of specimens.

473, ♀ *ad.*; Carson City, Nevada, March 30, 1868. 6—13— $4\frac{3}{4}$ — $4\frac{1}{8}$. Bill, deep black; interior of mouth, fleshy white; tarsi and toes, dark sepia, the latter pinkish beneath.

474, ♂ *ad.*; Carson City, Nevada, March 30, 1868. $5\frac{3}{4}$ —13— $4\frac{3}{4}$ — $4\frac{1}{16}$. Interior of mouth, pale yellow.

475, ♀ *ad.*; Carson City, Nevada, March 30, 1868. 6— $12\frac{5}{8}$ — $4\frac{5}{8}$ — $3\frac{1}{16}$. Interior of mouth, fleshy white.

748, eggs; Truckee Bottoms, May 19, 1868. Nest of straw and feathers, in deserted woodpecker's hole, in willow tree.

768, 769, eggs (3—4); Truckee Bottoms, May 29, 1868. Nests with same location, etc., as preceding.

1038, ♂ *ad.*; Salt Lake City, Utah, May 24, 1869. 6—13. Bill, black; iris, brown; feet, dark purplish-brown.

1416, eggs (3); Parley's Park, Wahsatch Mountains, Utah, July 16, 1869. Eggs in knot-hole in aspen-tree. Nest of feathers.

1484, ♂ *juv.*; Parley's Park, Wahsatch Mountains, Utah, July 30, 1869. $5\frac{3}{4}$ —12. Bill, black; rictus and interior of mouth, yellow; iris, brown; feet, dark livid sepia.

1485, ♂ *juv.*; Parley's Park, Wahsatch Mountains, Utah, July 30, 1869. $5\frac{5}{8}$ — $11\frac{3}{4}$. Feet, light pink.

TACHYCINETA THALASSINA.

Violet-green Swallow.

Hirundo thalassina, SWAINSON, Philos. Mag., I, 1827, 365.—BAIRD, Birds N. Am., 1858, 311; Catal., 1859, No. 228; Review, 1865, 299.—COOPER, Orn. Cal., 107.—B. B. & R., Hist. N. Am. Birds, I, 1874, 347, pl. XVI, fig. 11.

Tachycineta thalassina, CABANIS, Mus. Hein., 1850, 48.—COUES, Key, 1872, 113; Check List, 1873, No. 113; Birds N.W., 1874, 86.—HENSHAW, 1875, 217.

The beautiful Violet-green Swallow was first seen on the main island in Pyramid Lake, during the month of May. They were very abundant, and frequented chiefly the cliffs of calcareous tufa, where they were observed to enter the fissures of the rock to their nests within. In July we saw it again among the limestone walls of the eastern cañons of the Ruby Mountains, where it also nested in the crevices on the face of the cliffs, its associates being the White-throated Swift (*Panyptila saxatilis*), and Cliff Swallow (*Petrochelidon lunifrons*). Their nests were in almost every case

out of reach, only two of those that were found being accessible. Both were in horizontal fissures, scarcely large enough to admit the hand; the nest consisting of a flattened mass of sticks and straws, lined with feathers, like those of the Bank Swallows (*Cotyle* and *Stelgidopteryx*); one of them contained five young birds, but the other had apparently been tampered with in some way, since the parent was dead and her three eggs broken. The latter, like those of *T. bicolor* and the two species above mentioned, were pure white, without markings.

Although other observers, whose statements we do not in the least doubt, have described the habits of this bird as arboreal, like those of the White-bellied Swallow (*T. bicolor*) and the Purple Martin, we never found it so in any locality during our trip, it being everywhere a strictly saxicoline species, and an associate of *Panyptila saxatilis*, *Petrochelidon lunifrons*, and *Hirundo horreorum* rather than of the species named, and to be found only where precipitous rocks, affording suitable fissures, occurred. When on the wing the appearance of this lovely Swallow is very striking, and so unlike that of any other that it may be immediately distinguished. No other species resembles it except the *T. bicolor*, which is somewhat similar on account of the pure white lower parts; but a more attentive examination discovers the greater amount of white on the side of the head, and if the bird is viewed from above the plumage is seen to be tricolored—the rump rich intense violet, and the back lustrous green, the two colors being separated by a very conspicuous, broad, and apparently continuous, band of snowy white across the upper part of the rump, caused by the close approximation of the two white flank-patches.

This Swallow appeared to be a very silent species, but a few notes were heard, which called to mind the chirping of young Purple Martins, as heard in rainy weather.

List of specimens.

761, ♂ *ad.*; island in Pyramid Lake, Nevada, May 23, 1868. 5½—12¾(?)—4½. Bill, deep black; iris, burnt-umber; tarsi and toes, deep sepia.

847, ♀ *ad.*; East Humboldt Mountains, Nevada, July 20, 1868. 5½—11¾(?)—3½. Bill, deep black; interior of mouth, pale naples-yellow; iris, dark sepia; tarsi and toes, pale sepia-purple.

1070, ♀ *ad.*; Salt Lake City, Utah (City Creek Cañon), May 29, 1869.

COTYLE RIPARIA.

Bank Swallow.

Hirundo riparia, LINN., Syst. Nat., I, 1766, 344.

Cotyle riparia, BOIE, Isis, 1822, 550.—BAIRD, B. N. Am., 1858, 313; Catal., 1859, No. 229; Review, 1865, 319.—COOPER, Orn. Cal., 110.—COUES, Key, 1872, 114; Check List, 1873, No. 115; B. N.W., 1874, 90.—B. B. & R., Hist. N. Am. B., I, 1874, 353, pl. XVI, fig. 14.—HENSCHAW, 1875, 220.

The distribution of the common Bank Swallow was the same as that of the Rough-winged species, but it was everywhere less abundant. We never found it except when associated with the latter bird, and its habits and appearance seemed so much the same that it required somewhat close observation to distinguish them readily. The pure white lower parts, crossed by a dusky band across the breast, however, served as a good and unfailing mark by which to distinguish the present species, the lower parts of the Rough-winged Swallow being uniform mouse-color, growing gradually paler behind; while the flight of the Bank Swallow is swifter and more graceful, more like that of the species of *Tachycineta*, or true *Hirundo*.

While on the Truckee Reservation, in May, it was daily our custom to visit a small pond, situated in a broad meadow, for the purpose of studying the several species of Swallows which came there in large numbers every evening. Having taken our post of observation a little before sunset, a few individuals of the Rough-winged and White-bellied species were sure to be already there, having but a few rods to come from the ravines and cotton-woods near by. In a short time the Barn Swallows would make their appearance, gliding easily and swiftly over the surface of the water in pursuit of their insect-food. This soon became the most abundant species, excepting the Cliff Swallow, there having arrived in the meantime a very few individuals of the Violet-green and Bank Swallows, the latter being the least numerous of all. In one evening, as we sat on the grassy bank of this pond, we killed specimens of each of these species as they flew by us.

List of specimens.

1410, 1411, 1412, eggs. Valley of Weber River, June, 1869. [J. C. Olmstead.]

STELGIDOPTERYX SERRIPENNIS.

Rough-winged Swallow.

Hirundo serripennis, AUDUBON, Orn. Biog., IV, 1838, 593.

Cotyle serripennis, BONAP., Consp. Av., I, 1850, 342.—BAIRD, B. N. Am., 1858, 313; Catal., 1859, No. 230.—COOPER, Orn. Cal., 110.

Stelgidopteryx serripennis, BAIRD, Review Am. B., 1865, 316.—COUES, Key, 1872, 114; Check List, 1873, No. 116; B. N. W., 1874, 90.—B. B. & R., Hist. N. Am. B., I, 1874, 350, pl. XVI, fig. 12.—HENSHAW, 1875, 219.

Next to the Cliff and White-bellied Swallows, this was the most abundant species of the family. It was found only in the river-valleys, however, or in the lower ravines of the mountains, where, in company with the Bank Swallow, it excavated the earthy banks or took possession of holes dug by the Kingfisher (*Ceryle alcyon*). Its habits in general are quite similar to those of the species with which it so freely associates.

List of specimens.

534, ♀ *ad.*; Carson City, Nevada, April 25, 1868. $5\frac{1}{4}$ — $11\frac{1}{2}$ — $4\frac{1}{16}$ — $3\frac{1}{2}$. Bill, black; iris, bistre; tarsi and toes, dark horn-sepia.

1194, ♀ *ad.*; Salt Lake City, Utah, June 21, 1869. 5 — $11\frac{1}{2}$. Bill, deep black; iris, brown; feet, black.

1409, eggs; valley of Weber River, June, 1869. [J. C. Olmstead.]

FAMILY AMPELIDÆ—WAX-WINGS or CHATTERERS.

AMPELIS CEDRORUM.

Cedar-bird.

Bombycilla cedrorum, VIEILLLOT, Ois. Am. Sept., I, 1807, 88, pl. 57.

Ampelis cedrorum, SCLATER, Proc. Zool. Soc. Lond., 1856, 299.—BAIRD, Birds N. Am., 1858, 318; Catal., 1859, No. 233; Review, 1866, 407.—COOPER, Orn. Cal., 129.—COUES, Key, 1872, 115, pl. 56; Check List, 1873, 119; Birds N. W., 1874, 93.—B. B. & R., Hist. N. Am. Birds, I, 1874, 401, pl. XVIII, fig. 2.—HENSHAW, 1875, 229.

At only one locality did we meet with this elegant bird, and that was in the Upper Humboldt Valley, where it was common in September in the thickets along the streams flowing from the Clover Mountains. It was found in small companies, feeding on the fruit of a species of thorn-apple, or haw (*Crataegus rivularis*), which abounded in the thickets.

List of specimens.

- 915, ♂ *ad.*; Dearing's Ranch, Upper Humboldt Valley, September 10, 1868. $7\frac{7}{16}$ — $11\frac{1}{2}$ —(?)— $3\frac{1}{8}$. Bill, tarsi and toes, deep black; iris, purplish-brown.
 916, ♂ *ad.* Same date, locality, and remarks. $7\frac{1}{4}$ — $11\frac{3}{8}$ —(?)—3.

? PHÆNOPEPLA NITENS.

Shining Ptilogonys.

Ptilogonys nitens, SWAINSON, Anim. Menag., 1838, 285.

Cichlopsis nitens, BAIRD, Birds N. Am., 1858, 320, 923.

Phænopepla nitens, SCLATER, Proc. Zool. Soc. Lond., 1858, 543. —BAIRD, Cat. N. Am. Birds, 1859, No. 234; Review, 1866, 416.—COOPER, Orn. Cal., 131.—COUES, Key, 1872, 116; Check List, 1873, No. 120.—B. B. & R., Hist. N. Am. Birds, I, 1874, 405, pl. XVIII, figs. 3, 4.—HENSHAW, 1875, 229.

On several occasions we heard, among the cedar and piñon woods of the desert ranges in western Nevada, a note so similar to the prolonged, querulous, rattling call of Nuttall's Woodpecker (*Picus nuttalli*), that we entered the fact among our notes as evidence of the occurrence of that species eastward of the Sierra. We could never see the author of these notes, however, until, on the 27th of June, 1868, when exploring the Soda Lakes of the Carson Desert, we heard near by, in a ravine of that remarkable locality, the same familiar call and immediately started in search of the bird which produced it. It was soon discovered, perched upon the summit of a large grease-wood bush, but at our approach immediately took wing, and, notwithstanding every artifice and caution on our part, kept out of gunshot range, although enticing us on by frequent halts, during which it perched upon the topmost branch of the most prominent bushes. At each flight the peculiar rattling call referred to was uttered, so that the bird so long sought was at last before us. We were greatly surprised, however, to find that it was not the species we had supposed, but one we had never seen before.

Several shots were fired at it during the most favorable opportunities, but it escaped unscathed, and we were therefore unable to identify it with certainty. The appearance of the bird was so remarkable that we are able to refer it to only one known North American species—the *Phænopepla nitens*, with the female or young male of which it corresponded in plumage,

as well as could be ascertained from the distant view obtained. In its motionless attitude while perched, it called to mind *Oreoscoptes montanus*, which it closely resembled in size, general form, and dull, grayish colors; but when it flew its markings were more varied, *the wings presenting a large white patch, apparently on the primaries*. The manner of its flight was quite similar to that of the Mocking-bird (*Mimus polyglottus*), the wings and tail being widely spread; while the resemblance was still more striking from the white patch on the primaries. These characteristics correspond well with those of the female or young male of *Phænopepla nitens*, so that all circumstances taken into consideration render it extremely probable that this species is a rare summer inhabitant of the desert portions of western Nevada, a supposition strengthened by the fact that it was obtained in the southern portion of the State by Mr. Bischoff, the naturalist of Lieutenant Wheeler's expedition, in 1871.

FAMILY VIREONIDÆ—GREENLETS.

VIREOSYLVA GILVA.

Warbling Vireo, or Greenlet.

β. swainsoni.

Vireo swainsoni, BAIRD, B. N. Am., 1858, 336 (in text, *sub V. gilvus*).

Vireosylva swainsoni, BAIRD, Review Am B., 1866, 343.

Vireosylva gilva var. *swainsoni*, BAIRD, in Coop. B. Cal., I, 1870, 116.—B. B. & R., Hist. N. Am. B., I, 1874, 371.—HENSCHAW, 1875, 221.

Vireo gilvus var. *swainsoni*, COUES, Key, 1872, 121, fig. 64; Check List, 1873, No. 125a.

Vireo gilvus. b. *swainsoni*, COUES, B. N.W., 1874, 98.

Few, if any, of the western birds are more extensively distributed or more abundant than this Greenlet, for it abides in all fertile localities. Altitude makes no difference with it, since it is equally common among the willows or cotton-woods of the lowest valleys and the aspens just below the timber-line—the only condition required being, seemingly, the existence of deciduous trees or shrubbery. The food of this bird consists in summer chiefly of worms and other insects, but in the autumn it seems to subsist almost exclusively on the small bluish berries of a species of cornel (*Cornus pubescens*), which grows abundantly along the mountain streams.

The habits and notes of the western birds of this species are in all respects like those of the eastern ones.

List of specimens.

122, ♀ *ad.*; valley of the Truckee (Camp 12), August 6, 1867. $5\frac{3}{8}$ — $8\frac{1}{4}$ — $2\frac{11}{16}$ — $2\frac{1}{4}$ — $\frac{7}{16}$ — $\frac{5}{8}$ — $1\frac{5}{16}$ —1. Upper mandible, dark horn-color, commissure and lower mandible, lilaceous-white; iris, deep brown; tarsi and toes, light plumbeous-blue.

153, ♂ *ad.*; valley of the Humboldt (Camp 17), September 7, 1867. $5\frac{5}{16}$ — $8\frac{5}{16}$ — $2\frac{11}{16}$ — $2\frac{1}{4}$ — $\frac{3}{4}$ — $\frac{5}{8}$ — $1\frac{7}{8}$ — $1\frac{1}{16}$. Bill, black, commissure and basal two-thirds of lower mandible, more lilaceous; iris, hazel; tarsi and toes, plumbeous-blue, almost ultramarine.

177, ♀ *ad.*; West Humboldt Mountains (Camp 18), September 9, 1867. 5 — $7\frac{7}{8}$ — $2\frac{11}{16}$ — $2\frac{1}{4}$ — $\frac{3}{8}$ — $\frac{5}{8}$ — $1\frac{7}{8}$ — $1\frac{1}{16}$. Same remarks.

180, ♀ *ad.*; West Humboldt Mountains, September 10, 1867. $5\frac{1}{8}$ — 8 — $2\frac{9}{16}$ — $2\frac{1}{8}$ — $\frac{7}{16}$ — $\frac{9}{16}$ — $1\frac{3}{4}$ — $\frac{3}{4}$. Upper mandible, slaty horn-color, tomium edged with lilaceous; lower, pearl-whitish basally, then pale blue, the tip as dark as the upper mandible; iris, brown; tarsi and toes, light ashy-ultramarine.

187, ♂ *ad.*; West Humboldt Mountains, September 12, 1867. $5\frac{1}{2}$ — $8\frac{3}{8}$ — $2\frac{11}{16}$ — $2\frac{1}{4}$ — $\frac{3}{8}$ — $\frac{5}{8}$ — 2 — $1\frac{2}{16}$. Same remarks.

809, nest and eggs (2); Fort Churchill (Carson River), Nevada, June 24, 1868. Nest in cotton-wood copse, about four feet from ground. Female seen on nest.

878, ♀ *ad.*; East Humboldt Mountains, August 27, 1868. $5\frac{7}{16}$ — $8\frac{11}{16}$ —(?)— $2\frac{5}{16}$. Upper mandible, plumbeous-black with lilaceous edge; lower, plumbeous-blue with lilaceous glow basally, and darker terminally; iris, burnt-umber; tarsi and toes, delicate light ashy-blue.

879, (sex unknown); East Humboldt Mountains, August 27, 1868. $5\frac{3}{8}$ — $8\frac{1}{2}$ — $2\frac{5}{16}$. Same remarks.

1109, ♂ *ad.*; Antelope Island, Great Salt Lake, June 5, 1869. $5\frac{1}{2}$ — $8\frac{15}{16}$. Bill, dull blackish, the basal two-thirds of lower mandible lilaceous-bluish; iris, brown; tarsi and toes, plumbeous-blue.

1251, 1252, 1253, nests and eggs; Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nests all about four feet from ground, in aspens of a grove.

1317, nest and eggs; Parley's Park, June 27, 1867. Aspens.

1497, ♂ *ad.*; Parley's Park, August 10, 1869. $5\frac{7}{16}$ — $8\frac{11}{16}$. Upper mandible, blackish-brown; commissure and lower mandible, lilaceous; iris, vandyke-brown; tarsi and toes, fine light blue.

1504, ♂ *ad.*; Parley's Park, August 12, 1869. $5\frac{3}{8}$ — $8\frac{3}{4}$. Same remarks.

LANIVIREO CASSINI.

Cassin's Vireo.

Vireo cassini, XANTUS, Pr. Ac. Nat. Sci. Philad., 1858, 117.—BAIRD, B. N. Am., 1858, 340, pl. 78, fig. 1; Catal., 1859, No. 251.

Lanivireo solitarius var. *cassini*, B. B. & R., Hist. N. Am. B., I, 1874, 377, pl. xvii, fig. 9.

Vireo solitarius var. (?) *cassini*, HENSHAW, 1875, 223.

"*Vireo solitarius*" (part), COOPER, Orn. Cal., I, 1870, 117.

This rare and little-known species was noticed only in the cañons of

the West Humboldt Mountains, where it was not uncommon in September. Those found had probably migrated from the region to the northwestward, or from the Cascade Mountains or the country adjacent, since examples of *Zonotrichia coronata*, *Pipilo oregonus*, and *Melospiza guttata* were obtained at the same place.

List of specimens.

174, *ad.*; west slope of West Humboldt Mountains, Nevada, September 9, 1867. $5\frac{1}{2}$ —9— $2\frac{1}{6}$ — $2\frac{1}{2}$ — $\frac{1}{2}$ — $\frac{9}{16}$ — $2\frac{1}{6}$ —1. Upper mandible black, tomium bluish-lilac; lower mandible pure pale blue, the tip black; iris, hazel; tarsi and toes, fine ashy-ultramarine.

217, ♂ *ad.*; east slope of West Humboldt Mountains, September 25, 1867. $5\frac{1}{8}$ — $7\frac{1}{6}$ — $2\frac{3}{4}$ — $2\frac{3}{6}$ — $\frac{1}{2}$ — $\frac{3}{2}$ — $\frac{5}{8}$ — $2\frac{1}{8}$ — $\frac{1}{6}$. Same remarks.

LANIVIREO SOLITARIUS.

Solitary Vireo.

Muscicapa solitaria, WILSON, Am. Orn., II, 1810, 143, pl. 17, fig. 6.

Vireo solitarius, VIEILL., Nouv. Dict. Hist. Nat., XI, 1817.—BAIRD, B. N. Am., 1858, 340; Catal., 1859, No. 250.—COOPER, Orn. Cal., 117 (part).—COUES, Key, 1872, 66, 121; Check List, 1873, 127; B. N.W., 1874, 99.—HENSCHAW, 1875, 222.

Vircosylva solitaria, BAIRD, Review Am. B., 1866, 347.

Lanivireo solitarius, B. B. & R., Hist. N. Am. B., I, 1874, 373, pl. XVII, fig. 8.

This species was met with only during its autumnal migrations, when it seemed to be not uncommon in the month of September among the cañon thickets of the western slope of the Clover Mountains. A single specimen was also shot in a buffalo-berry thicket in Buena Vista Cañon, on the eastern slope of the West Humboldt Mountains, in September of the preceding year. It is still a question whether such individuals of this species were migrants from the higher portions of the mountains or from a more northern region; but that their migration was not vertical is most probable.

List of specimens.

920, ♂ *ad.*; head of Humboldt Valley (Camp 24), September 11, 1868. $5\frac{5}{16}$ —9—(?)— $2\frac{3}{8}$. Bill black, basal half of lower mandible, plumbeous-blue; iris, burnt-umber; tarsi and toes, fine ashy-blue.

LANIVIREO PLUMBEUS.

Lead-colored Vireo.

- Vireo plumbeus*, COUES, Pr. Ac. Nat. Sci. Philad., 1866, 73; Key, 1872, 122, fig. 6.
Vireosylva plumbea, BAIRD, Review Am. B., 1866, 349.—COOPER, Orn. Cal., 119.
Vireo solitarius var. *plumbeus*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 176.—
 COUES, Key, 1872, 351; Check List, 1873, No. 127a; B. N.W., 1874, 100.—
 HENSHAW, 1875, 224.
Lanivireo solitarius var. *plumbeus*, B. B. & R., Hist. N. Am. B., I, 1874, 377, pl. XVII, fig. 10.

The first locality where we met with this species in traveling eastward, was the eastern slope of the Ruby Mountains, where several other species characteristic of the Rocky Mountain district were first encountered, as *Helminthophaga virginice* and *Selasphorus platycercus*. It was rather common in July and August, its usual abode being the cedar and nut-pine groves on the lower slopes of the mountains, along with *Dendroica nigrescens* and *Helminthophaga virginice*, or in the brushwood of the ravines. Certain of its notes so closely resembled those of *Troglodytes parkmanni* that they were hard to distinguish.

List of specimens.

- 858, *ad.* (sex unknown); East Humboldt Mountains, Nevada, August 5, 1868. $5\frac{3}{4}$ — $9\frac{1}{2}$ —(?)— $2\frac{9}{16}$. Bill, plumbeous-black, basal half of lower mandible, plumbeous-blue; iris, dark bister; tarsi and toes, fine ashy-ultramarine.
 861, ♂ *ad.*; East Humboldt Mountains, August 5, 1868. (Specimen too badly mutilated for measuring.) Same remarks as to preceding.

VIREO PUSILLUS.

Least Vireo.

- Vireo pusillus*, COUES, Pr. Ac. Nat. Sci. Philad., 1866, 76.—BAIRD, Review Am. B., 1866, 360.—COOPER, Orn. Cal., 124.—COUES, Key, 1872, 124; Check List, 1873, No. 132.—B. B. & R., Hist. N. Am. B., I, 1874, 391, pl. XVII, fig. 14.—HENSHAW, 1875, 226.

This Vireo was the characteristic and most abundant species at Sacramento City, where it inhabited the dense willow copses along with *Empidonax pusillus*. It was not observed anywhere else during our explorations, and it is probable that its northward range in California is limited to the immediate vicinity of the Sacramento River. Its notes most resemble

those of *V. belli*, of the eastern prairie districts, but they are somewhat different. A single nest was found, the one in question being attached to a forked twig of a low bush among the undergrowth of a dense willow copse; it was about three feet from the ground, and contained no eggs.

List of specimens.

47, ♂ *ad.*; Sacramento, California, June 17, 1867. $5\frac{1}{4}$ —7— $2\frac{3}{16}$ — $1\frac{15}{16}$ — $\frac{7}{16}$ — $\frac{11}{16}$ — $2\frac{3}{16}$ — $1\frac{1}{4}$. Upper mandible, dusky; lower, brownish-white; iris, dark hazel; tarsi and toes, fine plumbeous-blue.

55, ♂ *ad.*; Sacramento, June 18, 1867. 5—7— $2\frac{3}{16}$ — $1\frac{7}{8}$ — $\frac{3}{8}$ — $\frac{11}{16}$ — $2\frac{1}{8}$ — $1\frac{1}{4}$. Bill, blackish-brown, commissure and lower mandible, pale brownish-lilaceous; iris, dark hazel; tarsi and toes, deep ashy-ultramarine.

FAMILY LANIIDÆ—SHRIKES or BUTCHER BIRDS.

COLLURIO BOREALIS.

Great Northern Shrike.

Lanius borealis, VIEILLOT, Ois. Am. Sept., I, 1807, 90, pl. 50.

Collyrio borealis, BAIRD, Birds N. Am., 1858, 324; Cat. N. Am. Birds, 1859, No. 236.

Collurio borealis, BAIRD, Review Am. B., 1866, 440.—COOPER, Orn. Cal., 137.—COUES, Key, 1872, 125, fig. 73; Check List, 1873, No. 134; Birds N.W., 1874, 101.—B. B. & R., Hist. N. Am. B., I, 1874, 415, pl. XIX, figs. 1, 2.—HENSLOW, 1875, 233.

During the winter of our residence at Carson City, several examples of this northern bird were seen, but it was at all times less common than the smaller species (*C. excubitoroides*), and seemed to be confined to the sheltered ravines among the foot-hills of the mountains. Those observed were perched on the summits of the willows along a stream, patiently surveying the surrounding fields and thickets, after the manner of other species of the genus.

List of specimens.

412, ♀ *ad.*; Carson City, Nevada, February 21, 1868. $10\frac{1}{4}$ — $14\frac{1}{4}$ — $4\frac{11}{16}$ — $3\frac{11}{16}$. Bill, dull black, lower mandible more ashy, duller basally; iris, umber; tarsi and toes, black.

455, ♀ *ad.*; Carson City, March 25, 1868. $10\frac{1}{2}$ — $14\frac{3}{8}$ — $4\frac{13}{16}$ — $3\frac{7}{8}$. Bill, nearly uniform dull slaty, lower mandible more ashy, paler basally; iris, burnt-umber; tarsi and toes, black.

COLLURIO LUDOVICIANUS.

Southern Shrike.

β. excubitoroides—White-rumped Shrike.

Lanius excubitoroides, SWAINSON, Fauna Bor. Am., II, 1831, 115, pl. 35.

Collyrio excubitoroides, BAIRD, B. N. Am., 1858, 527, pl. 75, fig. 2; Cat. N. Am. B., 1859, No. 238.

Collurio excubitoroides, BAIRD, Review Am. B., 1866, 445.—COOPER, Orn. Cal., 133.

Collurio ludovicianus var. *excubitoroides*, COUES, Key, 1872, 125; Check List, 1873, No. 135a.—B. B. & R., Hist. N. Am. B., I, 1874, 421, pl. XIX, fig. 3.—HENSLOW, 1875, 233.

Scarcely a locality was visited where this Shrike was not found, in greater or less plenty, its range including both the Sacramento Valley and the country eastward of the Sierra Nevada. At Sacramento it was frequently observed about the outskirts of the city, where it frequented the oak-groves and scattered trees, or the borders of the fields. In the Interior it was most common at those localities where there was a greater or less extent of willow thickets, with meadow-lands and sage-brush adjacent; but it was not rare on the higher mountain ranges, where it inhabited the mahogany and cedar groves in preference to other places. It was most usually observed perching quietly on the summit of a dead weed-stalk or prominent naked branch of a bush or tree, patiently watching for its food, or during its curious undulating flight, so strikingly characteristic of the species of this genus.

List of specimens.

156, ♂ *juv.*; valley of the Humboldt (Camp 17), September 2, 1867. $9-12\frac{1}{2}-3\frac{1}{6}-3\frac{5}{16}-1\frac{1}{16}-1-2\frac{7}{16}$. Bill, slaty horn-black, basal portion of lower mandible paler; iris, brown; tarsi and toes, black.

344, *juv.*; cotton-woods of Carson River, Fort Churchill, Nevada, December 6, 1867. $9\frac{1}{4}-12\frac{3}{8}-4-3\frac{1}{4}-1\frac{1}{16}-1-4-2\frac{3}{8}$. Bill deep black, lower mandible paler basally; iris, brown; tarsi and toes, black.

442, ♂ *ad.*; Carson City, Nevada, March 10, 1868. $9\frac{1}{8}-13-4\frac{1}{4}-3\frac{3}{8}$. Bill, pure black; iris, bister; tarsi and toes, black.

482, ♂ *ad.*; Carson, April 2, 1868. $9\frac{1}{4}-13\frac{1}{8}-4\frac{3}{16}-3\frac{7}{16}$. Same remarks.

524, ♂ *ad.*; Carson, April 24, 1868. $9-13-4\frac{1}{8}-3\frac{3}{8}$. Same remarks.

849, ♀ *ad.*; East Humboldt Mountains, Nevada, July 21, 1868. (Mahoganies; altitude 9,000 feet.) $9\frac{1}{8}-13-(?) -3\frac{7}{8}$. Bill, pure black; interior of mouth, livid fleshy-white; iris, bister; scutellæ of tarsi and toes, pure black, the interspaces dirty white.

889, *juv.*; East Humboldt Mountains, September 4, 1868. $8\frac{7}{8}-12\frac{1}{4}-(?) -3\frac{3}{16}$. Bill,

slate-black, pale purplish on base of lower mandible; iris, brown; tarsi and toes, black.

1044, nest and eggs (4); Salt Lake City, Utah, May 24, 1869. Nest in oak-bush, about four feet from ground.

1055, nest and eggs; Salt Lake City, Utah, May 27, 1869. Nest in sage-bush.

1095, nest and egg (1); Antelope Island, Great Salt Lake, June 4, 1869. Nest in sage-bush.

1129, nest and eggs (4); Antelope Island, Great Salt Lake, June 7, 1869. Nest in rose-bush in ravine.

1427, eggs (2); Promontory Point, Utah, June, 1869. [F. A. Clark.]

1521, eggs; Fremont's Island, Great Salt Lake, August 16, 1869. [F. A. Clark.]

FAMILY TANAGRIDÆ—TANAGERS.

PYRANGA LUDOVICIANA.

Western Tanager; "Louisiana Tanager."

Tanagra ludoviciana, WILSON, Am. Orn., III, 1811, 27, pl. 22, fig. 1.

Pyrranga ludoviciana, AUDUBON, Synop., 1839, 137.—BAIRD, B. N. Am., 1858, 303;

Catal. N. Am. B., 1859, No. 223.—COOPER, Orn. Cal., 145.—COUES, Key, 1872,

112; Check List, 1873, No. 110; B. N. W., 1874, 83.—B. B. & R., Hist. N. Am.

B., I, 1874, 437, pl. XX, figs. 3, 4.—HENSCHAW, 1875, 235.

This beautiful Tanager, one of the most brilliant of western birds, was found to be very generally distributed through the wooded portions of the route traversed, excepting in the valley portions of California, none having been seen from Sacramento eastward until well into the pine forest of the Sierra Nevada. It was first observed on the western portion of that range, at an altitude of about 5,000 feet, its song first attracting attention, from its extreme similarity to that of the Scarlet Tanager (*P. rubra*) of the East. From this point eastward it was met with in every wooded locality, being much more frequently seen on the mountains than along the rivers of the lower valleys. In May, soon after their arrival from the south, these Tanagers were very numerous in the rich valley of the Truckee, near Pyramid Lake, where they were observed to feed chiefly on the buds of the grease-wood bushes (*Obione confertifolia*), in company with the Black-headed Grosbeak and Bullock's Oriole. Very few were seen later in the season, however, nearly all having departed for the mountain woods. During July and August it was a common species on the eastern slope of the Ruby Mountains, where it inhabited the groves

¹ Geographically inappropriate.

of cedar, nut-pine, and mountain mahogany; while from June to August it was an abundant bird in the pine forests of the Wahsatch and Uintah ranges. In September they were noticed to feed extensively on the fruit of the *Crataegus rivularis*, in company with the Red-shafted Flicker, Gairdner's Woodpecker, the Cedar-bird, and the Cross-bills (*Loxia americana* and *L. leucoptera*).

In its habits this species is almost a perfect counterpart of the eastern *P. rubra*, while its song is scarcely distinguishable, being merely of a slightly finer, or more silvery, tone; but the ordinary note, sounding like *plit'-it*, is very different from the *chip'-a-rā, ree* of the eastern species. The note of the young is quite peculiar, being a low whistle, something like the complaining call of the Eastern Blue-bird (*Sialia sialis*), but louder.

List of specimens.

565, ♂ *ad.*; Truckee Reservation, May 15, 1868. $7\frac{3}{8}$ — $11\frac{9}{16}$ — $3\frac{1}{4}$. Bill, dilute wax-yellow, with a greenish cast, except along commissure, darker greenish-brown toward the culmen, which is dark sepia, with the terminal half sharply, black; iris, grayish-brown; tarsi and toes, pale plumbeous, the latter whitish beneath.

838, ♀ *ad.*; East Humboldt Mountains, Nevada, July 13, 1868. (Mahogany woods.) $7\frac{3}{8}$ — $11\frac{3}{4}$ —(?)— $3\frac{1}{8}$. Upper mandible, dark greenish-sepia, the tomium and lower mandible, light greenish-yellow; iris, burnt-umber; tarsi and toes, plumbeous.

1283, nest and eggs (3); Parley's Park, Wahsatch Mountains, Utah, June 25, 1869. Nest on extreme end of horizontal branch of pine tree in grove.

1376, nest and eggs (2); Uintah Mountains, Utah, July 7, 1869. Nest on mountain-mahogany tree, near end of horizontal branch.

FAMILY FRINGILLIDÆ—FINCHES, SPARROWS, and BUNTINGS.

LOXIA AMERICANA.

Common Crossbill.

Curvirostra americana, WILSON, Am. Orn., IV, 1811, 44, pl. 31, figs. 1, 2.—BAIRD, B. N. Am., 1858, 426; Catal., 1859, No. 318.—COOPER, Orn. Cal., I, 148.

Loxia americana, BONAP., Comp. & Geog. List, 1838, 38.

Loxia curvirostra var. *americana*, COUES, Key, 1872, 351; Check List, 1873, No. 143; B. N.W., 1874, 109.—B. B. & R., Hist. N. Am. B., I, 1874, 484, pl. xxiii, figs. 1, 4.—HENSHAW, 1875, 248.

The Common Crossbill may breed on the higher portions of the loftier ranges in the Interior, but none were seen by us until toward the last of

August, when they became gradually common in the lower cañons of the East Humboldt Mountains. They were usually observed in small flocks among the willows or aspens, and uttered frequently, especially while on the wing, a soft whistling note, somewhat like *chih, chih, chih*, quite unlike the note of any other bird of our acquaintance.

List of specimens.

884, ♂ *ad.*; Willows, foot of East Humboldt Mountains (Camp 21), August 29, 1868. 6—10½—(?)—27. Bill, uniform horn-sepia; tarsi and toes, grayish sepia; iris, raw-umber.

[This specimen is remarkable for its unusually small bill.]

LOXIA LEUCOPTERA.

White-winged Crossbill.

Loxia leucoptera, GMELIN, Syst. Nat., I, 1788, 844 —B. B. & R., Hist. N. Am. Birds, I, 1874, 488, pl. XXIII, figs. 2, 3.—COUES, Check List, 1873, No. 142; Birds N.W., 1874, 110.

Curvirostra leucoptera, WILSON, Am. Orn., IV, 1811, 48, pl. 31, fig. 3.—BAIRD, Birds N. Am., 1858, 427; Cat. N. Am. B., 1859, No. 319.—COOPER, Orn. Cal., I, 149.—COUES, Key, 1872, 129, fig. 76.

On the 12th of August, a male of what was probably this species, but in very unusually brilliant plumage, was seen among the cedars on the eastern slope of the Ruby Mountains. It is therefore probable that this species breeds sparingly on the higher portion of the loftier ranges.¹ In September it was common in the lower cañons on the eastern slope of the East Humboldt Mountains, where it inhabited the same localities as the more rare *L. americana*. The note of this Crossbill is a plaintive *week*, very different from the hurried *chih, chih* of the other species, or, indeed, the note of any other bird known to us.

¹ When first seen, this individual called instantly to mind the adult male of *Pyrranga erythromelana*, of Mexico and Central America, so rich and uniform was the bright carmine-red of the plumage, while the pure white wing-bands contrasted conspicuously with the deep black of the wings and tail. It is scarcely possible, however, that it could have been this southern Tanager, which has not yet been taken near our southern border. It should be considered, however, that a specimen of *Psaltiriparus melanotis*, also a Mexican bird, not before detected in the United States, was observed in the same locality at nearly the same time.

CARPODACUS CASSINI.

Cassin's Purple Finch.

Carpodacus cassini, BAIRD, Pr. Ac. Nat. Sci. Philad., 1854, 119; B. N. Am., 1858, 414; Catal., 1859, No. 307.—COOPER, Orn. Cal., I, 155.—COUES, Key, 1872, 128; Check List, 1872, No. 140; B. N.W., 1874, 106.—B. B. & R., Hist. N. Am. B., I, 1874, 460, pl. XXI, figs. 4, 5.—HENSHAW, 1875, 240.

Although this Finch was observed to be essentially pinicoline, it was occasionally found among deciduous trees when such occurred in the immediate vicinity of coniferous forests, this being notably the case during the breeding-season. In the pine forests of the Sierra Nevada, near Carson City, these birds were first observed on the 21st of March, at which date large flocks were found among the trees. They continued to increase in abundance until about the middle of April, when they gradually dispersed through the forest, the greater number going higher up the mountains. At the time of their arrival they were in full song, and continued so during the season, and it was noticed that the young males, in the plumage of the females (possibly the latter also), sang almost if not quite as vigorously and sweetly as those in the adult livery. In certain localities on the eastern slope of the Ruby Mountains they were quite abundant on several occasions, the flocks consisting chiefly of young-of-the-year, which, with their parents, had apparently come from the higher coniferous woods near the summits of the range, since no nests were found among the cedar and piñon groves of the lower slopes. In the pine-belt of the Wahsatch and Uintah Mountains they were abundant from May to August, during the whole of which time they were nesting. Most of the nests found were among the aspens and narrow-leaved cotton-woods (*Populus tremuloides* and *P. angustifolia*) of the higher portions of the ravines, where these trees replaced the conifers.

The song of this species is clear and sweet, and is even superior to that of the Eastern Purple Finch (*C. purpureus*), which, however, it greatly resembles. Many passages are loud and clear, and so much like the notes of certain Vireones that we were several times led by them in search of a new Greenlet. Other portions of its song, which was greatly varied, were sweet, soft warblings, and tender, whistling calls.

List of specimens.

446, ♂ ad.; Carson City, Nevada, March 21, 1868. 6 $\frac{5}{8}$ —11—3 $\frac{1}{8}$ $\frac{1}{8}$ —3 $\frac{1}{8}$ $\frac{1}{8}$. Bill, uni-

form horn-color, with delicate lilaceous tinge; iris, burnt-umber; tarsi and toes, dark horn-sepia.

447, ♂ *ad.*; Carson City, Nevada, March 21, 1868. $6\frac{1}{8}$ — $11\frac{1}{8}$ — $3\frac{3}{4}$ — $3\frac{1}{8}$. Same remarks. Bill, lilaceous-sepia.

463, ♂ *ad.*; Carson, March 28, 1868. $6\frac{1}{16}$ — $11\frac{1}{4}$ — $3\frac{3}{4}$ — $3\frac{1}{4}$. Same remarks.

464, ♂ *ad.*; Carson, March 28, 1868. $6\frac{1}{16}$ — $11\frac{1}{4}$ — $3\frac{1}{16}$ — $3\frac{1}{4}$. Same remarks.

465, ♀ *ad.*; Carson, March 28, 1868. $6\frac{5}{8}$ —11— $3\frac{3}{4}$ —3. Same remarks.

466, ♀ *ad.*; Carson, March 28, 1868. $6\frac{1}{16}$ — $11\frac{1}{2}$ — $3\frac{1}{16}$ — $3\frac{1}{8}$. Same remarks.

494, ♂ *ad.*; Carson, April 4, 1868. $6\frac{3}{4}$ —11— $3\frac{7}{8}$ — $3\frac{1}{8}$. Same remarks.

865, ♂ *ad.*; Camp 19, East Humboldt Mountains, August 10, 1868. $7\frac{1}{8}$ — $11\frac{7}{8}$ —(?)— $3\frac{3}{16}$. Same remarks.

1182, nest and eggs (5); City Creek Cañon, Utah, June 18, 1869. Nest in box-elder bush, about 7,000 feet altitude.

1239, nest and eggs (4); Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nest in top of cotton-wood tree by cañon stream.

1240, nest and eggs (4); Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nest in top of aspen.

1270, ♀ *ad.*; Parley's Park, June 23, 1869. $6\frac{5}{8}$ —11. Bill, umber-drab, paler and more lilaceous basally and beneath; iris, brown; tarsi and toes, horn-color.

1329, nest and eggs (2); Parley's Park, June 28, 1869. Nest in aspen along stream.

1342, 1343, nests and eggs (3, 1); Parley's Park, June 28, 1869. Nests in aspens near stream.

1347, ♂ *ad.*; Parley's Park, June 28, 1869. 7— $11\frac{3}{4}$.

1433, ♂ *ad.*; Parley's Park, July 19, 1869. $6\frac{1}{2}$ — $11\frac{1}{4}$. Bill, pinkish-drab, becoming gradually paler on commissure and on lower mandible, there fading basally into dull whitish; rictus, pale yellow; iris, brown; tarsi and toes, purplish-sepia.

1434, nest; Parley's Park, July 19, 1869. Nest on horizontal branch of cotton-wood tree.

1517, ♂ *juv.*; Parley's Park, August 16, 1869. $6\frac{3}{4}$ — $11\frac{3}{8}$.

1518, ♀ *juv.*; Parley's Park, August 16, 1869. $6\frac{3}{8}$ — $10\frac{3}{8}$.

CARPODACUS FRONTALIS.

House Finch; "Red-head Linnet."

(*Wé-to-wich* of the Paiutes.)

α. frontalis.

Fringilla frontalis, SAY, Long's Exped., II, 1824, 40.

Carpodacus frontalis, GRAY, Gen. Birds, 1844-'49.—BAIRD, Birds N. Am., 1858, 415; Catal., 1859, No. 308.—COOPER, Orn. Cal., I, 156.—COUES, Key, 1872, 129; Check List, 1873, No. 141.—HENSCHAW, 1875, 241.

Carpodacus frontalis var. *frontalis*, RIDGW., Am. Journ. Sci. and Arts, Jan., 1873, 40.—B. B. & R., Hist. N. Am. B., I, 1874, 466, pl. XXI, figs. 3, 6.

Carpodacus frontalis. a. frontalis, COUES, B. N.W., 1874, 107.

The "Red-head Linnet" was the most familiar and one of the most

abundant of the birds found at Sacramento, where it frequented the shade-trees of the streets or the door-yards and gardens in the city in preference to groves in the suburbs or country. In its abundance and semi-domestic habits it thus reminds one somewhat of the European House Sparrow (*Pyrgita domestica*), but, unlike that bird, has endeared itself to its protectors by the possession of a sweet song and brilliant plumage. It is greatly prized as a cage-bird, and justly, too, for while its plumage is equally pretty, its notes excel those of the Canary in sweetness, while at the same time they are fully equal in vivacity and power. All the notes are decidedly Canary-like, the usual utterance being a soft, musical *tweet*. The song itself differs from that of the Canary chiefly in being more tender, less piercing, and interspersed with more varied warblings. The males were observed to be shyer than the females, their wariness being perhaps explained by the fact that several were noticed which had their tails clipped, showing that they had once been in captivity. When their nests were disturbed, however, the males exhibited as much concern as the females, and kept up a lively *chinking* from an adjoining tree.

Few birds are more variable as to the choice of a location for their nests than the present species, since it adapts itself readily to any sort of a place where safety is assured. At Sacramento, they usually built among the small oak trees, generally near the extremity of a horizontal branch, but one nest was placed inside the pendulous, basket-like structure of a "Hanging-bird" (*Icterus bullocki*); in the narrow gorge of the Truckee River, where that stream breaks through the Virginia Mountains, one was found inside the abandoned nest of a Cliff Swallow; along the eastern shore of Pyramid Lake numerous nests were found among the rocks, placed on shelves in the interior of caves, along with those of the Barn Swallow and Say's Pewee, or in crevices on the outside of the tufa-domes, while in the neighboring valley of the Truckee, where there was an abundance of cotton-wood timber, their nests were nearly all built in the low grease-wood bushes. On Antelope Island, in the Great Salt Lake, they preferred the sage-brush, like the Black-throated and Brewer's Sparrows; in City Creek Cañon, near Salt Lake City, one was found in a mountain-mahogany tree, while in Parley's Park another was in a cotton-wood tree along a stream. At all the

towns or larger settlements, however, a large proportion of the individuals of this species have abandoned such nesting-places as those described above, and resorted to the buildings, where "odd nooks and crannies" afforded superior attractions.

Although chiefly a bird of the lower valleys, this species was sometimes found in the lower cañons of the mountains, it being common in Buena Vista Cañon, in the West Humboldt range, in September, having apparently nested among the ruined adobe houses of the deserted town. In City Creek Cañon, near Salt Lake City, several nests were found at an altitude of about 1,800 feet above the level of the mesa, or at the lower limit to the breeding-range of *C. cassini*, a single nest of which was found on a tree adjoining one in which was a nest of the present bird. In Parley's Park it was likewise found, but in small numbers, and only on the floor of the park, the *C. cassini* inhabiting the upper portion of the streams.

List of specimens.

- 2, 3, 4, nests and eggs; nests in oak-grove. Sacramento, California, June 6, 1867.
 28, 29, nests and eggs; nests in oak-grove. Sacramento, California, June 11, 1867.
 34, ♂ *ad.*; Sacramento, June 12, 1867. $5\frac{1}{6}$ — $9\frac{2}{6}$ — $3\frac{1}{3}$ — $2\frac{1}{2}$.
 41, nest and eggs (5); nest in oak-grove. Sacramento, California, June 13, 1867.
 52, nest and eggs; nest in oak-grove. Sacramento, California, June 18, 1867.
 57, nest and eggs; nest in oak-grove. Sacramento, California, June 19, 1867.
 73, nest and eggs (4); nest in oak-grove. Sacramento, California, June 20, 1867.
 765, nest and eggs (5); nest in niche in rocks. Tufa domes, Pyramid Lake, Nevada, May 25, 1868.
 589, ♂ *ad.*; Truckee Reservation, May 15, 1868. $6\frac{1}{6}$ — $9\frac{1}{8}$ — $2\frac{5}{8}$. Upper mandible, brownish horn-color, edged with pale rosy; lower mandible, paler and more pinkish than the upper, with wider rosy edge; iris, dark brown; tarsi and toes, pale brown.
 774, nest and eggs (5); nest in grease-wood bush. Truckee Reservation, Nevada, May 31, 1868.
 780, 781, nests and eggs (5); nest in grease-wood bush. Truckee Reservation, Nevada, June 2, 1868.
 805, nest and eggs (4); nest in grease-wood bush. Truckee Valley, Nevada, June 6, 1868.
 806, nest and eggs (5); nest in old one of Cliff-Swallow, on face of a precipice. Truckee Valley, Nevada, June 6, 1868.
 1063, nests and eggs (4); near Salt Lake City, May 29, 1869. Nest on mountain-mahogany bush, 1,800 feet above the level of the city!
 1076, ♂ *ad.*; Salt Lake City, Utah, June 1, 1869. $6\frac{1}{3}$ — $9\frac{1}{6}$. Bill, lilaceous-brown, darker above; iris, brown; legs and feet, sepia.
 1092, nest; Antelope Island, Great-Salt Lake, June 4, 1869. Sage-bush.

1093, ♂ *ad.*; Antelope Island, Great Salt Lake, June 4, 1869. 6 $\frac{1}{4}$ —9 $\frac{7}{8}$. Same remarks as to 1076.

1114, nest; Antelope Island, June 5, 1869. Sage-bush.

1131, ♂ *ad.*; Antelope Island, June 7, 1869.

1140, nest; Antelope Island, June 8, 1869. Sage-bush.

1183, nest and eggs; Salt Lake City, June 18, 1869. Sage-bush, 1,800 feet above camp (altitude above 7,000 feet).

1191, nest and eggs (2); Salt Lake City, June 21, 1869. Mountain-mahogany, 1,800 feet above camp.

1193, ♀ *ad.*; Salt Lake City, June 21, 1869. 6—10. Bill, purplish-drab, lower mandible, more lilaceous basally beneath; iris, brown; tarsi and toes, deep brown.

1238, nest and eggs (2); Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nest in cotton-wood tree along stream.

LEUCOSTICTE LITTORALIS.

Hepburn's Leucosticte.

Leucosticte littoralis, BAIRD, Trans. Chicago Acad. Sci., I, ii, 1869, 318, pl. 28, fig. 1.—COOPER, Orn. Cal., I, 162.

Leucosticte tephrocotis var. *littoralis*, COUES, Key, 1872, 130.—B. B. & R., Hist. N. Am. Birds, I, 1874, 507, pl. XXIII, fig. 6.—RIDGWAY, Bull. Geol. & Geog. Expl. Ter., No. 2, sec. ser., 1875, 74.

Leucosticte tephrocotis. b. *griseinucha*, COUES, Birds N.W., 1874, 111 (part).

A single flock of this species was seen on the 5th of January in the outskirts of Virginia City, Nevada. The flock comprised perhaps fifty individuals, all busily engaged in gleaning from the surface of the snow, flitting restlessly over one another, in the manner of Lapland Longspurs, at the same time uttering a twittering note.

CHRYSOMITRIS TRISTIS.

Common Goldfinch, Lettuce Bird, etc.

Fringilla tristis, LINN., Syst. Nat., I, 1766, 320.

Chrysomitris tristis, BONAP., Comp. & Geog. List, 1838, 33.—BAIRD, B. N. Am., 1858, 421; Catal., 1859, No. 313.—COOPER, Orn. Cal., I, 167.—COUES, Key, 1872, 131, pl. 3, figs. 7, 8, 9, 10; Check List, 1873, No. 149; B. N.W., 1874, 116.—B. B. & R., Hist. N. Am. B., II, 1874, 471, pl. XXII, figs. 7, 8.—HENSCHAW, 1875, 243.

Few birds were so abundant at Sacramento as this widely-distributed species; but eastward of the Sierra Nevada it was found to be extremely

rare at all places along our route. Its great abundance at Sacramento may possibly be explained by the extensive and luxuriant growth of thistles which occupied many waste-places in the suburbs, the seeds of these plants supplying them, in season, with a plentiful supply of food.

List of specimens.

5, 6, 7, nests and eggs; Sacramento City, California, June 6, 1867. Nests in an oak-grove, resting on horizontal branches of the small trees.

54, nest and eggs; Sacramento City, California, June 18, 1867. Nest on horizontal branch of small cotton-wood, in copse.

81, nest and eggs; Sacramento, June 24, 1867.

87, nest and eggs; Sacramento, June 28, 1867.

93, nest and eggs; Sacramento, June 29, 1867. Nest in small cotton-wood, in copse.

778, ♂ *ad.*; Truckee Reservation, Nevada, May 31, 1868. $5\frac{7}{8}$ — $9\frac{1}{4}$ —(?)— $2\frac{1}{2}$. Bill, orange-yellow, the point darker; iris, very dark sepia; tarsi and toes, dilute reddish-sepia.

1369, nest and eggs (3); Pack's Cañon, Uintah Mountains, Utah, July 4, 1869. Nest in thorn-apple shrub, by stream.

CHRYSOMITRIS PSALTRIA.

Green-backed Goldfinch; "Arkansas Goldfinch."¹

Fringilla psaltria, SAY, Long's Exped., II, 1823, 40.

Chrysomitris psaltria, BONAP., Comp. and Geog. List, 1838, 33.—BAIRD, B. N. Am., 1858, 422; Catal., 1859, No. 314.—COOPER, Orn. Cal., I, 168.—COUES, Key, 1872, 132; Check List, 1873, No. 151.—HENSHAW, 1875, 244.

Chrysomitris psaltria var. *psaltria*, RIDGWAY, Am. Jour. Arts and Sci., Dec., 1872, 454.—B. B. & R., Hist. N. Am. B., II, 1874, 474, pl. xxii, figs. 9, 10.

Chrysomitris psaltria. a. *psaltria*, COUES, B. N.W., 1874, 116.

This species we found only among the Wahsatch and Uintah Mountains, where it was not common, and usually found associated in small numbers with the large flocks of *C. pinus*. Attention was first called to it by its extraordinary note, a plaintive, mellow whistle, difficult to describe, but totally unlike that of any other bird we have heard. When the bird takes flight this note is changed to a simple piping *cheer*, in a fine, high key, and somewhat resembling the anxious note uttered by the male Red-winged Black-bird (*Agelaius phœniceus*) when its nest is disturbed.

¹Geographically inappropriate.

Last of specimens.

1189, ♂ *ad.*; Salt Lake City, Utah (City Creek Cañon), June 19, 1869. 4½—8. Bill, purplish-brown, the culmen nearly black, the lower mandible inclining to wax-brown; iris, brown; tarsi and toes, sepia-brown.

1224, nest and egg (1); Parley's Park, Wahsatch Mountains, June 22, 1869. Nest in top of willow-bush along stream.

CHRYSOMITRIS LAWRENCII.

Lawrence's Goldfinch.

Carduelis lawrencii, CASSIN, Pr. Ac. Nat. Sci. Philad., 1850, 105, pl. v.

Chrysomitris lawrencii, BONAP., Comp. Rend., 1853, 913.—BAIRD, B. N. Am., 1858, 424; Catal., 1859, No. 316.—COOPER, Orn. Cal., I, 171.—COUES, Key, 1872, 132; Check List, 1873, No. 150.—B. B. & R., Hist. N. Am. B., II, 1874, 478, pl. XXII, figs. 14, 15.

This beautiful little Goldfinch was observed only among the western foot-hills of the Sierra Nevada, where we had only occasional glimpses at it, just sufficient to identify the species, and passed so rapidly through its range that no opportunity was afforded to study its habits. It was common among the trees by the roadside, and uttered very pleasant and quite peculiar notes.

CHRYSOMITRIS PINUS.

Pine Goldfinch.

Fringilla pinus, WILSON, Am. Orn., II, 1810, 133, pl. 17, fig. 1.

Chrysomitris pinus, BONAP., Comp. & Geog. List, 1838, 33.—BAIRD, B. N. Am., 1858, 425; Catal., 1859, No. 317.—COOPER, Orn. Cal., I, 172.—COUES, Key, 1872, 131, pl. 3, figs. 11, 12; Check List, 1873, No. 148; B. N. W., 1874, 115.—B. B. & R., Hist. N. Am. B., II, 1874, 480, pl. XXII, fig. 16.—HENSHAW, 1875, 246.

The range of the Pine Goldfinch was strikingly similar to that of Cassin's Purple Finch, the two being almost invariably found in the same localities, whether during their migrations or in the nesting-season. In summer it was abundant in all the pine forests, from the Sierra Nevada to the Uintahs, and like the bird above mentioned occurred also among the aspen copses which usually replaced the conifers at the head of the cañons. The species was more or less gregarious, even in midsummer, and although their nests were extremely scattered, the birds themselves were seldom seen except in flocks. They had no song, but uttered frequently a peculiar screeching

note, sounding like *sweer*, very unlike that of any other bird, except the *Empidonax obscurus*; and when a flock suddenly took flight, they all joined in a more rattling note.

Besides the nest described below, another was found, in an aspen bush, but it was abandoned by the owners before any eggs were laid.

List of specimens.

892, ♂ *juv.*; East Humboldt Mountains, Nevada, September 5, 1868. 5½—9. Bill, ashy horn-color; iris, burnt-umber; tarsi and toes, dark purplish-brown.

913, ♂ *ad.*; East Humboldt Mountains, Nevada, September 8, 1868. 5—9. Bill, purplish-plumbeous, paler basally; iris, grayish-sepia; tarsi and toes, sepia.

1241, nest and egg (1); Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nest near extremity of horizontal arm of fir-tree, about fifteen feet from ground.

1519, ♂ *juv.*; 4½—9. 1520, ♀ *juv.*; 4½—8½. Parley's Park, August 10, 1868. Bill, purplish-plumbeous, paler basally; iris, sepia; tarsi and toes, plumbeous sepia-black.

PLECTROPHANES LAPPONICUS.

Lapland Longspur.

Fringilla lapponica, LINN., Syst. Nat., I, 1766, 317.

Plectrophanes lapponicus, SELBY, Linn. Trans., XV, 126, pl. 1.—BAIRD, B. N. Am., 1858, 433; Cat. N. Am. B., 1859, No. 326.—COOPER, Orn. Cal., I, 178.—COUES, Key, 1872, 133, fig. 81; Check List, 1873, No. 153; B. N.W., 1874, 120.—B. B. & R., Hist. N. Am. B., I, 1874, 515, pl. XXIV, fig. 7.

During the more severe portion of winter, individuals of this species were frequently detected among the large flocks of Horned Larks (*Eremophila alpestris*) around Carson City. They were recognized by their peculiar and unmistakable notes.

PASSERCULUS SANDVICHENSIS.

Savannah Sparrow.

α. alaudinus.

Passerculus alaudinus, BONAP., Comp. Rend., XXXVII, 1853, 918.—BAIRD, B. N. Am., 1858, 446; Cat. N. Am. B., 1859, No. 335.—COOPER, Orn. Cal., I, 1870, 181.

Passerculus savanna var. *alaudinus*, B. B. & R., Hist. N. Am. Birds, I, 1874, pl. XXIV, fig. 11.—HENSHAW, 1875, 254.

Passerculus savanna, COUES, Key, 1872, 135 (part); Check List, 1873, No. 159 (part).

Passerculus savanna. a. savanna, COUES, Birds N.W., 1874, 127 (part).

This well-known and widely-distributed Sparrow was an abundant species in every moist meadow and grassy marsh, not only in the valleys but also in the lower cañons of the mountains. It was found during the greater portion of the year, or from March to November, inclusive. During the breeding-season the male has a weak, lisping song, which may be somewhat nearly expressed by the syllables *witz, witz, wih'—tzul*, uttered as the bird perches upon a fence-post, or a bush by the brook-side, or as it nestles in the grass upon the ground.

List of specimens.

239, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, October 7, 1867. $5\frac{7}{8}$ — $9\frac{1}{8}$ — 3 — $2\frac{1}{2}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{1}{4}$ — $1\frac{3}{16}$. Bill, horn-color, darker on culmen, lower mandible paler, with lilaceous glow; iris, hazel; tarsi, straw-color, toes more brownish.

254, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, October 23, 1867. $5\frac{3}{4}$ — $9\frac{9}{16}$ — $3\frac{1}{16}$ — $2\frac{1}{2}$ — $\frac{13}{32}$ — $\frac{3}{4}$ — $2\frac{1}{4}$ — $\frac{7}{8}$. Tarsi, clear pinkish-white, with tinge of straw-yellow, the toes stained with brownish.

471, ♂ *ad.*; Carson City, Nevada, March 28, 1868. $5\frac{3}{8}$ — 8 — $2\frac{7}{8}$ — $2\frac{3}{8}$. Bill, lilac-bluish, the upper mandible nearly black; iris, sepia; tarsi and toes, brownish lilaceous-white.

480, ♂ *ad.*; Carson, March 30, 1868. $5\frac{11}{16}$ — $9\frac{1}{4}$ — 3 — $2\frac{7}{16}$. Same remarks.

553, ♀ *ad.*; Carson City, Nevada, April 27, 1868. $5\frac{7}{8}$ — 9 — $2\frac{7}{8}$ — $2\frac{3}{8}$. Same remarks.

885, ♂ *ad.*; Ruby Valley, Nevada, August 29, 1868. $5\frac{5}{8}$ —(?)—(?)— $2\frac{3}{8}$. Same remarks.

933, ♀ *ad.*; Camp 25, Humboldt Valley, September 16, 1868. $5\frac{13}{16}$ — $8\frac{13}{16}$ —(?)— $2\frac{1}{4}$. Upper mandible, purplish-black, paler toward rictus; lower, deep salmon-purple, darker terminally; iris, plumbeous-bister; tarsi, straw-white, toes more brownish.

970, ♂ *ad.*; Salt Lake City, May 21, 1869. $5\frac{5}{8}$ — $9\frac{5}{8}$. Bill, ashy-lilaceous, the upper mandible dusky—nearly black on the culmen.

971, ♂ *ad.*; same locality and date. $5\frac{5}{8}$ — $8\frac{7}{8}$.

972, ♂ *ad.*; same locality and date. $5\frac{3}{4}$ — $9\frac{1}{2}$.

1016, nest and eggs (5); Salt Lake City, May 21, 1869. Nest imbedded in ground, in wet meadow.

1017, nest and eggs (4); same locality, May 22. Nest in tuft of grass, in wet meadow.

1883, nests and eggs (4); same locality, June 3, 1869. Same remarks.

1090, nest and eggs (4); Antelope Island, Great Salt Lake, June 4, 1869. Nest on ground, beneath strip of sage-brush bark, in wet meadow.

1458, ♂ *juv.*; Parley's Park, Utah, July 26, 1869. $5\frac{3}{8}$ — 9 . Bill, brownish-lilaceous, darker on the culmen; iris, brown; tarsi and toes, pale pink.

1480, ♂ *juv.*; Parley's Park, July 30, 1869. $5\frac{1}{2}$ — $9\frac{1}{4}$.

1481, *juv.*; Parley's Park, July 30. $5\frac{3}{4}$ — $9\frac{3}{8}$.

POOECETES GRAMINEUS.

Bay-winged Bunting; Grass Bunting; Vesper Sparrow.*β. confinis.*

Poocætes gramineus var. *confinis*, BAIRD, B. N. Am., 1858, 448 (in text, *sub P. gramineus*).—COUES, Key, 1872, 136; Check List, 1872, No. 161a.—B. B. & R., Hist. N. Am. B., I, 1874, 545 (*sub P. gramineus*).—HENSHAW, 1875, 256.

Poocætes gramineus, COOPER, Orn. Cal., I, 1870, 186.

This common species was most frequently met with during the summer on the open grassy slopes of the higher cañons, where it and the Green-tailed Bunting were the chief songsters. Its song is sweet and varied, though simple and brief, and its clear, cheery notes are among our most pleasant recollections of those elevated regions. In the fall it descends to the lower valleys, and in September becomes exceedingly abundant among the rye-grass meadows along the foot-hills of the higher ranges. In winter it appears to make a complete southward migration, none having been seen at Carson City until the first of April.

List of specimens.

483, ♀ *ad.*; Carson City, Nevada, April 2, 1868. $6\frac{3}{4}$ — $11\frac{1}{8}$ — $3\frac{2}{16}$ —3. Upper mandible, dull brownish-plumbeous, tomium paler; rictus and whole lower mandible, dilute brownish-lilaceous; iris, raw-umber; tarsi and toes, dilute brownish, toes darkest.

902, ♂ *ad.*; Secret Valley, Nevada, September 6, 1868. $6\frac{3}{8}$ — $10\frac{1}{4}$ —(?)— $2\frac{5}{8}$. Upper mandible, umber-brown, darker at point, paler on rictus; lower, pale, fleshy lilaceous-brown, the extreme tip dusky; iris, vandyke; tarsi, clear brownish-white; toes, similar but stained with brownish.

1037, ♂ *ad.*; Salt Lake City, Utah, May 24, 1869. $6\frac{5}{8}$ — $10\frac{5}{8}$. Bill, brownish-lilaceous, upper half of upper mandible nearly black; iris, brown; tarsi and toes, lilaceous brownish-white.

1233, nest and eggs (3); Parley's Park, June 23, 1869. Nest on ground, beneath prostrate sage-bush, by roadside.

1280, nest and eggs (3); Parley's Park, Wahsatch Mountains, June 25, 1869. Nest in grassy bank of brook.

1398, nest and egg (1); Parley's Park, July, 1869. Nest on ground beneath sage-bush.

1464, ♂ *juv.*; Parley's Park, July 28, 1869. $6\frac{7}{16}$ — $11\frac{1}{8}$. Bill, clear light lilaceous, darker toward culmen; iris, brown; tarsi and toes, clear pale flesh-color.

COTURNICULUS PASSERINUS.

Yellow-winged Sparrow.

β. perpallidus.

Coturniculus passerinus var. *perpallidus*, RIDGWAY, Coues' Key, 1872, 137; Check List, 1873, 162a.—B. B. & R., Hist. N. Am. Birds, I, 1874, 556.—HENSHAW, 1875, 257, pl. I, fig. 2 (adult).

Coturniculus passerinus. b. perpallidus, COUES, Birds N.W., 1874, 132.

Coturniculus passerinus, COOPER, Orn. Cal., I, 1870, 189.

Like the Savanna Sparrow, this little Bunting is essentially a bird of the valley portions. It is also generally distributed, but instead of inhabiting the wet meadows, or the borders of marshes, it frequents only the dryer grassy places. It was found to be abundant in the fields about Sacramento City, as well as throughout the Interior.

List of specimens.

853, ♂ *juv.*; Ruby Valley, Nevada, July 22, 1868. 5—7 $\frac{7}{8}$ —(?)—11 $\frac{5}{16}$. Bill, pale, pinkish-lilaceous, the culmen darker; iris, grayish-umber; tarsi and toes, pale roseaceous-pink.

1102, ♂ *ad.*; Antelope Island, Great Salt Lake, Utah, June 4, 1869. 5 $\frac{1}{2}$ —8 $\frac{1}{2}$. Bill, lilaceous, upper half of upper mandible blackish; iris, brown; tarsi, pale yellowish brownish-white; toes, darker.

CHONDESTES GRAMMACA.

Lark Sparrow; Skylark Bunting.

Fringilla grammaca, SAY, Long's Exped., I, 1823, 139.

Chondestes grammaca, BONAP., Comp. & Geol. List, 1838, 32.—BAIRD, Birds N. Am., 1858, 456; Cat. N. Am. B., 1859, No. 344.—COOPER, Orn. Cal., I, 193.—COUES, Key, 1872, 146, fig. 90; Check List, 1873, No. 186; B. N.W., 1874, 159.—B. B. & R., Hist. N. Am. Birds, I, 1874, 562, pl. xxxi, fig. 1.—HENSHAW, 1875, 259.

This handsomely-marked and interesting bird is an exceedingly abundant species in favorable localities throughout the entire extent of the Western Region. Though essentially a western species, it is not restricted to that portion of the country which extends from the Rocky Mountains westward, as is most often the case with the birds peculiar to the western division of the continent, but it also inhabits nearly every portion of the Mississippi Valley, where it is no less numerous than in the most favored portions farther west. Indeed, this species seems to be gradually extending its range to the eastward, probably in consequence of the general and wide-

spread denudation of the forests, the country thus undergoing a physical change favorable to the habits of the species, having already become a regular summer resident in many sections of the country north of the Ohio. It was not noticed in Ohio, so far as the records show, previous to 1860, when Mr. J. M. Wheaton first observed it in the vicinity of Columbus, near the central portion of the State, and "since which time it has increased in numbers, and at present (1874) is not uncommon." [See Coues' *Birds of the Northwest*, p. 234.] Single specimens have already been taken in Massachusetts and Florida, where, in course of time, the species may become established.

The Lark Sparrow is essentially a prairie bird, although it prefers semi-wooded districts to the open prairies. It is equally common in the Sacramento Valley and in southern Illinois, inhabiting in each case places which are neither completely wooded nor entirely destitute of trees, and evincing a marked preference for localities where oak-groves alternate with meadow-lands and cultivated fields; and in its great abundance in the widely-separated districts named above, particularly when taken into consideration with its association in both with such species as *Thryomanes bewicki*, *Dendroica aestiva*, *Icteria virens*, *Collurio excubitoroides*, *Chrysomitris tristis*, *Coturniculus passerinus*, *Melospiza fasciata*, *Spizella socialis*, *Guiraca cærulea*, etc., adds to the marked similarity in the general *facies* of the avifaunæ of the two localities, the difference between them consisting in the possession by each of a small percentage of *representative* species and a very few peculiar forms.¹

The habits of this bird are chiefly terrestrial, since it lives mostly on the ground, where it may often be seen walking² gracefully along or hopping in the usual manner of Sparrows; the male ascending to a fence-post, the top of a small tree, or other prominent object, during the delivery of his song. Its habits in this respect vary greatly, however, it being quite arboreal in some localities, as was conspicuously the case at Sacramento,

¹ See pages 328-332.

² It may not be generally known that many of the terrestrial Fringillidæ are walkers as well as hoppers. We have often seen both this species and *Melospiza fasciata* walking on the ground with a step as firm and graceful as that of a Meadow Lark or Blackbird.

where it nested almost invariably in the small oak trees at heights varying from 15 to 30 feet from the ground; while, on the other hand, in southern Illinois, where the proportionate area of wood-land is much greater, we never found a nest of this species except on the ground, notwithstanding many nests were found.¹

The principal characteristic of the Lark Sparrow is the excellence of its song, which far surpasses that of any other member of the family we have ever heard, while in sprightliness and continuity, qualities so often lacking in our finer singers, we do not know its equal in any bird. We have not heard the song of the famed Skylark (*Alauda arvensis*), but from numerous descriptions imagine it to be somewhat similar in character to that of the present bird; and we very seriously doubt whether it is superior, if, indeed, it should prove equal. The Lark Sparrow sings all day long, even during the hottest part of summer, beginning in the early morn before any other bird, and not ceasing until the darkening of the evening shades have quieted the other songsters; often, in fact, have we been awakened at night by its song when all else was quiet. The song of this bird begins with a chant of clear, ringing notes, each uttered with great distinctness; then follows a silvery trill—the very expression of emotion—and then a succession of sprightly, sparkling notes, varied by rising and falling cadences, finally dying away until scarcely audible, but immediately resumed in all its sprightliness and vigor, and continued as before, until the singer seems actually exhausted by his efforts.

At Sacramento this bird is known as the Mexican Lark; it was familiar to all the boys, who in season eagerly searched for its nests in order to obtain the young, which were readily sold in the city for \$4.00 per pair.

¹ Many other birds exhibit the same variability in the selection of a site for their nests. A notoriously variable species is *Carpodacus frontalis* (see p. 459); and *Zenædura carolinensis* is another case in point, this species, in the same locality, nesting indifferently on the ground, on the top of a stump or rock, on a flat fence-rail, in a tree, or on the remnant of an old nest of another species. Mr. E. W. Nelson informs me that he found a nest of *Pipilo erythrophthalmus* in a bush, a foot or two from the ground, on Fox Prairie, Illinois; while at Mt. Carmel, in the same State, we have found a nest of *Agelaius phœniceus* in an elm tree, full 20 feet from the ground, and a nest of *Cyanura cristata* inside of a barn.

List of specimens.

8, nest and eggs (3); Sacramento, California, June 8, 1867. Lower branch of small oak, in grove.

30, nest and eggs (3); Sacramento, California, June 11, 1867. Cotton-wood copse, ten feet from ground.

50, nest and eggs (3); Sacramento, California, June 18, 1867. Twenty feet from ground, in oak-grove.

72, nest and eggs (3); Sacramento, California, June 20, 1867. Twenty feet from ground, in oak-grove.

85, nest and eggs; Sacramento, California, June 28, 1867. Six feet from ground, in cotton-wood copse.

90, nest and eggs; Sacramento, California, June 29, 1867. Six feet from ground, in cotton-wood copse.

783, nest and eggs (4); Truckee Reservation, Nevada, June 3, 1868. On ground beneath sage-bush, on *mesa*.

960, ♂ *ad.*; Salt Lake City, Utah, May 20, 1869. 7½—11½. Upper mandible, brownish-ash, lower whitish-blue; iris, brown; tarsi and toes, brownish-white.

1020, nest and eggs; Salt Lake City, May 22, 1869.

1045, nest and eggs (5); Salt Lake City, May 25, 1869.

1046, nest and eggs (5); same locality and date.

1047, 1048, nests and eggs; Salt Lake City, May 26, 1869.

1056, nest and eggs; Salt Lake City, May 27, 1869.

1174, nest and eggs (4); Salt Lake City, June 10, 1869.

1175, nest and eggs (4); Salt Lake City, June 17, 1869.

1197, nest and eggs; Salt Lake City, June 21, 1869.

Nests, all on the ground beneath sage-bushes; maximum number of eggs, five.

ZONOTRICHIA LEUCOPHRYS.

White-crowned Sparrow.

Emberiza leucophrys, FORSTER, Phil. Trans., LXII, 1772, 382, 403, 426.

Zonotrichia leucophrys, BONAP., Comp. & Geog. List, 1838, 32.—BAIRD, B. N. Am., 1858, 458, pl. 69, fig. 2; Cat. N. Am. B., 1859, No. 345.—COOPER, Orn. Cal., I, 196.—COUES, Key, 1872, 144; Check List, 1873, No. 183.—B. B. & R., Hist. N. Am. B., I, 1874, 566, pl. xxv, figs. 9, 10.—HENSHAW, 1875, 260.

Throughout the Rocky Mountain ranges, westward to the very verge of the desert-region of the Great Basin, this eastern form entirely replaces in summer the more western *Z. intermedia* of the Sierra Nevada. It was a very abundant summer species in the elevated parks of the Wahsatch and Uintah Mountains, where, from May to the latter part of August, not a single individual of *Z. intermedia* was found. At our camp in Parley's Park these birds were our most familiar neighbors, and by reason of their confiding habits and sweet morning carols endeared themselves to the members

of the party. One young individual, bred in a nest close to the camp, became so sociable as to visit daily the cook's tent for the crumbs scattered on the ground.

List of specimens.

1068, ♀ *ad.*; Salt Lake City, Utah, May 29, 1869. $6\frac{7}{8}$ — $9\frac{1}{2}$. Bill, orange-brown, lower mandible paler, tips of both black; iris, brown; tarsi and toes, deep brown.

1292, nest and eggs (5); Parley's Park, Wahsatch Mountains, Utah, June 26, 1869. Nest on ground, under Geranium bush.

1430, ♂ *ad.*; 7— $9\frac{7}{8}$. 1431, ♀ *ad.*; $6\frac{9}{16}$ — $9\frac{5}{8}$. Parley's Park, July 19, 1869. Bill, perfectly uniform, deep purplish, mahogany-brown; iris, brown; tarsi, reddish hepatic-brown; toes, darker.

1463, ♂ *juv.*; Parley's Park, July 28, 1869. $6\frac{5}{8}$ —10. Bill, mahogany-brown, darker on culmen and tip; iris, brown; tarsi and toes, dark purplish-brown.

ZONOTRICHIA INTERMEDIA.

Ridgway's Sparrow.¹

(*Mook'-um-poo'h* of the Washoes; *You-oo-hoot'-se-pah* of the Paiutes.)

Zonotrichia gambeli, BAIRD, Birds N. Am., 1858, 460 (part); Cat. N. Am. Birds, 1859, No. 346 (part).—COOPER, Orn. Cal., I, 1870, 195 (part).

Zonotrichia leucophrys var. *gambeli*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 157, 177.—COUES, Key, 1872, 145 (part); Check List, 1873, No. 183a (part).—B. B. & R., Hist. N. Am. Birds, I, 1874, 569, pl. xxv, figs. 11, 12.

Zonotrichia leucophrys var. *intermedia*, RIDGWAY, Coues' Check List, App., 1872, No. 183b.—COUES, Birds N.W., 1874, 156.—HENSHAW, 1875, 261, pl. VII, fig. 2 (adult).

At the Summit Meadows, the most elevated portion of the Donner Lake Pass of the Sierra Nevada, these birds were so extremely abundant on the 9th day of July, that, on the evening we camped there, twenty-seven of their eggs were found after a hurried search of less than twenty minutes' duration. The pleasing songs of the males were heard on every hand, not only during daylight, but at intervals through the night, these songs resembling those of *Z. leucophrys*, although they seemed somewhat more vigorous and distinct. They were exceedingly unsuspicious little birds, the pair usually remaining close by when their nest and eggs were being appropriated, the male even, on several occasions, singing, as he perched on the summit of a neighboring bush, while we were preparing the eggs for preservation.

¹ COUES, *Birds of the Northwest*, p. 156.

List of specimens.

95, 96, 97, 98, nest and eggs (4); Summit Meadows, Donner Lake Pass, Sierra Nevada, July 9, 1867. Maximum number of eggs, 5; usual number, 4.

172, ♂; West Humboldt Mountains, Nevada, September 7, 1867. $6\frac{1}{2}$ — $9\frac{1}{2}$ — $3\frac{1}{8}$ — $2\frac{9}{16}$ — $\frac{7}{16}$ — $\frac{13}{16}$ — $2\frac{3}{4}$ — $1\frac{1}{2}$. Bill, wax-yellow, upper mandible more ochre-reddish, point of culmen and gonys, black; iris, umber; tarsi and toes, yellowish horn-color.

183, ♂; West Humboldt Mountains, September 11, 1867. $6\frac{3}{4}$ — $9\frac{1}{4}$ — 3 — $2\frac{1}{2}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{13}{16}$ — $1\frac{7}{16}$. Same remarks.

197, ♂; West Humboldt Mountains, September 18, 1867. $6\frac{15}{16}$ — $10\frac{1}{8}$ — $3\frac{1}{4}$ — $2\frac{3}{4}$ — $\frac{7}{16}$ — $\frac{13}{16}$ — 3 — $1\frac{9}{16}$. Upper mandible, deep, light mahogany-brown, inclining to wax-yellow on rictus; lower mandible, paler than upper, inclining to deep wax-yellow, more citreous basally; extreme point of culmen and gonys, black; iris, umber; tarsi, clear, light reddish horn-color; toes, darker and more opaque-brownish.

200, ♂; West Humboldt Mountains, September 20, 1867. $6\frac{7}{8}$ — $9\frac{5}{8}$ — $3\frac{1}{4}$ — $2\frac{11}{16}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{7}{8}$ — $1\frac{7}{16}$. Same remarks.

201, ♂; West Humboldt Mountains, September 20, 1867. $6\frac{5}{8}$ — $9\frac{3}{8}$ — $3\frac{1}{8}$ — $2\frac{9}{16}$ — $\frac{7}{16}$ — $\frac{3}{2}$ — $2\frac{7}{8}$ — $1\frac{5}{16}$. Same remarks.

202, ♀; West Humboldt Mountains, September 20, 1867. $6\frac{5}{8}$ — $9\frac{11}{16}$ — $3\frac{1}{4}$ — $2\frac{5}{8}$ — $\frac{7}{16}$ — $\frac{13}{16}$ — $2\frac{13}{16}$ — $1\frac{3}{4}$. Same remarks.

207, ♂; West Humboldt Mountains, September 21, 1867. [Intermediate between *intermedia* and *leucophrys*.] $6\frac{3}{4}$ — $9\frac{15}{16}$ — $3\frac{1}{4}$ — $2\frac{11}{16}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — 3 — $1\frac{3}{8}$. Same remarks.

209, ♂; West Humboldt Mountains, September 21, 1867. $6\frac{7}{8}$ — $9\frac{5}{8}$ — $3\frac{1}{8}$ — $2\frac{5}{8}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{15}{16}$ — $1\frac{1}{2}$. Same remarks.

210, ♂; West Humboldt Mountains, September 21, 1867. $6\frac{15}{16}$ — $9\frac{1}{4}$ — $3\frac{1}{16}$ — $2\frac{9}{16}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{7}{8}$ — $1\frac{1}{2}$. Same remarks.

211, ♂; West Humboldt Mountains, September 21, 1867. $7\frac{1}{16}$ — $9\frac{7}{8}$ — $3\frac{3}{16}$ — $2\frac{5}{8}$ — $\frac{7}{16}$ — $\frac{13}{16}$ — 3 — $1\frac{5}{8}$. Same remarks.

212, ♀; West Humboldt Mountains, September 21, 1867. 7 — 10 — $3\frac{1}{4}$ — $2\frac{3}{4}$ — $\frac{7}{16}$ — $\frac{13}{16}$ — $2\frac{7}{8}$ — $1\frac{5}{8}$. Same remarks.

385, ♀; Truckee Reservation, December 26, 1867. $6\frac{5}{8}$ — 9 — 3 — $2\frac{7}{16}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $2\frac{7}{8}$ — $1\frac{3}{8}$. Same remarks.

930, ♂; head of Humboldt Valley (Camp 25), September 16, 1868. 7 — $9\frac{1}{2}$ —(?)— $2\frac{5}{8}$. Same remarks.

939, ♂; Camp 25, September 20, 1868. 7 — $9\frac{3}{4}$ —(?)— $2\frac{9}{16}$. Same remarks.

944, ♀; Deep Creek, Utah, October 5, 1868. $6\frac{1}{2}$ — $9\frac{3}{8}$ —(?)— $2\frac{7}{16}$. Same remarks.

ZONOTRICHIA CORONATA.

Golden-crowned Sparrow.

Emberiza coronata, PALLAS, Zoog. Rosso-As., II, 1811, 44, pl. [5] fig. 1 (♂ ad.).

Zonotrichia coronata, BAIRD, B. N. Am., 1858, 461; Catal., 1859, No. 347.—COOPER, Orn. Cal., I, 197.—COUES, Key, 1872, 145; Check List, 1873, No. 184; Birds N.W., 1874, 159 (sub *Z. querula*).—B. B. & R., Hist. N. Am. B., I, 1874, 573, pl. xxvi, fig. 1.

The only specimen of this species seen by us was the one obtained,

which was shot from a flock of *Z. intermedia*. Its occurrence on the West Humboldt Mountains may be accounted for by the fact that many of the Pacific-coast species have a tendency to straggle eastward during their migrations, among those which reach this range, besides the bird under consideration, being *Melospiza guttata*, *Pipilo oregonus*, *Lanivireo cassini*, *Helminthophaga lutescens*, etc.¹ [See pp. 379, 380.]

List of specimens.

237, ♀ ad.; West Humboldt Mountains, Nevada (Camp 19), October 7, 1867. $7\frac{13}{16}$ — $10\frac{1}{2}$ — $3\frac{3}{8}$ — $2\frac{3}{4}$ — $1\frac{5}{8}$ — $\frac{7}{8}$ — $3\frac{1}{4}$ — $1\frac{7}{8}$. Upper mandible, slaty horn-color, darker on culmen, tomium paler; lower mandible, pale lilaceous-brown; iris, olivaceous-hazel; tarsi and toes, clear horn-color.

JUNCO OREGONUS.

Oregon Snow-bird.

(*Tah'-bah-klat'-uk* of the Washoes; *Nebah'-tone* of the Paiutes.)

Fringilla oregona, TOWNSEND, Jour. Ac. Nat. Sci. Phila., VII, 1837, 188.

Junco oregonus, SCLATER, Pr. Zool. Soc. Lond., 1857, 7.—BAIRD, B. N. Am., 1858, 466; Cat. N. Am. B., 1859, No. 347.—COOPER, Orn. Cal., I, 199.—COUES, Key, 1872, 141; Check List, 1873, No. 175; B. N.W., 1874, 142.—B. B. & R., Hist. N. Am. B., I, 1874, 584, pl. XXVI, fig. 2.—HENSHAW, 1875, 267.

Junco hyemalis var. *oregonus*, RIDGWAY, Am. Nat., 1873, 613.

This representative of the Eastern Snow-bird (*J. hyemalis*) is very abundant in winter from the Pacific coast to the Wahsatch Mountains, but in summer has a more restricted distribution, being then confined to the coniferous forest-region of the higher western ranges. At the Summit Meadows, nearly 7,000 feet above the sea, on the Sierra Nevada, it was one of the commonest and most characteristic birds of the locality, but eastward of these mountains none were seen during the summer. In its winter migrations this bird shows the same remarkable movements as *Zonotrichia intermedia*, *Turdus guttatus*, etc., for while its summer habitat seems strictly limited on the eastward to the Sierra Nevada, it becomes generally dispersed in winter over the entire area of the Western Region, being a more or

¹ According to Mr. E. W. Nelson, an adult male of *Z. coronata* was captured by Dr. Hoy, at Racine, Wisconsin, during the spring migration.

less regular visitant during that season as far east as Kansas. We did not, however, meet with it farther eastward than the East Humboldt Mountains.

In all respects this species appears to be a perfect counterpart of the eastern *J. hyemalis*, being equally familiar in its habits during winter, while its notes are apparently precisely similar.

List of specimens.

224, ♀ *ad.*; West Humboldt Mountains, Nevada, October 3, 1867. $6-9-3-2\frac{1}{2}-\frac{3}{8}-\frac{3}{4}-2\frac{3}{16}-1\frac{3}{8}$. Bill, delicate lilaceous-white, the point dusky; iris, burnt-sienna; tarsi, clear horn-white; toes, deep sepia.

378, ♀ *ad.*; Truckee Reservation, Nevada, December 24, 1867. $6\frac{3}{8}-9\frac{1}{4}-3\frac{1}{8}-2\frac{1}{2}-\frac{7}{16}-\frac{3}{4}-2\frac{3}{4}-1\frac{1}{4}$. Same remarks.

384, ♂ *ad.*; Truckee Reservation, December 26, 1867. $6\frac{1}{4}-9\frac{1}{4}-3\frac{1}{4}-2\frac{5}{8}-\frac{7}{8}-1\frac{1}{8}-2\frac{3}{4}-1\frac{3}{8}$. Iris, purplish-claret; tarsi, dilute reddish-umber; toes, darker leaden-umber.

484, ♂ *ad.*; Carson City, Nevada, April 3, 1868. $6\frac{3}{8}-9\frac{3}{4}-3\frac{1}{4}-2\frac{5}{8}$. Iris, dark purplish-carmine.

485, ♂ *ad.*; Carson City, Nevada, April 3, 1868. $6\frac{1}{2}-9\frac{7}{8}-3\frac{1}{4}-2\frac{11}{16}$. Same remarks.

938, ♂ *ad.*; Trout Creek, Upper Humboldt Valley, Sept. 19, 1868. $6\frac{3}{4}-9\frac{5}{8}-2\frac{5}{8}$. Upper mandible, light sepia-brown, the tip black; lower mandible, pinkish-white; iris, madder-brown; tarsi, dilute sepia; toes, deeper sepia.

JUNCO CANICEPS.

Gray-headed Snow-bird.

Struthus caniceps, WOODHOUSE, Pr. Ac. Nat. Sci. Philad., 1852, 202.

Junco caniceps, BAIRD, B. N. Am., 1858, 468, pl. 72, fig. 1; Cat. N. Am. B., 1859, No. 353.—COOPER, Orn. Cal., I, 1870, 201.—B. B. & R., Hist. N. Am. B., I, 1874, 587, pl. XXVI, fig. 3.

Junco cinereus var. *caniceps*, COUES, Key, 1872, 141; Check List, 1873, No. 176; B. N.W., 1874, 143.—HENSHAW, 1875, 269.

Junco hyemalis var. *caniceps*, RIDGWAY, Am. Nat., 1873, 613.

The Gray-headed Snow-bird was met with only in the pine forests of the Wahsatch and Uintah Mountains, where it was rather common from May to August, inclusive. Its habits and notes closely resemble those of *J. hyemalis* and *J. oregonus*, but its song, a simple monotonous trill, is somewhat louder and more steady.

AMPHISPIZA BILINEATA.

Black-throated Sparrow.

(Wut'-tu-ze-ze of the Paiutes.)

Emberiza bilineata, CASSIN, Pr. Ac. Nat. Sci. Philad., 1850, 104, pl. 3.*Poospiza bilineata*, SOLATER, Proc. Zool. Soc. Lond., 1857, 7.—BAIRD, B. N. Am., 1858, 470; Cat. N. Am. B., 1859, No. 355.—COOPER, Orn. Cal., I, 203.—COUES, Key, 1872, 140; Check List, 1873, No. 172.—B. B. & R., Hist. N. Am. B., I, 1874, 590, pl. XXVI, fig. 8.—HENSHAW, 1875, 274.*Amphispiza bilineata*, COUES, B. N. W., 1874, 234.¹

This interesting little bird was found throughout the sage-brush country, the most desert-tracts of which are its favorite abode. It was equally common in the western depression and in the Salt Lake Valley, as well as in intermediate localities. Unlike the *A. nevadensis*, which frequents chiefly the more thrifty growth of artemisia in the damper valleys, this species prefers the arid mesas, where the growth is scant and stunted; and we found it nowhere else so abundant as on the Carson Desert, near the Soda Lakes, where much of the surface consisted of loose, shifting sand. It also differs markedly from that species in being migratory, being merely a summer sojourner, and one of the latest to arrive, few, if any, making their appearance in the Truckee Valley before the first of May, the advance individuals being noted on the 13th of that month, in 1868.

Like *A. nevadensis*, this species is remarkable for its peculiar song, which in pensive tone and sad expression harmonizes so perfectly with its desolate surroundings. It is from this song that the Indian name, *Wut-tu-ze-ze*, is derived, for the notes are very nearly expressed by the syllables *wut'*, *wut'*, *zeeeeè*, repeated once or twice, the first two notes quick and distinct, the last one a prolonged, silvery trill. Frequently a singer reverses, at each alternate repetition of the song, the accent of the first and last portions, thus producing a very peculiar effect.

List of specimens.

106, ♂ *juv.*; valley of the Truckee, July 25, 1867. $5\frac{1}{2}$ — $8\frac{1}{2}$ — $2\frac{1}{2}$ — $2\frac{3}{16}$ — $\frac{7}{16}$ — $\frac{11}{16}$ — $2\frac{7}{16}$ — $1\frac{3}{8}$. Upper mandible, plumbeous-black; lower, pale blue, lilaceous basally, the tip, dusky; iris, umber; tarsi and toes, dark plumbeous-sepia.

¹ "*Amphispiza*, COUES, n. g. (type *Emberiza bilineata*, Cass.)."

123, *juv.*; Truckee Valley, August 6, 1867. $5\frac{5}{8}$ — $8\frac{1}{8}$ — $2\frac{5}{8}$ — $2\frac{1}{4}$ — $\frac{3}{8}$ — $\frac{5}{8}$ — $2\frac{3}{8}$ — $1\frac{1}{2}$. Same remarks.

167, *juv.*; West Humboldt Mountains, September 4, 1867. $5\frac{5}{8}$ — $8\frac{1}{4}$ — $2\frac{5}{8}$ — $2\frac{3}{16}$ — $\frac{3}{8}$ — $\frac{5}{8}$ — $2\frac{1}{2}$ — $1\frac{1}{2}$. Same remarks.

961, ♂ *ad.*; Salt Lake City, Utah, May 20, 1869. $5\frac{3}{4}$ — $8\frac{1}{2}$. Upper mandible and tip of lower, deep black, rest of lower plumbeous-blue; iris, brown; tarsi and toes, purplish-plumbeous.

1113, nest and eggs (3); Antelope Island, Great Salt Lake, June 5, 1869. Nest in sage-bush.

1126, 1127, nests and eggs (3, 1); Antelope Island, June 7, 1869. Nests in sage-bushes, one foot from ground.

1136, nest; Antelope Island, June 8, 1869. Sage-bush, one foot above ground.

1195, 1196, nests and eggs (3); Salt Lake City, June 21, 1869. Nests in sage-bushes, about one foot from ground.

1402, 1403, nests; valley of the Weber River, July, 1869. [J. C. Olmstead.]

AMPHISPIZA NEVADENSIS.

Artemisia Sparrow.

(*Tok'-et-se-whah'* of the Paiutes.)

"*Poospiza bellii*," BAIRD, B. N. Am., 1858, 470 (part); Cat. N. Am. B., 1859, No. 356.—COOPER, Orn. Cal., I, 1870, 204 (part).—COUES, Key, 1872, 141 (part); Check List, 1873, No. 173. [Not *P. bellii*, Cass.]

Poospiza bellii var. *nevadensis*, RIDGWAY, Bull. Essex Inst., V, Nov., 1873, 191.—COUES, Check List, 1873, App., p. 127.—B. B. & R., Hist. N. Am. B., I, 1874, 594, pl. XXVI, fig. 9.—HENSHAW, 1875, 275, pl. XI (adult).

Amphispiza bellii, COUES, B. N.W., 1874, 234 (part).

The distribution of this species seems to be strictly governed by that of the sage-brush plants, since it is present in nearly all districts where these are found, while it is apparently wanting in localities of any other description. It is most partial to the moister valleys, where the growth is most thrifty, and in such places is generally the most abundant bird. It was observed to be most numerous in the valleys of the western depression, few being seen in the Salt Lake Valley, where the *A. bilineata* was so abundant; but it does occur there, as well as much farther eastward—at least to the valleys of Green River and its tributary streams. In the neighborhood of Carson City it was by far the most abundant bird of the open wastes, and its abundance did not abate with the approach of winter. In walking through the sage-brush one was almost certain to

see these birds at every few steps. They were exceedingly unsuspicious, and very reluctant to take flight, if not pursued too persistently; merely keeping a few feet in advance, running swiftly on the ground, their tails elevated at an angle of about 45° , but unexpanded, and keeping thus in front for several rods; when too nearly approached, merely dodging in and out among the low bushes, or concealing themselves momentarily behind a scraggly shrub. Should they be startled, even, they merely fly up, with a chipping twitter, and after a short meandering flight for a few rods, again alight and run out of sight.

They began singing toward the last of February, and by the beginning of April the first eggs were laid. During a walk through the sage-brush, on the ninth of the latter month, several nests were found, the female in nearly every instance betraying the position of the nest by remaining on it until we had approached quite near. Often, by carefully watching the ground a rod or two ahead, did we detect one of these birds steal slyly out from beneath a scraggly, usually nearly prostrate, bush, and, with tail elevated, run rapidly and silently away and soon disappear in the shrubbery. On such an occasion, a careful examination of the spot was almost certain to reveal an artfully-concealed nest, either imbedded in the ground, or, as was more rarely the case, resting among the lower branches of the bush.

The song of this bird, although not brilliant in execution nor by any means loud, is nevertheless of such a character as to attract attention. It has a melancholy pensiveness, remarkably in accord with the dreary monotony of the surroundings, yet as a sort of compensation, is possessed of delicacy of expression and peculiar pathos—just as the fine lights and shadows on the sunlit mountains, combined with a certain vagueness in the dreamy distance, subdue the harsher features of the desert landscape. This song, when first heard was mistaken for that of a lark (*Sturnella neglecta*) half a mile or so away; but we soon found that the bird was scarcely two rods distant. The early spring is when they sing most beautifully, the usual note during other seasons being a faint twitter or chirp, generally uttered as one chases another through the sage-brush.

List of specimens.

151, ♂ *ad.*; valley of the Humboldt (Oreana), August 31, 1867. $6\frac{9}{16}$ —10— $3\frac{1}{4}$ — $2\frac{3}{4}$ — $\frac{5}{8}$ — $\frac{3}{4}$ — $2\frac{15}{16}$ — $1\frac{9}{16}$. Upper mandible, plumbeous-black, tomium paler; lower, pure pale, bluish-lilaceous basally, the tip plumbeous; iris, bister; tarsi and toes, bluish-sepia.

157, ♂ *ad.*; Camp 17, September 2, 1867. $6\frac{3}{4}$ —10— $3\frac{1}{2}$ — $2\frac{7}{8}$ — $\frac{7}{16}$ — $\frac{11}{16}$ — $3\frac{1}{8}$ — $1\frac{1}{2}$. Tarsi and toes, purplish-black.

182, ♂ *ad.*; Wright's Cañon, West Humboldt Mountains, September 11, 1867. $6\frac{5}{8}$ — $8\frac{1}{2}$ — $3\frac{1}{4}$ — $2\frac{11}{16}$ — $\frac{13}{32}$ — $\frac{3}{4}$ — 3 — $1\frac{1}{2}$. Upper mandible, plumbeous-black, edged with whitish; lower, pale blue, the tip of the gonys dusky; iris, hazel; tarsi and toes, liver-brown with a plumbeous cast.

379, ♀ *ad.*; Truckee Reservation, December 26, 1867. (Sage-brush of the mesa.) 7 — $9\frac{1}{2}$ — $3\frac{3}{16}$ — $2\frac{9}{16}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — 3 — $1\frac{7}{16}$. Upper mandible, plumbeous-slate; lower mandible and commissure, pure, fine, light plumbeous-blue, the tip dusky; iris, reddish-vandyke; tarsi, deep sepia-brown; toes, more blackish.

380, ♂ *ad.*; same locality, date, etc. $6\frac{3}{4}$ — $9\frac{3}{4}$ — $3\frac{3}{8}$ — $2\frac{3}{4}$ — $\frac{7}{16}$ — $\frac{3}{4}$ — $3\frac{1}{8}$ — $1\frac{1}{2}$. Same remarks.

522, nest and eggs (2); Carson City, Nevada, April 27, 1868.

535, nest and eggs (3); Carson City, Nevada, April 27, 1868.

537, nest and eggs (3); same locality and date. (Nests on the ground, underneath sage-bushes.)

SPIZELLA MONTICOLA.

Canada Sparrow; Tree Sparrow.

Fringilla monticola, GMELIN, Syst. Nat., I, 1788, 912.

Spizella monticola, BAIRD, Birds N. Am., 1858, 427; Cat. N. Am. Birds, 1859, No.

357.—COOPER, Orn. Cal., I, 206.—COUES, Key, 1872, 142; Check List, 1873, No. 177; Birds N.W., 1874, 146.—B. B. & R., Hist. N. Am. Birds, II, 1874, 3, pl. XXVII, fig. 5.—HENSHAW, 1875, 277.

During the winter this well-known Sparrow was common and very generally distributed through the valleys of the western depression of the Great Basin. As in the East, it associated with Snow-birds and White-crowned Sparrows, although in this case its companions were different species (*Junco oregonus* and *Zonotrichia intermedia*, instead of *J. hyemalis* and *Z. leucophrys*).

List of specimens.

301, ♂ *ad.*; Truckee Meadows, Nevada, November 19, 1867. $6\frac{3}{4}$ — $9\frac{7}{8}$ — $3\frac{1}{4}$ — $2\frac{11}{16}$ — $\frac{3}{4}$ — $\frac{3}{4}$ — 3 — $1\frac{5}{8}$. Upper mandible, deep black, base of the culmen, yellow; lower mandible, citreous wax-yellow on basal two-thirds, then lilaceous-white, the tip black; iris, brown; tarsi, deep reddish sienna-brown; toes, blackish-brown.

SPIZELLA SOCIALIS.

Chipping Sparrow.

β. arizonæ.

(So'-ho-quoy'-e-tse of the Shoshones.)

Spizella socialis, BAIRD, Birds N. Am., 1858, 473 (part); Cat. N. Am. Birds, 1859, No. 359 (part).—COOPER, Orn. Cal., I, 1870, 207.*Spizella socialis* var. *arizonæ*, COUES, Key, 1872, 143; Check List, 1873, No. 178a.—B. B. & R., Hist. N. Am. Birds, II, 1874, 11.—HENSHAW, 1875, 277.*Spizella socialis. a. arizonæ*, COUES, Birds N.W., 1874, 148.

The common Chipping Sparrow was found to be very generally distributed, although it was a commoner species in the valley portions than on the mountains. It was a strictly arboreal bird, however, and thus inhabited different localities from *S. breweri*, even when both were found in the same neighborhood. In the environs of Sacramento City it was particularly numerous; and although the door-yards, gardens, and orchards were alike inhabited by it, the groves of small oak-trees in the inclosed fields were its favorite abode, where it nested in company with *Chondestes grammaca*, *Chrysomitris tristis*, and other equally abundant species.

In the Interior it was found in all wooded districts, but, contrary to the rule elsewhere, was less abundant among the cotton-woods of the river-valleys than in the groves of cedars and mahoganies on the lower slopes of the mountains, of which it was eminently characteristic. Nowhere did we find it in greater abundance than among these woods on the eastern slope of the Ruby Mountains, for there it was the most numerous of all the birds in July and August, associating in large flocks during the latter month, evidently preparing for their departure southward, which commenced in September. We have never observed the eastern form of this species to be gregarious to this extent, but no differences could be detected in its habits during the breeding-season, nor in any of its notes.

List of specimens.

848, ♀ *ad.*; East Humboldt Mountains, July 20, 1868. $5\frac{1}{2}$ — $8\frac{1}{4}$ —(?)— $2\frac{3}{16}$. Bill, dark sepia-slate, darker terminally, lower mandible more lilaceous; iris, vandyke; tarsi and toes, pinkish sepia-white.

860, nest and eggs (4); Ruby Mountains (east slope), altitude about 8,000 feet, August 5, 1868. Nest in mountain-mahogany tree, six feet from ground.

1187, nest and eggs (4); Salt Lake City (City Creek Cañon), Utah, June 19, 1869. Nest in scrub-oak, six feet from ground.

SPIZELLA BREWERI.

Brewer's Sparrow.

Spizella breweri, CASSIN, Pr. Ac. Nat. Sci. Phila., VIII, 1856, 40.—BAIRD, B. N. Am., 1858, 475; Cat. N. Am. B., 1859, No. 361.—COOPER, Orn. Cal., I, 1870, 209.

Spizella pallida var. *breweri*, COUES, Key, 1872, 143; Check List, 1873, No. 180a; B. N. W., 1874, 151.—B. B. & R., Hist. N. Am. B., II, 1874, 13, pl. xxvii, fig. 4.—HENSHAW, 1875, 279.

A counterpart of the eastern Field Sparrow (*S. pusilla*), in its predilection for fields, or any open bushy localities, this species was found in every place adapted to its habits. It was first observed at Sacramento, where it was quite common, inhabiting the bushy fields along with *Chondestes grammacus*, *Coturniculus perpallidus*, and *Sturnella neglecta*. In the sage-brush country, eastward of the Sierra Nevada, it was still more numerous than in the Sacramento Valley; and throughout the entire extent of the Great Basin was everywhere one of the commonest birds of the open wastes, and an almost constant associate of *Oreoscoptes montanus* and the two species of *Amphispiza*.

The resemblance of this species to *S. pusilla* extends no further than to a similarity of general habits, however, for its nest and eggs are extremely different, being more like those of *S. socialis*, while its song is remarkable for vivacity and variety, in this respect fully equaling that of the best Canaries, though it is considerably inferior to the latter in power. It is interspersed throughout with a variety of trills or water-notes, and plaintive chants which resemble somewhat the well-known notes of the Field Sparrow.

List of specimens.

105, ♀ *ad.*; valley of the Truckee, Nevada, July 24, 1867. $5\frac{3}{8}$ — $7\frac{9}{16}$ — $2\frac{7}{8}$ — 2 — $\frac{5}{16}$ — $\frac{5}{8}$ — $2\frac{1}{2}$ — $1\frac{1}{2}$. Bill, pale lilaceous-brown, darker along the culmen; iris, hazel; tarsi and toes, pale brownish flesh-color.

785, nest and eggs (3); Truckee Reservation, June 3, 1868. Nest in sage-bush, about three feet from ground.

810, nest and eggs (2); "Old River" (near sink of Carson), Nevada, June 27, 1868. Nest in sage-bush, about four feet from ground.

834, nest and eggs (3); Austin, Nevada, July 4, 1868. Sage-bush.

874, *ad.*; Ruby Valley, Nevada, August 28, 1868. $5\frac{7}{16}$ — 8 —(?)— $2\frac{1}{8}$. Upper mandible, black, approaching to ashy-lilac on the tomium; lower mandible, lilaceous-ashy; iris, ashy-umber; tarsi and toes, grayish horn-color.

- 1049, 1050, nests and eggs; Salt Lake City, Utah, May 26, 1869. Nests in sage-bushes, about three feet from ground.
- 1059, 1060, nests and eggs (3); Salt Lake City, May 27, 1869.
- 1067, nest and eggs (2); Salt Lake City, May 29, 1869.
- 1077, 1078, nests and eggs (4); Salt Lake City, June 1, 1869.
- 1091, 1097, 1098, 1099, nests and eggs; Antelope Island, Great Salt Lake, June 4, 1869.
- 1115 (3), 1116, 1117, 1118, nests and eggs; Antelope Island, Great Salt Lake, June 5, 1869.
- 1119 (3), 1120 (3), 1121 (3), 1122, nests and eggs; Antelope Island, Great Salt Lake, June 7, 1869.
- 1128, nest and egg (1); Antelope Island, June 7, 1869. Nest in sage-bush.
- 1132, ♀ *ad.*; Antelope Island, June 5, 1869.
- 1137 (3), 1138 (3), 1139, nests and eggs; Antelope Island, June 8, 1869.
- 1152, nest and eggs; Antelope Island, June 9, 1869.
- 1156, nest and eggs (4); southern shore, Great Salt Lake, June 11, 1869.
- All nests in sage-bushes, about three feet from ground.
- 1157, nest and eggs (3); Rabbit Island, Great Salt Lake, June 11, 1868. Nest in grease-wood bush.
- 1164 (4), 1165 (3), 1166 (3), nests and eggs; Salt Lake City, June 14, 1869.
- 1171, 1172, 1173, nests and eggs; Salt Lake City, June 16, 1869.
- 1176 (4), 1177 (2), nests and eggs; Salt Lake City, June 17, 1869.
- 1198, nest and eggs (4); Salt Lake City, June 21, 1869.
- 1236, nest and eggs (2); Salt Lake City, June 23, 1869.
- 1318, nest and eggs (2); Parley's Park, June 27, 1869. Nest in sage-bush.
- 1354, nest and eggs; Parley's Park, June 27, 1869. In sage-bush.
- 1396 (2), 1397 (1), nests and eggs; Parley's Park, July, 1869. Nests in sage-bushes.
- 1406 and 1407, nests; Cash Valley, July, 1869. [J. C. Olmstead.]
- 1466, ♀ *juv.*; Parley's Park, Wahsatch Mountains, Utah, July 28, 1869. 5♂—7♀. Bill, yellowish-lilac, upper half of upper mandible dark plumbeous; iris, brown; tarsi and toes, light brown.
- 1482, ♀ *ad.*; Parley's Park, July 30, 1869. 5♂—7♀.

MELOSPIZA FASCIATA.

Song Sparrow.

β. heermanni.

(See'-hoot'-se-pah of the Paiutes.)

Melospiza heermanni, BAIRD, B. N. Am., 1858, 478; *Ib.*, ed. 1860, 478, pl. 70, fig. 1; Cat. N. Am. B., 1859, No. 364.—COOPER, Orn. Cal., I, 1870, 212.

Melospiza melodia var. *heermanni*, COUES, Key, 1872, 139; Check List, 1873, No. 169d.—B. B. & R., Hist. N. Am. B., II, 1874, 24, pl. XXVII, fig. 9.—HENSHAW, 1875, 282.

Melospiza melodia. a. heermanni, COUES, B. N.W., 1874, 139.

γ. fallax.

Zonotrichia fallax, BAIRD, Pr. Ac. Nat. Sci. Phila., 1854, 119.

Melospiza fallax, BAIRD, B. N. Am., 1858, 481; ed. 1860, 481, pl. 27, fig. 2; Cat. N. Am. B., 1859, No. 367.—COOPER, Orn. Cal., I, 215.

Melospiza melodia var. *fallax*, COUES, Key, 1872, 139; Check List, 1873, No. 169a.—B. B. & R., Hist. N. Am. B., II, 1874, 22, pl. XXVII, fig. 10.—HENSHAW, 1875, 281.

Melospiza melodia. a. fallax, COUES, B. N. W., 1874, 139.

δ. guttata.

Fringilla (Passerella) guttata, NUTTALL, Man., I, 2d ed., 1840, 581.

Melospiza melodia var. *guttata*, COUES, Key, 1872, 139; Check List, 1873, No. 169b.—B. B. & R., Hist. N. Am. B., II, 1874, 27, pl. XXVII, fig. 12.

Melospiza melodia. f. guttata, COUES, B. N. W., 1874, 139.

"*Melospiza rufina*," BAIRD, B. N. Am., 1858, 480; Cat. N. Am. B., 1859, No. 366. [Not *Emberiza rufina*, BRANDT, 1836, = *Melospiza rufina*.]

Speaking of its different races collectively, the Song Sparrow is a widely-distributed bird. The race known as *M. heermanni* was very common in the thickets at Sacramento, and also throughout western Nevada, its eastern limit being, apparently, the West Humboldt Mountains, where the *M. fallax* began to replace it; the latter being the only form found thence to the Wahsatch and Uintah Mountains of Utah. The more northern *M. guttata* was encountered only in the range above mentioned, where a very few individuals were found in the month of October, in the sheltered cañons of the eastern slope. Since *Zonotrichia coronata* was met with in the same locality, it is likely that, as in the case of the latter species, they were not residents, but migrants from the northwestward. Whatever the race, however, the habits, and, so far as we could judge, the notes also, were nearly the same, the geographical modifications in these respects being by no means in proportion to those of form and plumage.

The Song Sparrow was found to be most partial to the dense thickets along streams or in the vicinity of other bodies of water, and was consequently most frequently seen in the lower valleys; indeed, we have no recollection of having observed it at a greater elevation than the meadow-like parks of the Wahsatch Mountains, where the var. *fallax* was abundant among the willows bordering the streams, along with *Passerella schistacea*.

According to our notes it was there confined to the floor of the park, or did not ascend to any great distance up the cañons along the streams. At Sacramento, as well in the river-valleys of western Nevada, it was common among the *tules* or rushes fringing the sloughs and ponds near the larger bodies of water. The species was stationary in all portions of its range, or at least did not perform more than a partial vertical migration, although the fact that individuals of the var. *guttata* were met with in the West Humboldt Mountains would seem to indicate that while the species, collectively, may be found in one locality throughout the year, *individuals* perform more or less of a latitudinal migration.

List of specimens.

β. heermanni.

150 ♀ *ad.*; Humboldt River (Oreana), August 31, 1867. $7-9\frac{1}{4}-3-2\frac{1}{2}-\frac{1}{2}-\frac{7}{8}-3-(2\frac{5}{8})$. Bill, dull liver-brown, the upper mandible darker, nearly black on the culmen; iris, hazel; tarsi and toes, dark liver-brown.

216, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, September 24, 1867. $6\frac{5}{8}-8\frac{1}{8}-2\frac{3}{4}-2\frac{1}{4}-\frac{7}{16}-\frac{1}{8}-2\frac{3}{4}-1\frac{1}{2}$. Bill, blackish hepatic-olive, paler and more slaty on lower mandible; iris, hazel; tarsi and toes, deep purplish horn-color.

236, ♂ *ad.*; Camp 19, October 7, 1867. $6\frac{7}{8}-9-2\frac{7}{8}-2\frac{7}{16}-\frac{7}{16}-\frac{1}{8}-3-1\frac{7}{8}$. Upper mandible, slaty horn-black, lower paler brownish-slaty; iris, hazel; tarsi and toes, pale horn-color.

368, ♂ *ad.*; Truckee Reservation, Nevada, December 25, 1867. $7-9\frac{1}{8}-2\frac{7}{8}-2\frac{7}{16}-\frac{7}{16}-\frac{1}{8}-3\frac{1}{8}-1\frac{1}{2}$. Upper mandible horn-black, paler along tomium; lower, brownish-slaty.

381, ♀ *ad.*; Truckee Reservation, December 26, 1867. $6\frac{1}{4}-8\frac{3}{8}-2\frac{5}{8}-2\frac{1}{8}-\frac{7}{16}-\frac{1}{8}-2\frac{5}{8}-1\frac{3}{8}$. Upper mandible hepatic-black, paler along tomium; lower, lilaceous-brown, with yellowish tinge basally beneath.

382, ♀ *ad.*; Truckee Reservation, December 26, 1867. $6\frac{3}{8}-8\frac{1}{2}-2\frac{3}{4}-2\frac{3}{16}-\frac{7}{16}-\frac{3}{4}-2\frac{7}{8}-1\frac{3}{8}$. Same remarks.

383, ♂ *ad.*; Truckee Reservation, December 26, 1867. $6\frac{3}{4}-8\frac{7}{8}-2\frac{1}{16}-2\frac{3}{8}-\frac{7}{16}-\frac{1}{8}-3-1\frac{1}{2}$. Same remarks.

470, ♂ *ad.*; Carson City, Nevada, March 28, 1868. $6\frac{5}{8}-8\frac{1}{16}-2\frac{7}{8}-2\frac{1}{4}$. Upper mandible, plumbeous-black, tomium paler; lower, dull plumbeous, with lilaceous glow basally and beneath; iris, bister; tarsi, whitish-brown; toes, deeper brown.

479, ♂ *ad.*; Carson, March 30, 1868. $6\frac{3}{8}-8\frac{5}{8}-2\frac{1}{16}-2\frac{5}{16}$. Same remarks.

γ. fallax.

890, *juv.*; Camp 22, Ruby Valley, Nevada, September 4, 1868. $6\frac{1}{8}-8\frac{1}{2}-(?) -2\frac{1}{4}$. Bill, lilaceous ashy-brown, darkest terminally, lower mandible more lilaceous; rictus, pale yellow; iris, very dark sepia; tarsi and toes, dilute lilaceous-sepia, latter pale yellow beneath.

931, ♀ *ad.*; Camp 25, Humboldt Valley, September 16, 1868. $6\frac{3}{4}$ — $8\frac{9}{16}$ —(?)— $2\frac{3}{16}$. Same remarks as to No. 470.

945, ♀ *ad.*; Camp 35, Deep Creek, Utah, October 5, 1868. $6\frac{5}{8}$ — $8\frac{3}{8}$ —(?)— $2\frac{1}{4}$. Same remarks.

946, ♀ *ad.*; Camp 35, Deep Creek, Utah, October 5, 1868. $6\frac{1}{4}$ — 8 —(?)— $2\frac{1}{8}$. Same remarks.

947, ♀ *ad.*; Camp 35, Deep Creek, Utah, October 5, 1868. $6\frac{1}{2}$ — $8\frac{7}{8}$ —(?)— $2\frac{1}{4}$. Same remarks.

948, ♀ *ad.*; Camp 35, Deep Creek, Utah, October 5. $6\frac{5}{8}$ — $8\frac{1}{2}$ —(?)— $2\frac{3}{16}$. Same remarks.

1228, nest and eggs; Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nest among bushes in willow-thicket along stream, about one foot from ground.

1232, nest and eggs (2); Parley's Park, June 23, 1869. Situated like preceding.

1275, nest and eggs (5); Parley's Park, June 24, 1869. Nest in thorn-apple bush along stream, six feet from ground.

1314, nest and eggs (3); Parley's Park, June 27, 1869. Nest in willows by stream.

1327, 1328; nests and eggs (4); Parley's Park, June 28, 1869. Nests in willows.

1363, 1364; nests and eggs (4); Pack's Cañon, Uintah Mountains, July 4, 1869. Nests in willows by stream, about three feet from ground.

1388, 1389; nests; Provo River, Utah, July 10, 1869. Willows.

1391, nest and eggs (3); Provo River, July 11, 1869. Nest in willows by stream.

1405, nest; Bear River Valley, July, 1869. (Collected by Mr. J. C. Olmstead.)

1419, nest and eggs; Parley's Park, July 16, 1869.

1457, ♂ *juv.*; July 26, 1869. $6\frac{5}{8}$ — $9\frac{1}{8}$. Bill, dark hepatic-plumbeous, lower mandible with pinkish flush, the upper almost black on the culmen; iris, brown; tarsi and toes, deep purplish-brown.

1461, nest; Parley's Park, July 26, 1869. Willows by stream.

1465, ♂ *juv.*; Parley's Park, July 28, 1869. $6\frac{7}{8}$ — $8\frac{7}{8}$. Same remarks as to No. 1457.

1475, ♀ *juv.*; July 29, 1869. $6\frac{1}{8}$ — $8\frac{1}{2}$. Same remarks.

1506, ♂ *juv.*; August 13, 1869. $6\frac{1}{2}$ — 9 . Same remarks.

δ. guttata.

223, ♀ *ad.*; Camp 19, October 3, 1867. $6\frac{5}{8}$ — $8\frac{1}{2}$ — $2\frac{11}{16}$ — $2\frac{1}{4}$ — $\frac{9}{16}$ — $\frac{3}{4}$ — $2\frac{7}{8}$ — $1\frac{1}{4}$. Upper mandible horn-black, paler along tomium; lower, horn-blue, darker terminally.

MELOSPIZA LINCOLNI.

Lincoln's Sparrow.

Fringilla lincolni, AUDUBON, Orn. Biog., II, 1834, 539, pl. 193.

Melospiza lincolni, BAIRD, Birds N. Am., 1858, 483; Catal. N. Am. Birds, 1859, No. 368.—COOPER, Orn. Cal., I, 216.—COUES, Key, 1872, 138; Check List, No. 167; Birds N.W., 1874, 135.—B. B. & R., Hist. N. Am. Birds, II, 1874, 31, pl. XXVII, fig. 13.—HENSHAW, 1875, 283.

During the summer we found this species only in the elevated parks of the higher mountain ranges; but during its migrations it was very plenti-

ful in the lower valleys. In Parley's Park it was a rather common summer resident, inhabiting the open slopes or level pieces of ground covered by low shrubs, weeds, and grass, in company with *Zonotrichia leucophrys* and *Poocetes confinis*. We did not hear its song, but its ordinary note was a rather strong *chuck*, much like that of *Passerella schistacea*. In the autumn it was common among the willows along Deep Creek, in northwestern Utah, and in April was quite abundant in the bushy fields at the base of the Sierra Nevada, near Carson City, particularly in places near springs or close by the streams.

List of specimens.

563, ♀ *ad.*; Carson City, Nevada, April 29, 1868. $5\frac{7}{16}$ — $7\frac{7}{8}$ — $2\frac{3}{8}$ —2. Upper mandible, blackish, tomium and lower mandible, dull brownish-ashy; rictus, pale yellow; iris, bister; tarsi and toes, dilute horn-color.

932, ♂ *ad.*; Upper Humdoldt Valley, September 16, 1868. $5\frac{7}{8}$ — $8\frac{1}{8}$ — $2\frac{3}{16}$ — $1\frac{3}{8}$ — $3\frac{1}{8}$ — $2\frac{3}{16}$. Upper mandible, plumbeous-black, the tomium pale yellowish-olive; lower mandible, pale grayish-olive, more yellowish basally; rictus, light yellow; iris, hazel; tarsi, pale brown, toes darker.

949, ♂ *ad.*; Deep Creek, Utah, October 5, 1868. $5\frac{7}{8}$ — $7\frac{7}{8}$ —(?)— $2\frac{1}{8}$. Upper mandible, dull plumbeous-black, tomium and lower mandible, light dull cinereous, more yellowish-lilaceous basally beneath; rictus, pale yellow; iris, sepia-drab; tarsi and toes, pale horn-color.

1276, nest and eggs (4); Parley's Park, Wahsatch Mountains, Utah, June 24, 1869. Nest on ground, beneath prostrate sage-bush, near stream.

PASSERELLA MEGARHYNCHA.

Thick-billed Sparrow.

Passerella megarhyncha, BAIRD, Birds N. Am., 1858, 925, pl. LXIX, fig. 4; Cat. N. Am. Birds, 1859, No. 376a.—COOPER, Orn. Cal., I, 1870, 222.

Passerella townsendi var. *megarhyncha*, B. B. & R., Hist. N. Am. Birds, II, 1874, 57, pl. XXVIII, fig. 10.

Passerella townsendi var. *schistacea*, COUES, Birds N.W., 1874, 162 (part).

This very interesting bird was met with only in the ravines of the Sierra Nevada, near Carson City and Washoe. Unlike *P. schistacea*, it was strictly a migrant, being entirely absent during the winter, and not arriving from the south until about the 20th of April. It was found mostly in damp or swampy places in the lower portion of the mountains, and was particularly numerous where the alders grew abundantly along the streams. In such places they were singing loudly on every hand, and their songs,

when first heard, seemed so similar to those of the Large-billed Water Thrush (*Seiurus ludovicianus*), of the east, that they were mistaken for the notes of that bird, until the singers were seen and the species identified. The song possessed but little resemblance to that of the *P. schistacea*, being so far superior as to be comparable only to that of the bird above mentioned, its chief qualities being great volume and liquidness.

List of specimens.

530, ♂ *ad.*; Carson City, Nevada, April 25, 1868. $7\frac{3}{4}$ — $10\frac{3}{8}$ — $3\frac{1}{2}$ — $21\frac{3}{8}$. General hue of bill, milky lilaceous-white, palest and purest on lower mandible, which has a delicate rosy tint basally beneath; culmen, pale plumbeous-sepia; iris, bistre; tarsi and toes, deep, rather dilute sepia-brown.

531, ♀ *ad.*; Carson City, Nevada, April 25, 1868. 7 — $9\frac{3}{4}$ — $3\frac{1}{8}$ — $2\frac{9}{16}$. Same remarks.

PASSERELLA SCHISTACEA.

Slate-colored Sparrow.

Passerella schistacea, BAIRD, B. N. Am., 1858, 490, pl. LXIX, fig. 3; Cat. N. Am. B., 1859, No. 376.—COOPER, Orn. Cal., I, 1870, 223 (figs. of head and feet).

Passerella iliaca var. *schistacea*, ANLEN, Bull. Mus. Comp. Zool., III, 1872, 168.—COUES, Key, 1872, 147.

Passerella townsendi var. *schistacea*, COUES, Key, 1872, 352; Check List, 1873, No. 189a; B. N.W., 1874, 162.—B. B. & R., Hist. N. Am. B., I^r, 1874, 56, pl. XXVIII, fig. 9.—HENSCHAW, 1875, 293.

This species was first met with at Carson City, Nevada, during its northward migration, which began late in February or early in March, some few individuals having doubtless remained during the winter in the shelter of the dense willow-thickets along the river. The following September it was observed in similar localities in the Upper Humboldt Valley; we may therefore judge that it is found, in proper season, and in suitable localities, throughout the country between the Sierra Nevada and the Wahsatch. During the summer months it was one of the commonest birds in Parley's Park, where it was a constant associate of *Melospiza fallax* in the willow-thickets. It is quite a counterpart of that species in manners and notes, while the nests and eggs are similar to such a degree that it often required the sacrifice of the parent, and always a very close observation, for the positive identification of the species. The ordinary note is a sharp chuck; but the song is scarcely distinguishable from that of *Melospiza fallax*.

List of specimens.

433, ♂ *ad.*; Carson City, Nevada, March 9, 1868. $7\frac{5}{8}$ — $10\frac{1}{4}$ — $3\frac{7}{16}$ — $2\frac{3}{4}$. Upper mandible, olivaceous-sepia, darkest basally, tomium ashy-lilac; rictus and basal two-thirds of lower mandible, bright maize-yellow, deepest beneath; terminal portion, brownish-lilaceous, the point dusky; iris, precisely the color of pectoral spots; tarsi and toes, dilute-sepia.

919, ♂ *ad.*; head of Humboldt Valley (Camp 24), September 11, 1868. $7\frac{3}{8}$ — $10\frac{1}{2}$ —(?)— $2\frac{1}{8}$. Upper mandible, sepia-plumbeous, darker along culmen, more lilaceous along tomium; lower paler, point dusky, the basal half deep maize-yellow; iris, burnt-sienna; tarsi and toes, very deep sepia.

1223, nest and eggs (4); Parley's Park, June 22, 1869. Nest in a bunch of willow sprouts about two feet from the ground, bank of stream.

1225, 1226, 1227, 1229, and 1230, nests and eggs; Parley's Park, June 23, 1869. 1289, nest and eggs; Parley's Park, June 25, 1869. Nests among bushes or willow-stubs in thickets along streams, from one to six feet above the ground.

1460, nest; Parley's Park, July 26, 1869. Nest among willows.

CALAMOSPIZA BICOLOR.

Lark Bunting.

Fringilla bicolor, TOWNSEND, Jour. Acad. Nat. Sci. Philad., VII, 1837, 189.

Calamospiza bicolor, BONAP., Comp. & Geog. List, 1838, 30.—BAIRD, B. N. Am., 1858, 492; Cat. N. Am. B., 1859, No. 377.—COOPER, Orn. Cal., I, 225.—COUES, Key, 1872, 147; Check List, 1873, No. 190; B. N.W., 1874, 163.—B. & R., Hist. N. Am. B., II, 1874, 61, pl. XXIX, figs. 2, 3.—HENSHAW, 1875, 294.

But a single specimen of this species was observed by us, and this was doubtless a straggler from the Great Plains on the eastern side of the Rocky Mountains. The individual in question was on the ground when shot, its appearance and manners being quite similar to those of *Chondestes grammacus*. On the plains just east of the town of Cheyenne, we noticed in August, from the car-windows, numerous large flocks of this species, startled by the approach of the train, the flocks rising from the grass on either side, and wheeling about in their flight in the irregular manner of Horned Larks (*Eremophila*).

List of specimens.

1477, ♂ *juv.*; Parley's Park, July 30, 1869. $7\frac{1}{4}$ — $11\frac{1}{2}$. Bill, ashy-white; upper half of upper mandible, pale ash, gonys with pinkish glow; iris, brown; tarsi and toes, purplish-brown.

HEDYMELES MELANOCEPHALUS.

Black-headed Grosbeak.

(*Look'-em* of the Washoes; *Uni-gu'-eet* of the Paiutes.)

Guiraca melanocephala, SWAINSON, Philos. Mag., I, 1827, 438.—BAIRD, Birds N. Am., 1858, 498; Cat. N. Am. Birds, 1859, No. 381.—COOPER, Orn. Cal., I, 1870, 228.

Hedymeles melanocephalus, CABANIS, Mus. Hein., I, 1851, 153.—B. B. & R., Hist. N. Am. Birds, II, 1874, 73, pl. xxx, figs. 1, 2.—HENSHAW, 1875, 296.

Goniaphea (Hedymeles) melanocephala, GRAY, Hand List, I, 1869, No. 7547.

Goniaphea melanocephala, COUES, Key, 1872, 149; Check List, 1873, No. 194; Birds N.W., 1874, 167.

This fine bird was quite abundant in the fertile valleys and lower cañons along the entire route, from Sacramento to the Wahsatch and Uintahs. Its range was exactly that of *Cyanospiza amæna*, and it was observed that in the Interior both these species reached their upper limit about where the summer range of *Pyranga ludoviciana* commenced, viz, about the middle portion of the cañons. It was abundant both at Sacramento and in the valley of the Truckee, in western Nevada, but was nearly restricted in the former locality to the willow thickets, while in the latter it preferred the shrubbery of buffalo-berry and other bushes. At the latter locality it was observed to feed, in May, upon the buds of the grease-wood (*Obione confertifolia*), in company with *Pyranga ludoviciana*, *Icterus bullocki*, and several other birds. It was also found in the shrubbery along the lower portion of the mountain-streams, but was there less numerous than in the river-valleys, while at an altitude of about 7,000 feet it appeared to be entirely absent. It was consequently rare in Parley's Park, where, however, a few pairs were nesting in the thickets along the streams. It was very frequently observed that the male of this species assists in incubation, being, in fact, more often seen on the nest than his mate.

This species appears to be a perfect counterpart of the eastern Rose-breasted Grosbeak (*H. ludovicianus*), its notes especially, in all their variations, being quite the same.

List of specimens.

21, nest and eggs (3); Sacramento, California, June 11, 1867. Nest in willow, about ten feet from ground. *Male on nest when found.*

22, ♀ *ad.* (parent of eggs No. 21); Sacramento, California, June 11, 1867. $8\frac{1}{2}$ — $13\frac{1}{4}$ — $3\frac{1}{2}$ — $\frac{3}{4}$ — $\frac{7}{8}$ — $3\frac{1}{4}$ —2. Upper mandible, slate-color, lower bluish-white, with tinge of lilaceous beneath; iris, dark hazel; tarsi and toes, pure light ashy-blue.

32, ♂ *ad.*; Sacramento, June 12, 1867. $8\frac{1}{2}$ — $12\frac{1}{4}$ — $4\frac{1}{8}$ — $3\frac{5}{16}$ — $\frac{3}{4}$ — $\frac{7}{8}$ — $3\frac{1}{8}$ — $1\frac{3}{8}$. Same remarks.

173, ♂ *juv.*; West Humboldt Mountains, September 7, 1867. $8\frac{3}{8}$ — $12\frac{3}{4}$ — $4\frac{3}{16}$ — $3\frac{7}{16}$ — $\frac{3}{4}$ — $\frac{7}{8}$ — $3\frac{1}{8}$ — $1\frac{3}{8}$. Same remarks.

564, ♂ *ad.*; Truckee Reservation, May 15, 1868. $8\frac{11}{16}$ — $13\frac{1}{8}$ —(?)— $3\frac{1}{2}$. Same remarks.

804, nest and eggs (3); Truckee River, June 6, 1868. Nest in buffalo-berry thicket.

964, ♂ *ad.*; Salt Lake City, Utah, May 20, 1869.

1036, ♂ *ad.*; Salt Lake City, Utah, May 24, 1869. $8\frac{1}{8}$ — $12\frac{7}{8}$. Upper mandible, slate-color, lower bluish-white; iris, brown; tarsi and toes, plumbeous.

1062, ♂ *ad.*; Salt Lake City, May 27, 1869. $8\frac{1}{8}$ — $12\frac{5}{8}$.

1300, nest and eggs (3); Parley's Park, Wahsatch Mountains, Utah, June 27, 1869. Nest in willows along stream. *Male on nest.*

1324, nest; Parley's Park, June 28, 1869. Nest in a willow copse.

1399, eggs; Cash Valley, Utah, July, 1869. [J. C. Olmstead.]

1474, ♀ *juv.*; Parley's Park, July 29, 1869. $8\frac{1}{8}$ — $12\frac{3}{8}$. Bill, dull lead-color, darker on culmen, lighter and more pinkish toward gonys; iris, brown; tarsi and toes, ashy-blue.

GUIRACA CÆRULEA.

Blue Grosbeak.

Loxia cærulea, LINN., Syst. Nat., I, 1766, 306.

Guiraca cærulea, SWAINS., Philos. Mag., I, 1827, 438.—BAIRD, Birds N. Am., 1858, 499; Cat. N. Am. Birds, 1859, No. 382.—COOPER, Orn. Cal., I, 1870, 230.—B. & R., Hist. N. Am. Birds, II, 1874, 77, pl. XXIX, figs. 4, 5.—HENSHAW, 1875, 298.

Goniaphea cærulea, SCLATER, Proc. Zool. Soc. Lond., 1856, 301.—COUES, Key, 1872, 149, fig. 93; Check List, 1873, No. 195; Birds N.W., 1874, 169.

The Blue Grosbeak was met with only at Sacramento, where it was a very common bird in the bushy fields in the outskirts of the city. The distribution of this species is quite remarkable, it being more or less common on both coasts northward as far, at least, as the parallel of 40°, but of exceedingly rare occurrence in the Interior, except along the southern border. This fact seems equally true of the eastern half of the continent as of the western, for there are few local lists pertaining to the Missis-

issippi Valley which include it, while on the Atlantic coast it is more or less common, locally, north to New Jersey, having even been taken in the eastern portion of Maine! Its distribution seems, therefore, not to be governed strictly by climatic conditions, but the facts adduced rather seem to indicate a somewhat littoral range for the species.

At Sacramento this species was found in the same localities with *Cyanospiza amœna*, it being as characteristic of the edges of the copses of young cotton-woods as was *Hedymeles melanocephalus* of the willow thickets.

List of specimens.

18, 19, nests and eggs (3); Sacramento, California, June 11, 1867.

20, ♀ *ad.* (parent of No. 18); Sacramento, California, June 11, 1867. 7—10 $\frac{3}{4}$ —3 $\frac{1}{2}$ —21 $\frac{5}{16}$ — $\frac{5}{8}$ —1 $\frac{1}{16}$ —2 $\frac{7}{8}$ —1 $\frac{1}{2}$. Upper mandible, dark bluish horn-color, lower light, somewhat lilaceous, ashy-white; iris, hazel; tarsi and toes, horn-color.

44, ♂ *ad.*; Sacramento, June 17, 1867. 7 $\frac{1}{2}$ —11 $\frac{1}{4}$ —3 $\frac{5}{8}$ —3 $\frac{1}{4}$ — $\frac{5}{8}$ — $\frac{5}{8}$ —3—1 $\frac{1}{2}$. Upper mandible blackish-slate, lower light plumbeous-blue; iris, hazel; tarsi and toes, plumbeous-brown.

51, nest and eggs (3); Sacramento, California, June 18, 1867.

82, nest and eggs (3); Sacramento, California, June 24, 1867.

91, nest and eggs (3); Sacramento, California, June 29, 1867.

Nests all similarly situated, being placed about six feet from ground, in small cotton-woods, in edge of copse.

CYANOSPIZA AMÆNA.

Lazuli Bunting.

Emberiza amœna, SAY, Long's Exped., II, 1823, 47.

Cyanospiza amœna, BAIRD, B. N. Am., 1858, 504; Cat. N. Am. B., 1859, No. 386.—COOPER, Orn. Cal., I, 1870, 233.—COUES, Key, 1872, 149; Check List, 1873, No. 198; B. N.W., 1874, 170.—B. B. & R., Hist. N. Am. B., II, 1874, 84, pl. xxx, figs. 11, 12.—HENSHAW, 1875, 300.

This pretty little Bunting was a very common species in all the fertile valleys, as well as in the lower cañons of the mountains, its range being co-extensive with that of *Hedymeles melanocephalus*. Like its eastern congener, *C. cyanea*, of which it is a perfect counterpart in habits, manners, and notes, it frequents bushy places only; but it avoids the sage-brush tracts, and resorts to the more thrifty shrubbery in the vicinity of the streams.

List of specimens.

9, nest and egg (1); Sacramento, California, June 8, 1867. Nest on extremity of drooping branch of small oak, in grove, about four feet from ground.

38, nest and eggs; Sacramento, June 12, 1867. Nest in bush.

92, nest and eggs; Sacramento, June 29, 1867. Nest in bush.

99, nest and eggs (2); Hunter's Station, Nevada, July 1, 1867. Nest in bush, along stream.

835, nest and eggs (3); Austin, Nevada, July 4, 1868. Nest in wild-rose brier, along stream in cañon.

850, ♀ *ad.*; East Humboldt Mountains, July 21, 1868. $5\frac{5}{8}$ — $8\frac{3}{4}$ —(?)— $2\frac{3}{8}$. Upper mandible, black, tomium pale bluish; lower, pale blue, point blackish; iris, dark vandyke; tarsi and toes, dull sepia.

962, ♂ *ad.*; Salt Lake City, May 20, 1869. $5\frac{1}{8}$ — $9\frac{1}{8}$. Bill, generally deep black, lower mandible plumbeous, strip of black on gonys; iris, dark brown; tarsi and toes, deep black.

1063, ♂ *ad.*; Salt Lake City, Utah, May 27, 1869. $5\frac{5}{8}$ — $9\frac{1}{8}$. Upper mandible, black; lower, bluish-white, a streak of black on the gonys (a constant feature in adult males); iris, brown; tarsi and toes, sepia-black.

1237, nest and eggs (3); Parley's Park, Utah, June 23, 1869. Nest in wild-rose brier, by stream.

1303, nest and eggs (4); Parley's Park, Utah, June 27, 1869. Nest in bush near stream.

1357, nest and eggs (4); Parley's Park, July 2, 1869. Nest among rose-bushes, by stream.

1418, nest and eggs; Parley's Park, July 16, 1869.

PIPILO MACULATUS.

Western Towhee.

β. megalonyx—Long-clawed Ground Robin.

Pipilo megalonyx, BAIRD, B. N. Am., 1858, 515, pl. LXXIII; Cat. N. Am. B., 1859, No. 394.—COOPER, Orn. Cal., I, 1870, 242.

Pipilo maculatus var. *megalonyx*, COUES, Key, 1872, 152; Check List, 1873, No. 205b.—B. B. & R., Hist. N. Am. B., II, 1874, 113, pl. XXXI, fig. 12.—HENSHAW, 1875, 303.

γ. oregonus—Oregon Ground Robin.

Pipilo oregonus, BELL, Ann. Lyc. N. H., New York, V, 1852, 6.—BAIRD, B. N. Am., 1858, 513; Cat. N. Am. B., 1859, No. 302.—COOPER, Orn. Cal., I, 241.

Pipilo maculatus var. *oregonus*, COUES, Key, 1872, 152; Check List, 1873, No. 205. B. B. & R., Hist. N. Am. B., II, 1874, 116, pl. XXI, fig. 9.

Of the western species of this genus, which resemble in their general markings the *P. erythrophthalmus* of the East, three definable forms have been recognized, these representing separate geographical areas, and thus corresponding to what are termed geographical, or climatic, races.¹ These

¹Typical *maculatus*, representing a fourth race, inhabits the table-lands of Mexico; additional forms are, *P. carmani*, Baird, of Socorro Island, and *P. consobrinus*, Ridgway, of Guadalupe.

forms are sufficiently easy to recognize in typical or extreme specimens, but such constitute so small a proportion of the number usually embraced in collections, that if called upon to define these supposed races by trenchant characters, it is very doubtful whether we could succeed to our own satisfaction, while the concurrence of others could scarcely be expected. This is especially the case with regard to the *oregonus* and *megalongyx* types, both of which came under our observation in the field. Judging from the specimens alone, of these two forms, we should not think of recognizing two races in the series before us, for it is absolutely impossible to distinguish certain specimens obtained in western Nevada from others taken in Utah. But since the notes of the birds of the two localities were so extremely dissimilar as to really astonish us upon the discovery of the fact, we cannot ignore this difference between the birds of the two districts; this, therefore, is our reason for arranging their synonymy as above.

In their manners and general appearance these western Ground Robins call at once to mind the eastern Towhee (*P. erythrophthalmus*), for they have the same colors (with merely minor differences, not distinguishable at a distance), the same flirting flight, while they are inseparably attached to the most bushy localities. But in direct contrast to the familiar eastern species, we found the western Towhee to be everywhere one of the very shiest birds of the country. The notes, too, are most remarkably different, since none of them are in the least attractive, but, on the contrary, simple and rude almost in the extreme.

The Oregon Ground Robin was found from Sacramento to the West Humboldt Mountains, it being equally common on both sides of the Sierra Nevada. Within the Great Basin, its range was strictly confined to the valleys and connecting cañons of the western depression, while it was abundant in proportion to the proximity of a locality to the Sierra. In summer it was generally distributed—that is, included the lower cañons of the mountains in its range, as well as the river-valleys; but in winter, it appeared to make a more or less extensive vertical migration, nearly, if not quite, forsaking the mountain localities. At Sacramento, it frequented the thickets around the border of fields in the outskirts of the city, in the same places as those inhabited by the Yellow-breasted Chat and Song Sparrow

(*Icteria longicauda* and *Melospiza heermanni*); and in the lower fertile valleys of the Interior, as those of the Truckee and Carson rivers, it chose similar localities along the river-banks. It was extremely rare in the fertile mountain cañons, excepting their lower portions, being far from common in the vicinity of our camps in the West Humboldt range. It was nowhere else so numerous as along the eastern base of the Sierra Nevada, near Carson City, where it was the most abundant bird among the scattered scraggy shrubs of dwarf-plum (*Prunus demissa?*) mixed with currant bushes, which grew plentifully in the old fields just below the commencement of the pine timber. There it was found chiefly during the spring, summer, and autumn, none having been observed during the coldest part of the winter, at which time they had sought shelter in the dense willow thickets in the river-valleys. About the middle of February, however, they began returning to their summer haunts at the foot of the mountains, and were observed, at first sparingly, in the locality described above, as well as in the dense chaparral of laurel (*Ceanothus velutinus*) and manzanita (*Arctostaphylos glauca*) on the sides of the ravines. Up to about the 9th of March they were nearly silent, their only note being a very common-place *teish*, uttered usually in an impertinent tone. At about the above date, however, the males commenced to sing, or rather to utter their rude trill, during the delivery of which the performer occupied a conspicuous position, as the summit of a tall bush or the top of a high rock, where he sat for an hour at a time, as he performed his part in the morning chorus, the black and white of his markings contrasting boldly, and his form clearly defined against the blue sky. The quality of the performance, however, it seemed to us, by no means justified such ostentation, for it amounted to no more than a rude trill, so simple as not to deserve the name of song, notwithstanding the frequency of its repetition and the earnestness of the performer. None of the few notes uttered by this bird bear the remotest resemblance to those of the eastern species (*P. erythrophthalmus*), although the spring-call described above may be compared to the final trill of the very creditable performance of the latter bird. At all times this bird was excessively shy—another striking contrast to its eastern relative—and was thus extremely difficult to procure, seldom allowing one to approach within gunshot; if too closely followed, flitting in its peculiar manner, for

short distances at a time, over the bushes, flirting the expanded white-tipped tail at each heavy beat of the wings.

Eastward of the West Humboldt Mountains, few Ground Robins were observed until we arrived at Salt Lake City; indeed, none were seen except at our camp near Austin, in the Toyabe Mountains, and in the eastern cañons of the Ruby range, at both of which places they were so extremely rare that we could not determine the race.¹ At Salt Lake City, however, we found the species again very abundant, even more so than at Carson City, and also inhabiting the chaparral on the foot-hills, which in this case consisted of scrub-oaks instead of manzanita, laurel, and wild-plum bushes. It was noticed immediately, however, that while to all appearance they were the same birds as those found near Carson City, they uttered totally different notes, which we found to agree perfectly with Dr. Coues' description in his "Prodrome," a fact which impressed us at once, for we had previously striven in vain to detect in the notes of the birds of this species at Carson the *remotest* resemblance to any uttered by the Cat-bird or the "Dickcissel" (*Euspiza*)²; and since in their characters the specimens agreed perfectly with the diagnosis of *megalonyx*, we had considered the description of the notes above referred to as erroneous, and were thus glad to find so satisfactory a relief from our dilemma. Instead of the rude, rather suppressed *teish* with which we had been familiar, a sharp *mew* was heard, scarcely distinguishable from the notes of the Cat-bird, found in the same locality; and the song was a very decided improvement on that of the western individuals, for, instead of a short, simple trill, apparently "strained out" after considerable effort, these trills were multiplied and connected by other notes, so that a passable song resulted. There was still no approach to the notes of *P. erythrophthalmus*, however, excepting a very slight one in the song; but the habits of the birds were much less shy, though they were far from being so confidently familiar as the very tame eastern species.

¹ Judging from the circumstance that accessions from the Rocky Mountain fauna were first encountered at these two localities, it seems most probable that the Ground Robins met with were also the Rocky Mountain form—*P. megalonyx*.

² "Ordinary call-note almost exactly like that of *Mimus carolinensis*; the song a rather harsh and monotonous repetition of four or six syllables, something like that of *Euspiza americana*."—Pr. Ac. Nat. Sci., 1866, p. 89.

*List of specimens.**β. megalonyx.*

956, nest and eggs (2); Salt Lake City, May 20, 1869. Nest on ground, among scrub-oaks on hill-side.

957, nest and eggs (3); Salt Lake City, May 20, 1869. Same remarks.

958, ♂ *ad.*; Salt Lake City, Utah, May 20, 1869. $8\frac{1}{2}$ — $10\frac{7}{8}$. Bill, pure black; iris, red-lead color; tarsi and toes, slaty-sepia.

1023, ♂ *ad.*; Salt Lake City, May 24, 1869. $8\frac{1}{8}$ —11. Bill, pure black; iris, intense scarlet; tarsi, purplish-sepia, toes darker.

1034, ♂ *ad.*; Salt Lake City, May 24, 1869. $8\frac{3}{4}$ — $11\frac{1}{2}$. Same remarks.

1035, ♂ *ad.*; Salt Lake City, May 24, 1869. $8\frac{1}{2}$ —11. Same remarks.

1043, nest and eggs (4); Salt Lake City, May 24, 1869. Nest on ground, beneath sage-bush.

1069, ♀ *ad.*; Salt Lake City, May 29, 1869. $8\frac{5}{8}$ —11. Same remarks.

1096, nest and eggs (4); Antelope Island, Great Salt Lake, June 4, 1869. Side of ravine. Nest on ground, beneath sage-bush.

1185, nest and eggs (3); Salt Lake City, June 18, 1869. Nest on ground, among scrub-oaks.

1186, nest and eggs (3); Salt Lake City, June 18, 1869. Nest on ground, beneath uprooted oak in thicket.

γ. oregonus.

35, nest and eggs (3); Sacramento City, California, June 12, 1867. Nest on ground, beneath fallen dead thistle, in thick cotton-wood copse.

199, ♂ *ad.*; West Humboldt Mountains, Nevada, September 20, 1867. $8\frac{5}{8}$ — $10\frac{3}{4}$ — $3\frac{9}{16}$ — $3\frac{1}{2}$ — $7\frac{1}{2}$ — $4\frac{1}{2}$ — $2\frac{3}{4}$. Bill, blackish-slate, commissure and lower mandible inclining to ashy; iris, deep brownish vermilion-red; tarsi and toes, dark horn-color.

222, ♀ *ad.*; West Humboldt Mountains, October 3, 1867. $8\frac{5}{8}$ — $10\frac{5}{8}$ — $3\frac{1}{2}$ — $2\frac{7}{8}$ — $1\frac{1}{2}$ — $4\frac{1}{2}$ — $2\frac{1}{2}$. Bill, black, lower mandible inclining to dusky slate, paler basally; iris, light hazel-red; tarsi and toes, deep purplish horn-color.

227, ♂ *ad.*; West Humboldt Mountains, October 4, 1867. $8\frac{5}{8}$ — $11\frac{1}{8}$ — $3\frac{3}{4}$ — $3\frac{1}{16}$ — $\frac{9}{16}$ — $1\frac{3}{16}$ — $4\frac{3}{16}$ — $1\frac{3}{4}$. Bill, slate-black, ashy on lower mandible; iris, light brownish-yellow; tarsi and toes, light horn-color.

235, ♂ *ad.*; West Humboldt Mountains, October 7, 1867. $8\frac{5}{8}$ — $10\frac{3}{16}$ — $3\frac{1}{2}$ — $2\frac{7}{8}$ — $\frac{9}{16}$ — $1\frac{5}{16}$ — $4\frac{1}{2}$. Iris, deep rufous.

434, ♀ *ad.*; Carson City, Nevada, March 9, 1868. $8\frac{1}{2}$ — $10\frac{1}{2}$ — $3\frac{1}{4}$ — $2\frac{3}{4}$. Bill, slate-black; iris, intense orange-chrome; tarsi and toes, dilute purplish-sepia, the toes with a violaceous cast.

476, ♂ *ad.*; Carson City, March 30, 1868. $8\frac{5}{8}$ — $11\frac{3}{8}$ — $3\frac{5}{8}$ —3. Bill, perfectly uniform, slaty black; iris, rich scarlet.

495, ♂ *ad.*; Carson City, April 4, 1868. $8\frac{5}{8}$ —11— $3\frac{5}{8}$ —3. Same remarks.

[In the western species, the iris when intense red—indicating high maturity—is never of the carmine shade often seen in *erythrophthalmus*, but inclines more to scarlet or orange-red.]

PIPILO CHLORURUS.

Green-tailed Bunting.

(*Pooe-tse'-tse* of the Washoes.)

"*Fringilla chlorura*, TOWNSEND," AUDUBON, Orn. Biog., V, 1839, 336.

Pipilo chlorurus, BAIRD, Birds N. Am., 1858, 519; Cat. N. Am. Birds, 1859, No. 398.—COOPER, Orn. Cal., I, 248.—COUES, Key, 1872, 153; Check List, 1873, No. 208; Birds N.W., 1874, 176.—B. B. & R., Hist. N. Am. Birds, II, 1874, 131, pl. XXXI, fig. 4.—HENSHAW, 1875, 307.

This very interesting species was met with on all the higher ranges, from the Sierra Nevada to the Uintahs, particularly in the elevated parks and cañons, where it was one of the most characteristic birds. We never observed it at a lower altitude than the beginning of the cañons, or, as happened rarely, in ravines of the foot-hills, while, in the river-valleys, it appeared to be entirely wanting. It is apparently migratory, as none were observed between the months of September and April, and in its passage to and from the south appears to follow the mountain ranges without performing sufficient vertical migration to reach the lower valleys. In the cañons of the lofty Toyabe Mountains, near Austin, this species was exceedingly abundant in the early part of July; it was also very common in the higher cañons and elevated garden-like slopes of the Ruby range, while in similar places near the station of Evanston, on the high Uintahs, numbers were heard singing on every hand during our brief stay there, in the month of May. Like its congeners, this species is a bird of the chaparral, living chiefly in the brushwood of the cañons and ravines; but it is also found among the rank herbage of those flowery slopes so characteristic of the higher portions of that mountainous region.

In the position of its nest there was a rather unusual uniformity of habit manifested, especially by the birds of one locality; thus, those found at Austin were all placed in the thickest part of low bushes of the *Symphoricarpus montanus*, at a height of eighteen inches to two feet above the ground; the same was usually the case in Parley's Park, although sometimes other shrubs, as wild-currant bushes, were selected. The maximum number of eggs found in a nest was four.

The song of this bird is possessed of great strength and clearness, as well as considerable variety, approaching most nearly that of the Bay-winged Bunting (*Poocetes gramineus*) in style, tone, and modulation. It is louder, however, and more continued, though in the latter respect it is far inferior to that of *Chondestes grammaca*. The ordinary note is remarkably sweet, sounding like a laughing pronunciation of the syllables *keek*, *keek'*, very much in the tone of the *tweet* of a Canary-bird; this note is uttered on the approach of anyone, when the bird hops familiarly about the stranger, without manifesting any symptoms of uneasiness at his presence, but rather expressing pleasure in its notes.

List of specimens.

169, ♀ *ad.*; Camp 18, West Humboldt Mountains, Nevada, September 7, 1867. $7\frac{1}{8}$ —10— $3\frac{3}{8}$ — $2\frac{5}{8}$ — $\frac{9}{8}$ — $\frac{1}{8}$ — $3\frac{1}{4}$ — $1\frac{1}{2}$. Upper mandible, slate-black, tomium bluish-white; lower, bluish-white, almost milk-white at the base; *iris*, *purplish-rufous*; tarsi, and toes, bluish horn-color.

532, ♂ *ad.*; Carson City, Nevada, April 25, 1868. $7\frac{1}{8}$ — $10\frac{1}{4}$ — $3\frac{7}{8}$ — $2\frac{3}{4}$. Upper mandible, black, tomium plumbeous-blue; lower, pure pale plumbeous-blue, tip black; *iris*, *deep purplish-ferruginous* (very similar to color of crown); tarsi, dilute whitish-sepia; toes, deeper sepia.

817 (4), 818 (3), nests and eggs; Austin, Nevada, July 2, 1868.

822 (4), 823 (4), 824 (2), 825 (2), 826 (2), nests and eggs; Austin, Nevada, July 3, 1868.

929, ♂ *ad.*; Camp 25, Humboldt Valley, September 16, 1868. $7\frac{1}{2}$ —10—(?)— $2\frac{5}{8}$. Same remarks.

959, ♀ *ad.*; Salt Lake City, May 20, 1869. $7\frac{1}{2}$ — $9\frac{3}{4}$. Upper mandible and gonyes, black, lower pale blue; *iris*, raw-sienna; tarsi, lilaceous sepia, toes darker, more plumbeous-sepia.

1052, ♂ *ad.*; Salt Lake City, Utah, May 26, 1869. $7\frac{5}{8}$ —10. Upper mandible, plumbeous-black, lower plumbeous-blue; *iris*, *cinnamon*; tarsi, pale brown; toes, darker.

1234, 1235, nests and eggs (3); Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Thick low bush, by stream.

1274, nest and eggs (3); Parley's Park, Wahsatch Mountains, Utah, June 24, 1869. Thick low bush, by stream.

1295, nest and eggs (3); Parley's Park, Wahsatch Mountains, Utah, June 25, 1869. Nest on ground, beneath bush.

1313, nest and eggs (3); Parley's Park, Wahsatch Mountains, Utah, June 27, 1869. Nest on ground, beneath bush.

1320 (4), 1321 (2), nests and eggs; Parley's Park, Wahsatch Mountains, Utah, June 27, 1869. Bushes by stream.

1325 (4), 1326 (2), nests and eggs; Parley's Park, Wahsatch Mountains, Utah, June 28, 1869. Bushes by stream.

1478, ♂ *juv.*; Parley's Park, July 30, 1869. $7\frac{3}{4}$ — $10\frac{1}{8}$. General hue of bill, livid slate, pinkish along the tomium and base beneath; *iris*, *ashy-umber*; tarsi and toes, deep horn.

1479, ♀ *juv.*; Parley's Park, July 30, 1869. $7\frac{1}{2}$ — $9\frac{3}{8}$. Same remarks.

PIPILO CRISSALIS.

Brown Bunting.

Fringilla crissalis, VIGORS, Zool. Beechey's Voyage, 1839, 19.

Pipilo fuscus var. *crissalis*, COUES, Key, 1872, 153; Check List, 1873, No. 206b. B. B. & R., Hist. N. Am. Birds, II, 1874, 122, pl. XXXI, fig. 8.

Pipilo fuscus, BAIRD, Birds N. Am., 1858, 517 [not of SWAINSON, Philos. Mag., I, 1827]; Cat. N. Am. Birds, 1859, No. 396.—COOPER, Orn. Cal., I, 1870, 245.

This large Bunting was noticed only during our ascent of the western slope of the Sierra Nevada, the species being easily recognized by its large size and uniform tawny color. It was first encountered in the ravines of the lowest foot-hills, and was continually observed among the thickets and chaparral by the roadside until the pine-forest grew dense and closed in to the roadside, after which none were seen. It appeared to be a very silent species, since no notes were heard.

FAMILY ALAUDIDÆ—LARKS.

EREMOPHILA ALPESTRIS.

Horned Lark; Shore Lark.

α. alpestris.

Alauda alpestris, FORSTER, Philos. Trans., LXII, 1772, 398.

Eremophila alpestris, BOIE, Isis, 1828, 322.—COUES, Key, 1872, 89, fig. 32; Check List, 1873, No. 53.—HENSHAW, 1875, 309.

Eremophila alpestris var. *alpestris*, B. B. & R., Hist. N. Am. B., II, 143, pl. XXXII, figs. 1, 2.

Eremophila alpestris. α. alpestris, COUES, B. N.W., 1874, 37.

Alauda cornuta, WILSON, Am. Orn., I, 1808, 87 (in text).

Eremophila cornuta, BOIE, Isis, 1828, 322.—BAIRD, B. N. Am., 1858, 403; Cat. N. Am. B., 1859, No. 302.

β. leucolæma.

? *Otocorys occidentalis*, MCCALL, Pr. Philad. Acad. Nat. Sci., V, 1851, 218 (*juv.*?). —BAIRD, Stansbury's Salt Lake, 1852, 318.

Eremophila alpestris var. *leucolæma*, COUES, B. N.W., 1874, 38.—HENSHAW, 1875, 309.

γ. chrysolæma.

Alauda chrysolæma, WAGLER, Isis, 1831, 350.

Eremophila cornuta var. *chrysolæma*, BAIRD, B. N. Am., 1858, 403.

Eremophila alpestris var. *chrysolæma*, COUES, Key, 1872, 89; Check List, 1873, No. 53a.—B. B. & R., Hist. N. Am. B., II, 1874, 144.—HENSHAW, 1875, 310.

Eremophila alpestris. c. chrysolæma, COUES, B. N.W., 1874, 38.

Eremophila cornuta, COOPER, Orn. Cal., I, 1870, 251 (part).

Few birds are more widely distributed than this one; and if the sagebrush deserves the title of "everlasting," from its abundance and uniform distribution, it would be as proper to designate this species as "omnipresent," so far as the more open portions of the western country are concerned. No locality is too barren for it, but, on the contrary, it seems to fancy best the most dry and desert tracts, where it is often the only bird to be seen over miles of country, except an occasional Dove (*Zenaidura carolinensis*), or a solitary Raven, seen at wide intervals. Neither does altitude appear to affect its distribution, except so far as the character of the ground is modified, since we saw them in July and August on the very summit of the Ruby Mountains, at an altitude of about 11,000 feet, the ground being pebbly, with a stunted and scattered growth of bushes. The small, deep-colored race known as *chrysolæma* was the usual form found in summer, but in winter most of these seemed to have migrated southward, their place being taken by flocks from the north, composed of migratory individuals of the races called *alpestris* and *leucolæma*, of which the former predominated.

*List of specimens.**α. alpestris* and *β. leucolæma*.¹

148, ♂ *ad.*; valley of the Humboldt (Camp 17), August 21, 1867. $7\frac{1}{4}$ — $12\frac{5}{8}$ — $4\frac{1}{8}$ — $3\frac{1}{2}$ — $7\frac{7}{8}$ — 3 — $2\frac{7}{8}$ — $1\frac{1}{6}$. Bill, plumbeous-black, basal half of lower mandible pearl-white; iris, umber; tarsi and toes, purplish-cinereous.

232, ♂ *ad.*; West Humboldt Mountains (Camp 19), October 4, 1867. $7\frac{1}{8}$ — $12\frac{1}{2}$ — $4\frac{1}{4}$ — $3\frac{5}{8}$ — $2\frac{1}{2}$ — $2\frac{1}{4}$ — $2\frac{1}{6}$ — $1\frac{5}{6}$. Tarsi and toes, plumbeous-black.

¹ We include the specimens of these two races together for the reason that they are not distinguished in our note-books, while the specimens themselves are not accessible at the present time. All the examples referable to these two races were collected in autumn or winter, during their migrations southward. Throughout the winter they were found in large flocks, frequenting all open places, and in severe weather daily venturing into the streets and door-yards of the towns. During the winter-season the present, or northern-bred, birds nearly replace the summer-resident, var. *chrysolæma*, though sometimes individuals of the latter may be shot from a large flock.

302, ♀ *ad.*; Truckee Meadows, November 19, 1867. $7\frac{1}{16}$ —13— $4\frac{3}{8}$ — $3\frac{1}{2}$ — $\frac{1}{2}$ — $1\frac{1}{16}$ —3— $\frac{7}{8}$. Tarsi and toes, livid-black.

395, ♂ *ad.*; Washoe Valley, January 3, 1868. $7\frac{1}{4}$ —13— $4\frac{5}{16}$ — $3\frac{1}{2}$. Bill, plumbeous-black, basal two-thirds of lower mandible abruptly, bluish-white; iris, umber; tarsi and toes, deep black.

397, ♂ *ad.*; Washoe Valley, January 3, 1868. $7\frac{1}{2}$ — $13\frac{5}{8}$ — $4\frac{5}{8}$ — $3\frac{3}{4}$. Same remarks.

417, ♂ *ad.*; Washoe Valley, January 3, 1868. $7\frac{5}{16}$ — $13\frac{1}{8}$ — $4\frac{1}{8}$ — $3\frac{1}{2}$. Same remarks.

γ. chrysolaema.

394, ♂ *ad.*; Washoe Valley, Nevada, January 3, 1868. 7 — $13\frac{1}{4}$ — $6\frac{3}{8}$ — $3\frac{5}{8}$ — $\frac{7}{16}$ — $1\frac{3}{16}$ — $2\frac{3}{4}$ — $\frac{7}{8}$. Bill, *plumbeous-white*, culmen and terminal third slaty; iris, umber; *tarsi*, *reddish-sepia*, toes, more blackish, yellow beneath (much as in *Anthus ludovicianus*).

396, ♀ *ad.*; Washoe Valley, Nevada, January 3, 1868. $6\frac{1}{2}$ — $11\frac{5}{8}$ — $3\frac{1}{16}$ — $3\frac{1}{4}$. Same remarks.

398, ♂ *ad.*; Washoe Valley, Nevada, January 3, 1868. 7 — $12\frac{1}{2}$ — $4\frac{1}{4}$ — $3\frac{3}{8}$. Same remarks.

784, nest and eggs (4); Truckee Reservation, June 3, 1868. Nest imbedded in hard gravelly ground, beneath small scraggy sage-bush, on *mesa* between river and mountains.

819, nest and eggs (3); Fort Churchill, Nevada, June 24, 1868. Nest on ground, underneath sage-bush.

1032, ♂ *ad.*; Salt Lake City, Utah, May 22, 1869. 7 — $12\frac{7}{8}$. Bill, black, basal two-thirds of lower mandible bluish-white; iris, brown; tarsi and toes, sepia-black.

1094, ♂ *ad.*; Antelope Island, Great Salt Lake, June 4, 1869. $7\frac{1}{4}$ — $13\frac{1}{4}$. Bill, pure blue-black, basal two-thirds of lower mandible fine pale blue; iris, brown; tarsi and toes, dark sepia.

FAMILY ICTERIDÆ—HANG-NESTS, AMERICAN ORIOLES, or
AMERICAN STARLINGS.

DOLICHONYX ORYZIVORUS.

Bob-o-link.

β. albinuchus.

Dolichonyx oryzivorus var. *albinucha*, RIDGWAY, Bull. Essex Inst., V, Nov., 1873, 192.—COUES, Check List, 1873, App., p. 129.

Dolichonyx oryzivorus, COOPER, Orn. Cal., I, 1870, 255 (part).—HENSIIAW, 1875, 311.

The Bob-o-link seems to be spreading over all districts of the "Far West" wherever the cultivation of the cereals has extended. We found it

common in August in the wheat-fields at the Overland Rancho in Ruby Valley, and we were informed at Salt Lake City that it was a common species on the meadows of that section of the country in May, and again in the latter part of summer, when the grain ripened. We did not meet with it in summer, however, and doubt whether it breeds anywhere in the Interior south of the 40th parallel.¹

List of specimens.

873, ♀ *ad.*; Ruby Valley, Nevada (Camp 21), August 28, 1868.

MOLOTHRUS ATER.

Cow Blackbird.

α. ater.

Molothrus ater, GRAY, Hand List, II, 1870, 36, No. 6507 [cites BODD., Pl. Enl., 1783, 606, fig. 1].—BAIRD, Orn. Simpson's Exped., 1876, 379.

Fringilla pecoris, GMELIN, Syst. Nat., I, 1788, 910.

Molothrus pecoris, SWAINS. & RICH., Fauna Bor. Am., II, 1831, 277.—BAIRD, B. N. Am., 1858, 524; Cat. N. Am. B., 1859, No. 400.—COOPER, Orn. Cal., I, 257.—COUES, Key, 1872, 155; Check List, 1873, No. 211.—B. B. & R., Hist. N. Am. B., II, 1874, 154, pl. XXXII, figs. 6, 7.—HENSHAW, 1875, 312.

Molothrus pecoris. a. pecoris, COUES, B. N.W., 1874, 180.

We found this species to be so rare in the country traversed by the expedition that the list of specimens given below comprises every individual seen during the whole time.

List of specimens.

146, ♂ *juv.*; Camp 17, valley of the Humboldt, August 31, 1867. 8—13 $\frac{7}{8}$ —4 $\frac{1}{2}$ —3 $\frac{3}{4}$ —1 $\frac{1}{6}$ —1—2 $\frac{3}{4}$ —1 $\frac{1}{8}$. Bill, slate-black, paler and more lilaceous on lower mandible; iris, hazel; tarsi and toes, black.

147, ♀ *juv.*; Camp 17, valley of the Humboldt, August 31, 1867. 7 $\frac{5}{16}$ —12 $\frac{7}{16}$ —4 $\frac{1}{16}$ —3 $\frac{3}{8}$ — $\frac{5}{8}$ — $\frac{7}{8}$ —2 $\frac{5}{8}$ —1 $\frac{1}{4}$. Same remarks.

782, ♂ *ad.*; Truckee Reservation, June 2, 1868. 8 $\frac{1}{2}$ —14—(?)—3 $\frac{3}{4}$. Bill, tarsi, and toes, deep black; iris, burnt-umber.

1231, egg; Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Deposited in nest of *Passerella schistacea*.

1401, egg; Bear River Valley, Utah, June, 1869. Deposited in nest of *Geothlypis trichas*. (Collected by Mr. J. C. Olmstead.)

¹ According to Mr. Henshaw (*l. c.*), the Bobolink apparently breeds at Provo, Utah, parent birds having been noticed feeding their young, July 25th.

XANTHOCEPHALUS ICTEROCEPHALUS.

Yellow-headed Blackbird.

(Se-zoo'h' of the Washoes.)

Icterus icterocephalus, BONAP., Am. Orn., I, 1835, 27, pl. 3.*Xanthocephalus icterocephalus*, BAIRD, B. N. Am., 1858, 531; Cat. N. Am. B., 1859, No. 404.—COOPER, Orn. Cal., I, 267.—COUES, Key, 1872, 156, fig. 98; Check List, 1873, No. 213; B. N. W., 1874, 188.—B. B. & R., Hist. N. Am. B. II, 1874, 167, pl. XXXII, fig. 9; pl. XXXIII, fig. 9.—HENSLOW, 1875, 315.

In order to be assured of the presence of this large and conspicuous species, it was only necessary to find an extensive marsh with a sufficient extent of tall rushes, or, as termed in western parlance, *tules*. It was most abundant in the vicinity of Sacramento City and along the southeastern margin of the Great Salt Lake, near the mouth of the Jordan River; but it was also plentiful at all intermediate points where suitable localities existed. These birds generally frequent the same marshes as the Red-wings (*Agelæus*), but usually the two congregate in colonies in separate portions of a marsh. In general habits there is much resemblance to the Red-wings, especially in their fondness for marshy localities; but in many respects there is a closer approach to the Cow-bird (*Molothrus*), notably in their very terrestrial nature; for they may be very often observed walking over the green-sward of the damp meadows with a firm, stately, and graceful gait, in the manner of the species alluded to above. The eggs, also, are more like those of *Molothrus* than those of *Agelæus*.

The notes of the Yellow-headed Blackbird are among the harshest and rudest we have heard in any species. Their general character is that characteristic of most "Blackbirds" of this family, the ordinary note being a deep *chuck*, similar to that of *Quiscalus purpureus* or *Q. æneus*, but louder; while the song of the male is a discordant squawk, apparently "strained out" by great effort, in a squeaking, rasping sort of way, like the similar performance of *Molothrus* or *Quiscalus*, but differing in that many of the notes compare, in loudness and grating tone, with those of the Guinea Hen (*Numida meleagris*). The singer, however, evidently thinks his performance pleasing, and it probably is to his mate, for he makes a great parade

of himself, spreading his tail widely, drooping his wings, and swelling out his body at each effort.

The species was partially migratory in the Interior, only a few examples being seen during the winter at Carson City, these being mostly solitary individuals mixed in with flocks of *Scolecophagus cyanocephalus*, although occasionally small troops visited the corrals for the purpose of gleaning the half-digested grain from the manure. Their gregarious nature was manifest at all times, however, even in summer, for they nested in large communities, apart from the other marsh-birds, although always found in close proximity to them.

List of specimens.

- 39, nest and eggs (3); Sacramento, California, June 12, 1867. Nest in tule-slough.
 140, ♂ *ad.*; Camp 17, valley of the Humboldt, Nevada, August 30, 1867. 11—
 17 $\frac{1}{4}$ —51 $\frac{3}{16}$ —47 $\frac{7}{8}$ —7—1 $\frac{3}{16}$ —4 $\frac{3}{16}$ —11 $\frac{3}{16}$. Bill, tarsi, and toes, deep black; iris, hazel.
 523, ♂ *ad.*; Carson City, Nevada, April 24, 1868. 10 $\frac{5}{8}$ —17—51 $\frac{1}{16}$ —4 $\frac{5}{8}$. Remarks
 as above.
 965, ♂ *ad.*; Salt Lake City, Utah, May 21, 1869. 11—18 $\frac{1}{8}$. Bill, tarsi, and toes,
 deep black; iris, brown.
 966, ♂ *ad.*; Salt Lake City, Utah, May 21, 1869. 11 $\frac{1}{8}$ —18 $\frac{1}{4}$. Remarks as above.
 973–1004, thirty-two nests with eggs; Salt Lake City, Utah, May 21, 1869. Nests
 among the *tules*, in a slough, near Warm Spring Lake; maximum number of eggs, four.
 1021, ♂ *ad.*; Salt Lake City, May 22, 1869. 11 $\frac{1}{4}$ —18 $\frac{1}{4}$. Bill, tarsi, and toes, black;
 iris, brown.
 1022, ♀ *ad.*; Salt Lake City, May 22, 1869. 9—14 $\frac{3}{8}$. Bill, dusky horn color,
 darker above; iris, brown; tarsi and toes, black.

AGELÆUS PHŒNICEUS.

Red-shouldered Blackbird.

α. phæniceus—*Red-and-buff-shouldered Blackbird.*

(*Se-zoo'-te-mo-lah'-gehk* of the Washoes; *Pah-cool'-up-at'-su-que* of the
 Paiutes.)

Oriolus phæniceus, LINN., Syst. Nat., I, 1766, 161.

Agelæus phæniceus, VIEILL., Analyse, 1816.—BAIRD, Birds N. Am., 1858, 526;
 Cat. N. Am. Birds, 1859, No. 401.—COOPER, Orn. Cal., I, 1870, 261.—COUES,
 Key, 1872, 156, pl. 4; Check List, 1873, No. 212.—B. B. & R., Hist. N. Am.
 Birds, II, 1874, 159, pl. XXXIII, figs. 1, 2, 3.—HENSHAW, 1875, 313.

Agelæus phæniceus. α. phæniceus, COUES, Birds N.W., 1874, 186.

β. gubernator—Red-and-black-shouldered Blackbird.

Psarocolius gubernator, WAGLER, Isis, 1832, 281.

Agelæus gubernator, BONAP., Comp. and Geog. List, 1838, 30.—BAIRD, Birds N. Am., 1858, 529; Cat. N. Am. Birds, 1859, No. 402.—COOPER, Orn. Cal., I, 1870, 263.

Agelæus phæniceus var. *gubernator*, COUES, Key, 1872, 156; Check List, No. 212a.—B. B. & R., Hist. N. Am. Birds, II, 1874, 163, pl. XXXIII, figs. 4, 8.

Agelæus phæniceus. c. gubernator, COUES, Birds N.W., 1874, 186.

The Red-winged Blackbird was found in all marshy places, being especially numerous in the vicinity of the great lakes of the Interior and along the larger rivers. The form distinguished as *gubernator* was exceedingly abundant among the tules near Sacramento, where it was associated with *A. tricolor* and *Xanthocephalus icterocephalus*; but east of the Sierra Nevada it was found only in the western depression, and was there very rare compared with the commoner form, *A. phæniceus*.

*List of specimens.**a. phæniceus.*

141, ♂; Camp 17, valley of the Humboldt, Nevada, August 30, 1867. $9\frac{1}{2}$ — $14\frac{5}{8}$ — $(4\frac{5}{8})$ — $(3\frac{7}{8})$ — $1\frac{3}{8}$ — 1 — $3\frac{3}{8}$ — $1\frac{1}{2}$. Bill, dark hepatic-brown, stripe of black on side of lower mandible and on the culmen; iris, hazel; tarsi and toes, black.

142, ♂; Camp 17, valley of the Humboldt, Nevada, August 30, 1867. 9 — $14\frac{5}{8}$ — $4\frac{1}{6}$ — $4\frac{1}{6}$ — $\frac{7}{8}$ — 1 — $3\frac{1}{4}$ — $(?)$. Same remarks.

154, ♂; Camp 17, September 2, 1867. $9\frac{1}{4}$ — $14\frac{3}{4}$ — $4\frac{3}{4}$ — $3\frac{1}{6}$ — $1\frac{5}{6}$ — 1 — $3\frac{3}{8}$ — $1\frac{1}{4}$. Same remarks.

238, ♂; Camp 19, West Humboldt Mountains, Nevada, October 7, 1867. $9\frac{3}{8}$ — $15\frac{5}{8}$ — $5\frac{1}{6}$ — $4\frac{1}{4}$ — $\frac{7}{8}$ — 1 — $3\frac{3}{4}$ — $1\frac{1}{2}$. Bill, tarsi, and toes, black; iris, hazel.

265, ♂; Camp 26, Truckee Meadows, Nevada, November 8, 1867. Willows. $9\frac{1}{2}$ — $15\frac{1}{4}$ — $4\frac{7}{8}$ — $4\frac{1}{6}$ — $\frac{7}{8}$ — 1 — $3\frac{1}{2}$ — $1\frac{3}{8}$. Bill, dull blackish, slightly brownish on tomium and gonys; iris, hazel; tarsi and toes, black.

266, ♂; Camp 26, Truckee Meadows, Nevada, November 8, 1867. $9\frac{1}{2}$ — $15\frac{3}{8}$ — $4\frac{1}{6}$ — 4 — $\frac{7}{8}$ — 1 — $3\frac{1}{2}$ — $1\frac{1}{2}$. Same remarks.

267, ♂; Camp 26, Truckee Meadows, Nevada, November 8, 1867. 9 — $14\frac{1}{2}$ — $4\frac{1}{6}$ — $3\frac{1}{6}$ — $1\frac{5}{6}$ — $1\frac{5}{6}$ — $3\frac{1}{2}$ — $1\frac{1}{4}$. Bill, uniform brownish-black, lower mandible rather paler.

268, ♂; Camp 26, November 8, 1867. Willows. $9\frac{3}{8}$ — 15 — $4\frac{7}{8}$ — 4 — $\frac{7}{8}$ — 1 — $3\frac{5}{8}$ — $1\frac{1}{2}$. Bill, uniform dull black.

293, ♂; Camp 26, November 18, 1867. $9\frac{1}{2}$ — $15\frac{1}{2}$ — $5\frac{1}{8}$ — $4\frac{1}{8}$ — $1\frac{3}{6}$ — $1\frac{1}{6}$ — $3\frac{7}{8}$ — $1\frac{5}{8}$. Bill, uniform slate-black; iris, vandyke-brown; tarsi and toes, black.

294, ♂; Camp 26, November 18, 1867. $9\frac{1}{4}$ — $15\frac{1}{2}$ — $5\frac{1}{8}$ — $4\frac{1}{8}$ — $\frac{7}{8}$ — $1\frac{1}{6}$ — $3\frac{3}{4}$ — $1\frac{1}{2}$. Bill, slaty-black, inclining to brownish-cinereous on basal portion of lower mandible.

295, ♂; Camp 26, November 18, 1867. 9 — $14\frac{3}{8}$ — $4\frac{5}{8}$ — $3\frac{5}{8}$ — $\frac{2}{2}$ — $1\frac{1}{6}$ — $3\frac{1}{2}$ — $1\frac{3}{8}$. Same remarks.

296, ♂; Camp 26, November 18, 1867. $9\frac{1}{2}$ — $15\frac{3}{4}$ — $5\frac{1}{4}$ — $4\frac{3}{16}$ — $\frac{29}{32}$ — $1\frac{1}{32}$ — $3\frac{7}{8}$ — $1\frac{1}{2}$. Same remarks. (Prepared by Mr. Parker.)

297, ♀; Camp 26, November 18, 1867. $8\frac{1}{8}$ —13— $4\frac{1}{4}$ — $3\frac{7}{16}$ — $\frac{13}{16}$ — $\frac{15}{16}$ — $3\frac{1}{2}$ — $1\frac{1}{8}$. Upper mandible, dull black, lower dull cinereous; iris, hazel; tarsi and toes, dull black.

298, ♀; Camp 26, November 18, 1867. $7\frac{5}{8}$ — $12\frac{1}{4}$ — $4\frac{1}{8}$ — $3\frac{5}{16}$ — $\frac{3}{4}$ — $\frac{7}{8}$ — $3\frac{3}{8}$ — $1\frac{1}{4}$. Upper mandible, brownish slaty-black, tomium paler, lower brownish cinereous; iris, vandyke-brown; tarsi and toes, black.

299, ♀; Camp 26, November 18, 1867. $7\frac{3}{8}$ — $12\frac{3}{8}$ — $4\frac{1}{4}$ — $3\frac{1}{4}$ — $\frac{13}{16}$ — $\frac{15}{16}$ —3— $1\frac{1}{4}$. Same remarks.

403, ♀; Camp 26, November 19, 1867. $7\frac{7}{8}$ — $12\frac{1}{2}$ — $4\frac{1}{4}$ — $3\frac{7}{16}$ — $\frac{13}{16}$ — $\frac{15}{16}$ — $3\frac{3}{16}$ — $1\frac{1}{4}$. Upper mandible, horn-black, tomium paler; lower pale horn-color, the point dusky; iris, hazel; tarsi and toes, brownish-black.

566, ♂ *ad.*; Truckee Reservation, May 15, 1868. $9\frac{1}{4}$ — $15\frac{1}{4}$ —(?)—4. Bill, tarsi, and toes, deep black; iris, sepia.

772 (3), 773 (3); nests and eggs. Truckee Reservation, May 31, 1868. Nests in small bushes, in overflowed meadow.

967, ♂ *ad.*; Salt Lake City, Utah, May 21, 1869. 10— $16\frac{1}{4}$. Bill, tarsi, and toes, black; iris, brown.

968, ♂ *ad.*; Salt Lake City, Utah, May 21, 1869. 10—16. Same remarks.

1005, 1006, 1007, 1008, 1009; nests and eggs. Salt Lake City, May 21, 1869. Tule-meadows; maximum number of eggs, four.

1023, ♂ *ad.*; Salt Lake City, May 22, 1869. $9\frac{7}{8}$ —19. Remarks as above.

1024, ♂ *ad.*; Salt Lake City, May 22, 1869. $9\frac{1}{2}$ — $15\frac{1}{4}$. Remarks as above.

1025, ♂ *ad.*; Salt Lake City, May 22, 1869. $9\frac{5}{8}$ — $15\frac{7}{8}$. Remarks as above.

1089, nest and eggs (4); Antelope Island, Great Salt Lake, June 4, 1869. Grassy marsh, lake-shore.

1142 (4), 1143 (4), 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, nests and eggs; Antelope Island, Great Salt Lake, June 9, 1869. Nests in sage-brush, in alkaline pond, near lake-shore.

β. gubernator.

432, ♂ *ad.*; Carson City, Nevada, March 9, 1868. $9\frac{3}{8}$ — $15\frac{5}{8}$ — $5\frac{1}{8}$ — $4\frac{1}{4}$. Bill, tarsi, and toes, deep black; iris, hazel.

788, nest and eggs (4); Truckee Reservation, June 3, 1868. Nest in small bush, in wet meadow.

AGELÆUS TRICOLOR.

Red-and-white-shouldered Blackbird.

Icterus tricolor, NUTTALL, Man. Orn., I, 2d ed., 1840, 186.

Agelæus tricolor, BONAP., Comp. & Geog. List, 1838, 30.—BAIRD, B. N. Am., 1858, 530; Cat. N. Am. B., 1859, No. 403.—B. B. & R., Hist. N. Am. B., II, 1874, 165, pl. XXXIII, figs. 5, 6, 7.—COOPER, Orn. Cal., I, 1870, 265.

Agelæus phæniceus var. *tricolor*, COUES, Key, 1872, 156; Check List, 1873, No. 212b.

Agelæus phæniceus. d. *tricolor*, COUES, Birds N.W., 1874, 186.

This very distinct species was seen only in the neighborhood of Sacra-

mento City, where it was excessively abundant, along with the *A. gubernator* and *Xanthocephalus icterocephalus*, among the tules near the river. The individuals of this species were easily distinguished by their different appearance, while their notes were strikingly dissimilar.

STURNELLA NEGLECTA.

Western Meadow-Lark.

(*Se-zoo'-te-ya'-lehk* of the Washoes; *Pah'-at-se'-tone* of the Paiutes.)

Sturnella neglecta, AUDUBON, B. Am., VII, 1843, 339, pl. 487.—BAIRD, Birds N. Am., 1858, 537; Catal., 1859, No. 407.—COOPER, Orn. Cal., I, 1870, 270.

Sturnella magna var. *neglecta*, COUES, Key, 1872, 157; Check List, 1873, No. 214a.—B. B. & R., Hist. N. Am. B., II, 1874, 176, pl. XXXIV, fig. 1.—HENSHAW, 1875, 317.

Sturnella magna. b. *neglecta*, COUES, B. N.W., 1874, 190.

The Western Meadow Lark is a generally-distributed species, since it occurs wherever there are grassy tracts, as well as in the sage-brush of the more fertile districts; it is much less common in the mountains, however, than in the lower valleys, and we do not remember meeting with it higher up than an altitude of 7,000 feet. So far as general habits are concerned, it is a counterpart of the eastern species (*S. magna*), but its notes are most strikingly different, while it exhibits some very noticeable peculiarities of manners. It is a much more familiar bird than its eastern relative, and we observed that the manner of its flight differed in an important respect, the bird flitting along with a comparatively steady, though trembling, flutter, instead of propelling itself by occasional spasmodic beatings of the wings, then extending them horizontally during the intervals between these beats, as is the well-known manner of flight of the eastern species.

All observers, we believe, from the earliest explorers to those of the present time, agree as to the wide difference in the notes of the Western Meadow Lark from those of the eastern bird; and this we consider to be a sufficient evidence of specific diversity, notwithstanding the close similarity of general appearance—especially if taken in connection with the other differences alluded to, and the equally important fact, attested by many writers, that in the region where the habitats of the two forms adjoin they

are found together, each preserving with perfect distinctness its peculiarities of habits and voice, there not being that gradual transition from one to the other, in proceeding eastward or westward, which would exist in case the differences were merely the impress of geographical causes.

We know of no two congeneric species, of any family of birds, more radically distinct in all their utterances than the eastern and western Meadow Larks, two years of almost daily association with the latter, and a much longer familiarity with the former, having thoroughly convinced us of this fact; indeed, as has been the experience of every naturalist whose remarks on the subject we have read or heard, we never even so much as suspected, upon hearing the song of the Western Lark for the first time, that the author of the clear, loud, ringing notes were those of a bird at all related to the Eastern Lark, whose song, though equally sweet, is far more subdued—half-timid—and altogether less powerful and varied. As to strength of voice, no eastern bird can be compared to this, while its notes possess a metallic resonance equalled only by those of the Wood Thrush. The modulation of the song of the Western Lark we noted on several occasions, and found it to be most frequently nearly as expressed by the following syllables: *Tung'-tung'-tung'ah, tillah'-tillah', tung'*—the first three notes deliberate, full, and resonant, the next two finer and in a higher key, the final one like the first in accent and tone. Sometimes this song is varied by a metallic trill, which renders it still more pleasing. The ordinary note is a deep-toned *tuck*, much like the *chuck* of the Blackbirds (*Quiscalus*), but considerably louder and more metallic; another note is a prolonged rolling chatter, somewhat similar to that of the Baltimore Oriole (*Icterus baltimore*), but correspondingly louder, while the anxious call-note is a liquid *tyur*, which in its tone and expression calls to mind the spring-call (not the warble) of the Eastern Blue-bird (*Sialia sialis*), or the exceedingly similar complaining note of the Orchard Oriole (*Icterus spurius*). In fact, all the notes of the Western Lark clearly indicate its position in the family *Icteridæ*, which is conspicuously not the case in the eastern bird.¹

¹The song itself is more like that of the Common Troupial (*Icterus vulgaris*) than any other we have ever heard, but it is, if anything, more powerful; the tone and accent are, however, exceedingly similar.

List of specimens.

149, ♂ *juv.*; Camp 17, valley of the Humboldt, Nevada, August 31, 1867. (Grassy river-bottom.) $9\frac{3}{8}$ — $14\frac{1}{4}$ — $4\frac{1}{2}$ — $3\frac{3}{4}$ — $1\frac{3}{16}$ — $1\frac{5}{16}$ — $2\frac{5}{8}$ — $\frac{3}{4}$. Upper mandible, light pinkish-sepia; lower brownish lilaceous-white, tip darker; iris, hazel; tarsi and toes, delicate lilaceous-white, faintly tinged with brown.

155, ♂ *juv.*; Camp 17, September 2, 1867. (Grassy river-bottom.) $9\frac{1}{8}$ — $14\frac{3}{4}$ — $4\frac{5}{8}$ — $3\frac{11}{16}$ — $1\frac{3}{16}$ — $1\frac{5}{16}$ — $2\frac{1}{4}$ — $\frac{3}{4}$. Upper mandible, clear light sepia, deepening into horn-color at end; lower brownish lilaceous-whitish, darker terminally.

247, ♂ *juv.*; Camp 19, West Humboldt Mountains, Nevada, October 11, 1867. (Fields.) $10\frac{3}{8}$ — 15 — 5 — $4\frac{1}{8}$ — $1\frac{3}{8}$ — $1\frac{5}{16}$ — $3\frac{1}{4}$ — 1 . Upper mandible, deep horn-color, blackish terminally; tomium and lower mandible, paler *lilaceous* horn-color, darker terminally; iris, hazel; tarsi, delicate brownish-whitish; toes, slightly darker.

362, ♀ *juv.*; Truckee Reservation, Nevada, December 18, 1867. 9 — $14\frac{1}{4}$ — $4\frac{1}{2}$ — $3\frac{1}{2}$ — $1\frac{3}{16}$ — $1\frac{1}{4}$ — $2\frac{3}{4}$ — $\frac{7}{8}$. Bill, generally, delicate lilaceous-white; upper mandible with a dilute brownish tinge, the culmen light sepia; iris, umber; tarsi and toes, delicate lilaceous-white.

415, ♂ *ad.*; Carson City, Nevada, March 5, 1868. $9\frac{3}{4}$ — $16\frac{1}{2}$ — $5\frac{1}{4}$ — $4\frac{1}{16}$. Upper mandible, *black*; basal portion of culmen, (between frontal feathers,) broad stripe on basal three-fourths of upper tomium, with basal two-thirds of lower mandible *pure pale blue*; tip of lower mandible, black; iris, umber; tarsi and toes, delicate, uniform, pale ashy-lilaceous.

459, ♂ *ad.*; Carson, City, Nevada, March 26, 1868. $10\frac{1}{4}$ — 17 — $5\frac{1}{4}$ — $4\frac{1}{4}$. Same remarks.

460, ♂ *ad.*; Carson City, Nevada, March 26, 1868. 10 — 16 — 5 — 4 . Same remarks.

505, nest and eggs (5); Carson City, Nevada, April 21, 1868. Nest imbedded in ground beneath sage-bush; nest precisely like that of *S. magna*.

787, nest and eggs (4); Truckee Reservation, June 3, 1868. Nest imbedded in the ground, beneath a low bush, on the grassy bank of the river.

ICTERUS BULLOCKI.

Bullock's Oriole.

(*Yset'-ke* of the Washoes.)

Xanthornus bullockii, SWAINSON, Synop. Mex. Birds, Philos. Mag., I, 1827, 436.

Icterus bullockii, BONAP., Comp. & Geog. List, 1838, 29.—BAIRD, B. N. Am., 1858, 549; Catal., 1859, No. 416.—COOPER, Orn. Cal., I, 273.—COUES, Key, 1872, 158, fig. 100; Check List, 1873, No. 217; B. N.W., 1874, 195.—B. B. & R., Hist. N. Am. B., II, 1874, 199, pl. XXXIV, figs. 3, 7.—HENSHAW, 1875, 320.

Except in the higher pine forests, this beautiful Oriole is common in all wooded localities of the western country. It abounded at Sacramento to such an extent that several nests were often found in one tree, a large

cotton-wood by our camp containing five, some of which, however, were unoccupied. In May we found numbers of them in the rich valley of the Truckee, near Pyramid Lake, and observed that they were then subsisting chiefly on the tender buds of the grease-wood (*Obione confertifolia*), in company with *Hedymeles melanocephalus*, *Pyrranga ludoviciana*, and some other species.

The nest of Bullock's Oriole is very similar in its structure and composition to that of the Baltimore (*I. baltimore*), but it is less frequently pendulous, and seldom, if ever, so gracefully suspended. Its usual position is between upright twigs, near the top of the tree, thus resembling more that of the Orchard Oriole (*I. spurius*), which, however, is very different in its composition.

List of specimens.

1, nest and eggs (2); Sacramento, California, June 6, 1867. Nest in top of large isolated cotton-wood.

220, nest; Camp 19, West Humboldt Mountains, October 1, 1867. In aspen-thicket. (Collected by Mr. J. D. Hague.)

567, ♂ *ad.*; Truckee Reservation, May 15, 1868. $8\frac{1}{8}$ — $12\frac{3}{4}$ —(?)— $3\frac{7}{16}$. Upper mandible, black, the tomium bluish-white; lower, pale blue, slightly dusky toward end of gonys; iris, hazel; tarsi and toes, pale brownish-blue.

808, nest; Truckee Reservation, May, 1868. Nest on drooping branch of willow.

1057 (2), 1058 (5), nests and eggs; Salt Lake City, Utah, May 27, 1869. Nests in mountain-mahogany bush, 1,500 feet above camp.

1061, ♂ *ad.* (parent of No. 1057). 8 — $12\frac{1}{2}$. Upper mandible black, tomium and lower mandible fine light blue; iris, brown; tarsi and toes, deep blue, with a faint yellowish stain.

1065, nest and eggs (4); Salt Lake City, May 29, 1869. Nest in maple-sapling, in wooded ravine. (City Creek Cañon.)

1106, nest and eggs (2); Antelope Island, Great Salt Lake, June 5, 1869. Nest in apple-tree, in orchard.

1130, nest and eggs; Antelope Island, June 7, 1869. Willow-copse.

1178, 1179, nests and eggs; Salt Lake City, June 18, 1869. Mountain-mahogany trees, 1,800 feet above camp.

1346, ♂ *ad.*; Parley's Park, Wahsatch Mountains, Utah, June 28, 1869. $8\frac{1}{4}$ —12. Bill black, commissure and lower mandible fine light blue; iris, brown; tarsi and toes, horn-blue.

1387, nest; Provo River, Utah, July 10, 1869. Thorn-apple bush.

1390, nest; Provo River, Utah, July 11, 1869. Thorn-apple bush.

SCOLECOPHAGUS CYANOCEPHALUS.

Brewer's Blackbird.

Psarocolius cyanocephalus, WAGLER, Isis, 1829, 758.

Scolecophagus cyanocephalus, CABANIS, Mus. Hein., I, 1851, 195.—BAIRD, B. N. Am., 1858, 552; Cat. N. Am. B., 1859, No. 418.—COOPER, Orn. Cal., I, 278.—COUES, Key, 1872, 160; Check List, 1873, No. 322; B. N.W., 1874, 199.—B. & R., Hist. N. Am. B., II, 1874, 206, pl. xxxv, fig. 3.—HENSHAW, 1875, 321.

Seldom seen there during summer, this Blackbird becomes one of the most abundant species in the lower valleys during the winter season, when immense flocks frequent the settlements and resort daily to the corrals for their food, which at this time consists largely of the grain gleaned from the fresh dung, or found scattered where the stock has been fed. They also visit the slaughter-houses for their share of the offal, of which, however, the Magpies deprive them of the greater portion. In the severer weather small companies even came to the door-yards in Carson City, to feed upon the crumbs and scraps of meat thrown from the tables. During the breeding-season they were observed to have retired to the mountains, where they frequented the trees in the lower cañons, or on the lower slopes, the groves of cedars and nut-pines being a favorite resort. On the 3d of June, 1867, we discovered the breeding-ground of a large colony of this species in a grove of the above-named trees, among the mountains fronting the southern end of Pyramid Lake. More than a hundred pairs had congregated there, and almost every tree contained one or more nests, while as many as three containing eggs or young were sometimes found on a single tree. Each nest was saddled upon a horizontal branch, usually near the top of the tree, or at a height of twelve or fifteen feet from the ground, and was well concealed in a thick tuft of foliage, the position being quite the same in every instance; most of them contained young birds, and when these were disturbed the parents flew very near, exhibiting much concern, and uttering a soft *chuck* as they hovered about us; the maximum number of eggs or young found in a nest was six, the usual number being four or five. In Parley's Park, among the Wahsatch Mountains, they were also abundant during the breeding-season, and although many nests were found, they were more scattered, on account, we suppose, of the surrounding country being more generally

wooded—their gregariousness in the instance mentioned above being most likely due to the fact that trees were exceedingly scarce in that portion of the country, and, so far as the mountains were concerned, limited to occasional isolated groves. Along toward the latter part of July and during the month of August, they became exceedingly abundant in Parley's Park, a large proportion of the flocks being composed of young birds; and so numerous were they that an average of ten or a dozen would be brought down by a single shot. They thus contributed very essentially to the subsistence of our tame hawks—four fine examples of *Buteo swainsoni*, reared that season from the nest, and allowed perfect liberty about the camp. A wounded bird, winged in one of these massacres, exhibited great spirit and determination when confronted by one of the hawks mentioned above, for he no sooner saw the latter than he became suddenly possessed of the most infuriate passion, even while yet held in the hand, and, with feathers raised, and silvery eyes flashing, sprang upon the hawk and fastened to the back of his head with bill and claws. The poor hawk was greatly terrified, and with outspread wings hopped frantically over the ground, at the same time uttering such plaintive whistlings that the scene excited shouts of laughter and applause from the spectators. The hawk was finally released from its tormentor, and would never afterward touch a living bird. During a great flight of grasshoppers which devastated the grain-fields of Parley's Park and surrounding districts, these Blackbirds were almost constantly employed in catching these insects, and during their stay appeared to eat nothing else. When engaged in their pursuit it was observed that they often flew from the perch and caught them in the air, in true flycatcher style, this performance being so far from exceptional that it was not uncommon to see several individuals perform the exploit at one time.

List of specimens.

189, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, September 17, 1867. (Sheep corral.) $9\frac{1}{16}$ — $16\frac{1}{4}$ — $5\frac{7}{16}$ — $4\frac{7}{16}$ — $\frac{3}{4}$ — $1\frac{1}{8}$ — $4\frac{1}{8}$ — $1\frac{1}{2}$. Bill, tarsi, and toes, deep black; iris, *whitish sulphur-yellow*.

190, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, September 17, 1867. 10 — 16 — $5\frac{3}{8}$ — $4\frac{3}{8}$ — $1\frac{3}{8}$ — $1\frac{1}{8}$ — 4 — $1\frac{1}{16}$. Same remarks.

191, ♂ *ad.*; Camp 19, West Humboldt Mountains, Nevada, September 17, 1867. $9\frac{3}{4}$ — $15\frac{3}{4}$ — $5\frac{5}{16}$ — $4\frac{3}{8}$ — $1\frac{3}{8}$ — $1\frac{1}{8}$ — $3\frac{1}{8}$ — $1\frac{1}{8}$. Same remarks.

195, ♂ *ad.*; Camp 19, September 19, 1867. (Sheep corral.) $10-15\frac{3}{4}-5\frac{3}{8}-4\frac{7}{16}-\frac{3}{4}-1\frac{1}{8}-4\frac{1}{4}-1\frac{3}{8}$. Same remarks.

196, ♀ *ad.*; Camp 19, September 19, 1867. $9\frac{3}{4}-14\frac{15}{16}-4\frac{13}{16}-4-\frac{3}{4}-1\frac{1}{8}-3\frac{13}{16}-1\frac{1}{8}$. Bill, tarsi, and toes, black; iris, *light reddish-hazel*.

198, ♂ *ad.*; Camp 19, September 20, 1867. (Sheep corral.) $10-16-5\frac{5}{16}-4\frac{5}{16}-\frac{13}{16}-1\frac{1}{8}-4\frac{1}{4}-1\frac{11}{16}$. Bill, tarsi, and toes, deep black; iris, *whitish sulphur-yellow*.

205, ♀ *ad.*; Camp 19, September 21, 1867. $9\frac{1}{2}-14\frac{15}{16}-5-4\frac{1}{8}-\frac{3}{4}-1\frac{1}{16}-3\frac{7}{8}-1\frac{5}{8}$. Bill, tarsi, and toes, black; iris, *light brownish-hazel*.

206, ♀ *ad.*; Camp 19, September 21, 1867. $9\frac{1}{2}-14\frac{3}{4}-4\frac{15}{16}-4\frac{1}{16}-\frac{3}{4}-1\frac{1}{16}-3\frac{3}{4}-1\frac{1}{2}$. Iris, deep (not light) hazel.

789 (4), 790 (6), 791 (4), 792, 793, 794, 795, 796, 797, 798, nests and eggs; near Truckee Reservation, June 3, 1868.

1277, nest and eggs (3); Parley's Park (Wahsatch Mountains), Utah, June 24, 1869. Nest in bush by stream.

1278 (4), 1279 (2), nests and eggs; Parley's Park (Wahsatch Mountains), Utah, June 24, 1869. Nests in cotton-woods, along stream; supported against the trunk by small twigs.

1424, ♂ *ad.*; Parley's Park, June 17, 1869. $10\frac{1}{4}-19\frac{1}{4}$. Bill, tarsi, and toes, black; iris, white.

1462, ♂ *juv.*; Parley's Park, July 28, 1869. $10-16\frac{1}{2}$. Bill, legs, and feet, black; iris, grayish yellowish-white.

FAMILY CORVIDÆ—CROWS and JAYS.

CORVUS CORAX.

Raven.

β. carnivorus—American Raven.

(*Kah'-gehk* of the Washoes; *Ah'-dah* of the Paiutes; *Hih* of the Shoshones.)

Corvus carnivorus, BARTRAM, Travels, Fla., 1793, 290.—BAIRD, Birds N. Am., 1858, 560; Cat. N. Am. Birds, 1859, No. 423.—COOPER, Orn. Cal., I, 1870, 282.

Corvus corax var. *carnivorus*, B. B. & R., Hist. N. Am. Birds, II, 1874, 234, pl. XXXVII, fig. 6.—HENSHAW, 1875, 324.

Corvus corax (var.?), COUES, Key, 1872, 162.

Corvus corax, COUES, Check List, 1873, No. 226; Birds N.W., 1874, 204.

Corvus cacalotl, WAGLER, Isis, 1831, 527.—BAIRD, Birds N. Am., 1858, 563; Cat. N. Am. Birds, 1859, No. 424.

This large bird is one of the most characteristic species of the Great Basin, over which it appears to be universally distributed, no desert-tract being so extensive or sterile that a solitary Raven may not be seen any day, although in such regions it is most usually observed winging

its way silently, or with an occasional hoarse croak, from the mountains on one side the desert to the range opposite. It is also plentiful in the most fertile sections. We did not see it in the Sacramento Valley, where the Common Crow (*C. americanus*) was so abundant—the two species being, in fact, nowhere found together in equal abundance; but it became numerous immediately after we had crossed the Sierra Nevada, while the Crow disappeared almost entirely. In those portions where the Raven was the predominant species, as in western Nevada, we found that it went by the popular name of “Crow,” while the more rare *C. americanus* was distinguished as the “Tom Crow!” At the Truckee Meadows the Ravens were very abundant in November, but were so shy as to be with difficulty approached within gunshot. At the latter locality we once observed an assembly of them annoying a Rough-legged Hawk (*Archibuteo sancti-johannis*) which had alighted on a fence-post; but the hawk did not appear to mind them much, and did not fly until we approached, when he took to flight, and was followed by the Ravens until almost out of sight. At Carson City they were very numerous in winter at the slaughter-house, just outside the town, where they congregated with the Magpies to feed upon the offal; they were then very tame and easily killed. The true home, however, of the Ravens appeared to be in the desert mountains, where their eyries were often seen among the high volcanic rocks, out of reach of an ordinary climber. In the appearance, manners, and voice of the Raven there is such a general resemblance to the Common Crow that after long familiarity with the latter the peculiarities of the former are forgotten. This, probably, accounts for the inappropriateness, or incorrectness, of the western nomenclature of these two birds, for when the two are seen together, which not often happens, the “Tom Crow” appears dwarfed in size, or not as large as a crow should be. The notes, also, are quite similar in their character (far more so than those of the Fish Crow, *C. ossifragus*, and the common species), but they are considerably hoarser and less vehement. The most conspicuous difference is in their manner of flight, the Crow flapping its wings continually, and seldom if ever sailing with outstretched, motionless pinions, while the Raven almost constantly soars in the buoyant and well-sustained manner of certain *Raptores*, a flapping flight being the very rare exception.

List of specimens.

271, ♀ *ad.*; Camp 26, November 11, 1867. 25—50½—17—13½—3—2½—9½—5½. Bill, tarsi, and toes, deep black; *interior of mouth, deep slaty violaceous-black*; iris, deep vandyke.

284, ♂ *ad.*; Camp 26, November 15, 1867. 26—51—17—13½—3—2½—10¼—5¾. Same remarks. Interior of mouth with some flesh-color beneath the tongue and far back.

285, ♀ *ad.*; Camp 26, November 15, 1867. 25—50—17—14—3—2¼—10—6. Same remarks. Interior of mouth with cloudings of livid flesh-color posteriorly.

CORVUS AMERICANUS.

Common Crow.

(*Kah'-gehk Nah'-ming* of the Washoes; *Queh' Ah'-dah* of the Paiutes.)

Corvus americanus, AUDUBON, Orn. Biog., II, 1834, 317.—BAIRD, B. N. Am., 1858, 566; Cat. N. Am. Birds, 1859, No. 426.—COUES, Key, 1872, 162; Check List, 1873, No. 228.—B. B. & R., Hist. N. Am. B., II, 1874, 243, pl. xxxvii, fig. 5.—HENSHAW, 1875, 327.

Corvus americanus. a. americanus, COUES, B. N.W., 1874, 206.

Corvus caurinus, COOPER, Orn. Cal., I, 1870, 285 (part, if not entirely).

In crossing the plains from Sacramento City to the Sierra Nevada, we found the Common Crow exceedingly numerous at a certain place along our route, where a considerable stream crossed the plains; they flew about over the ground and up into the trees with the same noisy cawing as in the east, and appeared to be in all respects the same bird. In the country to the eastward of the Sierra Nevada, however, the Crow was so extremely rare as to be met with on but two occasions, when the number of individuals was limited to a very few. The first examples were seen at the stage-station near the Humboldt marshes, in November. Three individuals only were found there, and these walked unconcernedly about the door-yard with the familiarity of tame pigeons, merely hopping to one side when approached too closely. So much confidence displayed by this usually wary bird was in such contrast with the extreme shyness and caution it exhibits in more thickly-populated portions of the country, that we concluded they were domesticated specimens, and found out our mistake only after questioning the station-keeper as to the history of his "pets," when we received

permission to shoot one for our collection. Later in the same month a very few—perhaps less than half a dozen individuals—were found at the Truckee Meadows, where they frequented the willows along the river. These also were very tame, but except in this regard seemed to be exactly like the Crow of the Eastern States, the notes being quite identical.¹

List of specimens.

256, ♂ *ad.*; Humboldt Meadows (Camp 22), October 31, 1867. 19—(?)—12½—10—(?)—2—7—4½. Bill, tarsi, and toes, deep black; iris, hazel.

263, ♂ *ad.*; Camp 26, Truckee Meadows, November 8, 1867. Willows, along river. 19¼—37—12½—10½—2—2—7¼—4¾. Bill, tarsi, and toes, deep black; iris, deep vandyke; interior of mouth (except corneous portions), deep flesh-color.

PICICORVUS COLUMBIANUS.

Clarke's Nutcracker.

(*Pah'-bup* of the Washoes; *Tok'-o-kõt* of the Shoshones.)

Corvus columbianus, WILSON, Am. Orn., III, 1811, 29, pl. xx, fig. 2.

Picicorvus columbianus, BONAP., Consp. Av., I, 1850, 384.—BAIRD, B. N. Am., 1858, 573, 925; Cat. N. Am. B., 1859, No. 430.—COOPER, Orn. Cal., I, 289.—COUES, Key, 1872, 162, fig. 104; Check List, 1873, No. 230; B. N.W., 1874, 207.—B. B. & R., Hist. N. Am. B., II, 255, pl. xxxviii, fig. 4.—HENSHAW, 1875, 328.

The dense forest of lofty pines and kindred trees on the Sierra Nevada was where this remarkable bird most abounded, but it was also found to the eastward wherever extensive coniferous woods occurred, it being common on the Wahsatch and Uintah ranges, and rare on the intermediate Ruby Mountains; but it was never seen except among the pines, which seem necessary to its existence. The habits and manners of this bird deviate so widely from those of the family to which it belongs that no one would suspect its true relationship; it acts like a Woodpecker, screams like a Woodpecker, and looks so much like one that the best ornithologists are apt to be misled, by the first glimpse of it, into believing it an undescribed species

¹ Mr. E. W. Nelson informs me that in November he noticed the Crows exhibiting the same familiarity at Sacramento City, where they were seen about the door-yards and corrals of houses in the suburbs.

of the Woodpecker family; this was our own impression, corrected only by the obtaining of specimens. Prince Maximilian described a white-tailed Woodpecker ("*Picus leucurus*") seen by him in the Rocky Mountains, which was undoubtedly this bird; and Mr. J. A. Allen, an accurate observer, was more recently led into the same error.¹

In the pine woods near Carson City these birds were very abundant, and, with the Jays (*Cyanura frontalis*), made the forest resound with their harsh, discordant cries. Their notes were often to be heard when the bird could not be seen, and were generally the first indication of its presence. The usual utterance, a guttural *chur-r-r-r-r-r-r-r*, repeated several times, and generally as two or more alighted in the same tree, possessed a peculiar snarling character; occasionally, however, an individual would take up a rather musical piping strain, which being immediately answered by all the others in the neighborhood, made the woods echo with their cries. As before stated, all the actions of this bird call to mind the traits of the Woodpecker tribe; it is a conspicuous object as it floats in gentle undulations above the tops of the tall pine trees, when it resembles in its motions the Ring-necked Woodpecker (*Melanerpes torquatus*); it is also often seen to swoop to the ground to pick up a fallen pine-seed, return to the tree and hammer it vigorously against a branch; and should two or more alight in close proximity a general snarling *chur-r-r-r* ensues, reminding one of the quarrelsome Red-headed Woodpecker (*Melanerpes erythrocephalus*).

We were unable to find the eggs of this bird, but a nest was discovered on the Ruby Mountains, in August, 1868, after the young had flown. This nest was in a hole—apparently the deserted excavation of the Red-shafted Flicker—in a tall pine stump, about twenty feet from the ground; the nest itself was a very elaborate and symmetrical one, composed of pine needles and fine roots, with larger sticks outside, resembling in its general character that made by other species of the family. Attention was first attracted to this nest by observing a pair of these birds enter the cavity in question. It is not known whether it is the constant habit of this species to thus build inside of holes in trees, but on the Sierra Nevada they were

¹ See *American Naturalist*, Vol. VI, p. 350, and *Bull. Mus. Comp. Zoology*, Vol. III, No. 6, June, 1872, p. 150.

often seen to go into hollows about the trees, as if going to and from their nests.¹

List of specimens.

308, ♀ *ad.*; Pea-Vine Mountain, near Sierra Nevada, November 20, 1867. Pine woods. $12\frac{1}{2}$ — $21\frac{3}{8}$ — $7\frac{5}{8}$ — $6\frac{1}{4}$ — $1\frac{1}{16}$ — $1\frac{1}{4}$ — $4\frac{3}{4}$ — $2\frac{3}{4}$. Bill, tarsi, and toes, deep black; iris, bright hazel.

309, ♀ *ad.*; Pea-Vine Mountain, near Sierra Nevada, November 20, 1867. Pine woods. $12\frac{3}{8}$ — $21\frac{5}{8}$ — $7\frac{5}{8}$ — $6\frac{1}{8}$ — $1\frac{5}{8}$ — $1\frac{3}{16}$ — $4\frac{1}{2}$ —3. Same remarks.

310, ♀ *ad.*; Pea-Vine Mountain, near Sierra Nevada, November 20, 1867. Pine woods. $12\frac{3}{8}$ — $21\frac{5}{8}$ — $7\frac{5}{8}$ — $6\frac{1}{4}$ — $1\frac{5}{8}$ — $1\frac{1}{4}$ — $4\frac{1}{4}$ — $2\frac{1}{2}$. Same remarks.

320, ♂ *ad.*; pine woods, shore of Lake Tahoe. (Mr. H. G. Parker.) 13 —(?)— 8 — $6\frac{3}{4}$ — $1\frac{3}{4}$ — $1\frac{5}{16}$ — $4\frac{3}{4}$ — $2\frac{3}{4}$.

443, ♂ *ad.*; Carson, March 21, 1868. Pines. $12\frac{3}{4}$ — $22\frac{3}{4}$ — 8 — $6\frac{1}{2}$. Bill, tarsi, and toes, black; iris, blackish-sepia.

444, ♀ *ad.*; Carson, March 21, 1868. Pines. $12\frac{3}{8}$ — $22\frac{1}{2}$ — $7\frac{3}{4}$ — $6\frac{3}{8}$. Same remarks.

854, ♀ *ad.*; Camp 19, East Humboldt Mountains, August 4, 1868. $12\frac{5}{8}$ — 22 —(?)—6. Same remarks.

868, ♂ *ad.*; Camp 19, August 12, 1868. $12\frac{1}{8}$ — 22 —(?)— $6\frac{3}{16}$. Same remarks.

1447, ♂ *ad.*; Parley's Park, Wahsatch Mountains, Utah, July 23, 1869. $12\frac{3}{4}$ — $23\frac{1}{4}$. Bill, tarsi, and toes, black; iris, umber.

GYMNOKITTA CYANOCEPHALA.

Blue Nutcracker; Maximilian's "Jay."

Gymnorhinus cyanocephalus, MAXIMILIAN, Reise Nord-Am., 1841, 21.

Gymnokitta cyanocephala, BONAP., Consp. Av., I, 1850, 382.—BAIRD, Birds N. Am., 1858, 574; Cat. N. Am. Birds, 1859, No. 431.—COOPER, Orn. Cal., I, 292.—COUES, Key, 1872, 163; Check List, 1873, No. 231; Birds N.W., 1874, 209.—B. B. & R., Hist. N. Am. Birds, II, 1874, 260, pl. xxxviii, fig. 2.—HENSHAW, 1875, 331.

This extraordinary bird was found to inhabit exclusively the nut-pine and cedar woods on the mountain ranges of the Interior, of which it was the most characteristic species. It was eminently gregarious, even breeding in colonies, and in winter congregating in immense flocks, which sometimes consisted of thousands of individuals, all uttering their querulous notes as they swept to and fro over the hills, in their restless migrations. Its blue color is about the only feature in this bird which would lead one at first sight to suspect its relationship with the Jays, all its habits being so utterly

¹According to Captain Charles Bendire, U. S. A., this is by no means the usual position of the nest. [See *Bulletin of the Nuttall Ornithological Club*, Vol. I, No. 2, July, 1876, pp. 44, 45.]

different from those of the more familiar species of this family. It is as essentially migratory as the Passenger Pigeon (*Ectopistes migratoria*) of the east, its appearance in and departure from a locality being equally sudden. We have often visited a nut-pine woods and found it one day full of noisy, roving troops, and the next as gloomy and silent as if a bird had never made its appearance there. In fall and winter, the large flocks, as they sweep back and forth over the scantily-wooded foot-hills, are sure to attract the attention of a stranger to the country, not merely from their appearance, but the more so from the fact that their peculiar piping notes of *pe'-pe'-wè*, *pe'-pe'-wè*, *pe'-pe'-wè* are often the only sound which breaks the solitude of these desolate regions, and would thus catch the ear of the most unobservant person.

In its manners, Maximilian's Jay resembles Clarke's Nutcracker (*Picicorvus*) more than any other bird, the chief difference being its migratory nature, the latter being of very sedentary habits. Most of its movements are quite similar, its attitude being much the same as it sits upon the summit of a small cedar, quietly reconnoitering, while it also frequently alights upon the ground to pick up a fallen pine-seed or cedar-berry. Its flight, however, is strikingly different, being almost exactly like that of the Robin (*Turdus migratorius*)—a gliding flight, with the wings rather inclined downward and the head raised—but is perhaps rather swifter. The various notes have all a striking character; the usual one resembles somewhat the tremulous, querulous wailing of the little Screech Owl (*Scops asio*), but is louder, less guttural, and more plaintive, while another is something like the soft love-note of the Magpie (*Pica hudsonica*); besides, there is the peculiar piping whistle of *pe'-wee*, *pe'*, described above, and usually uttered during the migration of a flock.

The breeding-season of this bird is remarkably early; for on the 21st of April, before we had thought of looking for their nests, full-grown young were flying about in a cedar and piñon grove near Carson City. In this grove we found the abandoned nests, perhaps a hundred or more in number, and also one containing young nearly ready to fly; but we were too late for the eggs. These nests were all saddled upon the horizontal branches, at a height of eight or ten feet from the ground, and, except that they were

more bulky, resembled in their construction those of the eastern Blue Jay (*Cyanura cristata*). The single nest which was not deserted contained four fledgelings, which, when taken out for examination and placed in our hat, scrambled out, at the same time squalling vociferously. In color they resembled the old birds, but were of a duller and more uniform blue.

List of specimens.

502, ♂ *ad.*; Carson City, Nevada, April 20, 1868. Cedars. $11\frac{3}{4}$ — $18\frac{3}{8}$ — $6\frac{1}{8}$ —5. Bill, tarsi, and toes, deep black; iris, deep sepia; interspaces of scutellæ and under surface of toes, ashy-whitish.

503, ♀ *ad.*; Carson City, Nevada, April 20, 1868. Cedars. $10\frac{5}{8}$ —18— $5\frac{1}{8}$ — $4\frac{5}{8}$. Same remarks.

507, ♂ *ad.*; Carson City, Nevada, April 21, 1868. Cedars. $11\frac{3}{4}$ —19— $6\frac{5}{8}$ — $5\frac{1}{8}$. Same remarks.

PICA NUTTALLI.

Yellow-billed Magpie.

Pica nuttalli, AUDUBON, Orn. Biog., IV, 1833, 450, pl. 362.—BAIRD, Birds N. Am., 1858, 578; Cat. N. Am. Birds, 1859, No. 433.—COOPER, Orn. Cal., I, 295.

Pica melanoleuca var. *nuttalli*, COUES, Key, 1872, 164; Check List, 1873, No. 233a; Birds N.W., 1874, 212.

Pica caudata var. *nuttalli*, B. B. & R., Hist. N. Am. Birds, II, 1874, 270, pl. XXXVIII, fig. 2.

The Yellow-billed Magpie was observed only in the Sacramento Valley, where it was very abundant among the scattered oaks. It was found in the outskirts of Sacramento City as soon as the first large oaks were met with, moving about in small scattered flocks, and incessantly chattering, whether while on the wing or when perched among the branches; it appeared to be both more noisy and more gregarious than the Black-billed Magpie, which, however, it greatly resembled in other respects. Many nests were found, but they were all in the tops of the tallest oaks, and could not be reached; this was one of the most conspicuous differences in its habits from *P. hudsonica*, which was found to invariably build its nest in bushes, or, at most, only in the smallest trees, as alders and cedars, even where large trees were abundant; the dense thickets of willow and buffalo-berry bushes being preferred to any others.

List of specimens.

- 64, ♂ *juv.*; Sacramento, California, June 20, 1867. Oaks. $14\frac{5}{8}$ —22— $7\frac{1}{8}$ — $5\frac{7}{8}$ —1— $1\frac{9}{16}$ — $6\frac{5}{8}$ — $5\frac{1}{8}$.
 65, ♂ *juv.*; oaks. $16\frac{5}{8}$ — $23\frac{3}{4}$ — $7\frac{3}{4}$ — $6\frac{5}{8}$ — $1\frac{1}{4}$ — $1\frac{1}{16}$ — $8\frac{1}{2}$ — $6\frac{1}{2}$.
 66, ♂ *juv.*; Sacramento, California, June 20, 1867. Oaks. $15\frac{1}{4}$ —23— $7\frac{3}{4}$ — $6\frac{1}{8}$ — $1\frac{1}{8}$ — $1\frac{3}{4}$ —7— $5\frac{1}{2}$.
 67, ♂ *juv.*; oaks. $16\frac{3}{4}$ — $23\frac{1}{4}$ — $7\frac{5}{8}$ — $6\frac{1}{4}$ — $1\frac{1}{8}$ — $1\frac{5}{8}$ —8— $6\frac{1}{4}$.
 68, ♀ *juv.*; oaks. $15\frac{3}{4}$ — $22\frac{3}{8}$ — $7\frac{1}{2}$ — $6\frac{3}{16}$ — $1\frac{1}{16}$ — $1\frac{5}{8}$ —8—6.
 69, ♀ *juv.*; oaks. 16— $23\frac{3}{8}$ — $7\frac{5}{8}$ — $6\frac{3}{8}$ — $1\frac{1}{16}$ — $1\frac{5}{8}$ — $7\frac{5}{8}$ — $6\frac{1}{8}$.
 70, ♀ *juv.*; oaks. $16\frac{3}{4}$ — $23\frac{1}{2}$ — $7\frac{3}{4}$ — $6\frac{3}{8}$ — $1\frac{1}{4}$ — $1\frac{3}{4}$ —8— $6\frac{1}{4}$.
 78, *juv.*; oaks. $16\frac{1}{2}$ — $23\frac{3}{4}$ — $7\frac{1}{2}$ — $6\frac{1}{2}$ — $1\frac{1}{4}$ — $1\frac{5}{8}$ — $8\frac{1}{4}$ — $6\frac{1}{2}$.
 79, *juv.*; oaks. 14— $22\frac{1}{4}$ — $7\frac{1}{8}$ —6— $1\frac{1}{16}$ — $1\frac{1}{16}$ — $6\frac{1}{8}$ — $4\frac{1}{2}$.
 80, *juv.*; oaks. $16\frac{3}{16}$ — $22\frac{3}{8}$ — $7\frac{1}{8}$ — $6\frac{1}{8}$ — $1\frac{3}{16}$ — $1\frac{9}{16}$ — $8\frac{1}{4}$ — $6\frac{3}{4}$.
 314, ♂ *ad.*; American River, Sacramento Co., Cal., November, 1867. (H. G. Parker.) 19—(?)—8— $6\frac{1}{2}$ — $1\frac{7}{8}$ — $1\frac{3}{8}$ — $10\frac{1}{2}$ — $8\frac{3}{4}$.

[All the specimens obtained, with the exception of the last, were immature and in molting condition; thus the measurements given are of little importance. In all, the bill and bare orbital-region is pure unshaded yellow, varying little, if any, with the specimen, being of a deep lemon; or nearly chrome-yellow, the face more citreous. The skin over the whole body also, as well as the underside of the claws (possibly only in young birds), is yellow. We did not notice, in examining this species, the leaden-blue outer ring to the iris, afterward found to be a constant feature in *P. hudsonica*.]

PICA RUSTICA.

Black-billed Magpie.

β. hudsonica—American Magpie.

(*Tah'-tut* of the Washoes; *Que'-tou-gih*, *gih* of the Paiutes.)

Corvus hudsonicus, SABINE, App. Franklin's Journey, 1823, 25, 261.

Pica hudsonica, BONAP., Comp. & Geog. List, 1838, 27.—BAIRD, B. N. Am, 1858, 576; Cat. N. Am. B., 1859, No. 432.—COOPER, Orn. Cal., I, 296.

Pica melanoleuca var. *hudsonica*, COUES, Key, 1872, 164, fig. 106; Check List, 1873, No. 233a; B. N.W., 1874, 211.—HENSHAW, 1875, 334.

Pica caudata var. *hudsonica*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 178.—B. B. & R., Hist. N. Am. B., II, 1874, 266, pl. XXXVIII, fig. 1.

Pica rustica var. *hudsonica*, BAIRD, Orn. Simpson's Exped., 1876, 380.

The Black-billed Magpie is one of the most characteristic birds of the Interior, but its abundance varies greatly, in fact, almost unaccountably, with the locality; it is also one of the most conspicuous birds of that region,

being eminently distinguished by the elegance of its form and the striking contrasts of its plumage. In western Nevada, from the Sierras eastward to the West Humboldt Mountains, it was one of the most abundant species, but on the opposite side of the Great Basin its entire absence from many favorable localities was noted as the most striking peculiarity of the fauna. It was most abundant in the rich valleys of the Truckee and Carson Rivers, and along the eastern base of the Sierra Nevada; and, although less common, it was very far from rare in the lower cañons of the West Humboldt Mountains. It was resident wherever observed, and at all times was rather familiar than otherwise, though when much persecuted in one locality it soon learned, by the natural shrewdness characteristic of the family, to look out for itself. During the winter the Magpies resorted daily, in company with the Ravens, to the slaughter-houses to feed upon the offal.

The Black-billed Magpie is more or less gregarious at all seasons, and when moving about usually goes in small troops, or loose flocks, which chatter in their peculiar manner as they fly. The usual note is a distinct chatter, unlike the note of any other bird of our acquaintance, but during the breeding-season a softer, more musical note is frequently uttered, sounding somewhat like *kay'e-ehk-kay'*. We did not detect any difference between the notes of this and the Yellow-billed species, although slight differences may exist.

List of specimens.

101, ♂ *juv.*; Camp 10, Truckee Meadows, Nevada, July 6, 1867. Willows. 16—24 $\frac{1}{4}$ —8 $\frac{3}{8}$ —7—1 $\frac{1}{4}$ —1 $\frac{1}{2}$ —8 $\frac{3}{8}$ —6 $\frac{1}{2}$. Bill, slaty-black, fading into ashy on bare orbital region; iris, very dark brown, with pearl-blue outer ring; tarsi and toes, black, the latter ashy beneath.

143, ♂ *ad.*; Camp 17, valley of the Humboldt, August 31, 1867. 19 $\frac{3}{8}$ —23 $\frac{5}{8}$ —7 $\frac{1}{6}$ —6 $\frac{3}{4}$ —1 $\frac{5}{16}$ —1 $\frac{1}{2}$ —10 $\frac{3}{8}$ —8 $\frac{3}{4}$. Same remarks.

178, ♂ *ad.*; Camp 18, West Humboldt Mountains, September 10, 1867. 18 $\frac{1}{2}$ —23—7 $\frac{3}{4}$ —6 $\frac{1}{2}$ —1 $\frac{5}{16}$ —1 $\frac{9}{16}$ —10 $\frac{3}{16}$ —8 $\frac{7}{16}$. Same remarks.

194, ♀ *ad.*; Camp 19, West Humboldt Mountains, September 19, 1867. 20—24—8 $\frac{1}{4}$ —7—1 $\frac{5}{16}$ —1 $\frac{1}{2}$ —11 $\frac{1}{8}$ —9 $\frac{5}{8}$. Same remarks. Bill, pure black.

204, ♀ *ad.*; Camp 19, September 21, 1867. 20—24 $\frac{1}{2}$ —8 $\frac{5}{16}$ —7—1 $\frac{1}{2}$ —1 $\frac{5}{8}$ —11 $\frac{1}{4}$ —9 $\frac{3}{4}$. Same remarks.

246, ♂ *ad.*; Camp 19, October 11, 1867. 17 $\frac{3}{8}$ —21 $\frac{1}{4}$ —7 $\frac{1}{2}$ —6 $\frac{1}{4}$ —1 $\frac{3}{8}$ —1 $\frac{1}{2}$ —9 $\frac{1}{2}$ —8. Same remarks.

249, ♂ *ad.*; Camp 19, October 12, 1867. $19\frac{3}{4}$ — $24\frac{1}{8}$ —8—7— $1\frac{5}{16}$ — $1\frac{1}{2}$ — $11\frac{3}{8}$ — $9\frac{1}{2}$. Same remarks.

289, ♀ *ad.*; Camp 26, Truckee Meadows, November 18, 1867. $20\frac{1}{2}$ — $24\frac{1}{4}$ — $8\frac{3}{8}$ — $6\frac{1}{16}$ — $1\frac{1}{2}$ — $1\frac{1}{16}$ — $11\frac{3}{8}$ — $9\frac{3}{8}$. Same remarks.

290, ♀; Camp 26, Truckee Meadows, November 18, 1867. $19\frac{3}{4}$ — $24\frac{1}{2}$ — $8\frac{5}{8}$ —7—(?)—(?)—11— $9\frac{1}{2}$. Same remarks.

306, ♂ *ad.*; Camp 26, November 20, 1867. (Slaughter-house.) $20\frac{1}{4}$ —25— $8\frac{3}{8}$ — $6\frac{7}{8}$ — $1\frac{7}{16}$ — $1\frac{1}{16}$ — $11\frac{3}{8}$ — $11\frac{1}{4}$ — $9\frac{1}{4}$. Same remarks.

307, ♂ *ad.*; Camp 26, November 20, 1867. (Slaughter-house.) $17\frac{3}{8}$ — $22\frac{7}{8}$ — $7\frac{3}{4}$ — $6\frac{3}{8}$ — $1\frac{5}{16}$ — $1\frac{1}{16}$ — $9\frac{7}{8}$ —8. Same remarks.

338, ♀ *ad.*; Carson City, Nevada, November 25, 1867. (Slaughter-house.) $18\frac{1}{2}$ —23— $7\frac{7}{8}$ — $6\frac{1}{2}$ — $1\frac{3}{8}$ — $1\frac{5}{8}$ — $10\frac{1}{8}$ — $8\frac{1}{16}$. Same remarks.

392, ♂ *ad.*; Washoe Valley, Nevada, January 3, 1868. (Willow-copse.) 20— $24\frac{1}{4}$ — $8\frac{1}{8}$ — $6\frac{3}{4}$. Same remarks.

401, ♂ *ad.*; Truckee Bottoms, December 19, 1867. $21\frac{3}{4}$ —25— $8\frac{1}{2}$ —7— $1\frac{3}{8}$ — $1\frac{3}{4}$ —13— $11\frac{1}{8}$. Same remarks.

407, *ad.*; Truckee Bottoms, December, 1867.

501, eggs (8); Carson City, Nevada, April 20, 1868. Nest in cedar.

506, eggs (2); Carson City, Nevada, April 21, 1868. Willows.

509 (6), 510 (6), eggs; Carson City, Nevada, April 22, 1868. Willows.

511, egg (1); Carson City, Nevada, April 23, 1868. (In nest from which No. 506 were taken.)

512, egg (1); Carson City, Nevada, April 23, 1868. Willows.

513, eggs (4); Carson City, Nevada, April 23, 1868. Willows.

514 (8), 515 (8), eggs; Carson City, Nevada, April 23, 1868. Buffalo-berry.

526, eggs (3); Carson City, Nevada, April 25, 1868. Alder swamp.

538, eggs (9); Carson City, Nevada, April 27, 1868. Willows.

539, eggs (9); Carson City, Nevada, April 27, 1868. Buffalo-berry.

540, eggs (9); Carson City, Nevada, April 27, 1868. Willows.

541, eggs, (7); Carson City, Nevada, April 27, 1868. Willows.

542, eggs (8); Carson City, Nevada, April 27, 1868. Willows.

543, eggs (7); Carson City, Nevada, April 27, 1868. Buffalo-berry.

544, eggs (6); Carson City, Nevada, April 27, 1868. Nut-pine.

545, 546, eggs (6); Carson City, Nevada, April 27, 1868. Willows.

547, eggs (6); Carson City, Nevada, April 27, 1868. Buffalo-berry bushes.

548 (4), 549 (4), eggs; Carson City, Nevada, April 27, 1868. Willows.

550 (3), 551 (2), eggs; Carson City, Nevada, April 27, 1868. Willows.

552, eggs (2); Carson City, Nevada, April 27, 1868. Willows.

556 (8), 557 (8), eggs; Carson City, Nevada, April 29, 1868. Alder-bushes.

767, eggs (6); Truckee Bottom, May 29, 1868. Nest in willows on river-bank.

[The nest is in every instance "domed," the *real* nest being inclosed in an immense thorny covering, by which it is generally far exceeded in bulk. In the *side* of this covering is a winding passage leading into the nest. The purpose of this canopy is possibly to conceal the very long tail of the bird, which, if exposed, would endanger its safety.]

CYANURA STELLERI.

Steller's Jay.

β. frontalis—Blue-fronted Jay.

(“Mountain Jay” of Californians.)

Cyanura stelleri, BAIRD, B. N. Am., 1858, 581 (part).—COOPER, Orn. Cal., I, 1870, 298 (part).

Cyanura stelleri var. *frontalis*, RIDGWAY, Am. Jour. Sci. and Arts, V, Jan., 1873, 43.—B. B. & R., Hist. N. Am. B., II, 1874, 279, pl. xxxix, fig. 2.

Cyanurus stelleri. *b. frontalis*, COUES, Check List, 1873, No. 235a; B. N.W., 1874, 215.

We found this Jay only among the pines on the Sierra Nevada, since it did not, like the Nutcracker (*Picicorvus*), occur on the higher ranges of the Great Basin, though it was represented on the eastern side by the *C. macrolopha*—neither the latter nor the subject of these remarks occurring at any point intermediate between the Sierra and the Wahsatch, along the line of our route. Except when driven to the lower ravines and foot-hills by the unusual continuance of cold weather or by violent snow-storms upon the mountains, it was not observed to descend to below the coniferous woods, though it was common in the lower edge of this forest-belt. It was almost always found in the same localities as Clarke's Nutcracker, it being usual to see both species in one tree; its voice seemed also exceedingly like that of the bird just mentioned, being a series of rough and grating, squawking or screeching notes, very different indeed from those of its eastern congener, *C. cristata*, whose utterances are far more varied and flexible, and even musical in comparison; but like the eastern species it frequently imitated other birds, particularly the Hawks, some of which it mimicked, on occasion, quite successfully. The usual note of the Blue-fronted Jay is a hoarse monosyllabic squawk, very deep-toned, and grating; but a monotonous chatter is often heard, consisting of a rapid repetition of hollow-toned notes, somewhat like *kuk, kuk, kuk, kuk, kuk, kuk*, the style of utterance being comparable to the “scythe-whetting” call of the Flickers (*Colaptes*), but much more sonorous and less musical. On one occasion we fired at an individual of this species in the top of a tall pine tree, and merely disabling one wing, its fall was broken by the resistance of the uninjured wing and outspread tail, the bird alighting easily upon one of the lower branches of

an adjoining tree, when it began to ascend by hopping from one limb to another, at the same time uttering a very perfect imitation of the squealing note of the Red-tailed Hawk (*Buteo borealis*), apparently for the purpose of preventing pursuit.

On the 24th of February, 1868, during a protracted period of extreme cold weather, with deep snows on the mountains, we observed a pair of these Jays in a shade-tree on one of the back streets of Carson City; but they appeared ill at ease so near the habitations of man, skulking about, as if afraid of being seen in town, and evidently anxious to return to their native woods.

List of specimens.

321, ♂ ? *ad.*; El Dorado County, California. Presented by Mr. H. G. Parker. $12\frac{1}{2}$ —(?)— $5\frac{5}{8}$ — $4\frac{1}{16}$ — $1\frac{1}{4}$ — $1\frac{1}{2}$ — $5\frac{3}{8}$ — $4\frac{3}{8}$.

322, ♂ ? *ad.*; El Dorado County, California. Presented by Mr. H. G. Parker. $12\frac{7}{8}$ —(?)—6— $4\frac{7}{8}$ — $1\frac{1}{4}$ — $1\frac{1}{2}$ — $5\frac{3}{8}$ — $3\frac{1}{4}$.

328, ♂ *ad.*; Carson City, Nevada, November 27, 1867. $12\frac{1}{2}$ — $17\frac{5}{8}$ —6— $4\frac{7}{8}$ — $1\frac{1}{8}$ — $1\frac{1}{2}$ — $5\frac{5}{8}$ — $3\frac{1}{2}$. Bill, tarsi, and toes, deep black; iris, vandyke-brown.

329, ♀ *ad.* (mate of preceding); Carson City, Nevada, November 27, 1867. 12—17— $5\frac{3}{4}$ — $4\frac{5}{8}$ — $1\frac{1}{8}$ — $1\frac{1}{2}$ — $5\frac{1}{4}$ —4.

330, ♀ *ad.*; Carson City, Nevada, November 27, 1867. 12— $17\frac{1}{2}$ — $5\frac{5}{8}$ — $4\frac{9}{16}$ —1— $1\frac{9}{16}$ —5—3.

445, ♂ *ad.*; Carson City, March 21, 1868. $12\frac{3}{8}$ —18—6—5. Bill, tarsi, and toes, black; iris, bistre.

477, ♂ *ad.*; Carson City, March 30, 1868. 12— $17\frac{1}{2}$ —6— $4\frac{7}{8}$.

497, ♂ *ad.*; Carson City, April 18, 1868. 13— $18\frac{3}{8}$ — $6\frac{1}{4}$ — $5\frac{1}{8}$. Bill, tarsi, and toes, deep black; iris, bistre. [Type of var. *frontalis*, Ridgw., l. c.]

498, ♀ *ad.* (mate of preceding); Carson City, April 18, 1868. $11\frac{3}{4}$ — $17\frac{1}{4}$ — $5\frac{11}{16}$ — $4\frac{3}{4}$. [Type of var. *frontalis*, Ridgw., l. c.]

CYANURA MACROLOPHA.

Long-crested Jay.

Cyanocitta macrolopha, BAIRD, Pr. Ac. Nat. Sci. Philad., 1854, 118.

Cyanura macrolophus, BAIRD, Birds N. Am., 1858, 582; Cat. N. Am. Birds, 1859, No. 436.—COOPER, Orn. Cal., I, 1870, 300.

Cyanura stelleri var. *macrolopha*, ALLEN, Bull. Mus. Zool., III, 1872, 178.—COUES, Key, 1872, 165, fig. 107; Check List, 1873, No. 235a.—B. B. & R., Hist. N. Am. Birds, II, 1874, 281, pl. XXIX, fig. 3.—HENSHAW, 1875, 335.

Cyanura coronata var. *macrolopha*, RIDGW., Am. Journ. Sci. and Arts, V, Jan., 1873, 43.

This more eastern representative of Steller's Jay was first met with

among the pines of the Wahsatch Mountains, which formed, apparently, the western limit of its range. It was there by no means common, but became more so as we proceeded eastward into the Uintahs, where it was comparatively plentiful. In its habits and manners it seemed a perfect counterpart of *C. frontalis*, but its notes appeared to be less sonorous than those of that form.

List of specimens.

1284, nest and eggs (6); Parley's Park, June 25, 1869. Nest in small fir-tree, in edge of woods, saddled on horizontal branch, about 15 feet from ground. Nest abandoned, and several of the eggs broken.

1373, ♂ *ad.*; Pack's Cañon, Uintah Mountains, July 5, 1869. 13¾—19. Bill, black; iris, brown; legs and feet, black.

1374, nest (of preceding, contained three fully-fledged young). Nest on mountain-mahogany tree, on side of ravine of a secluded cañon in the pine-region, situated in a sort of triple fork, near extremity of horizontal branch.

1375, ♂ *ad.*; Pack's Cañon, July 6, 1869. 13¾—19¼. Same remarks.

1445, 1446, *juv.*; Parley's Park, Wahsatch Mountains, Utah, July 23, 1869.

CYANOCITTA CALIFORNICA.

California Valley Jay.

(*Yo-shoo'-ah* of the Washoes.)

Garrulus californicus, VIGORS, Zool. Beechey's Voy., 1839, 21, pl. v.

Cyanocitta californica, STRICKL., Ann. Mag. XV, 1845, 342.—BAIRD, Birds N. Am., 1858, 584; Cat. N. Am. Birds, 1859, No. 437.—COOPER, Orn. Cal., I, 1870, 302.—B. B. & R., Hist. N. Am. Birds, II, 1874, 288, pl. XL, fig. 1.

Aphelocoma floridana var. *californica*, COUES, Key, 1872, 166; Check List, 1873, No. 236b.

Aphelocoma floridana. c. *californica*, COUES, Birds N.W., 1874, 219.

The common "Valley Jay" of California was observed in abundance only among the western foot-hills of the Sierra Nevada, where it was seen both in the brushwood of the ravines and among the scattered pines. It was also noticed among the oaks of the plains, where, however, it was less plentiful. On the eastern slope it appeared to be quite common, at least on the foot-hills near Carson City, where, in 1868, it made its first appearance toward the last of April.

This species may be instantly distinguished at a distance from the *C. woodhousii* by the conspicuous contrast between the pale gray of the back and the blue of the wings and tail, as well as by the pure white lower parts; the colors of *C. woodhousii* being much more uniform, appearing almost entirely dull grayish-blue, brighter on the wings and tail. The notes, however, appear to be much the same in the two species.

List of specimens.

558, ♂ *ad.*; Carson City, Nevada, April 29, 1868. Sage-brush, below pines. $12\frac{1}{2}$ — 16 — $5\frac{1}{4}$ — $4\frac{1}{4}$. Bill, tarsi, and toes, deep black; iris, bister.

559, ♂ *ad.*; Carson City, Nevada, April 29, 1868. $12\frac{1}{8}$ — 16 — $5\frac{1}{4}$ — $4\frac{1}{4}$. Same remarks.

560, ♀ *ad.*; Carson City, Nevada, April 29, 1868. $11\frac{1}{2}$ — $15\frac{3}{4}$ — $5\frac{1}{4}$ — $4\frac{1}{4}$. Same remarks.

CYANOCITTA WOODHOUSII.

Woodhouse's Jay.

(*We'-ahk* of the Paiutes.)

Cyanocitta woodhousii, BAIRD, B. N. Am., 1858, 585, pl. 59; Cat. N. Am. B., 1859, No. 438.—COOPER, Orn. Cal., I, 1870, 304.

Aphelocoma floridana var. *woodhousii*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 179.—COUES, Key, 1872, 166; Check List, 1873, No. 236a; B. N.W., 1874, 219.

Cyanocitta californica var. *woodhousii*, B. B. & R., Hist. N. Am. B., II, 1874, 291, pl. XL, fig. 3.

Cyanocitta floridana var. *woodhousii*, HENSHAW, 1875, 337.

This very interesting bird we found to be the most generally-distributed species of the family, since it occurred on nearly every range where there was water in the main cañons, or extensive woods of nut-pine and cedar on the slopes; it was said to occasionally visit the wooded valleys of the Truckee and Carson Rivers, but we never saw it at either place, although it was found to be more or less common in the similar valley of the Weber, in Utah. At our camp on the western slope of the West Humboldt Mountains, it was very abundant in September, and one of the most familiar birds of the neighborhood. It was very unsuspicious where not molested, and anything unusual in the occupation of any one about the

camp was sure to excite its curiosity. On one occasion, while the writer was at work skinning birds in the shade of the bushes overhanging the stream, one often came and perched upon a branch near by, quietly watching every movement with all the inquisitive curiosity of a Cat-bird (*Galeoscoptes carolinensis*). On the opposite side of the same range, in Buena Vista Cañon, it was also common, and was there several times observed in the gardens and door-yards of the town. It was also rather common on the eastern slope of the Ruby range, in the extensive piñon and cedar woods, while at "City of Rocks," in the southern portion of Idaho, the most northern point reached during our trip, it was very numerous in October, among the woods of the same description. On the western foot-hills of the Wahsatch it was more or less plentiful, according to the locality, among the scrub-oaks, while many were seen in the valley of the Weber. It did not occur in Parley's Park, however, the altitude of that place being probably too great.

In its manners this Jay and its congeners differ strikingly from the species of the genus *Cyanura*, or the Crested Jays, their movements calling to mind the Mocking-bird (*Mimus polyglottus*) and the Cat-bird (*Galeoscoptes carolinensis*), their manner of flight being exactly the same, while they exhibit a similar predilection for thickets and scrubby brushwood. The notes of the present species greatly resemble those of *C. californica*, and are harsh and piercing to an extreme degree. That most frequently uttered is a shrill screech, sounding like *we'-ahk, we'-ahk*, whence the name bestowed upon it by the Paiute Indians.

List of specimens.

162, ♂ *ad.*; Camp 18, West Humboldt Mountains, September 4, 1867. Brushwood, along brook. $11\frac{7}{8}$ — $15\frac{3}{8}$ —5— $4\frac{3}{8}$ — $1\frac{1}{16}$ — $1\frac{7}{16}$ — $5\frac{5}{8}$ —4. Bill, tarsi, and toes, deep black; iris, chestnut-hazel.

186, ♂ *ad.*; Camp 18, West Humboldt Mountains, September 12, 1867. Junipers. 12 — $15\frac{7}{16}$ —5— $4\frac{3}{16}$ — $1\frac{1}{16}$ — $1\frac{5}{16}$ —5— $\frac{3}{16}$ — $3\frac{11}{16}$. Same remarks.

188, ♀ *ad.*; Camp 18, West Humboldt Mountains, September 13, 1867. Brushwood, along brook. $12\frac{1}{2}$ — $15\frac{3}{4}$ — $5\frac{1}{4}$ — $4\frac{3}{8}$ — $1\frac{1}{8}$ — $1\frac{5}{16}$ — $5\frac{7}{8}$ — $4\frac{9}{16}$. Same remarks.

242, ♂ *ad.*; Camp 19, West Humboldt Mountains, October 8, 1867. Sage-brush. $12\frac{5}{16}$ — $15\frac{13}{16}$ — $5\frac{1}{4}$ — $4\frac{7}{16}$ — $1\frac{1}{8}$ — $1\frac{5}{16}$ —6—4. Same remarks.

1190, *juv.*; Salt Lake City, Utah, June 19, 1869. $11\frac{1}{4}$ —15. Bill and feet, black; iris, brown.

FAMILY TYRANNIDÆ—TYRANT FLYCATCHERS.

TYRANNUS VERTICALIS.

Western Kingbird; "Arkansas Flycatcher."

Tyrannus verticalis, SAY, Long's Exped., II, 1823, 60.—BAIRD, Birds N. Am., 1858, 173; Cat. N. Am. Birds, 1859, No. 126.—COOPER, Orn. Cal., I, 1870, 312.—COUES, Key, 1872, 170, figs. 110a, 112; Check List, 1873, No. 244; Birds N.W., 1874, 236.—B. B. & R., Hist. N. Am. Birds, II, 1874, 324, pl. XLIII, fig. 2.—HENSCHAW, 1875, 342.

Generally distributed throughout all fertile districts of the west, this species was extremely abundant in favorable localities, this being especially the case at Sacramento, where perhaps no other species equaled it in numbers. In its habits, this Kingbird is remarkably similar to the eastern species, *T. carolinensis*, and their nest and eggs cannot be distinguished; but it is of an even more vivacious and quarrelsome disposition, continually indulging in aerial combats, sometimes to such an extent that half a dozen or more may be seen pitching into each other promiscuously, but apparently more from playful than pugnacious motives. They are also of a very sympathetic disposition, for when a nest is disturbed, the owners soon bring around them, by their cries, all the others in the neighborhood; but no sooner do they assemble than they begin their playful contests, and fill the air with their twitterings. Their notes are all weaker and less rattling than those of the eastern species, partaking more of the character of a tremulous, though rather shrill, twitter.

We know of no other bird so easily tamed, or which so thoroughly enjoys the society and protection of human beings, when once domesticated, as this species, as the following account of three individuals possessed by us in the field, at various times, may show:—

The first of these pets, familiarly known to the party as "Chippy," was obtained about the middle of July from the Indians, who had just taken him, along with three others, all fully fledged, from the nest. He was carried to camp, and fed with grasshoppers and flies until able to catch them for himself, which he learned to do in about a week after he acquired the power of flight. The little fellow had a most voracious appetite, and during the day continually followed us about, teasing for grasshoppers, until he had eaten enough, after which he quieted down for five minutes or

so, when he began to clamor for more—thus appearing to be always hungry. Had one person the office of keeping him supplied with food he would consequently have been extremely troublesome; but, fortunately, all became interested in him, and he thus received favors and caresses from all hands. When gorged with food, he usually remained perched upon the shoulder of the one who carried him, but sometimes he would fly off to his favorite perch, a rope running from the rear of a tent to a stake in the ground; or, if it happened to be midday and the sun particularly oppressive, would take shelter underneath a hoisted umbrella, hung beneath the fly of a tent for the purpose of shading a thermometer, perching upon one of the ribs of the apparatus. Chippy was the earliest riser in camp, and at day-break his merry twitter aroused his human companions, of whom his favorite one, the writer, he would often awake by alighting in his face, for he would invariably select him from the dozen or more persons who lay on the ground wrapped in their blankets. At all times he was greatly averse to being left alone, and when night approached would nestle more closely against one's neck, twittering contentedly until asleep, and if removed exhibiting the greatest disappointment, while he was often so persistent in keeping his place that repeated removals were necessary to induce him to remain upon the roost provided for him, inside the tent.

His almost insatiable appetite was the subject of comment by us all, and speculations were indulged in as to the probable number of grasshoppers he consumed in a day. It was finally agreed that this should be settled by experiment, so each person was instructed to keep count of the number he himself fed him during the day. At evening notes were compared, and it was found that he had been fed one hundred and twenty grasshoppers since morning!

From the very first he was so completely tame that he did not exhibit under any circumstances the slightest trace of timidity; he always disliked to be handled, however, but this was evidently on account of his plumage, merely, for he would immediately come to any one who called him, or alight upon a hand held out as an invitation. He soon learned his own name, and knew it so well that when he had strayed some distance from camp (as he often did when led away by the temptations of companions

of his kind, who often visited the vicinity of our camp for the purpose), it was only necessary to call him, and if within hearing he was sure to leave his comrades with impolite abruptness and fly in haste to camp, twittering gladly as he came. The writer was once leaving the camp for a trip into the mountains, and had scarcely reached the mouth of the cañon, several hundred yards distant, when Chippy's familiar voice was heard, and on looking back he was discovered following, as fast as his wings could carry him, twittering with all his might, as if calling out for us to wait for him. He soon overtook us, and, alighting upon our shoulder, accompanied us on our way, every now and then flying off after a butterfly or other insect that had caught his eye, capturing which he would return and beat his prey against the hard brim of our straw hat until in a condition to be swallowed; or often these little detours were for the purpose of sporting awhile with others of his species encountered by the way, returning in a little while, followed by them to within a few yards, when they would alight on a branch, apparently wondering at the perfect understanding existing between us. After ascending the cañon to where the path became too much obstructed by rocks and brushwood to proceed farther, except on foot, we dismounted and unsaddled; Chippy seemed disposed to rest, so he was placed in the shade of the saddle, as it lay upon the ground, and we proceeded on our way. The little fellow soon missed us, however, and it was not long before he found us out, by the report of our gun—a sound with which he had long been familiar, and which he had not learned to fear, the barrel of our gun often being his perch when he accompanied us on our trips, even the report, though of course startling him, not frightening him from our shoulder. On several occasions did the report of our gun prove the means of directing him to us when he had strayed beyond his usual bounds, such a circumstance once occurring half a mile from camp, after he had been missing all the morning. His natural fondness for the society of the birds of his species living in the neighborhood did not have the effect of in the least alienating his affections, but came, nevertheless, near costing him his life, the circumstances being as follows: He used daily to bring his playmates to the camp, where, after sporting about with them for a half hour or so, they would all leave together and be absent, sometimes

the whole afternoon, Chip often not returning until near evening; we began to fear that in consequence of this some harm might befall him while out of our sight, or that some day he might fail to return at all; so, as the best means of preventing such a misfortune, we determined to frighten the wild birds away when they should next make their appearance, and thus keep Chip out of temptation. A favorable opportunity presented one afternoon when three were sporting together at a considerable height near our camp; and having just observed Chippy on his accustomed perch, brought out our gun and fired at them. Fortunately none were hit, for one of them, which proved to be our pet, separated from the rest and flew in terror to the camp, screaming with all his might. We hastened back, fearing he had been injured, and found him perched upon a rope, terribly frightened, but not at all hurt. His disregard for firearms was now at an end, and when we approached him with gun in hand he beat a precipitate retreat, and continued to do so at every attempt, his feathers pressed close to his body and his neck stretched—the very picture of fear. The moment the weapon was laid aside, however, his confidence was restored, and he was then as easily approached as before.

We carried Chippy with us, as we moved from camp to camp, for nearly two months after. Everywhere he excited curiosity and wonder, even among the Indians, while the members of our party grew daily more attached to him. One morning, however, in the latter part of September, we missed his familiar awakening twitter, and when we arose from our blankets he could not be found. Search was made throughout the day, but without success, and a large hawk having been seen early in the morning hovering about the place, seemed to explain the cause of his disappearance. He was never afterward seen.

It was suggested by members of the party that instead of exhibiting the docility and intelligence characteristic of the species, this bird was perhaps an exceptional individual, and that another could not be found which would afford a parallel case. The following summer, however, another young one was taken from the nest, and being reared under exactly the same circumstances developed the same traits to such perfection that he would have absolutely passed for the same bird. As happened with

Chippy No. 1, the new pet after a while attracted others of his species to our camp, and these soon became so familiar that they would perch upon the tents, even during our presence. One individual happened to alight upon the fly of the mess-tent while we were at lunch, and being near the edge of the canvas, and his shadow showing his exact position from beneath, he was easily caught. This proved to be a full-grown bird, although evidently one of the year, and being placed in a cage and sumptuously fed for a day or two, was released in Chip's presence, and would not depart. He had become almost as tame as his companion, and remained with us until both were killed by our domesticated hawks, some fine specimens of *Buteo swainsoni*, which were allowed the liberty of the camp.

List of specimens.

- 15, nest and eggs (3); Sacramento, California, June 11, 1867. Nest in large cotton-wood tree.
- 16, nest and eggs (3); Sacramento, June 11, 1867. Nest in small willow, in copse.
- 17, ♀ *ad.* (parent of No. 15). $8\frac{1}{2}$ — $14\frac{7}{8}$ — $4\frac{7}{8}$ — $4\frac{1}{16}$ — $\frac{3}{4}$ — $\frac{3}{4}$ — $3\frac{5}{8}$ — $1\frac{3}{4}$. Bill, tarsi, and toes, deep black; iris, hazel.
- 37, nest and eggs; Sacramento, June 12, 1867. Nest in small cotton-wood, in copse.
- 45, nest and eggs (3); Sacramento, June 17, 1867. Nest on horizontal branch of large cotton-wood.
- 46, ♂ *ad.* (parent of preceding.) $9\frac{1}{8}$ — $16\frac{1}{8}$ — $5\frac{1}{4}$ — $4\frac{3}{8}$ — $\frac{3}{4}$ — $1\frac{1}{16}$ — 4 — $1\frac{3}{4}$. Bill, tarsi, and toes, deep black; iris, hazel.
- 71, nest and eggs (4); Sacramento, June 20, 1867. Nest in top of small oak, in grove.
- 1180, nest and eggs (4); Salt Lake City, Utah, June 18, 1869. Nest on small mountain-mahogany bush, overhanging cliff.
- 1181, nests and eggs; same date and remarks.
- 1408, nest; Bear River Valley, July, 1869. [J. C. Olmstead.]

TYRANNUS CAROLINENSIS.

Kingbird.

- Lanius tyrannus* var. *γ carolinensis*, GMEL., Syst. Nat., I, 1788, 302.
- Tyrannus carolinensis*, TEMMINCK, Tabl. Méth. —, 24.—BAIRD, B. N. Am., 1858, 171; Cat. N. Am. B., 1859, No. 124.—COOPER, Orn. Cal., I, 1870, 311.—COUES, Key, 1872, 169, pl. II, figs. 1, 2, 110b, 111; Check List, 1873, No. 242; Birds N.W., 1874, 235.—B. B. & R., Hist. N. Am. B., II, 1874, 316, pl. XLIII, fig. 4.—HENSHAW, 1875, 341.

In the rich valley of the Truckee River, in western Nevada, two or

more pairs of this familiar eastern bird had their abode among the large cotton-wood trees near our camp; in fact, this species seemed to be no more rare in that locality than the *T. verticalis*, which, however, was itself far from common. On the eastern border of the Great Basin it was more abundant, being quite as numerous in the Salt Lake Valley as the *T. verticalis*, both frequently nesting in the same grove.

List of specimens.

1496, ♀ *juv.*; Parley's Park, Wahsatch Mountains, Utah, August 10, 1869. $8\frac{1}{2}$ — $14\frac{1}{2}$. Bill, tarsi, and toes, black; iris, dark brown.

MYIARCHUS CINERASCENS.

Ash-throated Flycatcher.

Tyrannula cinerascens, LAWRENCE, Ann. Lyc. N. H. New York, V, 1851, 109.

Myiarchus cinerascens, SCLATER, Ibis, 1859, 121.—COUES, Key, 1872, 171; Check List, 1873, No. 248; B. N.W., 1874, 239.

Myiarchus crinitus var. *cinerascens*, B. B. & R., Hist. N. Am. B., II, 1874, 337, pl. XLIII, fig. 6.—HENSHAW, 1875, 345.

Myiarchus mexicanus, BAIRD, Birds N. Am., 1858, 179 (not of KAUP); Catal., 1859, No. 131.—COOPER, Orn. Cal., I, 1870, 316.

This species was apparently not abundant anywhere, being probably more so in the Sacramento Valley than in any locality eastward of the Sierra Nevada. It was not noticed in the vicinity of Sacramento City, in June, but among the oaks of the plains toward the foot-hills of the Sierras it was common early in July. A few were observed among the cotton-woods of the lower Truckee in July and August, and it was also a not infrequent summer-resident in the cañons of the Ruby Mountains, where it was most often observed perched upon a gnarled cedar or mountain-mahogany overhanging the top of a rocky gorge or high cliff. It was very rare in Parley's Park.

Resembling its eastern relative, the Great Crested Flycatcher (*M. crinitus*), in its general habits, its notes, however, are weaker, and do not possess in so great a degree the strikingly wild character so marked in the vehement whistlings of that species.

List of specimens.

104, ♂ *ad.*; Truckee Reservation (Camp 12), Nevada, July 24, 1867. $8\frac{1}{2}$ —13—4— $3\frac{1}{4}$ — $\frac{7}{8}$ — $\frac{7}{8}$ — $3\frac{3}{8}$ — $1\frac{1}{8}$. Bill, deep black; iris, hazel; tarsi and toes, black.

SAYORNIS NIGRICANS.

Black Pewee.

Tyrannula nigricans, SWAINSON, Synop. Mex. Birds, Philos. Mag., I, 1827, 367.
Sayornis nigricans, BONAP., Comp. Rend., XXVIII, 1854, 87.—BAIRD, B. N. Am., 1858, 183; Cat. N. Am. B., 1859, No. 134.—COOPER, Orn. Cal., I, 1870, 319.—COUES, Key, 1872, 172; Check List, 1873, No. 251.—B. B. & R., Hist. N. Am. B., II, 1874, 340, pl. XLV, fig. 1.—HENSHAW, 1875, 347.

The Black Pewee was found only at Sacramento, where it was rather common about the out-buildings of habitations near the river. In its sociable disposition, its movements, and its ordinary note of *chip*, it reminded us exactly of the eastern *S. fuscus*; we did not, however, hear it utter a note similar to that from which the latter receives its common name, but judging from the extreme similarity of the other notes, so far as heard, consider it likely that the one to which we refer is also uttered.

SAYORNIS SAYUS.

Say's Pewee.

(*To-que'-oh* of the Paiutes.)

Muscicapa saya, BONAP., Am. Orn., I, 1825, 20, pl. II, fig. 3.
Sayornis sayus, BAIRD, B. N. Am., 1858, 185; Cat. N. Am. Birds, 1859, No. 136. COOPER, Orn. Cal., I, 1870, 320.—COUES, Key, 1872, 172; Check List, 1873, No. 250; B. N.W., 1874, 240.—B. B. & R., Hist. N. Am. B., II, 1874, 347, pl. XLV, fig. 3.—HENSHAW, 1875, 349.

Throughout the country eastward of the Sierra Nevada, this interesting bird was found in all suitable places, though it was not abundant anywhere, since it was seldom that more than one pair inhabited a restricted locality. Its favorite haunts were the rocky shores of the lakes and rivers, or the walls of the lower cañons in the mountains, where it built its bulky but soft and downy nest among the recesses of the rocks, or, as was more often the case, upon a narrow shelf of rock projecting from the ceiling or dome of a cave. In those wild localities it was found to be rather shy in its disposition; but wherever man had fixed his abode upon the dreary waste this species was attracted to his vicinity, thus assuming the semi-domesticated habits of *S. fuscus* and *S. nigricans*, which it repre-

sents in this intermediate region. It was even noticed at several stage-stations in the midst of the Humboldt and Carson Deserts, where no water occurred except in the artificial wells. About the larger settlements it was found to be more numerous, and at Unionville, in the West Humboldt Mountains, had, with *Sialia arctica* and *Salpinctes obsoletus*, taken possession of the abandoned adobe houses in the upper portion of the town. At this place we observed a nest which was attached to the under side of the eave of a large stone building, being apparently built upon the base of a deserted nest of the Cliff Swallow (*Petrochelidon lunifrons*).

While this species agrees with its more western and eastern representatives (*S. nigricans* and *S. fuscus*) in nesting-habits, the character of its nest and eggs, its fondness for rocky localities in the vicinity of water, and in the readiness with which it becomes attached to the vicinity of dwellings, it differs from both in notes, the usual utterance being a fine plaintive *peer, peer*, much like a certain wailing note of *Contopus virens*, another common note being a prolonged querulous twitter.

List of specimens.

181, ♀ *ad.*; West Humboldt Mountains (Camp 18), Nevada, September 11, 1867. $8\frac{1}{16}$ — $12\frac{3}{8}$ — $4\frac{1}{4}$ — $3\frac{9}{16}$ — $\frac{5}{8}$ — $\frac{3}{4}$ — $3\frac{1}{2}$ — $1\frac{5}{8}$. Bill, tarsi, and toes, deep black; iris, hazel.

456, ♂ *ad.*; Carson City, Nevada, March 25, 1868. $7\frac{3}{4}$ — $12\frac{5}{8}$ — $4\frac{5}{16}$ — $3\frac{1}{2}$. Bill, deep black; iris, bistre; tarsi and toes, plumbeous-black.

457, ♀ *ad.*; Carson City, Nevada, March 25, 1868. $7\frac{11}{16}$ — $12\frac{3}{8}$ — $4\frac{1}{16}$ — $3\frac{5}{16}$. Same remarks.

762, nest and eggs (2); island in Pyramid Lake, Nevada, May 23, 1868. Nest attached to shelf on roof of cave, on rocky shore.

764, nest and eggs (4); east shore of Pyramid Lake, May 25, 1868. Nest on shelf in cave, among the tufa domes.

CONTOPUS BOREALIS.

Olive-sided Flycatcher.

Tyrannus borealis, SWAINSON, Fauna Bor. Am., II, 1831, 141, pl. xxxv.

Contopus borealis, BAIRD, B. N. Am., 1858, 188; Cat. N. Am. B., 1859, No. 137.—

COOPER, Orn. Cal., I, 1870, 323.—COUES, Key, 1872, 173; Check List, 1873,

No. 253; B. N.W., 1874, 243.—B. B. & R., Hist. N. Am. B., II, 1874, 353, pl.

XLIV, fig. 1.—HENSHAW, 1875, 350.

This interesting bird was a rather common summer-resident in the

higher portion of the pine-belt of the Wahsatch, and we have every reason to believe that it is also found in similar localities on the Sierra Nevada. Near the summits of the pine-clad hills in the vicinity of our camp in Parley's Park it was by no means rare in certain parts of the woods, its favorite resort being those portions of the forest where many of the trees had been deadened by fire, the most characteristic associate species being *Chrysomitris pinus*, *Carpodacus cassinii*, and *Junco caniceps*. It was extremely shy, and could be approached only with the greatest difficulty. Attention was usually attracted to it by its mellow whistling notes, which bore a faint resemblance to certain utterances of the Cardinal Grosbeak (*Cardinalis virginianus*), the bird being generally perched upon the summit of a tall dead pine. One of the specimens obtained was secured only by a tedious and difficult climb to the top of a very tall fir-tree, which fortunately began branching near the ground, the bird having lodged among the topmost branches. The first individual of the species that we saw was perched quite a distance off, upon a dead mahogany tree on the side of one of the lower cañons of the East Humboldt Mountains. Being the first example we had ever seen, its appearance struck us as quite peculiar, as it sat quietly in an upright attitude, but it was at last decided to be a Shrike (*Collurio*); upon returning down the cañon an hour or more afterward, however, it was noticed occupying the same position, but presently it flew from the perch and snapped an insect in the air, when it returned to the branch and beat it against the limb in true flycatcher style.

List of specimens.

875, ♂ *ad.*; East Humboldt Mountains (Camp 21), Nevada, August 29, 1868. $7\frac{1}{2}$ —13—(?)— $3\frac{1}{2}$. Upper mandible, black, lower dilute brown, more yellowish basally; iris, deep sepia; whole interior of mouth, rich orange-yellow; tarsi and toes, sepia-black.

1273, ♂ *ad.*; Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. $7\frac{7}{8}$ —13 $\frac{1}{2}$. Bill, black, lower mandible pale wax-brown, more yellowish basally, the tip black; iris, brown; feet, deep black; interior of mouth, deep yellow.

1423, ♂ *ad.*; Parley's Park, July 17, 1869. $7\frac{7}{8}$ —13 $\frac{5}{16}$. Upper mandible, black, lower wood-brown, more yellowish basally; interior of mouth, rich Indian-yellow; iris, brown; tarsi and toes, deep black.

CONTOPUS RICHARDSONI.¹

Richardson's Pewee.

Tyrannula richardsonii, SWAINSON, Fauna Bor. Am., II, 1831, 146, pl. XLVI, lower figure.

Contopus richardsonii, BAIRD, B. N. Am., 1858, 189; Cat. N. Am. B., 1859, No. 138.—COOPER, Orn. Cal., I, 1870, 325.

Contopus virens var. *richardsonii*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 179.—COUES, Key, 1872, 174; Check List, 1873, No. 255a.—B. B. & R., Hist. N. Am. B., II, 1874, 360, pl. XLIV, fig. 4.—HENSHAW, 1875, 353.

Contopus (*virens* var. ?) *richardsonii*, COUES, Birds N.W., 1874, 247.

Richardson's Pewee was met with in every wooded locality, and was no less common at an altitude of 8,000 feet, in the Wahsatch Mountains, than at Sacramento, but little above the sea-level. In all respects except its notes and the character of its nest, this species is a counterpart of the eastern Wood Pewee (*C. virens*), its appearance and manners being quite the same. It seems, however, to be more crepuscular than the eastern species, for while it remains quiet most of the day, no sooner does the sun set than it begins to utter its weird, lisping notes, which increase in loudness and frequency as the evening shades deepen. At Sacramento we frequently heard these notes about our camp at all times of the night. This common note of Richardson's Pewee is a harsh, abrupt lisping utterance, more resembling the ordinary rasping note of the Night-Hawk (*Chordeiles popetue*) than any other we can compare it with, though it is of course weaker, or in strength proportioned to the size of the bird. Being most frequently heard during the close of day, when most other animals become silent and Nature presents its most gloomy aspect, the voice of this bird sounds lonely, or even weird.

The nest of this species, as is well known, differs very remarkably from that of *C. virens*, being almost invariably placed in the crotch between nearly upright forks, like that of certain *Empidonaces*, as *E. minimus* and *E. obscurus*, instead of being saddled upon a horizontal branch, while its structure is very different, the materials being chiefly plant-fibers and

¹ With almost absolute similarity to *C. virens*, its eastern representative, in all appreciable details of form, size, and color, this bird presents such radical differences in notes, accompanied by certain peculiarities of habits, that we feel bound to consider it a distinct species.

stems of fine grasses, instead of beautiful lichens and mosses, matted together with spiders' webs, and with but a slight admixture of other substances. All its habits, however, especially its deportment, are exactly those of *C. virens*, while the eggs of the two species are scarcely, if at all, distinguishable.

At Sacramento we observed in this bird a remarkable display of attachment to its favorite haunts, especially to the place where the nest is built. The nest and eggs of a pair had been taken and the female killed as she flew from the nest; several days afterward, upon revisiting the locality, and happening to look up at the site of the former nest, we were surprised to see a new one already completed in the very same spot, the male having found another mate. When we climbed to the nest the male exhibited more than usual anxiety, and upon returning the following day it was found to be abandoned, and the only egg it contained broken.

List of specimens.

12, nest and eggs (2); Sacramento, June 10, 1867. Nest at extremity of broken dead branch near top of small oak, in grove.

13, ♀ *ad.* (parent of No. 12); Sacramento, California, June 10, 1867. $6\frac{3}{16}$ — $10\frac{1}{8}$ — $3\frac{1}{4}$ — $3\frac{9}{16}$ — $7\frac{7}{16}$ — $2\frac{5}{8}$ — $1\frac{1}{2}$. Bill, deep black above, light-brownish beneath, more yellow basally, the point nearly black; whole interior of mouth, deep orange-yellow; iris, dark brown; tarsi and toes, black.

42, nest and eggs (2); Sacramento, June 15, 1867. Nest saddled on rather large branch of oak, in grove, about 15 feet from ground.

43, ♀ *ad.* (parent of No. 42); Sacramento, June 15, 1867. $6\frac{1}{4}$ — 10 — $3\frac{5}{16}$ — $2\frac{1}{16}$ — $1\frac{9}{16}$ — $7\frac{7}{16}$ — $2\frac{1}{2}$ — $1\frac{1}{4}$. Bill, black, basal half of lower mandible dilute brown.

86, nest and eggs; Sacramento, June 16, 1867. Situated like No. 12.

88, nest and eggs; Sacramento, June 24, 1867. Same situation.

89, nest; Sacramento, June 24, 1867.

898, ♂ *juv.*; East Humboldt Mountains (Camp 23, Secret Valley), September 6, 1868. $6\frac{1}{8}$ — $10\frac{7}{8}$ —(?)— $2\frac{1}{8}$. Upper mandible, black, lower clear pale yellow, the tip black; iris, sepia; tarsi and toes, black.

1250, nest and eggs; Parley's Park, Utah, June 23, 1869. Nest in aspen, 20 feet from ground.

1282, nest and eggs (3); Parley's Park, June 25, 1869. Nest in crotch of dead aspen, along stream.

1304, nest and eggs (2); Parley's Park, June 27, 1869. Nest in crotch of dead aspen.

1315, nest and eggs (2); Parley's Park, June 27, 1869. Nest in dead aspen.

1503, ♀ *ad.*; Parley's Park, August 12, 1869. $6\frac{7}{16}$ — $10\frac{3}{16}$. Upper mandible, black, lower scarcely paler; interior of mouth, rich yellow; iris, brown; legs and feet, black.

EMPIDONAX PUSILLUS.¹**Little Flycatcher; Traill's Flycatcher.**

(Pish'-e-wah'-e-tse of the Shoshones.)

? Platyrhynchus pusillus, SWAINSON, Synop. Mex. Birds, Philos. Mag., I, 1827, 366.*Empidonax pusillus*, CABANIS, Journ. für Orn., 1855, 480.—BAIRD, Birds N. Am., 1858, 194; Cat. N. Am. Birds, 1859, No. 141.—B. B. & R., Hist. N. Am. B., II, 1874, 366, pl. XLIV, fig. 9.*Empidonax traillii* var. *pusillus*, COUES, Key, 1872, 175; Check List, 1873, No. 257a.—HENSHAW, 1875, 356.*Empidonax traillii*. b. *pusillus*, COUES, Birds N.W., 1874, 252.*Empidonax traillii*, COOPER, Orn. Cal., I, 1870, 327.

This is the most abundant and generally distributed of the *Empidonaces*, being, so far as known, the only one of the genus occurring across the entire breadth of the continent.² It prefers the lower portions of the country, however, its favorite haunts being the willows of the river-valleys, and we did not find it higher up among the mountains than an altitude of about 7,000 feet, where it was confined to the willow thickets bordering the streams flowing across the parks. In the environs of Sacramento City it was, next to *Tyrannus verticalis*, the commonest of the Flycatchers, and was as characteristic of the willow copses as *Contopus richardsoni* was of the oak groves. In its manners, this species is more lively than its mountain relatives, *E. obscurus* and *E. hammondi*, especially after sunset, when they chase one another among the bushes, twittering as they fly, frequently perching on a high twig and with swelled throats uttering their not unmusical note of *twip'utawah'*, which is translated by the people of Parley's Park as "pretty dear," by which name it was there familiar to every one.

¹We are unable to appreciate differences between western and eastern ("*traillii*") specimens of this species sufficient to constitute the latter a recognizable variety. It is only those specimens from the dryer and more scantily wooded localities of the West which are paler and grayer colored than the average of eastern examples, and even then the difference is not comparable to that existing between *E. flaviventris* and *E. difficilis*.

²As stated above, we consider *pusillus* and "*traillii*" to be in every respect identical, while we hold *flaviventris* and *difficilis* to be specifically distinct.

List of specimens.

33, nest and eggs (4); Sacramento, California, June 12, 1867. Nest about 2 feet from ground, in small bush in cotton-wood copse.

36, ♀ *ad.* (parent of above); Sacramento, June 12, 1867. $6\frac{5}{8}$ — $8\frac{5}{8}$ —(?).

83, nest and eggs; Sacramento, California, June 24, 1867. Nest about 4 feet from ground, in small bush in willow copse.

84, ♀ *ad.* (parent of eggs No. 83); Sacramento, June 24, 1867. $5\frac{5}{8}$ — $8\frac{1}{8}$ — $2\frac{9}{16}$ — $2\frac{1}{8}$ — $\frac{9}{16}$ — $\frac{9}{16}$ — $2\frac{1}{8}$ — $1\frac{1}{8}$. Upper mandible, black, lower dilute brownish-yellow, more whitish basally; iris, hazel; tarsi and toes, deep hazel.

94, nest and eggs; Sacramento, June 29, 1867. Nest situated like No. 83.

876, ♀ *ad.* (parent of 877); Ruby Valley, Nevada (Camp 21), August 29, 1868. $5\frac{7}{8}$ — $8\frac{3}{8}$ —(?)— $2\frac{1}{4}$. Upper mandible, black, lower very dilute lilaceous-brown, more yellowish basally; whole interior of mouth, rich orange-yellow; tarsi and toes, deep black.

877, *juv.*; Ruby Valley, Nevada (Camp 21), August 29, 1878. $5\frac{1}{2}$ — $8\frac{1}{4}$ —(?)— $2\frac{1}{8}$. Upper mandible, plumbeous-black, lower pale lilaceous, more yellowish basally; whole interior of mouth, rich orange-yellow; iris, purplish-bister; tarsi and toes, pale plumbeous.

1100, ♂ *ad.*; Antelope Island, Great Salt Lake, Utah, June 4, 1869. $6\frac{1}{4}$ — $9\frac{1}{4}$. Upper mandible, black, lower dilute brown; iris, brown; tarsi and toes, deep black.

1101, ♀ *ad.* (mate of preceding); Antelope Island, Great Salt Lake, Utah, June 4, 1869. 6 — $8\frac{5}{8}$. Same remarks.¹

1242, 1243, 1244, 1245, 1246, 1247; nests and eggs. Parley's Park, Wahsatch Mountains, Utah, June 23, 1869. Nests among willows along stream, generally about 5 or 6 feet from ground.

1288, nest and eggs (2); Parley's Park, June 25, 1869. Nest in wild-rose brier, among undergrowth of thicket, along stream.

1305, nest and eggs (4); Parley's Park, June 27, 1869. Nest in wild-rose brier.

1316, nest and egg (1); Parley's Park, June 27, 1869. Nest in rose-bush.

1330, nest and eggs (4); Parley's Park, June 28, 1869. Same remarks.

1331, nest and eggs (3); Parley's Park, June 28, 1869. Nest in rose-bush, undergrowth of willow-copse.

1358, nest; Parley's Park, July 2, 1869. Nest in rose-bush, by stream.

1420, nest and eggs (3); Parley's Park, July 17, 1869. Nest in willows, along stream.

1469, ♂ *ad.*, $5\frac{7}{8}$ — $9\frac{1}{4}$; 1470, ♀ *ad.*, $5\frac{11}{16}$ — $8\frac{5}{8}$; 1471, ♀ *ad.*, $5\frac{5}{8}$ — $8\frac{5}{8}$; 1472, ♀ *ad.*, $5\frac{11}{16}$ — $8\frac{5}{8}$. Parley's Park, July 29, 1869. Upper mandible, deep black, lower light purplish wood-brown; interior of mouth, deep yellow; iris, deep reddish-brown; tarsi and toes, deep black.

1473, ♀ *ad.*; Parley's Park, July 29, 1869. $5\frac{3}{4}$ — $8\frac{1}{2}$. Lower mandible, brownish-white.

1493, ♂ *juv.*; Parley's Park, August 7, 1869. 6 — 9 .

¹These specimens represent the absolutely typical "*traillii*" style.

EMPIDONAX OBSCURUS.

Wright's Flycatcher.

(*Yet'-to-gish* of the Paiutes; *Pish'-e-wah'-e-te-tse* of the Shoshones.)

? *Tyrannula obscura*, SWAINSON, Synop. Mex. Birds, Philos. Mag., I, 1827, 367.

Empidonax obscurus, BAIRD, Birds N. Am., 1858, 200; Cat. N. Am. B., 1859, No. 146.—COOPER, Orn. Cal., I, 1870, 329.—COUES, Key, 1872, 176; Check List, 1873, No. 261; Birds N.W., 1874, 258.—B. B. & R., Hist. N. Am. B., II, 1874, 381, pl. XLIV, fig. 6.—HENSHAW, 1875, 360.

Empidonax wrightii, BAIRD, Birds N. Am., 1858, 200 (in text). [Name proposed in case SWAINSON'S *T. obscura* should prove a different species.]

This *Empidonax* is as characteristic of the mountains as *E. pusillus* is of the lower valleys. It inhabits both the aspen groves and copses of the higher cañons and the mahogany woods of the middle slopes, in which places it is sometimes one of the most numerous of the smaller birds. It is probably not entirely restricted to these elevated regions during the breeding-season, however, since it was common in May among the willow thickets in the lower Truckee Valley, while the first individual of the season was observed in a cedar and piñon woods on the low hills near Carson City, on the 21st of April. In September we found it in the lower cañons of the West Humboldt Mountains, where, as in other ranges, the summer fauna assimilated that of the river-valleys rather than that of the higher cañons. It was equally common on both sides of the Great Basin, the only districts where it was entirely absent being those where the ranges were destitute of water and vegetation. It was more abundant in the aspen copses of the high cañons of the lofty Toyabe range, near Austin, than anywhere else, but it was quite plentiful in similar localities on the Wahsatch and Uintah Mountains.

The habits and manners of this species much resemble those of others of the genus, while in the location and structure of its nest, and the color of its eggs, it resembles very closely *E. hammondi* and *E. minimus*. The notes, however, are decidedly distinctive, and but little like those of its congeners. The ordinary utterance is an exceedingly liquid *whit*, but when the nest is disturbed, as well as on some other occasions, a plaintive *swee* is uttered, which much resembles the call-note of *Chrysomitris pinus*, but is

rather less loud. We always found this little bird to be exceedingly confiding and unsuspicious; so much so, indeed, that when collecting its eggs on the Toyabe Mountains, an attempt to catch the parent bird with the hand, as it sat upon the nest, proved successful in nearly every instance. One specimen was, on this occasion, frightened from off its eggs by our stumbling against the sapling containing the nest before the latter was discovered, and alighted in another bush some distance off; it was fired at but apparently missed, for it flew and disappeared; we were therefore considerably astonished, upon returning to secure the nest, to find the bird again upon her eggs, where she remained without making the least attempt to escape, and suffered herself to be caught, when it was found that several of her quill and tail-feathers had been carried away, and one toe cut off, by the shot we had fired.

List of specimens.

208, ♂ *ad.*; eastern slope West Humboldt Mountains, September 21, 1867. $5\frac{1}{6}$ — $8\frac{1}{8}$ — $2\frac{5}{8}$ — $2\frac{1}{8}$ — $\frac{7}{16}$ — $\frac{5}{8}$ — $2\frac{5}{16}$ — $1\frac{1}{8}$. Upper mandible, uniform deep black, lower mandible dilute chrome-yellow; iris, hazel; tarsi and toes, deep black.

508, ♂ *ad.*; Carson City, Nevada, April 21, 1868. $6\frac{5}{16}$ — $9\frac{5}{8}$ — 3 — $2\frac{1}{2}$. Upper mandible, black, lower dilute brownish-white, dusky toward end; whole interior of mouth, intense yellow; iris, deep sepia; tarsi and toes, deep black.

827, nest and eggs (4); 828, nest and eggs (3); 829, nest and eggs (2); 830, nest and eggs (4); 831, nest and egg (1). Austin, Nevada, July 3, 1868. No. 827 in mountain-mahogany bush, on extreme summit of hill, about 2,000 feet above camp, or at an altitude of 9,000 feet; the others all in aspen thickets, and within reach of the hand.

832, ♀ *ad.* (parent of No. 828, *caught on nest, by hand!*); Austin, Nevada, July 3, 1868. $5\frac{7}{8}$ — $8\frac{7}{16}$ — $2\frac{5}{8}$ — $2\frac{3}{16}$. Upper mandible, sepia-black, lower dilute sepia-brown, yellowish basally; iris, dark sepia; tarsi and toes, deep black.

833, ♀ *ad.* (parent of No. 827, *caught on nest, by hand!*); Austin, Nevada, July 3, 1868. $6\frac{1}{4}$ — $8\frac{3}{4}$ — $2\frac{3}{4}$ — $2\frac{5}{16}$. Same remarks.

867, ♀ *juv.*; Camp 19, East Humboldt Mountains, August 10, 1868. $5\frac{3}{4}$ — $8\frac{3}{8}$ —(?)— $2\frac{1}{4}$. Upper mandible, black, lower, with terminal half, light yellowish, basally more pinkish; interior of mouth, lemon-yellow; iris, dark sepia; tarsi and toes, deep black.

895, ♂ *ad.*; Camp 23, East Humboldt Mountains, September 6, 1868. $5\frac{1}{6}$ — $8\frac{3}{4}$ —(?)— $2\frac{5}{16}$. Upper mandible, black, lower dilute brown, paler and more yellowish basally; interior of mouth, orange-yellow; iris, umber; tarsi and toes, deep black.

896, ♀ *ad.*; Camp 23, East Humboldt Mountains, September 6, 1868. $5\frac{1}{6}$ — 9 —(?)— $2\frac{9}{16}$. Same remarks.

897, ♂ *ad.*; Camp 23, East Humboldt Mountains, September 6, 1868. 6 — 9 —(?)— $2\frac{3}{8}$. Same remarks.

911, ♀ *ad.*; Camp 23, East Humboldt Mountains, September 8, 1868. $6\frac{1}{8}$ — $8\frac{7}{8}$ —(?)— $2\frac{5}{16}$. Upper mandible deep black, terminal third of lower deep mahogany-brown, basal portion, with rictus, pale chrome-yellow; interior of mouth, rich Indian yellow; iris, umber; tarsi and toes, deep black.

911a, ♀ *ad.*; East Humboldt Mountains, September 8, 1868. $5\frac{3}{4}$ — $8\frac{1}{2}$ —(?)— $2\frac{1}{4}$. Same remarks.

912, ♀ *ad.*; Camp 23, East Humboldt Mountains, September 8, 1868. $5\frac{7}{8}$ — $8\frac{5}{8}$ —(?)— $2\frac{5}{16}$. Same remarks.

934, ♂ *juv.*; Camp 25, Humboldt Valley, September 16, 1868. $5\frac{7}{8}$ — $8\frac{3}{4}$ —(?)— $2\frac{1}{4}$. Bill, black, basal two-thirds of lower mandible, lilaceous-white; iris, very dark sepia; tarsi and toes, plumbeous-black. (This specimen is remarkable for its pure and very light ashy colors.)

940, ♀ *ad.*; Secret Valley, Nevada, September 6, 1867.

1248, 1249, nests and eggs; Parley's Park, Wahsatch Mountains, Utah Territory, June 23, 1869. Nests in aspen-copse.

1281, nest and eggs (4); Parley's Park, June 25, 1869. Nest in crotch of dead aspen, along stream.

1334, nest and eggs; Parley's Park, June 28, 1869. Nest in aspens.

1336 (4), 1337 (3), nests and eggs; Parley's Park, June 28, 1869. Nests in aspens.

1353, nest and eggs (4); Parley's Park, June 28, 1869. Nest in service-berry bush.

1515, ♀ *juv.*; Parley's Park, August 16, 1869. 6—9. Lower mandible, pale pinkish.

EMPIDONAX HAMMONDI.

Hammond's Flycatcher.

Tyrannula hammondii, XANTUS, Pr. Ac. Nat. Sci. Philad., 1858, 117.

Empidonax hammondii, BAIRD, B. N. Am., 1858, 119, pl. 76, fig. 1; Cat. N. Am. B., 1859, No. 145.—COOPER, Orn. Cal., I, 1870, 330.—COUES, Key, 1872, 176; Check List, 1873, No. 260; B. N. W., 1874, 257.—B. B. & R., Hist. N. Am. B., II, 1874, 383, pl. XLIV, fig. 7.—HENSHAW, 1875, 362.

This delicate little Flycatcher was not met with anywhere as a summer resident, but during its autumnal migration was found to be very common on the East Humboldt Mountains. It inhabited exclusively the aspen-groves and copses of tall alders and willows in the higher cañons, and seemed to keep in the darkest and most secluded places. The only note heard was a soft *pit*.

List of specimens.

893, ♂ *ad.*; East Humboldt Mountains, Nevada (Camp 22), September 5, 1868. $5\frac{1}{2}$ — $8\frac{1}{8}$ — $2\frac{9}{16}$ — $2\frac{3}{16}$ — $\frac{3}{8}$ — $\frac{9}{16}$ — $2\frac{1}{4}$ —(?). Upper mandible, deep black, lower dilute brown, the edge, with rictus, orange-yellow; iris, dark bistre; tarsi and toes, black.

894, ♂ *ad.*; East Humboldt Mountains (Camp 23), September 6, 1868. $5\frac{1}{2}$ — $8\frac{5}{8}$ —(?)— $2\frac{5}{16}$. Same remarks.

- 908, ♀ *ad.*; East Humboldt Mountains (Camp 23), September 8, 1868. $5\frac{1}{4}$ — $8\frac{1}{8}$ — $2\frac{3}{16}$. Lower mandible, rich brown.
- 909, ♂ *ad.*; East Humboldt Mountains (Camp 23), September 8, 1868. $5\frac{1}{2}$ — $8\frac{9}{16}$ —(?)— $2\frac{5}{16}$. Lower mandible, with rictus, wood-brown.
- 910, ♂ *ad.*; East Humboldt Mountains (Camp 23), September 8, 1868. $5\frac{3}{4}$ — $8\frac{7}{8}$ —(?)— $2\frac{7}{16}$. Same remarks.

EMPIDONAX DIFFICILIS.¹

Western Yellow-bellied Flycatcher.

- Empidonax difficilis*, BAIRD, B. N. Am., 1858, 198 (in text); ed. 1860, pl. 76, fig. 2; Cat. N. Am. B., 1859, No. 144a.
- Empidonax flaviventris* var. *difficilis*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 179.
—COUES, Key, 1872, 176 (in text).—B. B. & R., Hist. N. Am. B., II, 1874, 380.
—HENSHAW, 1875, 362.
- Empidonax flaviventris*. b. *difficilis*, COUES, B. N.W., 1874, 256.
- Empidonax flaviventris*, COOPER, Orn. Cal., I, 1870, 328.

This species was the rarest of the *Empidonaces* met with by us, a few only being seen in the pine forests high up on the Wahsatch Mountains, and a still smaller number on the eastern slope of the Sierra Nevada. At the former place a few pairs were found in July and August, and when observed were usually perched upon a dead twig, sitting in a nearly vertical position, the tail constantly jerked to one side. The only note heard was a distinct *chip*, much like that of the Yellow-rump Warbler (*Dendroica coronata*).

List of specimens.

- 1490, ♂ *ad.*; Parley's Park, Wahsatch Mountains, Utah, August 5, 1869. 6 — $9\frac{1}{4}$. Upper mandible, black, lower lilaceous-white; iris, deep reddish-hazel; tarsi and toes, purplish-black.
- 1491, ♀ *ad.*; Parley's Park, Wahsatch Mountains, Utah, August 5, 1869. $5\frac{7}{8}$ — $8\frac{5}{8}$. Same remarks.

¹ It is with little hesitation that we consider this bird as distinct specifically from *E. flaviventris*. Not only are there very conspicuous and constant differences in proportions and colors (especially the former), but numerous observers have noticed remarkable and important peculiarities in the nesting-habits, the present species almost invariably building its nest in cavities, either of stumps, trees, or rocks, or on beams inside of buildings, a habit not yet noticed in *E. flaviventris*, nor, indeed, in any other species of the genus. [See Cooper, Proc. Cal. Acad. Sciences, December 6, 1875, who, however, is mistaken in supposing that "the differences in the two races seem to be wholly in shades of color and size, and not in proportions, as formerly supposed."]

FAMILY ALCEDINIDÆ—KINGFISHERS.

CERYLE ALCYON.

Belted Kingfisher.

(*Tat'um-pahl'te* of the Washoes; *Tsan'ak-nuk'ket-ah* of the Paiutes; *Pang'wechin'ah-moo* of the Shoshones.)

Alcedo alcyon, LINN., Syst. Nat., I, 1766, 180.

Ceryle alcyon, BOIE, Isis, 1828, 316.—BAIRD, B. N. Am., 1858, 158; Cat. N. Am. B., 1859, 117.—COOPER, Orn. Cal., I, 1870, 337.—COUES, Key, 1872, 188; Check List, 1873, No. 286; B. N.W., 1874, 273.—B. B. & R., Hist. N. Am. B., II, 1874, 392, pl. XLV, fig. 6.—HENSHAW, 1875, 366.

The common Kingfisher was found in the vicinity of all streams and lakes containing fish. In the lower valleys it was resident, but in the mountains was found only in summer.

List of specimens.

292, ♂ *ad.*; Truckee Meadows, Nevada, November 18, 1867.—14—23 $\frac{3}{4}$ —6 $\frac{5}{8}$ —5 $\frac{3}{8}$ —2 $\frac{1}{2}$ — $\frac{3}{8}$ —4—1 $\frac{5}{8}$. Bill, black, more slaty basally, where clouded with pale ashy; iris, dark vivid vandyke-brown; tarsi and toes, livid brownish-black, more bluish on the knees and adjoining part of the tibiae.

1452, ♀ *ad.*; Parley's Park, Utah, July 26, 1869. 12 $\frac{7}{8}$ —22 $\frac{1}{2}$. Bill, black, the rictus and basal portion of lower mandible pale ashy; iris, rich dark brown; tarsi and toes, dark plumbeous-sepia in front, purplish salmon-pink behind and beneath.

1492, ♀ *ad.*; Parley's Park, August 7, 1869. 14 $\frac{3}{8}$ —22 $\frac{3}{4}$. Same remarks as to the preceding.

FAMILY PICIDÆ—WOODPECKERS.

PICUS HARRISI.

Harris's Woodpecker.

(*Kahsoo'te* of the Washoes; *Wahpe'-pannah* of the Paiutes.)

Picus harrisii, AUDUBON, Orn. Biog., V, 1839, 191, pl. 417.—BAIRD, Birds N. Am., 1858, 87; Cat. N. Am. Birds, 1859, No. 75.—COOPER, Orn. Cal., I, 375.

Picus villosus var. *harrisii*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 180.—COUES, Key, 1872, 194; Check List, 1873, No. 298a.—B. B. & R., Hist. N. Am. Birds, II, 1874, 507.—HENSHAW, 1875, 386.

This perfect counterpart of the Hairy Woodpecker of the East (*P. villosus*) was met with throughout the year in all wooded localities, from the

Sierra Nevada eastward. It was equally common in the forests of Coniferæ and among the broad-leaved or deciduous trees. The notes and habits are in all respects identical with those of its eastern representative.

List of specimens.

364, ♀ *ad.*; Truckee Reservation, December 19, 1867. $9\frac{5}{16}$ —15—5— $4\frac{3}{16}$ — $1\frac{1}{8}$ — $1\frac{1}{16}$ — $3\frac{1}{4}$ — $1\frac{3}{4}$. Bill, slaty horn-color; iris, burnt-sienna; tarsi and toes, plumbeous-green.

372, ♂ *ad.*; Truckee Reservation, December 21, 1867. $9\frac{3}{4}$ — $16\frac{3}{4}$ — $5\frac{3}{16}$ — $4\frac{7}{16}$. Bill, greenish-slate, darker terminally; naked orbital region, similar, but paler; iris, reddish-brown; tarsi and toes, dark slaty-green.

373, ♂ *ad.*; same locality and date. $9\frac{5}{8}$ — $16\frac{3}{8}$ — $5\frac{5}{16}$ — $4\frac{3}{8}$. Same remarks.

438, ♂ *ad.*; Carson City, March 10, 1868. $9\frac{1}{8}$ — $15\frac{1}{2}$ — $5\frac{1}{8}$ — $4\frac{1}{4}$. *Extent of tongue beyond end of bill, $2\frac{1}{8}$ inches*; its corneous tip, pale plumbeous.

1435, ♂ *juv.*; Parley's Park, July 21, 1869. 10—17. Bill, dark slate; iris, burnt-sienna; tarsi and toes, cinereous.

1512, ♀ *ad.*; Parley's Park, August 16, 1869. $9\frac{7}{8}$ —17.

NOTE.—The two latter specimens, besides being larger than those from western Nevada, are also more spotted with white on the wings, thereby showing an approach to *P. villosus*.

PICUS GAIRDNERI.

Gairdner's Woodpecker.

Picus gairdneri, AUDUBON, Orn. Biog., V, 1839, 317.—BAIRD, Birds N. Am., 1858, 91; ed. 1860, pl. 85, figs. 2, 3; Cat. N. Am. Birds, 1859, No. 76.—COOPER, Orn. Cal., I, 1870, 377.

Picus pubescens var. *gairdneri*, COUES, Key, 1872, 194; Check List, 1873, No. 299a.—B. B. & R., Hist. N. Am. Birds, II, 1874, 512.—HENSHAW, 1875, 388.

Picus pubescens. b. *gairdneri*, COUES, Birds N.W., 1874, 282.

We found this bird to be unaccountably rare in all portions of the country, even where its larger cousin, *P. harrisi*, abounded; indeed, it was seen at only two localities along the entire route, a very few being found in September among the thickets by one of the streams flowing from the lofty Clover Mountains into the Upper Humboldt. At Parley's Park two families of young were met with, on separate occasions, in July and August, but we did not succeed in obtaining specimens. At the former locality they were feeding on the fruit of *Cratægus rivularis*, in company with many other species of birds. In all respects, both as to habits and voice, this bird seems to be a perfect counterpart of the Downy Woodpecker (*P. pubescens*) of the East.

List of specimens.

925, ♂ *ad.*; Upper Humboldt Valley (Camp 25, Deering's Creek), Nevada, September 12, 1868. 7—12 $\frac{1}{4}$ —(?)—3 $\frac{7}{16}$. Bill, pure slate; iris, burnt-umber; tarsi and toes, ochraceous olive-green.

935, ♂ *ad.*; Upper Humboldt Valley (Camp 25, Deering's Creek), Nevada, September 17, 1868. 6 $\frac{7}{8}$ —12 $\frac{1}{8}$ —(?)—3 $\frac{1}{2}$.

PICUS NUTTALLI.

Nuttall's Woodpecker.

Picus nuttalli, GAMBEL, Pr. Ac. Nat. Sci. Philad., I, 1843, 259.—BAIRD, Birds N. Am., 1858, 93; Cat. N. Am. Birds, 1859, 78.—COOPER, Orn. Cal., I, 1870, 378.—B. B. & R., Hist. N. Am. Birds, II, 1874, 521, pl. L, figs. 3, 6.

Picus scalaris var. *nuttalli*, COUES, Key, 1872, 193; Check List, 1873, No. 297a.

Among the scattered oaks of the Sacramento plains we found this Woodpecker to be very common, but met with it nowhere else. It was particularly abundant where the oaks attained a large size, and formed more extensive groves, nearer the foot-hills of the Sierra Nevada. Its manners were very much those of the Downy Woodpeckers (*P. pubescens* and *P. gairdneri*), but the notes were entirely different, the usual one consisting of a very prolonged rattling call, quite unlike that of any other bird with which we are acquainted.¹

PICUS ALBOLARVATUS.

White-headed Woodpecker.

Leuconerpes albolarvatus, CASSIN, Pr. Ac. Nat. Sci. Philad., 1850, 166.

Picus albolarvatus, BAIRD, Birds N. Am., 1858, 96; Cat. N. Am. B., 1859, No. 81.—COOPER, Orn. Cal., I, 1870, 382.—COUES, Key, 1872, 192; Check List, 1873, No. 295.—B. B. & R., Hist. N. Am. B., II, 1874, 526, pl. L, figs. 7, 8.

In the dense forests of lofty and massive coniferæ which cover the slopes of the Sierra Nevada, this Woodpecker was found all the year round. It was first met with in July, on the western slope, at an elevation of about 5,000 feet; it was the most abundant Woodpecker of the locality, and was almost constantly seen sporting about the tops of the tall dead pines, usually

¹In several localities in western Nevada we heard, on different occasions, similar notes, but they turned out to be those of one of the Passeres, and a species which we are not able to identify, unless it may be *Phænopepla nitens*. (See page 447.)

out of gunshot range. On the eastern slope, it was common near Carson City throughout the winter, keeping entirely among the pines, though sometimes coming down to the lower edge of the woods.

The appearance of the White-headed Woodpecker is very striking, on account of the bold contrast between the white head and neck and the uniform black of the rest of the plumage—the white patch on the primaries showing conspicuously only when the bird is flying. In its habits it resembles the larger “Sapsuckers” (*P. villosus* and *P. harrisi*), except that it is more lively in its disposition, in which respect it approaches quite nearly to the playful *Melanerpeæ*. Its notes, however, are quite distinctive, for although they bear some resemblance to the clear, sharp *diph* of the species above mentioned, the call forms a connected series of these notes, each ending in a rather suppressed twitter.

List of specimens.

435, ♂ *ad.*; Carson City, March 10, 1868. $9\frac{7}{16}$ — $15\frac{3}{4}$ — $5\frac{3}{16}$ — $4\frac{1}{4}$. Bill, uniform slate-black; iris, dull carmine; tarsi and toes, olivaceous-slate. *Tongue protrudes $\frac{3}{4}$ of an inch beyond the end of the bill*; its corneous tip white. [See under *P. harrisi*, p. 546.¹]

436, ♀ *ad.* (mate of No. 435). $9\frac{7}{16}$ — $15\frac{7}{8}$ — $5\frac{1}{4}$ — $4\frac{3}{4}$. Same remarks.

527, ♂ *ad.*; Carson City, April 25, 1868. $9\frac{3}{8}$ — $16\frac{1}{8}$ — $5\frac{3}{16}$ — $4\frac{3}{8}$.

528, ♂ *ad.*; Carson City, April 25, 1868. $9\frac{1}{4}$ — $15\frac{3}{4}$ — $5\frac{1}{16}$ — $4\frac{3}{16}$.

529, ♀ *ad.* (mate of No. 528). $8\frac{13}{16}$ — $15\frac{1}{2}$ — 5 — $4\frac{3}{16}$.

PICOIDES ARCTICUS.

Black-backed Three-toed Woodpecker.

Picus (Apternus) arcticus, SWAINSON, Fauna Bor. Am., II, 1831, 313, pl. 57.

Picoides arcticus, GRAY, Genera of Birds, II, 184—, 434, pl. 108, fig. 7.—BAIRD, B. N. Am., 1858, 98; Cat. N. Am. B., 1859, No. 82.—COOPER, Orn. Cal., I, 1870, 384.—COUES, Key, 1872, 194; Check List, 1873, 300; B. N.W., 1874, 284.—B. B. & R., Hist. N. Am. B., II, 1874, 530, pl. L, fig. 1.

The only specimen of this species seen was the one obtained. It was engaged in hammering on the trunk of a dead pine tree, near the foot of the mountains.

List of specimens.

409, ♀ *ad.*; pines of the Sierra Nevada, near Carson City, February 19, 1868. $9\frac{1}{2}$ — $15\frac{1}{2}$ — $5\frac{3}{16}$ — $4\frac{1}{4}$. Bill, slate-color; iris, burnt-sienna; tarsi and toes, dull slate.

¹Professor Baird has proposed for this species the generic or subgeneric term *Xenopicus* (Birds N. Am., 1858, p. 83), which, in view of certain marked structural differences from typical *Picus*, it may in future be deemed advisable to adopt.

SPHYRAPICUS RUBER.

Red-breasted Woodpecker.

Picus ruber, GMELIN, Syst. Nat., I, 1788, 429.

Sphyrapicus ruber, BAIRD, Birds N. Am., 1858, 104; Cat. N. Am. Birds, 1859, No. 87.—COOPER, Orn. Cal., I, 1870, 392.—COUES, Key, 1872, 195; Check List, 1873, No. 303.

Sphyrapicus varius var. *ruber*, RIDGW., Am. Journ. Sci. & Arts, V, Jan., 1873, 40.—B. B. & R., Hist. N. Am. Birds, II, 1874, 544, pl. LI, fig. 6.

Sphyrapicus varius. c. ruber, COUES, Birds N.W., 1874, 286.

The Red-breasted Woodpecker was observed only on the Sierra Nevada, chiefly on the western side of that range; we are not even certain of its occurrence on the eastern slope, but it is our impression that we saw it once among the pines near Carson City, but the occasion was not such as to afford a satisfactory opportunity to identify the individual in question.¹

SPHYRAPICUS NUCHALIS.

Red-naped Woodpecker.

(*Qū'um-ah'-utz* of the Shoshones.)

Sphyrapicus varius var. *nuchalis*, BAIRD, Birds N. Am., 1858, 103 (in text).—B. B. & R., Hist. N. Am. Birds, II, 1874, 542, pl. LI, figs. 3, 4.—COOPER, Orn. Cal., I, 390.—COUES, Key, 1872, 195; Check List, 1873, No. 302a.—HENSHAW, 1875, 392.

Sphyrapicus nuchalis, BAIRD, Birds N. Am., 1858, 921; ed. 1860, pl. xxxv; Cat. N. Am. B., 1859, No. 86.

Sphyrapicus varius. b. nuchalis, COUES, Birds N.W., 1874, 286.

Throughout the country between the Sierra Nevada and the Rocky Mountains, the Red-naped Woodpecker is a common species in suitable localities. Its favorite summer-haunts are the groves of large aspens near the head of the upper cañons, high up in the mountains, and for this reason we found it more abundant in the Wahsatch and Uintah region than elsewhere; indeed, but a single individual was observed on the Sierra Nevada, and this one was obtained on the eastern slope of the range, near

¹ It has recently been obtained by Mr. Henshaw on the eastern slope, near Lake Tahoe.

Carson City. It was very rare throughout western Nevada, but became abundant as we approached the higher mountains in the eastern portion of the State. Among the aspen groves in Parley's Park, as well as in similar places throughout that portion of the country, it was by far the most abundant of the Woodpeckers; and it seemed to be as strictly confined to the aspens as *S. thyroideus* was to the pines. Its nest was almost invariably in a living tree, into the soft wood of which it bored with the greatest ease, the excavation being at nearly all heights between eight and thirty feet from the ground, and almost invariably in the trunk of the tree. Both parents incubate and feed the young.

In its general manners, this species is quite a counterpart of the eastern Red-throated Woodpecker (*S. varius*), but its notes are quite appreciably different, the whining utterance so characteristic of all the species of the genus being less plaintive, while we heard other notes which we never knew the eastern bird to utter.

List of specimens.

490, ♀ *ad.*; Carson City, Nevada, April 4, 1868. Pines. $8\frac{3}{4}$ — $15\frac{1}{2}$ — $5\frac{1}{4}$ — $4\frac{3}{8}$. Bill, black; iris, dark bister; tarsi and toes, olive-cinereous.

936, ♀ *juv.*; Upper Humboldt Valley (Camp 25), September 18, 1868. $8\frac{3}{8}$ — $15\frac{5}{8}$ —(?)— $4\frac{1}{4}$. Bill, dark sepia-slate; iris, dark bister; tarsi and toes, olive-plumbeous.

938, ♂ *ad.*; Thousand Spring Valley (Camp 27), September 23, 1868. $8\frac{5}{8}$ — $15\frac{1}{2}$ —(?)— $4\frac{3}{8}$. Bill, pure slaty-drab; iris, dark bister; tarsi and toes, greenish olive-cinereous.

1355, ♂ *ad.*; Parley Park, Wahsatch Mountains, Utah, July 1, 1869. $8\frac{5}{8}$ — $15\frac{3}{4}$. Bill, deep black; iris, brown; feet, greenish-ashy.

1356, ♀ *ad.*; Parley's Park, Wahsatch Mountains, Utah, July 1, 1869. $8\frac{5}{8}$ —16. Same remarks. [*Stomachs of both specimens filled with ants.*]

1422, ♂ *ad.*; Parley's Park, July 17, 1869. $8\frac{3}{4}$ — $15\frac{3}{4}$. Bill, purplish-black; iris, brown; tarsi and toes, slaty-olive.

1429, ♀ *ad.*; Parley's Park, July 19, 1869. $8\frac{1}{4}$ — $15\frac{1}{4}$. Bill, black; iris, brown; tarsi and toes, olivaceous-blue.

1436, ♂ *ad.*; Parley's Park, July 21, 1869. $8\frac{3}{4}$ — $15\frac{3}{4}$. Bill, black; iris, umber; tarsi and toes, dull light blue.

1438, ♂ *ad.*; Parley's Park, July 22, 1869. 8— $15\frac{5}{8}$. Bill, black; iris, brown; legs and feet, olivaceous-blue.

1439, ♀ *ad.*; Parley's Park, July 22, 1869. $8\frac{1}{2}$ — $15\frac{1}{4}$. Same remarks.

1440, ♀ *ad.*; Parley's Park, July 22, 1869. 8— $14\frac{5}{8}$. Same remarks.

1448, ♂ *ad.*; Parley's Park, July 23, 1869. $8\frac{1}{4}$ —15. Bill, dark purplish-brown.

SPHYRAPICUS THYROIDEUS

Brown-headed Woodpecker; Williamson's Woodpecker.

Picus thyroideus, CASSIN, Pr. Ac. Nat. Sci. Philad., 1851, 349.

Sphyrapicus thyroideus, BAIRD, Birds N. Am., 1858, 106; Catal., 1859, No. 89.—COOPER, Orn. Cal., I, 1870, 394.—COUES, Key, 1872, 195; Check List, 1873, No. 304; Birds N.W., 1874, 288.—B. B. & R., Hist. N. Am. Birds, II, 1874, 547, pl. LVI, fig. 6 (“♂”=♀ with red streak on throat!).—HENSHAW, Am. Nat., 1874, 242 [Identity of *thyroideus* and “*williamsoni*” demonstrated]; Wheeler's Rep., 1875, 394.

Picus williamsoni, NEWBERRY, Pacific R. R. Rep., VI, 1857, 89, pl. xxxiv, fig. 1 (young ♂, or adult ♂ with red of throat destroyed by action of alcohol; formerly supposed to be ♀!).

Sphyrapicus williamsoni, BAIRD, Birds N. Am., 1858, 105; Cat. N. Am. Birds, 1859, No. 88.—COOPER, Orn. Cal., I, 1870, 393.—COUES, Key, 1872, 195; Check List, 1873, No. 305.—B. B. & R., Hist. N. Am. Birds, II, 1874, 545, pl. LI, fig. 5.

The discovery of the astonishing fact that the Brown-headed Woodpecker (*S. thyroideus*, Cass.) and Williamson's Woodpecker (*S. williamsoni*, Newb.) are female and male of the same species, is due to the field-observations of Mr. H. W. Henshaw, the accomplished ornithologist of Lieutenant Wheeler's expedition; the fact being first announced in 1874, in an article in the *American Naturalist* (Vol. VIII, p. 242). A suspicion that the two might eventually prove to be different plumages of one species several times arose in our mind during the course of our field-work, the chief occasion for which was the very suggestive circumstance that both were invariably found in the same woods, and had identical manners and notes, while they also agreed strictly in all the details of form and proportions, as well as in the bright gamboge-yellow color of the belly. Our theory that *thyroideus* was perhaps the *young*, and *williamsoni* the *adult*, proved erroneous, however; and it never occurred to us that the differences might be sexual, an oversight caused chiefly by the circumstance of our having seen in collections many specimens of *thyroideus* with a red streak on the throat and marked as males, while the type specimen of *williamsoni* had a white streak on the throat and was said to be a female. We were thus entirely misled by the erroneous identification of the sex in these speci-

mens. We gave the matter up, however, only after shooting a very young specimen of what was undoubtedly *williamsoni*, and another of *thyroideus*, both of which very closely resembled the adults of the same forms, a circumstance which at once convinced us that the differences could not depend on age; so we finally concluded that the two must be distinct. Now, however, that Mr. Henshaw has so satisfactorily explained the case, we have no hesitation in indorsing his opinion.

We found this species both on the Sierra Nevada and in the Wahsatch, and it is probable that its range extends throughout the entire Western Region. It is confined to the coniferous forests, however, so that its distribution is governed greatly by local conditions. It appears to be constantly pinicoline, since it was a winter resident among the pines near Carson City, while it was found in summer among those of the Wahsatch, in Parley's Park. Excepting the circumstance of its being so strictly confined to the coniferous forests, it resembles the other species of the genus in habits and manners, while the notes appear to be only very slightly different; the latter are finer and less plaintive, however, than in *nuchalis* or *varius*, and uttered in more detached syllables. The female of this species presents when flying a very close resemblance to the species of *Centurus*, the plumage being similarly barred with black and white, while a distinct white area is presented on the lower portion of the rump. The first male killed (No. 331) had the bill thickly coated with the resinous juices of the pine trees among which it had been feeding.

List of specimens.

331, ♂ *ad.*; pines of the Sierra Nevada, near Carson City, November 27, 1867. $9\frac{3}{8}$ — 19 — $5\frac{1}{2}$ — $4\frac{1}{2}$ — 1 — $\frac{5}{8}$ — $3\frac{1}{2}$ — $1\frac{3}{4}$. Bill, deep purplish sepia-slate; iris, chestnut; tarsi and toes, ashy-olive.

332, ♀ *ad.*; Carson City, Nevada, November 27, 1867. $9\frac{1}{4}$ — $16\frac{3}{4}$ — $5\frac{5}{8}$ — $4\frac{3}{4}$ — $\frac{1}{16}$ — $\frac{1}{16}$ — $3\frac{3}{4}$ — $1\frac{3}{4}$. Bill, deep brownish-slate; iris, reddish-vandyke; tarsi and toes, ashy-olive.

437, ♀ *ad.*; Carson, March 10, 1868. $9\frac{1}{4}$ — $16\frac{1}{2}$ — $5\frac{5}{8}$ — $4\frac{3}{4}$. Bill, dusky purplish-slate; iris, umber; tarsi and toes, light ashy-green. (*Tongue protrudes $\frac{3}{4}$ of an inch beyond bill*; its corneous tip color of bill.)

1486, ♂ *juv.*; Parley's Park, August 5, 1869. $9\frac{1}{8}$ — $15\frac{1}{2}$. Bill, black; iris, dark brown; tarsi and toes, greenish-ashy.

1513, ♀ *juv.*; Parley's Park, Wahsatch Mountains, Utah, August 16, 1869.

MELANERPES FORMICIVORUS.

California Woodpecker.

Picus formicivorus, SWAINSON, Synop. Birds Mex, Philos. Mag., I, 1827, 439.

Melanerpes formicivorus, BONAP., Consp., I, 1850, 115.—BAIRD, B. N. Am., 1858, 114; Cat. N. Am. B., 1859, No. 95.—COOPER, Orn. Cal., I, 1870, 403.—COUES, Key, 1872, 197; Check List, 1873, No. 310.—B. B. & R., Hist. N. Am. B., II, 1874, 566, pl. LIII, figs. 1, 2.—HENSHAW, 1875, 399.

This handsome Woodpecker was observed only among the oaks in the Sacramento Valley, where it sported among the trees along with Yellow-billed Magpies and Valley Jays (*Cyanocitta californica*). We had no opportunity to observe its habits closely.

MELANERPES TORQUATUS.

Lewis's Woodpecker.

Picus torquatus, WILSON, Am. Orn., III, 1811, 31, pl. 30, fig. 3.

Melanerpes torquatus, BONAP., Consp., I, 1850, 115.—BAIRD, B. N. Am., 1858, 115; Cat. N. Am. B., 1859, No. 96.—COOPER, Orn. Cal., I, 1870, 406.—B. B. & R., Hist. N. Am. B., II, 1874, 561, pl. LIV, fig. 5.—HENSHAW, 1875, 397.

Asyndesmus torquatus, COUES, Pr. Ac. Nat. Sci. Phila., 1866, 56; Key, 1872, 197; Check List, 1873, No. 311; B. N.W., 1874, 291.

This very remarkable Woodpecker was found along the entire route, from Sacramento eastward, but only in certain widely-separated localities. It prefers the scattered trees of plains, or the mere edge of the denser forests, and was consequently found most abundantly among the oaks of the Sacramento Valley and the scattered pines along the eastern base of the Sierra Nevada. None were seen among the cotton-woods of the Truckee or Carson Rivers, while only a few were noticed among the very large aspens in the lower cañons of the East Humboldt Mountains, as well as in similar groves along the streams of the Upper Humboldt Valley. None were observed in the Wahsatch or Uintah Mountains, nor in the Salt Lake Valley. We cannot account for this apparent irregularity of its distribution, which is somewhat parallel to the case of *Pica hudsonica* in the same region.

In its general habits and manners this beautiful species resembles quite closely the eastern Red-headed Woodpecker (*M. erythrocephalus*), being

quite as lively and of an equally playful disposition. Some of its actions, however, are very curious, the most remarkable of them being a certain elevated flight, performed in a peculiar floating manner, its progress apparently laborious, as if struggling against the wind, or uncertain, like a bird which had lost its course and become confused. At such a time it presents the appearance of a Crow high in the air, while the manner of its flight is strikingly similar to that of Clarke's Nutcracker (*Picicorvus columbianus*—see page 516). After performing these evolutions to its satisfaction, it descends in gradually contracting circles, often to the tree from which it started.

When a nest of this species in an oak tree was disturbed, the parents were observed to alight upon a large horizontal branch, and now and then cautiously look over at the intruder, at the same time uttering a faint rattling or twittering note. When frolicking among the trees the notes of this species are a faint shrill scream and a rattling twitter, somewhat like the notes of *M. erythrocephalus*, but much weaker.

List of specimens.

76, ♂ *ad.*; Sacramento City, California, June 22, 1867. $10\frac{3}{4}$ — $20\frac{3}{4}$ — $6\frac{5}{8}$ — $5\frac{1}{2}$ — $1\frac{1}{4}$ — $\frac{3}{4}$ — $3\frac{1}{2}$ — $1\frac{3}{4}$. Bill, deep purplish-slate; iris, deep hazel; tarsi and toes, pale ashy-blue.

77, ♀ *ad.* (mate of No. 76); same locality and date. $10\frac{13}{16}$ — $20\frac{5}{8}$ — $6\frac{9}{16}$ — $5\frac{1}{2}$ — $1\frac{3}{16}$ — $\frac{3}{4}$ — $3\frac{3}{4}$ — $1\frac{1}{2}$. Same remarks.

561, ♂ *ad.*; Carson City, Nevada, April 29, 1868. $11\frac{5}{8}$ — $21\frac{3}{4}$ — 7 — $5\frac{7}{8}$. Bill, black; iris, hazel; tarsi and toes, olivaceous-blue.

924, ♂ *ad.*; Upper Humboldt Valley (Camp 24), September 12, 1868. $11\frac{3}{8}$ — $21\frac{1}{2}$ —(?)— $5\frac{13}{16}$. Bill, slate-black, deeper terminally; iris, burnt-sienna; tarsi and toes, rather dark ashy.

MELANERPES ERYTHROCEPHALUS.

Red-headed Woodpecker.

Picus erythrocephalus, LINN., Syst. Nat., I, 1766, 174.

Melanerpes erythrocephalus, SWAINSON, Fauna Bor. Am., II, 1831, 316.—BAIRD, Birds N. Am., 1858, 113; Cat. N. Am. Birds, 1859, No. 94.—COOPER, Orn. Cal., I, 1870, 402.—COUES, Key, 1872, 196; Check List, 1873, No. 309; Birds N.W., 1874, 290.—B. B. & R., Hist. N. Am. Birds, II, 1874, 564, pl. LIV, fig. 4.—HENSHAW, 1875, 398.

A single individual of this common eastern species was seen near Salt Lake City in June, 1869, the one in question being observed among the

willows along the stream flowing from Parley's Park. Eastward of the Rocky Mountains, as far west as Laramie, it was abundant about the telegraph-poles along the railroad.

COLAPTES MEXICANUS.

Red-shafted Flicker.

(*Tetsum'* of the Washoes; *Ah'soo-pannah* of the Paiutes; *Gooe-nee'-utz* of the Shoshones.)

Colaptes mexicanus, SWAINSON, Synop. Mex. Birds, Philos. Mag., I, 1827, 440.
BAIRD, Birds N. Am., 1858, 120; Cat. N. Am. Birds, 1859, No. 98.—COOPER, Orn. Cal., I, 1870, 408.—COUES, Key, 1872, 198; Check List, 1873, No. 314; Birds N.W., 1874, 294.—B. B. & R., Hist. N. Am. Birds, II, 1874, 578, pl. LV, figs. 3, 4.—HENSHAW, 1875, 400.

Being the most abundant and generally distributed of the Woodpeckers, this species was found in all wooded localities; and though it appeared to be rather partial to the deciduous trees of the lower valleys, it was far from rare among the pines of the mountains, excepting in the denser portions of the forest. As to its general appearance, habits, and notes, it is a perfect counterpart of the eastern Yellow-shafted Flicker (*C. auratus*), its notes especially being absolutely undistinguishable; indeed so great is the similarity between the two species that the western bird is almost universally known as the "Yellow Hammer" by the people of that country, notwithstanding there is not a yellow feather in its plumage. It appeared to be far more shy than the eastern species, however, and we always found it difficult to secure, except when a heavy growth favored a near approach. This wildness may be partly accounted for by the eagerness with which these handsome birds are sought by the Indians, who highly prize the tail and quill-feathers as ornaments for their head-dresses.

List of specimens.

103, ♂ *juv.*; Truckee Reservation (Camp 12), Nevada, July 24, 1867. 13—205—61—51 $\frac{1}{4}$ —13 $\frac{3}{8}$ —7—4 $\frac{1}{4}$ —3 $\frac{1}{8}$. Bill, brownish-black; iris, chestnut; tarsi and toes, pale livid blue.

126, ♂ *juv.*; Camp 12, August 1, 1867. $13\frac{1}{4}$ — $20\frac{1}{2}$ — $6\frac{7}{16}$ — $5\frac{3}{8}$ — $1\frac{9}{16}$ — 7 — $1\frac{1}{2}$ — $3\frac{3}{16}$. Same remarks.

241, ♂ *ad.*; West Humboldt Mountains (Camp 19), October 8, 1867. 13 — 21 — $6\frac{1}{2}$ — $5\frac{5}{16}$ — $1\frac{1}{2}$ — $1\frac{5}{16}$ — $4\frac{1}{2}$ — $2\frac{1}{4}$. Bill, slate-black, deeper terminally; iris, deep chestnut; naked eyelids, tarsi and toes, fine pale lilaceous-blue.

357, ♂ *ad.*; Truckee Reservation, December 18, 1867. $13\frac{1}{2}$ — 21 — $6\frac{3}{4}$ — $5\frac{5}{8}$ — $1\frac{11}{16}$ — 1 — 5 — $2\frac{1}{8}$. Iris, deep cherry-red.

363, ♂ *ad.*; Truckee Reservation, December 19, 1867. 14 — $21\frac{1}{2}$ — 7 — $5\frac{3}{4}$ — $1\frac{5}{8}$ — 1 — 5 — $2\frac{1}{4}$. Same remarks.

374, ♂ *ad.*; Truckee Reservation, December 21, 1867. $13\frac{3}{8}$ — $21\frac{1}{4}$ — $6\frac{7}{8}$ — $5\frac{3}{4}$. Same remarks.

391, ♂ *ad.*; Washoe Valley, January 3, 1868. $13\frac{1}{4}$ — 21 — $6\frac{13}{16}$ — $5\frac{5}{8}$. Same remarks.

393, ♀ *ad.*; Washoe Valley, January 4, 1868. $12\frac{3}{4}$ — $20\frac{1}{2}$ — $6\frac{5}{8}$ — $5\frac{7}{16}$.

461, ♂ *ad.*; Carson City, March 28, 1868. $13\frac{1}{2}$ — 22 — $6\frac{15}{16}$ — $5\frac{3}{4}$.

462, ♂ *ad.*; same locality and date. $13\frac{1}{2}$ — 22 — $6\frac{7}{8}$ — $5\frac{3}{4}$.

481, ♀ *ad.*; same locality, March 30, 1868. $13\frac{3}{8}$ — $21\frac{1}{4}$ — $6\frac{7}{8}$ — $5\frac{11}{16}$.

736, eggs (5); Truckee Reservation, May 17, 1868. Excavation in a small willow, on bank of the river.

1345, ♂ *juv.*; Parley's Park, Utah, June 28, 1869.

1428, ♂ *juv.*; Parley's Park, Utah, July 19, 1869. $12\frac{1}{2}$ — $20\frac{1}{4}$. Bill, slate-black; iris, bistre; tarsi and toes, light ashy-blue.

COLAPTES HYBRIDUS.¹

"Hybrid" Flicker.

Colaptes ayresii, AUDUBON, Birds Am., VII, 1843, 348, pl. 494.

Colaptes hybridus, BAIRD, Birds N. Am., 1858, 122; Cat. N. Am. Birds, 1859, No. 98a.—B. B. & R., Hist. N. Am. Birds, II, 1874, 582, pl. LIV, fig. 3.

List of specimens.

400, ♂; Washoe Valley, January 4, 1868. 13 — $20\frac{3}{4}$ — $6\frac{3}{4}$ — $5\frac{5}{8}$.

[General appearance of typical *mexicanus*, having ashy throat and scarlet "moustaches," but occiput with a distinct scarlet crescent, and the red of the remiges and rectrices inclining decidedly to orange.]

¹ Whether the puzzling specimens included under this name are really hybrids, or whether they are remnants of a generalized form from which two "incipient species" have become differentiated, must long remain an open question. The latter view, however, seems the more rational; and it is altogether probable that this "hybrid" series is gradually losing its neutral character, through the nearer approach, generation by generation, of its members to the characters of one or the other of the two specialized forms. [For a full and very sensible discussion of this subject, see Coues's *Birds of the Northwest*, pp. 293, 294.]

COLAPTES AURATUS?

Yellow-shafted Flicker.

Cuculus auratus, LINN., Syst. Nat., I (ed. 10), 1758, 112.

Colaptes auratus, SWAINS., Zool. Journ., III, 1827, 353.—BAIRD, Birds N. Am., 1858, 118; Catal. N. Am. B., 1859, No. 97.—COUES, Key, 1872, 197; Check List, 1873, No. 312; Birds N.W., 1874, 292.

Early in October, 1867, we saw near Unionville, in the West Humboldt Mountains, a Flicker which had bright gamboge-yellow shafts to the quills and tail-feathers. It flew from the brushwood of a ravine close by, and was followed over the hills, from rock to rock, through the sage-brush and across fields, and from one ravine to another, for nearly an hour, until it finally disappeared. It was so extremely shy that we found it impossible to get within fair gunshot range, but several shots were risked at it, one of which brought several feathers, which on examination were found to be pure, bright gamboge-yellow, without the faintest trace of orange. On the 22d of November following, a similar individual was seen among the willows along the Truckee River, at the Glendale Meadows; but being on the opposite side of the stream, it could not be obtained. Whether these birds were the typical eastern *C. auratus* or *C. chrysoides*¹ of the southern portion of the Middle Province, we cannot, of course, be sure; but geographical considerations render the former more probable. It is almost certain they were not specimens of *C. hybridus*, since the latter is seldom, if ever, without more or less of an orange tinge to the wings and tail.²

¹ *Geopicus chrysoides*, MALHERBE, Rev. et Mag. Zool., IV, 1852, 553.

Colaptes chrysoides, BAIRD, Birds N. Am., 1858, 125; Cat. N. Am. Birds, 1859, No. 99.—COOPER, Orn. Cal., I, 1870, 410.—COUES, Key, 1872, 198; Check List, 1873, No. 313.—B. B. & R., Hist. N. Am. Birds, II, 1874, 583, pl. LIV, figs. 1, 2.

² In the "Ornithology of California," page 412, Dr. J. G. Cooper mentions two specimens from Oakland, near San Francisco, "which are evidently of the form *hybridus*, Baird," one of which "differs from the *auratus* only in having the head grayish like *mexicanus* and the *black* of the cheek-feathers tipped with *red*."

FAMILY CUCULIDÆ—CUCKOOS.

COCYZUS AMERICANUS.

Yellow-billed Cuckoo.

Cuculus americanus, LINN., Syst. Nat., I, 1766, 170.

Coccyzus americanus, BONAP., Obs. Wils. Orn., 1825, No. 47.—COUES, Key, 1872, 190, fig. 126; Check List, 1873, No. 291; B. N.W., 1874, 275.

Coccygus americanus, BAIRD, B. N. Am., 1858, 76; Cat. N. Am. B., 1859, No. 69.—COOPER, Orn. Cal., I, 1870, 371.—B. B. & R., Hist. N. Am. B., II, 1874, 477, pl. XLVIII, fig. 4 ("3" err.).—HENSHAW, 1875, 386.

The Yellow-billed Cuckoo was so often seen or heard during our sojourn in the West, that we cannot regard it as a particularly rare bird in certain portions of that country. At Sacramento City its well-known notes were heard on more than one occasion in June, among the oak groves in the outskirts of the city, while across the Sierra Nevada several individuals were seen in July in the wooded valley of the lower Truckee.

FAMILY TROCHILIDÆ—HUMMING-BIRDS.

CALYPTE ANNÆ.

Anna's Hummer.

Ornismya anna, LESSON, Oiseaux Mouches, 1830, pl. CXXIV.

Athis anna, BAIRD, B. N. Am., 1858, 137; Cat. N. Am. B., 1859, No. 105.

Calypte annæ, GOULD, Introd. Trochilidæ, 1861, 88.—B. B. & R., Hist. N. Am. B., 1874, 454, pl. XLVII, fig. 7.—HENSHAW, 1875, 375.

Selasphorus anna, COUES, Key, 1872, 185; Check List, 1873, No. 279.

Calypte anna, COOPER, Orn. Cal., I, 1870, 358.

This beautiful Hummer was found only at Sacramento City, where it was rare, or at least far less common than the *Trochilus alexandri*. We did not see enough of it to detect anything distinctive in its habits.

List of specimens.

10, nest and eggs (2); Sacramento City, California, June 9, 1867. Nest at extremity of a small dead twig, underneath lower branches of small oak, in grove.

TROCHILUS ALEXANDRI.

Black-chinned Hummer.

(Soong-oooh'-eh of the Paiutes.)

Trochilus alexandri, BOURCIER & MULSANT, Ann. de la Soc. d'Agric. de Lyons, IX, 1846, 330.—BAIRD, B. N. Am., 1858, 133; ed. 1860, pl. 44, fig. 3; Cat. N. Am. B., 1859, No. 102.—COOPER, Orn. Cal., I, 1870, 353.—COUES, Key, 1872, 184; Check List, 1873, 276.—B. B. & R., Hist. N. Am. B., II, 1874, 450, pl. XLVII, fig. 1.—HENSHAW, 1875, 373.

This was the only Hummer which was encountered along every portion of our route, in the proper localities, it being equally common at Sacramento City and among the mountains of Utah, as well as at favorable intermediate points. Since we found it in the Wahsatch, where it was associated with *Selasphorus platycercus*, among the flowery meadows of the higher slopes, it will be seen that its vertical range during the breeding-season extends through fully 9,000 feet of altitude. At Sacramento it nested in the oak groves in the outskirts of the city, where it was apparently more numerous than *Calypte annæ*; while in the Interior it was equally common in the river-valleys and on the higher slopes of the mountains. In its habits it appeared to be a perfect counterpart of the eastern Ruby-throat (*T. colubris*).

List of specimens.

776, nest and eggs (2); Truckee Reservation, June 1, 1868. Nest attached to dead twig of grease-wood bush, on river-bank.

777, ♂ *ad.* (parent of the preceding). $3\frac{1}{8}$ — $4\frac{3}{8}$ —(?)— $1\frac{1}{2}$. Bill, black; iris, deep sepia; tarsi and toes, black.

1285, nest and eggs (2); Parley's Park, June 25, 1869. Nest on branch of scrub-oak, in a grove.

1352, ♀ *ad.*; Parley's Park, Utah, June 28, 1869. $3\frac{7}{8}$ — $4\frac{3}{4}$. Bill, black; iris, very dark brown; tarsi and toes, purplish-black.

1483, ♂ *juv.*; Parley's Park, July 30, 1869. $3\frac{7}{8}$ — $4\frac{3}{8}$. Same remarks.

SELASPHORUS RUFUS.

Rufous Hummer.

(Soong-oooh'-eh of the Paiutes.)

Trochilus rufus, GMELIN, Syst. Nat., I, 1788, 497.

Selasphorus rufus, SWAINSON, Fauna Bor. Am., II, 1831, 324.—BAIRD, B. N. Am., 1858, 134; Cat. N. Am. B., 1859, No. 103.—COOPER, Orn. Cal., I, 355.—COUES, Key, 1872, 185; Check List, 1873, No. 277.—B. B. & R., Hist. N. Am. B., II, 1874, 459, pl. XLVII, fig. 4.—HENSHAW, 1875, 375.

Among the sun-flowers (*Helianthus giganteus*?), which covered acres of

ground, in the rich valley of the lower Truckee, this was the only species of Humming-bird found in August, at which time great numbers were seen sporting in all their elegance and beauty among these flowers; they displayed the greatest activity and grace of motion, and were ever restless and moving, now chasing each other, then hovering in front of a golden flower for a few moments, then off like a flash. Upon revisiting the same locality in May and June of the following season, not one of this species was to be found, its place being apparently entirely taken by the Black-chinned species (*Trochilus alexandri*). We next saw the Rufous-backed Hummer in the fertile cañons of the West Humboldt Mountains, where it was more or less common in October. Eastward of the latter locality, the species was seen only in Secret Valley, near the northern extremity of the East Humboldt range, where it was much more rare than *S. platycercus*, this point being the most eastern to which it is known to extend, so far as we are at present aware. It was not found during the breeding-season anywhere along our route.

List of specimens.

124, ♂ *juv.*; Truckee Reservation, Nevada, August 6, 1867. $3\frac{11}{16}$ — $4\frac{1}{4}$ — $1\frac{3}{4}$ — $1\frac{1}{2}$ — $\frac{11}{16}$ — $\frac{1}{16}$ — 1 — $\frac{3}{8}$. Bill and feet, black; iris, dark brown.
905, ♂ *juv.*; East Humboldt Mountains (Camp 23), September 8, 1868. $3\frac{5}{8}$ — $4\frac{7}{16}$ — $1\frac{7}{16}$.

SELASPHORUS PLATYCERCUS.

Broad-tailed Hummer.

(*Pe'-esh-a-tse* and *Toowith'-e-kim'-booah* of the Shoshones.)

Trochilus platycercus, SWAINSON, Synop. Mex. Birds, Philos. Mag., I, 1827, 441.

Selasphorus platycercus, BONAP., Consp., I, 1850, 82.—BAIRD, B. N. Am., 1858, 135, 922; Cat. N. Am. B., 1859, No. 104.—COOPER, Orn. Cal., I, 357.—COUES, Key, 1872, 185; Check List, 1873, No. 278; Birds N.W., 1874, 271.—B. B. & R., Hist. N. Am. B., II, 1874, 462, pl. XLVII, fig. 5.—HENSHAW, 1875, 377.

In traveling eastward across the Great Basin, we first encountered the Broad-tailed Hummer on the Ruby Mountains, where it was very abundant in July and August, on the flower-covered slopes of the upper cañons on the eastern side of the range, in company with *Stellula calliope*; in September we found it associated with the latter species and *Selasphorus rufus* in

the northern continuation of the same range (the East Humboldt Mountains), while on the Wahsatch and Uintahs it was found still more abundantly throughout the summer in company with *Trochilus alexandri*. The distribution of Humming-birds being governed by the presence or absence of tracts where a profusion of flowers flourish, this species is consequently mainly confined to the higher slopes of the mountains; but whenever a portion of the lower valleys is made to bloom by irrigation, this Hummer soon finds it out and at once appears. Under such circumstances its vertical range is very great, amounting, in one instance which came under our observation, to fully 6,000 feet; for one morning we killed a specimen near the ranche in Ruby Valley, and later during the same day, when we had ascended to the summit of one of the highest peaks, which towered to nearly 12,000 feet, a single individual buzzed past us.

The flight of this Humming-bird is unusually rapid, and that of the male is accompanied by a curious screeching buzz, while it is followed through an undulating course. Long before the author of this curious sound was detected its source was a mystery to us. This shrill screeching note is heard only when the bird is passing rapidly through the air, for when hovering among the flowers its flight is accompanied by only the usual muffled hum common to all the species of the family. During the nesting-season the male is of an exceedingly quarrelsome disposition, and intrepid, probably beyond any other bird, the Flycatchers not excepted. All birds that approach the vicinity of his nest, whether they be his own species or of the size of hawks, are immediately assaulted with great force and pertinacity by this seemingly insignificant little creature, the vigor of whose attacks, accompanied as they are by the shrill piercing noise we have mentioned, invariably puts to flight any bird assaulted. We have thus seen the Western Kingbird (*Tyrannus verticalis*), the Black-headed Grosbeak (*Hedymeles melanocephalus*), and the Sharp-shinned Hawk (*Nisus fuscus*) beat a hasty retreat before the persevering assaults of this Humming-bird. When thus teasing an intruder the little champion ascends almost perpendicularly to a considerable height, and then descends with the quickness of a flash at the object he would annoy, which is probably more frightened by the accompanying noise than by the mere attack itself. As we chanced, while hunting

on the mountains, to pass through the haunts of this Hummer, it frequently happened that one of the little creatures, prompted apparently by curiosity, would approach close to us and remain poised in one spot, its wings vibrating so rapidly as to appear as a mere haze around the body; now and then it would shift from one side to another, its little black eyes sparkling as it eyed us intently. So close would it finally approach that to strike it with the hat or a stick seemed to be quite an easy matter, but upon the slightest motion on our part the little thing would vanish so quickly that its direction could scarcely be traced.

On the mountains we found many nests of this Humming-bird, every one of them being discovered by frightening the female from off her eggs or young. They were variously situated, most of them being in the scrub-oaks on the slopes of the hills; many were in willows or other bushes bordering the streams, and not a few on drooping twigs of cotton-wood trees, along the water-courses. One of those which we secured (No. 1377) affords good evidence of the possession by this bird of a high degree of instinct, if not an approach to reason. This nest was built upon a dead twig of a small cotton-wood; the bark of this twig gradually loosened, and after the eggs were laid slipped around (perhaps by the parent bird alighting upon one edge of the nest), so that the nest was turned round to the under side of the limb and the eggs thrown out. Instead of abandoning this nest, however, the sharp little owners built an addition to it, making another complete nest on the upper side, which was now secured in position by the superior weight of the more bulky pendant one.¹

List of specimens.

- 963, ♂ *ad.*; Salt Lake City, May 20, 1869, (City Creek Cañon). 4—4 $\frac{7}{8}$. Bill and feet black; iris, dark sepia.
 1042, ♂ *ad.*; Salt Lake City, May 24, 1869. 4—5. Same remarks.
 1054, ♂ *ad.*; Salt Lake City, May 26, 1869. 4—4 $\frac{13}{16}$. Same remarks.
 1064, ♂ *ad.*; Salt Lake City, May 29, 1869. 4—4 $\frac{15}{16}$. Same remarks.
 1272, ♀ *ad.*; Parley's Park, June 23, 1869. 4 $\frac{1}{8}$ —5 $\frac{3}{16}$. (Caught in a tent during a hard shower.)
 1311, ♂ *ad.*; Parley's Park, June 28, 1869. 4.

¹ In Gould's *Introduction to the Trochilidae* (page 20), it is stated that certain South American Humming-Birds adjust the equilibrium of their nests by weighting the lighter side with a small stone or bit of hard earth!

1312, ♂ *ad.*; Parley's Park, June 28, 1869. 4.

1319, nest and eggs (2); Parley's Park, June 26, 1869. Nest on drooping branch of a cotton-wood tree, by a stream.

1332, nest and eggs (2); Parley's Park, June 28, 1869. Nest on bush, along stream.

1333, nest; Parley's Park, June 28, 1869. Nest on drooping branch of a cotton-wood tree, by stream.

1348, ♂ *ad.*; Parley's Park, June 28, 1869.

1349, ♂ *ad.*; Parley's Park, June 28, 1869.

1350, ♂ *ad.*; Parley's Park, June 28, 1869.

1351, ♂ *ad.*; Parley's Park, June 28, 1869.

1366, nest and eggs (2); Uintah Mountains (Pack's Cañon), July 3, 1869. Nest in a sage-bush.

1377, nest; Pack's Cañon, July 7, 1869. Nest on dead twig of a small cotton-wood.

1437, ♂ *ad.*; Parley's Park, July 21, 1869.

1441, nest and eggs (2); Parley's Park, July 23, 1869. Nest among willows, along stream.

1442, nest and eggs (2); same date and remarks.

1449, ♀ *ad.*; Parley's Park, July 23, 1869.

STELLULA CALLIOPE.

Calliope Hummer.

Trochilus calliope, GOULD, Proc. Zool. Soc. Lond., 1847, 11.

Stellula calliope, GOULD, Introd. Trochilidæ, 1861, 90.—COOPER, Orn. Cal., I, 1870, 363.—COUES, Key, 1872; Check List, 1873, No. 282.—B. B. & R., Hist. N. Am. Birds, II, 1874, 445, pl. XLVII, fig. 9.—HENSHAW, 1875, 372.

On the flowery slopes of the Ruby and East Humboldt Mountains, at an altitude of 7,500–10,000 feet, this little Hummer was abundant in August and September, in company with *Selasphorus platycercus*; the habits and appearance of the two species being so much alike that we never knew which was before us until the specimen was secured. The range of the species is doubtless almost universal throughout the Basin, like that of *Trochilus alexandri* and *Selasphorus rufus*.

List of specimens.

869, ♀ *ad.*; East Humboldt Mountains (Camp 19), August 12, 1868. $3\frac{2}{16}$ — $4\frac{1}{4}$ —(?)— $1\frac{3}{8}$. Bill and feet, black; iris, very dark brown.

882, ♂ *juv.*; East Humboldt Mountains (Camp 21), August 29, 1868. $3\frac{1\frac{5}{8}}{16}$ — $4\frac{1\frac{3}{8}}{16}$ —(?)— $1\frac{5}{8}$. Same remarks.

904, ♀ *ad.*; Secret Valley (Camp 22), September 7, 1868. $3\frac{1}{2}$ —(?)—(?)— $1\frac{9}{16}$. Same remarks.

FAMILY CYPSELIDÆ—SWIFTS.

PANYPTILA SAXATILIS.

White-throated Swift.

Acanthylis saxatilis, WOODHOUSE, Sitgreaves' Rep., 1853, 64.

Panyptila saxatilis, COUES, Key, 1872, 182; Check List, 1873, No. 269; Birds N.W., 1874, 265.—HENSHAW, 1875, 370.

Cypselus melanoleucus, BAIRD, Pr. Ac. Nat. Sci. Philad., 1854, 118.

Panyptila melanoleuca, BAIRD, Birds N. Am., 1858, 141; Cat. N. Am. Birds, 1859, No. 107.—COOPER, Orn. Cal., I, 1870, 347.—B. B. & R., Hist. N. Am. Birds, II, 1874, 424, pl. XLV, fig. 5.

We first noticed this singular bird in the early part of July, 1868, on the Toyabe Mountains, near Austin. A single individual only was observed at that place, the one in question passing rapidly by, as if bound for some distant locality; the direction of its course was southward, where the peaks of the range are more lofty and precipitous, so it is probable that in favorable portions of these mountains the species may have occurred in abundance. Upon arriving at the Ruby Mountains, a little later in the same month, we found it extremely numerous about the high limestone cliffs which formed the walls of the cañons leading back from our camp. At this place they literally swarmed, and were associated with smaller numbers of *Petrochelidon lunifrons* and *Tachycineta thalassina*, both of which nested among the same rocks. It was afterward seen in City Creek Cañon, near Salt Lake City, but it was not abundant there.

The appearance of this bird calls to mind at first sight the Chimney Swifts (*Chætura pelagica* and *C. vauxi*) on a large scale, or *Nephæcetes*, but it has more conspicuous colors, and more active and varied manners; the deeply-forked tail, and the abrupt contrast between the black and white areas of its plumage distinguishing it at a glance from all other North American Swifts. It was our frequent amusement to clamber half-way up a cliff, or to where farther progress was impossible, and, hidden among the rocks, watch the movements of these extraordinarily active birds. Every few moments a pair would rush by with such velocity as to be scarcely seen, one chasing the other, and both uttering a sharp rattling twitter. Another pair would collide high up in the air, and, fastening upon each

other with their strong claws, come whirling to the ground, just before reaching which they would loosen their clutches and separate, or after again ascending resume the struggle. Others hovered around overhead, and without seeming aware of our presence, entered, now and then, the small horizontal fissures in the overhanging cliff to their nests, which were utterly inaccessible.

Specimens of this bird were extremely difficult to procure from the fact that most of those shot fell among the rocks where they could not be reached, while when away from the cliffs they flew at too great a height to be reached with shot.

The notes of this Swift are strong and rattling, sometimes rather shrill, certain ones resembling very much the chatter of young Baltimore Orioles (*Icterus baltimore*) as uttered while being fed by their parents.

List of specimens.

836, ♂ *ad.*; Camp 19, East Humboldt Mountains, July 13, 1868. $6\frac{1}{6}$ — $13\frac{3}{4}$ —(?)— $4\frac{7}{8}$. Bill, deep black; iris, dark bister; tarsi and toes, pale livid-pinkish; naked eyelids, sepia-brown.

837, ♀ *ad.*; same locality and date. $6\frac{1}{2}$ —14—(?)— $4\frac{1}{6}$.

846, ♂ *ad.*; same locality, July 20, 1868. 7— $14\frac{1}{8}$ —(?)—5. Interior of mouth, livid flesh-color.

NEPHÆCETES NIGER.

Black Swift.

β. borealis.

Cypselus borealis, KENNERLY, Pr. Ac. Nat. Sci. Philad., 1857, 202.

Nephæcetes niger var. *borealis*, COUES, Key, 1872, 183; Check List, 1873, No. 270.

Nephæcetes niger. b. *borealis*, COUES, Birds N.W., 1874, 269.

Nephæcetes niger, BAIRD, Birds N. Am., 1858, 142; Cat. N. Am. Birds, 1859, No. 108, [not *Hirundo nigra*, GMEL., 1788, = *Nephæcetes*¹].—COOPER, Orn. Cal., I, 1870, 349.—B. B. & R., Hist. N. Am. B., 429, pl. XLV, fig. 4.

The occurrence of this Swift in the valley of the Truckee was made known to us only through the discovery of the remains of an individual which had been devoured by a hawk or owl, the sternum, wings, tail, and feet having been left upon a log in a cotton-wood grove. On the 23d of

¹The West Indian form.

June, following, we found it abundant in a very similar portion of the valley of Carson River; they were observed early in the morning, hovering over the cotton-wood groves in a large swarm, after the manner of Night-Hawks (*Chordeiles*), but in their flight resembling the Chimney Swifts (*Chaetura*), as they also did in their uniform dusky color, the chief apparent difference being their much larger size. They were evidently breeding in the locality, but whether their nests were in the hollow cotton-wood trees of the extensive groves along the river, or in crevices on the face of a high cliff which fronted the river near by, we were unable to determine on account of the shortness of our stay. They were perfectly silent during the whole time they were observed.

List of specimens.

807, wings, tail, feet, and sternum; Truckee Reservation, May 31, 1868. (Found on a log in the woods, where left by a hawk or owl.)

? CHÆTURA VAUXI.

Oregon Swift.

Cypselus vauxii, TOWNSEND, Journ. Acad. Nat. Sci. Philad., VIII, 1839, 148.

Chaetura vauxii, DEKAY, Zool. New York, II, 1844, 36.—BAIRD, Birds N. Am., 1858, 145; ed. 1860, pl. 18; Cat. N. Am. Birds, 1859, No. 110.—COOPER, Orn. Cal., I, 1870, 351.—COUES, Key, 1872, 183; Check List, 1873, No. 272; Birds N.W., 1874, 268.

Chaetura (pelagica var.?) *vauxi*, B. B. & R., Hist. N. Am. Birds, II, 1874, 435, pl. XLV, fig. 8.

During our sojourn at the Truckee Reservation, near Pyramid Lake, in May and June, 1868, we saw, nearly every evening, but never until after sundown, quite a number of small Swifts which must have been this species; but they always flew at so great a height that we found it impossible to obtain a specimen in order to determine the species. In appearance, manner of flight, and, apparently, in size also, they resembled the eastern Chimney Swift (*C. pelagica*), but they differed in their entirely crepuscular habits, and the fact that they were perfectly silent—the latter in particular being a very marked difference from the eastern species.

FAMILY CAPRIMULGIDÆ—GOATSUCKERS.

ANTROSTOMUS NUTTALLI.

Poor-will.

(*Koo-ta-gueh'* of the Paiutes; *Toet-sa-gueh'* of the Shoshones.)

Caprimulgus nuttalli, AUDUBON, Orn. Biog., V, 1839, 335.

Antrostomus nuttalli, CASSIN, Journ. Ac. Nat. Sci. Philad., II, 1852, 123.—BAIRD, Birds N. Am., 1858, 149; Cat. N. Am. Birds, 1859, No. 113.—COOPER, Orn. Cal., I, 1870, 341.—COUES, Key, 1872, 181; Check List, 1873, No. 266; Birds N.W., 1874, 261.—B. B. & R., Hist. N. Am. B., II, 1874, 417, pl. XLVI, fig. 3.—HENSHAW, 1875, 369.

Unlike its eastern representative, the well-known Whip-poor-will (*A. vociferus*), this western species is an inhabitant of open places exclusively, the sage-brush country being, so far as we observed, its only habitat. It appeared to be most abundant on the *mesas* and about the foot-hills of the mountains, but it was often observed or heard in the lower valleys, as well as in the mountain-parks, below an altitude of 8,000 feet. This bird was seen only when startled from the ground by our too near approach, when it would fly up suddenly and flutter off in a manner similar to that of certain Owls, the flight being also noiseless. Often while returning late from the mountains, and while following the road or trail homeward across the *mesa*, we have beheld one of these birds start up in front of us, as noiselessly as a shadow, again settling down a few rods ahead; we have followed one thus for a hundred yards or more before it would diverge from our course.

The call of this bird is somewhat like that of the Whip-poor-will, but is far less distinctly uttered, as well as weaker, sounding more like *poor-will*, the last syllable only being distinctly enunciated. This call we have heard at all hours of the day, but they sing most vigorously as night approaches. Both sexes incubate.

List of specimens.

799, ♂ *ad.*; Truckee Reservation, Nevada, June 3, 1868. $8\frac{3}{16}$ — $17\frac{1}{2}$ —(?)—5. Bill, black; iris, raw-umber; tarsi and toes, dusky sepia.

843, eggs 2; East Humboldt Mountains, July 20, 1868. Deposited on bare ground, beneath sage-bush, on hill-side. Male killed while flying from eggs.

844, ♂ *ad.* (parent of preceding); East Humboldt Mountains, July 20, 1868. $8\frac{1}{2}$ — $17\frac{3}{4}$ —(?)— $4\frac{7}{8}$. Bill, deep black; interior of the mouth, flesh-color; iris (very narrow), amber; eyelids, ochraceous-brown; tarsi, pale ashy-lilaceous, the toes darker.

937, ♂ *ad.*; Upper Humboldt Valley, September 19, 1868. $8\frac{3}{8}$ — $17\frac{7}{8}$ —(?)—5. Same remarks.

1379, ♂ *ad.*; Uintah Mountains, Utah, July 7, 1869. $8\frac{1}{2}$ — $17\frac{3}{4}$. Bill, black; iris (narrowly), brown; eyelids, dull ochraceous; tarsi and toes, dull dusky purplish.

CHORDEILES POPETUE.

Night-Hawk.

β. henryi.

(*Kow'a-look* of the Washoes; *Wy'-e-up-ah'-oh* of the Shoshones.)

Chordeiles henryi, CASSIN, Illust. Birds Cal., Texas, &c., 1855, 239.—BAIRD, Birds N. Am., 1858, 153, 922; Cat. N. Am. Birds, 1859, No. 115.

Chordeiles popetue var. *henryi*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 179.—B. B. & R., Hist. N. Am. Birds, II, 1874, 404, pl. XLVI, fig. 4.—HENSHAW, 1875, 367.

Chordeiles virginianus var. *henryi*, COUES, Key, 1872, 181; Check List, 1873, No. 267a.

Chordeiles virginianus. b. *henryi*, COUES, Birds N.W., 1874, 264.

Chordeiles popetue, COOPER, Orn. Cal., I, 1870, 343.

The Night-Hawk was a common summer inhabitant of the country traversed. It was most numerous during the months of August and September, when just before dark they congregated in immense numbers and overspread in scattered flocks those localities where insect-life most abounded. In July, their well-known booming sound was often heard. During the greater portion of the day they remained inactive, and were then frequently surprised during their *siesta*, as they perched on a horizontal limb, a board of a fence, or a stick lying on the ground, their position being, according to our experience, invariably lengthwise with the perch.¹ While thus resting they often evince a strong attachment to the perch they occupy, returning

¹This disposition to sit lengthwise with the perch may be considered by some a constant habit of the Caprimulgidæ; we should be inclined to so regard it ourselves, were it not for the fact that the first specimen of *Antrostomus vociferus* we ever killed was shot while asleep on a small branch of a hickory tree, its position being at right-angles with the direction of the twig, in the manner usual among the true "perchers" (Passeres, etc.).

to it repeatedly when frightened away; No. 118 of the specimens enumerated below being killed after it had been frightened off a stick lying on the ground in a corral three times by unsuccessful shots at it. In all its habits, as well as in the notes, there appears to be no difference whatever between the western and eastern birds of this species.

List of specimens.

- 118, ♂ *ad.*; Truckee Valley, Nevada, August 4, 1867. $9\frac{1}{2}$ — $23\frac{3}{4}$ — $7\frac{1}{16}$ — $6\frac{9}{16}$ — $1\frac{1}{4}$ — $\frac{5}{16}$ — $4\frac{1}{4}$ — $2\frac{1}{4}$. Bill, black; iris, dark hazel; tarsi and toes, dusky purplish.
- 842, 1 egg; East Humboldt Mountains, Nevada, July 17, 1868. Egg on the bare ground, beneath a sage-bush.
- 856, ♂ *ad.*; East Humboldt Mountains, Nevada, August 4, 1868. $9\frac{3}{4}$ — $23\frac{1}{2}$ —(?)— $6\frac{7}{8}$. Same remarks.
- 857, ♂ *ad.*; same locality and date. 10 — $23\frac{1}{2}$ —(?)— 6 . Same remarks.
- 1344, ♂ *ad.*; Parley's Park, Utah, June 28, 1869.
- 1383, 1 egg; Uintah Mountains (head of Du Chesne River), Utah, July 8, 1869.
- 1426, 1 egg; Parley's Park, July 17, 1869.
- 1443, 2 eggs; Parley's Park, July 23, 1869.
- 1450, ♂ *ad.*; Parley's Park, July 24, 1869. $9\frac{1}{2}$ — $23\frac{1}{4}$.
- 1507, ♀ *ad.*; Parley's Park, August 13, 1869. $9\frac{1}{8}$ — $22\frac{1}{2}$.
- 1514, ♀ *ad.*; Parley Park, August 26, 1869. $9\frac{1}{2}$ — $23\frac{1}{4}$.

FAMILY STRIGIDÆ—OWLS.

STRIX FLAMMEA.

Barn Owl.

B. pratincola.

- Strix pratincola*, BONAPARTE, Comp. & Geog. List, 1838, 7.—CASSIN, in Baird's Birds N. Am., 1858, 47.—BAIRD, Cat. N. Am. Birds, 1859, No. 47.—COOPER, Orn., Cal., I, 415.
- Strix pratincola* var. *pratincola*, RIDGWAY, B. B. & R., Hist. N. Am. Birds, III, 1874, 13.
- Strix americana*, AUDUBON, Synopsis, 1839, 25.
- Strix flammea americana*, SCHLEG., Mus. Pays-Bas, 1862, Striges, 4.
- Strix flammea* var. *americana*, COUES, Key, 1872, 201, fig. 134; Check List, 1873, No. 316; Birds N.W., 1874, 298.

The Barn Owl was seen only in the vicinity of Sacramento, the single one observed being frightened from a hollow tree.

List of specimens.

422 ♂ *ad.*; "San Francisco, California, February 11, 1868. $14\frac{3}{4}$ — $42\frac{1}{2}$ —(?)— $11\frac{1}{4}$. Bill, bluish-yellow, growing white at the point; eyes, blue-black." (Presented by Mr. H. G. Parker.)

OTUS WILSONIANUS.

Long-eared Owl.

Otus wilsonianus, LESSON, *Traité Orn.*, I, 1831, 110.—CASSIN, in Baird's B. N. Am., 1858, 53.—BAIRD, *Cat. N. Am. Birds*, 1859, No. 51.—COOPER, I, 1870, 426.

Otus vulgaris var. *wilsonianus*, ALLEN, *Bull. Mus. Comp. Zool.*, III, 1872, 180.—COUES, *Key*, 1872, 204; *Check List*, 1873, No. 320; *Birds N.W.*, 1874, 304.—B. B. & R., *Hist. N. Am. Birds*, III, 1874, 18.—HENSCHAW, 1875, 403.

Seldom, if ever, did we enter a willow-copse of any extent, during our explorations in the West, without starting one or more specimens of this Owl from the depths of the thicket. This was the case both near Sacramento and in the Interior, and in summer as well as in winter. In these thickets they find many deserted nests of the Magpie, and selecting the most dilapidated of these, deposit their eggs on a scant additional lining. This practice is so general, so far as the birds of the Interior are concerned, that we never found the eggs or young of this species except as described above. On the 27th of May we found a nest containing four downy young among the willows along the bank of the Truckee River.

List of specimens.

56, ♂ *ad.*; Sacramento, California, June 18, 1867. $14\frac{1}{2}$ — $39\frac{1}{2}$ — $12\frac{1}{4}$ — $10\frac{3}{8}$ — $1\frac{3}{8}$ — $1\frac{3}{4}$ — $6\frac{1}{2}$ —4. Bill, black; iris, bright lemon-yellow; toes, beneath, pale yellowish-ashy, their scutellæ more yellowish.

74, ♂ *juv.*; Sacramento, June 22, 1867.— $11\frac{3}{4}$ — $30\frac{1}{4}$ — $8\frac{3}{4}$ — $6\frac{1}{8}$ — $1\frac{1}{6}$ — $1\frac{5}{8}$ — $4\frac{1}{2}$ —3. Bill, brownish-blue; iris, bright yellow; exposed scutellæ of the toes, pale brownish-blue; soles, ashy-whitish.

389, ♀ *ad.*; Washoe Valley, Nevada, January 3, 1868. $14\frac{1}{4}$ —39— $11\frac{5}{8}$ — $10\frac{1}{8}$. Bill, deep black; iris, rich gamboge-yellow; toes pale ashy naples-yellow beneath, the scutellæ light yellowish-brown; claws, deep black.

390, ♂ *ad.* (mate of preceding). 14—36— $11\frac{1}{4}$ — $9\frac{1}{2}$. Same remarks.

424, "♀ *ad.*; San Francisco, California, January 31, 1868. $14\frac{3}{8}$ — $39\frac{5}{8}$ —(?)— $10\frac{1}{2}$. Eyes, bright yellow." (Presented by Mr. H. G. Parker.)

536, eggs (2); Carson City, Nevada, April 27, 1868. Eggs deposited in a deserted nest of the Magpie (*Pica hudsonica*), in a willow-thicket along the Carson River. Parent shot.

BRACHYOTUS PALUSTRIS.

Short-eared Owl.*β. cassini.*

Strix brachyotus, FORSTER, Phil. Trans., LXII, 1772, 384.

Otus brachyotus, BOIE, Isis, 1822, 549.

Otus (Brachyotus) brachyotus, B. B. & R., Hist. N. Am. B., III, 1874, 22.—HENS-
SHAW, 1875, 404.

Brachyotus palustris, BONAP., Comp. List., 1838, 7.—COUES, Key, 1872, 204;
Check List, 1873, No. 321; B. N.W., 1874, 306.

Brachyotus cassinii, BREWER, Pr. Boston Soc. N. H., 1856, —.—CASSIN, in Baird's
B. N. Am., 1858, 54.—BAIRD, Cat. N. Am. B., 1859, No. 52.—COOPER, Orn.
Cal., I, 428.

This Owl we did not meet with anywhere, the only specimen in the collection having been presented by Mr. H. G. Parker. It is said, however, to be an abundant species in certain portions of California.

List of specimens.

425, "♀ *ad.*; San Francisco, California, February 17, 1868. $16\frac{1}{8}$ — $43\frac{1}{4}$ —(?)—11.
Eyes, bright yellow."

SCOPS ASIO.

Mottled Owl; Little Red Owl.*α. asio.*

Strix asio, LINN., Syst. Nat., I, 1766, 132.

Scops asio, BONAP., Comp. and Geog. List, 1838, 6.—CASSIN, in Baird's Birds N.
Am., 1858, 51.—BAIRD, Cat. N. Am. Birds, 1859, No. 49.—COOPER, Orn. Cal.,
I, 1870, 420.—COUES, Key, 1872, 202, fig. 136; Check List, 1873, No. 318.—
B. B. & R., Hist. N. Am. Birds, III, 1874, 49.

Scops asio. a. asio, COUES, Birds N.W., 1874, 303.

Scops asio var. *macalli*, HENSHAW, Orn. Wheeler's Exp., 1875, 405. (Not *S.*
macalli, CASS.)

This common little Owl we observed only in the vicinity of Sacramento City; not a single individual was seen in the Interior, nor did we hear of its occurrence there. It was not met with in the red plumage, which appears to be rare—perhaps unknown—on the Pacific coast.

List of specimens.

61, ♀ *juv.*; Sacramento, California, June 20, 1867. $8\frac{3}{4}$ — $22\frac{3}{4}$ — $6\frac{1}{4}$ —5— $\frac{9}{16}$ — $1\frac{1}{2}$ — $3\frac{1}{8}$ —2. Bill, pale ashy pea-green; iris, lemon-yellow; toes, pale grayish.

62, ♂ *juv.*; same locality and date. $8\frac{5}{8}$ — $21\frac{5}{8}$ —6— $4\frac{1}{8}$ — $\frac{9}{16}$ — $1\frac{3}{8}$ —3— $2\frac{1}{8}$. Same remarks.

75, ♂ *ad.*; Sacramento, June 22, 1867. 9—22—7— $5\frac{5}{8}$ — $\frac{5}{8}$ — $1\frac{3}{8}$ — $3\frac{3}{8}$ — $2\frac{1}{8}$. Bill, light brownish-blue; iris, lemon-yellow; toes, very pale ashy.

NYCTALE ACADICA.

Saw-whet Owl.

Strix acadica, GMELIN, Syst. Nat., I, 1788, 296. (*Adult.*)

Nyctale acadica, BONAP., Comp. and Geog. List, 1838, 7.—CASSIN, in Baird's Birds N. Am., 1858, 58.—BAIRD, Cat. N. Am. Birds, 1859, No. 57.—COOPER, Orn. Cal., I, 436.—COUES, Key, 1872, 205; Check List, 1873, No. 328; Birds N.W., 1874, 315.—B. B. & R., Hist. N. Am. Birds, III, 1874, 43.

Strix albifrons, SHAW, Nat. Misc., V, 1794, pl. 171. (*Young.*)

Nyctale albifrons, CASSIN, Illustr. Birds Cal., Tex., &c., 1854, 187; in Baird's Birds N. Am., 1858, 57.—BAIRD, Cat. N. Am. Birds, 1859, No. 56.—COOPER, Orn. Cal., I, 435.

But a single individual of this pretty little Owl was met with; this one was captured alive by Mr. O. L. Palmer, of our party, who found it asleep and placed his hat over it. It was perched on the edge of an old Robin's nest, in a dense willow thicket near the camp.

List of specimens.

941, ♀ *ad.*; Thousand Spring Valley (Camp 27), September 24, 1868. 8—20—(?)— $4\frac{3}{4}$. Bill, deep black; iris, clear bright gamboge-yellow; toes, pale naples-yellow; claws, deep black.

BUBO VIRGINIANUS.

Great Horned Owl.

β. subarcticus.

(*Temoooh-moooh'* of the Washoes; *Moo-hoo'* of the Paiutes.)

Bubo subarcticus, HOY, Pr. Ac. Nat. Sci. Philad., VI, 1852, 211.

Bubo virginianus var. *arcticus*, CASSIN, Illustr. Birds Cal., Tex., &c., 1854, 178. [Not *Strix (Bubo) arcticus*, SWAINS., 1831, = albinoscent arctic form.]—COUES, Key, 1872, 202; Check List, 1873, No. 317.—B. B. & R., Hist. N. Am. B., III, 1874, 60, 64.—HENSHAW, 1875, 407.

Bubo virginianus var. *pacificus*, CASSIN, Illustr. Birds Cal., Tex., &c., 1854, 178; in Baird's B. N. Am., 1858, 49.¹

Bubo virginianus, CASSIN, Baird's B. N. Am., 1858, 49 (part).—BAIRD, Cat. N. Am. B., 1859, No. 48.—COOPER, Orn. Cal., I, 1870, 418.

The Great Horned Owl was found by us in all wooded districts, except—

¹ Not of RIDGWAY, in B. B. & R., Hist. N. Am. Birds, which is a northern littoral form, of very dark colors, which appears to be unnamed, and which may be distinguished as *B. virginianus saturatus*, RIDGWAY.

ing the Sacramento Valley, where none were seen, although the species undoubtedly occurs there. In the lower Truckee Valley, near Pyramid Lake, it was abundant in December, and its nocturnal hootings were heard from among the cotton-wood groves every moonlight night, while its feathers, more than those of any other bird, adorned the arrows of the Indians on the reservation. It was also common near Carson City, and a few were startled one morning as we rode through a cedar woods near the "City of Rocks," in southern Idaho. One was also seen on the eastern shore of Pyramid Lake in May, it being chased from rock to rock by a male Falcon (*Falco communis nævius*), who, with his mate, had a nest on the "Pyramid" just off the shore.

The hooting of this Owl is low and hoarse, resembling the distant barking of a large dog; its modulation is something like the syllables *hoo'h'*, *hoo*, *hoo*, *hoo*—*hoooooooo*, the latter portion a subdued trembling echo, as it were, of the more distinctly uttered notes. These notes do not differ in the least from those of the eastern birds of this species.

List of specimens.

504, eggs (3); Carson River, near Carson City, Nevada, April 21, 1868. Nest about 30 feet from the ground, in a large cotton-wood tree; evidently an abandoned one of the *Buteo swainsoni*.

SPEOTYTO CUNICULARIA.

Burrowing Owl.

γ. hypogæa.¹

Strix hypugæa, BONAP., Am. Orn., I, 1825, 72.

Athene hypogæa, BONAP., Consp., I, 1850, 39.—CASSIN, in Baird's Birds N. Am., 1858, 59.—BAIRD, Cat. N. Am., B., 1859, No. 58.—COOPER, Orn. Cal., I, 440.

Speotyto cunicularia var. *hypogæa*, RIDGWAY, in COUES' Key, 1872, 207; in B. B. & R., Hist. N. Am. Birds, III, 1874, 90.—COUES, Check List, 1873, No. 332; Birds N.W., 1874, 321.—HENSLOW, 1875, 409.

Athene cunicularia, CASSIN, in Baird's Birds N. Am., 1858, 60 (not of MOLINA, 1782). —BAIRD, Cat. N. Am. Birds, 1859, No. 59.—COOPER, Orn. Cal., I, 1870, 437.

Although the "Ground Owl" was found at widely-separated places

¹ Races *α* and *β* are, *cunicularia*, Mol., of the Pampas of Paraguay, Buenos Ayres, etc., and *grallaria*, Spix, of Peru and western Brazil. Other geographical forms are *δ*, *floridana*, Ridgw., of southwestern Florida, and *ε*, *guadeloupensis*, Ridgw., of the island of Guadeloupe (West Indies).

along our entire route, it was abundant at very few localities. It was most numerous on the dry plains near Sacramento, being even found on the open commons in the outskirts of the city, where it occupied deep excavations which were apparently the result of its own work, as no spermophiles or other burrowing quadrupeds were noticed in the locality. Eastward of the Sierra Nevada we found it only at wide intervals; it was rather rare about Carson City, and in the vicinity of the Steamboat Springs, near Washoe; a single pair was seen on the mesa between the Humboldt River and the West Humboldt Mountains, and a few were noticed in Fairview Valley; while in the neighborhood of Salt Lake City it was more common.

This Owl is as diurnal in its habits as any of the Falconidæ, being habitually found abroad during the brightest hours of day; and its sight is so remarkably acute that it is extremely difficult to approach, even when bushes, banks of earth, or other screens are taken advantage of. Should one be in its burrow, it will almost certainly fly forth at the most noiseless approach of a person, for its sense of hearing is no less remarkable than its sight. When thus disturbed, this Owl flies to a safe distance, and after alighting upon some prominent object, as a hillock or a telegraph-wire, watches attentively every motion of the intruder, while now and then he scolds him with a saucy chattering, at the same time ludicrously bowing.

Near Carson City, we attempted, with the assistance of Mr. Parker, to excavate the burrow of a pair of these Owls. This burrow was situated in a wheat-field, and was guarded by the male bird, who sat at its entrance. As we approached him he flew, but before getting out of range was winged and brought down; he was captured with great difficulty, as he made for the sage-brush fast as his extraordinary leaps could carry him, but when overtaken offered no resistance, merely snapping his bill a little. Having him secured, we then proceeded to our task of excavating to the nest, which was accomplished after digging hard for nearly an hour. The hole terminated about eight feet from the entrance and four beneath the surface of the ground. Before arriving at its extremity our captive was released, when he immediately disappeared into the hole; but when the end was reached he, with his mate (the latter unharmed), was secured. In the

chamber, which contained no nest whatever, were found one egg and the remains of a frog, which had probably been carried to the female by her attentive companion.

List of specimens.

60, *ad.*; Sacramento City, California, June 20, 1867. $9\frac{1}{2}$ — $25\frac{5}{8}$ — $7\frac{1}{8}$ — $5\frac{5}{8}$ — $1\frac{1}{8}$ — $1\frac{1}{8}$ — $3\frac{1}{2}$ — $2\frac{1}{4}$.

315, *ad.*; "near American River, Sacramento County, California, November, 1867." (Presented by Mr. H. G. Parker.)

423, "♀ *ad.*; San Francisco, California, January 23, 1868. $9\frac{3}{8}$ — $24\frac{5}{8}$ —(?)— $5\frac{1}{2}$. Eyes, bright yellow." (Presented by Mr. Parker.)

525, egg (1); Carson City, Nevada, April 25, 1868.

FAMILY FALCONIDÆ—HAWKS, EAGLES, KITES, ETC.

FALCO COMMUNIS.

Peregrine Falcon.

β. navius—American Peregrine; "Duck Hawk."

Falco navius, GMELIN, Syst. Nat., I, 1783, 271 (*adult*).

Falco anatum, BONAP., Comp. & Geog. List, 1838, 4.—CASSIN, Baird's B. N. Am., 1858, 7.—BAIRD, Cat. N. Am. B., 1859, No. 5.—COOPER, Orn. Cal., I, 457.

Falco communis var. *anatum*, RIDGWAY, Pr. Bost. Soc. Nat. Hist., 1873, 45; in B. B. & R., Hist. N. Am. Birds, III, 1874, 132.—HENSHAW, 1875, 411.

Falco communis. c. anatum, COUES, Birds N.W., 1874, 341.

Falco nigriceps, CASSIN, Illust. Birds of Cal., Tex., &c., 1854, 87; Birds N. Am. (Baird), 1858, 8; ed. 1860, pl. 11.—BAIRD, Cat. N. Am. Birds, 1859, No. 6.—COOPER, Orn. Cal., I, 1870, 456.

Falco communis, COUES, Key, 1872, 213, fig. 141 (not of GMELIN, 1788); Check List, 1873, No. 343.

The Duck Hawk was observed only at Pyramid Lake and along the lower portion of the Truckee River. At the former locality a single pair frequented the rocky eastern shore and the adjacent clusters of pyramidal rocky islands. On the 23d of May, 1868, when we visited the Pyramid, we observed a male of this Falcon, in the blue plumage, flying

about this immense pyramidal rock, and from the zealous manner in which he drove away every intruder not to his liking, we concluded the female must be sitting on her eggs or young. The Pyramid was ascended, however, to the very summit, but the nest was not found; but this was not strange, since but one of the three corners of the rock was accessible, while to diverge to either side from the exceedingly difficult path by which we ascended would have been impossible. The location of the nest was afterward definitely ascertained by noticing the male alight on a narrow ledge near the top of one of the vertical sides, about one hundred and fifty feet above the water. A few moments later he was again observed flying around, and while we were watching him he discovered among the rocks a large Horned Owl (*Bubo subarcticus*) which he immediately dislodged and followed a considerable distance along the shore, uttering a whistling note at each assault. The single specimen in our collection was killed under the following circumstances: Having sat down on a log by the edge of the river to rest, as well as to observe the movements of a Killdeer Plover (*Ægialitis vociferus*) which was running back and forth over the gravelly bar forming the opposite shore, we saw the Killdeer suddenly squat and then dodge, and at the same time saw the Falcon check itself in its flight, after having missed its aim. Whether its lack of success was caused by the nimbleness of the intended quarry, or whether the Falcon saw us just as it was about to strike, we know not; but after suddenly checking itself it wheeled immediately about, and would have soon disappeared had we not fired before it got out of range. At the report of our gun, another one, probably the mate of our victim, flew from a cotton-wood tree in the direction from which he came.

List of specimens.

102, ♂ *juv.*; Big Bend of the Truckee, Nevada, July 23, 1857. $16\frac{1}{2}$ — $39\frac{1}{4}$ — $12\frac{3}{4}$ — 10 — $1\frac{5}{6}$ — $1\frac{3}{4}$ — $6\frac{1}{2}$ — $3\frac{3}{8}$. Weight $1\frac{1}{2}$ pounds. Basal half of the bill, pale bluish-white, terminal portion slate, deepening into black at end; cere, bluish-white, bare orbital space greenish-white; iris, vivid brownish-black; tarsi and toes, lemon-yellow, with a faint greenish tinge; claws, jet black.

FALCO SAKER.

Saker Falcon.*β. polyagrus—Prairie Falcon.*

Falco polyagrus, CASSIN, Illustr. Birds Cal., Tex., &c., 1853, 88, pl. 16 (front figure—not the dark one, which = *F. communis pealei*, RIDGWAY, Bull. Essex Inst., V, Dec., 1873, p. 201); in Baird's Birds N. Am., 1858, 12.—BAIRD, Cat. N. Am. Birds, 1859, No. 10.—COOPER, Orn. Cal., I, 458.

Falco lanarius var. *polyagrus*, RIDGWAY, in B. B. & R., Hist. N. Am. Birds, III, 1874, 123.—HENSHAW, 1875, 410.

Falco mexicanus, COUES, Key, 1872, 213; Check List, 1873, No. 342.

Falco mexicanus var. *polyagrus*, COUES, Birds N.W., 1874, 339.

This daring Falcon was a rather common species throughout the Great Basin. It was first observed on the 31st of October, 1867, at the Humboldt Marshes, where we saw one swoop upon a flock of tame pigeons at the stage-station. Late in November, of the same year, it was noticed again among the marshes along the Carson River, near Genoa, where it was observed to watch and follow the Marsh Hawks (*Circus hudsonius*), compelling them to give up their game, which was caught by the Falcon before it reached the ground; this piracy being not an occasional, but a systematic habit. In the Truckee Valley we saw one snatch a young chicken from a door-yard, in the presence of several spectators. The quarry of this Falcon is by no means confined to animals smaller than itself, however, for the specimen in our collection was killed while leisurely eating a Jackass Rabbit (*Lepus callotis*), an animal of nearly twice his weight, and which he had carried to the top of a fence-post by the road-side. He exhibited no alarm at the approach of our buggy, but continued tearing and devouring his prey; we had even passed by him without seeing him, when the quick eye of Mr. Parker detected him in time for a shot.

In the rocky cañons of the more lofty ranges to the eastward it was common during summer, particularly about the limestone cliffs of the Ruby range, where the families of young, accompanied by their parents, made a great clamor, as they flew among the precipitous rocks where they had been bred. They were likewise common in the rocky cañons of the Wahsatch.

List of specimens.

336, ♂ *juv.*; Carson City, Nevada, November 29, 1867. 17—37 $\frac{3}{4}$ —12 $\frac{1}{4}$ —10 $\frac{1}{8}$ —7—1 $\frac{7}{8}$ —7 $\frac{1}{2}$ —4 $\frac{1}{2}$. Weight, 1 $\frac{1}{2}$ pounds. Bill, very pure bluish-white, shading terminally into bluish-slaty, the point black; cere, rictus, and bare orbital region, greenish-white; iris, vivid vandyke-brown; tarsi and toes, very pale yellowish, with a tinge of verdigris-green.

FALCO COLUMBARIUS.

Pigeon Hawk; American Merlin.

Falco columbarius, LINN., Syst. Nat., I, 1766, 123.—COUES, Key, 1872, 214; Check List, 1873, No. 344; Birds N.W., 1874, 345.—HENSCHAW, 1875, 412.—COOPER, Orn. Cal., I, 1870, 460.

Hypotriorchis columbarius, GRAY, Genera of Birds, 184.—BAIRD, Cat. N. Am. Birds, 1859, No. 7.

Falco (Hypotriorchis) columbarius, CASSIN, in Baird's Birds N. Am., 1858, 9.

Falco (Æsalon) lithofulco var. *columbarius*, RIDGW., Pr. Boston Soc., N. H., 1873, 46; in B. B. & R., Hist. N. Am. Birds, III, 1874, 144.

This little Falcon was seen on but three or four occasions. The specimen in the collection was shot just after it had made an unsuccessful assault on a flock of black-birds (*Scolecophagus cyanocephalus*) which were feeding on the ground in a corral. Its success was no doubt thwarted by the opening of the door of the house near by, for it flew away frightened, but fortunately came in our direction, and alighted upon a fence-post within easy gunshot range.

List of specimens.

291, ♀ *ad.*; Truckee Meadows, Nevada, November 18, 1867. 11 $\frac{1}{4}$ —24—7 $\frac{7}{8}$ —6 $\frac{3}{8}$ —1 $\frac{9}{16}$ —1 $\frac{1}{4}$ —5 $\frac{1}{2}$ —3 $\frac{1}{4}$. Terminal portion of the bill, deep slate-black, basal half very pale whitish-blue, with a yellowish wash toward the rictus; cere and rictus, light greenish-yellow; eyelids, bright gamboge-yellow, bare orbital region more citreous; iris, bright vandyke-brown; tarsi and toes, deep gamboge-yellow; claws, jet-black.

FALCO SPARVERIUS.

"Sparrow Hawk;" American Kestrel.

Falco sparverius, LINN., Syst. Nat., I, 1766, 123.—COOPER, Orn. Cal., I, 1870, 462.—COUES, Key, 1872, 214, fig. 142; Check List, 1873, No. 346; Birds N.W., 1874, 349.—HENSCHAW, 1875, 413.

Falco (Tinnunculus) sparverius, CASSIN, Baird's Birds N. Am., 1858, 13.—RIDGW., in B. B. & R., Hist. N. Am. Birds, III, 1874, 169.

Tinnunculus sparverius, VIEILL., Ois. Am. Sept., I, 1807, 40, pl. 12.—BAIRD, Cat. N. Am. Birds, 1859, No. 13.

Regarding the western range of this widely-distributed species, nothing

more need be said than that it occurs *everywhere*, in suitable places; at the same time, we may remark that it is by far the most abundant of all the birds of prey, although its numbers vary greatly with the locality. At a certain spot along the Carson River, not far from Carson City, stood, in the spring of 1868, a clump of five large cotton-wood trees, the only ones for miles around, and each of these trees was inhabited by a pair of these little Falcons, who had nests in the hollows of the limbs. This is well known to be the favorite location for their nests; but where there were no trees to accommodate them, we found them adapting their nesting-habits to the character of the surroundings. Thus, in the precipitous cañons of the Ruby Mountains, they built among the crevices of the limestone cliffs, in company with the Prairie Falcon (*F. polyagrus*), the Violet-green and Cliff Swallows, and the White-throated Swift; while in some portions of Utah they took possession of the holes dug by the Kingfishers and Red-shafted Flickers in the earthy banks of the ravines. Among the cliffs of Echo Cañon, along the line of the Union Pacific Railroad, in Utah, we noticed these birds in August swarming by hundreds about the brow of the precipice, several hundred feet overhead.

List of specimens.

63, ♂ *ad.*; Sacramento, California, June 20, 1867. $10\frac{5}{8}$ — $22\frac{7}{8}$ — $7\frac{3}{4}$ — $6\frac{3}{8}$ — $\frac{9}{16}$ — $1\frac{1}{8}$ — $5\frac{1}{4}$. Bill, bluish-white, growing slate-black terminally; *cere and angle of the mouth*, intense orange-red; iris, very dark brown; tarsi and toes, deep orange-chrome; claws, jet-black.

107, ♂ *ad.*; Big Bend of the Truckee (Camp 12), Nevada, July 26, 1867. $10\frac{3}{4}$ — $22\frac{3}{4}$ — $7\frac{1}{2}$ — $6\frac{3}{8}$ — $\frac{7}{16}$ — $1\frac{1}{16}$ — $5\frac{3}{8}$ — $3\frac{1}{4}$. Bill, pale blue basally, slate-black terminally; *cere* and bare orbital region, pale dull yellow; iris, vandyke-brown; tarsi and toes, dull yellow; claws, black.

108, ♀ *juv.* (young of preceding); Camp 12, July 26, 1867. $10\frac{3}{4}$ — $23\frac{1}{2}$ — $7\frac{9}{16}$ — $6\frac{7}{16}$ — $\frac{1}{2}$ — $1\frac{1}{2}$ — $5\frac{1}{2}$ — $3\frac{1}{2}$. Bill, pale fleshy-blue, or lilaceous-white; *cere* and orbital region, pale dull yellow; iris dark brown; tarsi and toes, very pale dull yellow.

125, ♂ *ad.*; Camp 12, August 6, 1867. $10\frac{3}{8}$ — $22\frac{7}{8}$ — $7\frac{5}{8}$ — $6\frac{5}{8}$ — $\frac{9}{16}$ — $\frac{1}{16}$ — $5\frac{3}{8}$ — $3\frac{1}{16}$. Basal half of the bill, pure pale blue, terminal portion slate-black; *cere* and bare orbital region, dull yellow; iris, very deep brown; tarsi and toes, deep chrome-yellow; claws, black.

343, ♀ *ad.*; near Fort Churchill, Nevada, December 6, 1867. $11\frac{1}{4}$ — $24\frac{1}{4}$ — $8\frac{3}{8}$ — $7\frac{9}{16}$ — $1\frac{1}{4}$ — $5\frac{1}{2}$ — $3\frac{3}{8}$. Same remarks.

419, "♀ *ad.*; San Francisco, California, January 23, 1868. $11\frac{1}{4}$ — $24\frac{1}{4}$ —(?)— $7\frac{1}{8}$." (Presented by Mr. H. G. Parker.)

420, "♀ *ad.*; San Francisco, January 23, 1868. $11\frac{1}{8}$ — $23\frac{7}{8}$ —(?)— $6\frac{7}{8}$." (H. G. Parker.)

489, ♀ *ad.*; Carson, Nevada, April 4, 1868. 11—24—8 $\frac{1}{4}$ —6 $\frac{7}{8}$. Cere (entirely surrounding base of the bill), bare orbital region, and tarsi and toes, intense reddish-orange, or orange-chrome.

496, ♂ *ad.*; Carson, April 18, 1868. 10 $\frac{1}{2}$ —23 $\frac{7}{8}$ —7 $\frac{13}{16}$ —6 $\frac{5}{8}$. Same remarks.

816, egg (1); Fort Churchill, Carson River, June 24, 1868. Egg, with four downy young, deposited in a hollow snag of a cotton-wood tree, about 15 feet from the ground.

CIRCUS HUDSONIUS.

Marsh Hawk.

Falco hudsonius, LINN., Syst. Nat., I, 1766, 128.

Circus hudsonius, VIEILL., Ois. Am. Sept., I, 1807, 36, pl. IX.—CASSIN, Baird's Birds N. Am., 1858, 38.—BAIRD, Cat. N. Am. Birds, 1859, No. 38.—COOPER, Orn. Cal., I, 489.

Circus cyaneus hudsonius, SCHLEG., Mus. Pays-Bas, *Circi*, 1862, 2.

Circus cyaneus var. *hudsonius*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 181.—COUES, Key, 1872, 210, fig. 159; Check List, 1873, No. 333; Birds N.W., 1874, 327.—B. B. & R., Hist. N. Am. Birds, III, 1874, 214.—HENSLOW, 1875, 416.

No marsh of any extent was visited, either in winter or summer, where this Hawk could not be seen at almost any time during the day skimming over the tules in search of its prey. The latter consists of small birds of all kinds, the young of water-fowl, lizards, and probably small mammals, although the latter were not found in the crop of any of the specimens examined. The stomachs and crops of those killed at Pyramid Lake were filled to their utmost capacity with the remains of small lizards, and nothing else; at the same locality, however, they were often observed to chase small birds, particularly Brewer's and the Black-throated Sparrows, the most numerous species, of which this Hawk appears to be a most dreaded enemy, since its appearance creates perfect consternation among all the Sparrows in its path, who utter distressed cries, and make confused and desperate efforts to escape by plunging precipitately into the thickest bushes.

List of specimens.

129, ♀ *juv.*; eastern shore of Pyramid Lake, August 15, 1867. 19 $\frac{1}{2}$ —43 $\frac{1}{2}$ —13 $\frac{7}{8}$ —11 $\frac{1}{4}$ —3—2 $\frac{3}{8}$ —9 $\frac{1}{4}$ —6. Bill, deep black, more bluish basally; cere and rictus, greenish-gamboge, most yellowish on top; iris, yellowish-gray; tarsi and toes, rich orange-yellow; claws, jet-black.

131, ♂ *juv.*; Big Bend of the Truckee (Camp 12), August 17, 1867. 18 $\frac{3}{4}$ —42—13—11—2 $\frac{3}{8}$ —2 $\frac{1}{8}$ —9—6 $\frac{1}{8}$. Same remarks.

367, ♀ *juv.*; Truckee Reservation, near Pyramid Lake, December 21, 1867. 20 $\frac{1}{4}$ —44—15—12 $\frac{1}{2}$. Iris, dull fulvous.

NISUS COOPERI.

Cooper's Hawk.

Falco cooperi, BONAP., Am. Orn., I, 1828, pl. x, fig. 1.

Accipiter cooperi, DE KAY, Zool. N. Y., II, 1844, 18, pl. iv, fig. 5.—CASSIN, in Baird's Birds N. Am., 1858, 16.—BAIRD, Cat. N. Am. Birds, 1859, No. 15.—COOPER, Orn. Cal., I, 464.—COUES, Key, 1872, 212; Check List, 1873, No. 339; Birds N.W., 1874, 334.

Nisus cooperi, SCHLEG., Rev. Acc., 1873, 73.—RIDGWAY, in B. B. & R., Hist. N. Am. Birds, III, 1874, 230.—HENSHAW, 1875, 418.

Accipiter mexicanus, SWAINS., Fauna Bor. Am., II, 1831, 45.—CASSIN, Baird's B. N. Am., 1858, 17.—BAIRD, Cat. N. Am. B., 1859, No. 16.—COOPER, Orn. Cal., I, 1870, 465.

Nisus cooperi var. *mexicanus*, RIDGW., Proc. Boston Soc. Nat. Hist., May, 1873, 19.—B. B. & R., Hist. N. Am. B., III, 1874, 231.

This daring depredator was more or less common in all localities where small birds abounded, but it was far from numerous anywhere. It was most often seen sailing, with the long tail widely expanded, in broad circles over the thickets which sheltered its prey. The specimen in the collection was shot while soaring thus over an aspen copse, and came whirling to the ground; but being merely winged, made for the thicket by vigorous leaps, and would have escaped but for a second charge. In other portions of the country, particularly in the fertile cañons of the East Humboldt Mountains, it was often observed chasing, with its swift, rushing flight, a fleeing Robin or Flicker.

List of specimens.

240, ♂ *juv.*; West Humboldt Mountains (Camp 19), October 8, 1867. $14\frac{3}{4}$ — $26\frac{5}{8}$ — $8\frac{1}{4}$ — $6\frac{3}{8}$ — $\frac{1}{2}$ — $1\frac{1}{16}$ — 7 — $4\frac{1}{2}$. Bill, pale blue on the basal third, dull black terminally; cere and rictus, yellowish-green; iris, light chrome-yellow; tarsi and toes, lemon-yellow, with a slight tinge of green; claws, slate-black.

NISUS FUSCUS.

Sharp-shinned Hawk.

Falco fuscus, GMELIN, Syst. Nat., I, 1788, 283.

Accipiter fuscus, BONAP., Comp. & Geog. List, 1838, 5.—CASSIN, in Baird's B. N. Am., 1858, 18.—BAIRD, Cat. N. Am. B., 1859, No. 17.—COOPER, Orn. Cal., I, 1870, 466.—COUES, Key, 1872, 212; Check List, 1873, No. 338; Birds N.W., 1874, 333.

Nisus fuscus, KAUP, Jardine's Contr. Orn., 1850, 64, 281.—RIDGW., in B. B. & R., Hist. N. Am. B., III, 1874, 224.—HENSHAW, 1875, 417.

This miniature of Cooper's Hawk was observed only in the Upper

Humboldt Valley, where it was common in September along the streams flowing from the Clover Mountains. The specimen obtained had been chasing a small bird through a very dense thicket, but losing sight of the fugitive, alighted upon a twig within a few feet of us.

List of specimens.

917, ♀ *juv.*; Upper Humboldt Valley (Camp 24), September 10, 1868. $13\frac{1}{2}$ — $24\frac{3}{4}$ —(?)— $6\frac{7}{8}$. Bill, black, growing gradually pale bluish basally; cere and angle of the mouth, yellowish-green; iris, sulphur-yellow; tarsi and toes, rich lemon-yellow; claws, jet-black.

BUTEO LINEATUS.

Red-shouldered Hawk.

β. elegans—*Red-breasted Hawk.*

Buteo elegans, CASSIN, Pr. Ac. Nat. Sci. Philad., 1855, 281; Baird's B. N. Am., 1858, 28.—BAIRD, Cat. N. Am. B., 1859, No. 25.—COOPER, Orn. Cal., I, 1870, 477.

Buteo lineatus var. *elegans*, RIDGWAY, in Coues' Check List, 1873, No. 352a; in B. B. & R., Hist. N. Am. B., III, 1874, 277.

Buteo lineatus, COUES, Key, 1872, 216 (part).

This handsome Hawk was seen only in the Sacramento Valley, where it was rather common among the trees near the river.

BUTEO BOREALIS.¹

Red-tailed Hawk.

β. calurus—*Dusky Red-tail.*

Buteo calurus, CASSIN, Pr. Ac. Nat. Sci. Philad., 1855, 281; Baird's Birds N. Am., 1858, 22.—BAIRD, Cat. N. Am. B., 1859, No. 20.—COOPER, Orn. Cal., I, 1870, 471.

Buteo borealis var. *calurus*, RIDGWAY, in Coues' Check List, 1873, No. 351a; in B. B. & R., Hist. N. Am. B., III, 1874, 236.—HENSHAW, 1875, 423.

Buteo borealis b. *calurus*, COUES, B. N.W., 1874, 352.

Buteo montanus, CASSIN, Pr. Ac. Nat. Sci. Philad., 1856, 39; Baird's B. N. Am., 1858, 26 (not of NUTTALL, 1840, = *B. swainsoni*).—BAIRD, Cat. N. Am. B., 1859, No. 24.—COOPER, Orn. Cal., I, 1870, 469.

The Red-tailed Hawk was a very common species in all wooded localities of the Interior. It was especially abundant during the winter among

¹ Other western races of this Hawk are *γ. lucasanus*, RIDGW., of Cape St. Lucas, and *δ. krideri*, HOOPES, of the Great Plains, from Minnesota to Texas. *B. harlani*, AUD., and *B. cooperi*, CASS., are allied but apparently distinct species.

the cotton-woods of the Truckee and Carson Valleys, where we found it quite unsuspicious and easily killed. During the summer it was much less abundant in the lower valleys than Swainson's Hawk, but it was more common on the mountains, particularly in the pine forests. On the Wahsatch, we saw several of its nests on tall pine trees or on ledges of the cliffs, most of them being inaccessible, in which respect this species differs conspicuously from the *B. swainsoni*, which in the same region was found to build its nest on the top of the scrub-oaks or in the small aspens, within easy reach.

The series of specimens in the collection exhibits the usual individual variation so remarkable to the western birds of this species, there being examples so light-colored as to be scarcely distinguishable from the typical eastern *B. borealis*, while one is of an almost uniform deep sooty-black, the others being variously intermediate. As was the case with *B. swainsoni*, the light and dark individuals were often found paired.¹

List of specimens.

132, ♀ *ad.* (*melanotic, very black*); Big Bend of the Truckee (Camp 12), Nevada, August 17, 1867. $23\frac{1}{2}$ —54— $16\frac{1}{2}$ (molting). Bill, slate-black, the basal half of the lower mandible bluish-slate; cere, dull yellowish-green, purest on top; rictus, more yellow; iris, muddy naples-yellow; tarsi and toes, dull pale greenish-yellow; claws black.

337, ♀ *ad.* (*melanotic, rufous-breasted style*); Genoa, Nevada, November 29, 1867. $23\frac{1}{2}$ —55—17— $14-1\frac{3}{16}$ —2— $9\frac{1}{4}$ — $5\frac{1}{4}$. Weight, $3\frac{1}{2}$ pounds. Bill, dull black, passing into pale bluish basally; cere and rictus, light dull ashy-green; iris, deep hazel; tarsi and toes pale dull naples-yellow; claws, black.

347, ♂ *ad.*; Truckee Reservation, December 19, 1867. $21\frac{3}{4}$ — $51\frac{3}{4}$ —16— $13\frac{1}{4}$ — $1\frac{1}{8}$ —(?)—9—5. Weight, 2 pounds. Bill, dull black, fading into dull light bluish basally; cere and rictus, dull greenish-yellow; iris, deep light hazel; tarsi and toes, very dull light chrome-yellow, deeper beneath.

351, ♂ *ad.*; same locality, December 11, 1867. $21\frac{1}{2}$ —49— $15\frac{5}{8}$ — $12\frac{3}{4}$ — $1\frac{3}{16}$ —(?)— $9\frac{5}{8}$ — $5\frac{1}{2}$. Weight, $2\frac{1}{2}$ pounds. Bill, black, fading basally into light horn-drab; basal half of the lower mandible, pale blue; cere and rictus, clear light yellowish-green; iris,

¹ There being many who yet hold the old belief that this dark phase, found in so many species of Falconidæ, is in some manner dependent on *age*, we wish to impress our readers with the fact that it is a *purely individual* condition, *entirely independent of age, sex, or season*; it is properly styled *melanism*, and is analogous to the condition of *erythrism* in certain owls. In every American species which has this fuliginous plumage, the dark birds are dusky *from the nest up*; while those in light plumage never assume the dark dress. This is probably the case with the Old World species also.

naples-yellow, the lower two-thirds with a brownish suffusion; tarsi and toes, dull light naples-yellow, with a slight greenish tinge.

352, ♀ *ad.*; same locality and date. $23-57\frac{1}{2}-17\frac{3}{4}-14\frac{1}{2}-1\frac{3}{16}-(?) -10-5\frac{3}{4}$. Weight, $3\frac{1}{4}$ pounds. Iris, deep light brown, the upper third naples-yellow.

353, ♀ *ad.*; same locality, December 13, 1867. $23-54-17-13\frac{7}{8}-1\frac{3}{16}-(?) -9\frac{3}{4}-5\frac{1}{2}$. Weight, 3 pounds. Same remarks.

354, ♂ *ad.*; same locality and date. $22-53-16\frac{1}{2}-13\frac{7}{8}-1\frac{1}{8}-(?) -9\frac{1}{2}-5\frac{1}{2}$. Weight, $2\frac{3}{4}$ pounds. Iris, hazel; tarsi and toes, deep light chrome-yellow.

355, ♂ *ad.*; same locality and date. $22\frac{1}{2}-52-16-13-1\frac{1}{8}-(?) -9-5\frac{1}{8}$. Weight, $2\frac{1}{2}$ pounds. Iris, deep light hazel, naples-yellow above; tarsi and toes, dull greenish naples-yellow.

356, ♀ *ad.*; same locality, December 14, 1867. $24-55-17\frac{1}{2}-14\frac{1}{2}-1\frac{9}{32}-(?) -10\frac{1}{2}-6$. Weight, 4 pounds. Same remarks as to No. 352.

361, ♂ *ad.*; same locality, December 18, 1867. $22-50\frac{3}{4}-16-13\frac{1}{4}-1\frac{1}{16}-(?) -10-5$. Weight, 3 pounds. Same remarks.

418, ♂ *juv.*; San Francisco, California, February 11, 1868. " $20\frac{3}{4}-49\frac{3}{4}-(?) -13$. Eye, bright yellow." (Presented by Mr. H. G. Parker.)

1502, ♀ *juv.*; Echo Cañon, Utah, July 29, 1869. $23-51$. Collected by J. C. Olmstead.

BUTEO SWAINSONI.

Swainson's Hawk.

Buteo swainsoni, BONAP., Comp. and Geog. List, 1838, 3.—CASSIN, Baird's Birds N. Am., 1858, 19.—BAIRD, Cat. N. Am. Birds, 1859, No. 18.—COOPER, Orn. Cal., I, 476.—COUES, Key, 1872, 217; Check List, 1873, No. 354; Birds N.W., 1874, 355.—B. B. & R., Hist. N. Am. Birds, III, 1874, 263.—HENSHAW, 1875, 421.

Buteo bairdii, HOY, Pr. Ac. Nat. Sci. Philad., 1853, 451 (*Young*).—CASSIN, Baird's Birds N. Am., 1858, 21.—BAIRD, Cat. N. Am. Birds, 1859, No. 19.

Buteo insignatus, CASSIN, Illustr. Birds Cal., Tex., &c., 1854, 102, 198, pl. XXXI, (*melanotic.*); Baird's Birds N. Am., 1858, 23.—BAIRD, Cat. N. Am. Birds, 1859, No. 21.—COOPER, Orn. Cal., I, 474.

Buteo oxypterus, CASSIN, Pr. Ac. Nat. Sci. Philad., 1855, 283 (*Young*); Baird's Birds N. Am. 1858, 30.—BAIRD, Cat. N. Am. Birds, 1859, No. 28.—COOPER, Orn. Cal., I, 1870, 480.

Buteo swainsoni var. *oxypterus*, RIDGW., in B. B. & R., Hist. N. Am. Birds, III, 1874, 266.

"*Buteo harlani*," BRYANT, Pr. Bost. Soc. N. H., 1861, 116.—COOPER, Orn. Cal., I, 1870, 473 (part) [not *B. harlani*, AUD.].

Swainson's Buzzard is one of the most abundant of the large Hawks of the Interior, but it seemed to be less common in winter than in summer. It appeared to be most numerous in the valleys, but it was nevertheless far from rare on the lower slopes of the mountains, as well as in the parks. Our observations in the field tended from the very first to confirm

the theory advanced by Dr. Bryant,¹ that the several supposed species described by Mr. Cassin under the names of *B. bairdi*, Höy, *B. insignatus*, Cassin, and *B. swainsoni*, Bonap., were merely different plumages of one species, the very first specimens obtained by us being a family of four young, with their parents, the former being *B. bairdi*, while of the latter the male was a very light-colored, or extremely typical, *B. swainsoni*, and the female a very extreme example of *B. insignatus*! Similar cases were often observed afterward, the plumage of the adults being sometimes reversed—that is, a male in the plumage of the so-called *insignatus* being sometimes paired with a very light-colored female.

The family mentioned above was first observed on the 26th of July, while we were hunting among the cotton-woods of the lower Truckee Valley. Our attention was attracted by a peculiar squealing cry, not before heard by us, and upon emerging from the willows and looking across the open meadow we observed among the trees on the opposite side several large Hawks, one of which was feeding a young one in a nest in the top of a tall cotton-wood. We then approached this tree under cover of the willows, but upon arriving there found that the old Hawk had gone after more food for its young, three of which were in the trees on the opposite side of a deep and wide slough which we were unable to cross. We then shot the one in the nest, as it looked over the edge at us; but, as it did not fall, found it necessary to ascend the tree, which was easily done. The nest was very similar to that of other Buteones, being composed almost entirely of sticks, but appeared rather small for the size of the bird, measuring but about two feet in diameter by one foot in thickness. We found it so filled with the accumulated remains of animals carried to the young that scarcely any depression was noticeable on the top, the decomposing rubbish consisting of bones and other remnants of small hares (*Lepus artemisia*), ground squirrels (*Spermophilus lateralis*, *S. harrisi*, and *Tamias quadrivittatus*), and, strange to say, a full-grown young Sparrow Hawk (*Falco sparverius*). We had scarcely reached the nest before the male arrived, and flying about us uttered plaintive cries, of a mewing character, somewhat like the

¹“Remarks on the Variations of Plumage of *Buteo borealis*, Auct., and *Buteo harlani*, Aud.” Proc. Bost. Soc. Nat. Hist., VIII, 1861, pp. 107–119.

notes of *B. lineatus*, but less loud and more monotonous. Three days afterward this family was again met with, and the three remaining young immediately secured; but the parent birds were not so easily killed, for, although they received several charges of dust shot, as they courageously flew about us, they were far tougher than their young. The female was brought down first, when the male only increased in courage and clamor, until he, too, was killed.

On the Truckee Reservation a nest of this species was found in a large cotton-wood tree, and the female (No. 771) shot from it. This nest was built near the extremity of a large drooping branch, and was consequently inaccessible; by climbing above it, however, the eggs, two in number, could be seen, but it was found impossible, under the circumstances, to secure them. Many other nests were discovered in this locality, but they were in the ordinary position, viz, in a fork of a tall tree. In Parley's Park, on the Wahsatch Mountains, Swainson's Hawk was common, and many nests were found among the scrub-oaks on the slopes or on small aspens on the sides of the ravines. Their position was always low down, often merely a few feet from the ground, and easily reached without climbing. In one of these nests, found July 2d, was a single young one, which, although yet covered with snow-white cottony down, was savagely tearing at a dead weasel which had been carried to the nest by the old birds, both of which were killed; of these, the male is a remarkably light-colored example, the entire lower parts, including the under side of the wings, being pure white, the breast covered by a broad patch of uniform cinnamon-rufous, while the female, on the other hand, is one of the darkest examples of the species we ever saw, being of a uniform sooty-black, only the under tail coverts being slightly barred with whitish.

The food of this Hawk is by no means confined to small mammals and birds, but during the flights of the grasshoppers, which so often devastate the fields of Utah and other portions of the West, they keep continually gorged on these insects; and at one season we found them living chiefly on the large cricket so common in the Salt Lake Valley. On the 31st of May, 1869, at Salt Lake City, we noticed a number of these Hawks on the ground, where they remained most of the time quiet, but every now

and then they would raise their wings and hop briskly in pursuit of some object, which, at the distance, we could not distinguish. Cautiously approaching them, four were shot during the forenoon; they would not allow us to walk to within gunshot, but after flying for a few minutes would sometimes return toward us, and, passing by, give us a fair opportunity for wing-shots. Upon dissection, the stomachs of these specimens were found to be filled entirely with the large crickets mentioned above.

At our camp in Parley Park we reared four young birds of this species, which were taken from their nests while in the downy state. As they grew up under our care they became very pleasing pets, being exceedingly docile, and much attached to those who fed them. When sufficiently old to use their wings they showed no disposition to leave, although they were allowed full liberty all the while; and though they made frequent tours of inspection over the neighboring meadows, and occasional foraging excursions among the flocks of Blackbirds (*Scolecophagus cyanocephalus*) which frequented the vicinity, they seldom went far away, and always returned after a short absence. They were fed principally upon bits of fresh beef and mutton, varied occasionally by the carcasses of birds we had skinned. Their chief amusement about camp consisted in chasing grasshoppers over the ground, which they pursued by leaping after them, with the wings extended; but when not engaged in this occupation they usually perched quietly upon the fence near by or upon the tents.

List of specimens.

109, ♀ *juv.*; Big Bend of the Truckee (Camp 12), Nevada, July 26, 1867. $16\frac{1}{2}$ —45—13— $10\frac{1}{8}$ —1— $1\frac{5}{8}$ — $6\frac{7}{8}$ —3. Bill, dull black, inclining to pale blue on the rictus and on the basal half of the lower mandible; cere, pale yellowish-green; iris, cinereous, with a brownish outer wash; tarsi and toes, very pale ashy-green.

113, ♀ *ad.* (*fuliginous plumage, parent* of Nos. 109, 115, 116, and 117); Camp 12, July 29, 1867. $21\frac{1}{2}$ —53—17—14—1—2— $8\frac{5}{8}$ —5. Weight, $2\frac{1}{4}$ pounds. Bill, slate-black, light blue basally; cere and rictus, pure light yellow; iris, deep hazel; tarsi and toes, light chrome-yellow; claws, black.

114, ♂ *ad.* (*normal plumage, mate of the preceding*); Camp 12, July 29, 1867. $19\frac{3}{4}$ —48—16— $12\frac{7}{8}$ — $1\frac{5}{8}$ — $1\frac{5}{8}$ — $7\frac{3}{4}$ — $4\frac{1}{2}$. Weight, $1\frac{1}{2}$ pounds. Cere and rictus, light dull lemon-yellow; tarsi and toes, deep chrome-yellow; iris, deep hazel.

115, ♀ *juv.*; Camp 12, July 29, 1867. $19\frac{3}{4}$ —47—14—11— $1\frac{5}{8}$ — $1\frac{3}{4}$ — $7\frac{1}{2}$ — $3\frac{3}{4}$. Weight, 2 pounds. Same remarks as to No. 109.

116, ♂ *juv.*; Camp 12, July 29, 1867. $19\frac{3}{8}$ — $45\frac{1}{2}$ — $13\frac{3}{4}$ — $10\frac{3}{4}$ — $3\frac{7}{8}$ — $1\frac{1}{2}$ —7— $3\frac{3}{4}$. Weight, $1\frac{3}{8}$ pounds. Same remarks.

117, ♂ *juv.*, Camp 12, July 29, 1867. $18\frac{1}{4}$ — $43\frac{3}{4}$ — $12\frac{1}{4}$ — $9\frac{3}{4}$ — $2\frac{7}{8}$ — $1\frac{1}{2}$ — $6\frac{3}{4}$ — $4\frac{1}{8}$. Weight, $1\frac{1}{2}$ pounds. Same remarks.

771, ♀ *ad.* (*intermediate plumage, barred ochraceous belly*); Truckee Reservation, May 29, 1868. (*Shot from nest.*) $21\frac{1}{2}$ —52— $16\frac{1}{2}$ — $13\frac{1}{2}$. Weight, 3 pounds. Bill, deep black, the upper mandible scarcely paler basally, lower with the basal third pale blue; cere and rictus, greenish-gamboge; iris, burnt-sienna; tarsi and toes, deep gamboge, with a greenish tinge.

1072, ♀ *ad.* (*normal plumage, immaculate white belly*); Salt Lake City, Utah, May 31, 1869. 21—53. Weight, $2\frac{1}{2}$ pounds. Bill, slate-black, becoming light slate-blue basally; cere and rictus, greenish-gamboge; naked eyebrow, olive-yellow; iris, deep fine hazel; tarsi and toes, deep chrome-yellow. (Stomach filled with grasshoppers.)

1073, ♀ *ad.* (*normal plumage, immaculate white belly*); same locality and date. $21\frac{1}{2}$ —53. Weight, $2\frac{1}{2}$ pounds. Same remarks.

1074, ♀ *ad.* (*normal plumage, immaculate white belly*); same locality and date. 22—53½. Weight, $2\frac{3}{4}$ pounds. Same remarks.

1075, ♀ *ad.* (*normal plumage, immaculate white belly*); same locality and date. $21\frac{1}{2}$ —54. Weight, $2\frac{3}{4}$ pounds. Same remarks.

1291, ♂ *ad.* (*normal plumage*); Parley's Park, Utah, June 25, 1869. 20—50. Weight, $2\frac{1}{4}$ pounds. Upper mandible, deep black, scarcely bluish basally; lower, with basal third, light blue; cere and rictus, greenish-gamboge; iris, burnt-sienna, yellowish on top; eyebrow, olivaceous; tarsi and toes, deep light chrome-yellow.

1310, ♂ *ad.* (*normal plumage*); Parley's Park, June 26, 1869. $19\frac{1}{2}$ —48. Same remarks.

1322, fragment of egg. Parley's Park, June 27, 1869.

1335, ♀ *ad.* (*fuliginous plumage*); Parley's Park, June 28, 1869. 22—56—17. Weight, $3\frac{1}{2}$ pounds. Bill, black, pale blue basally; cere and rictus, greenish lemon-yellow; iris, deep brown; tarsi and toes, chrome-yellow.

1359, ♂ *ad.* (*normal plumage, very white*); Parley's Park, July 2, 1869. 20—50½. Same remarks.

1360, ♀ *ad.* (*fuliginous plumage, very black; mate of the preceding!*); Parley's Park, July 2, 1869. 21—51½. Weight, $2\frac{1}{2}$ pounds. Same remarks.

1501, ♀ *juv.*; Parley's Park, August 10, 1869. 21—50¾. Bill, black, becoming pale blue basally; cere and rictus, fine yellowish-green; iris, yellowish-brown; tarsi and toes, light chrome-yellow.

ARCHIBUTEO LAGOPUS.

Rough-legged Hawk.*β. sancti-johannis.*

(*Ma'-hoo-ehk* and *Ma'-ede-kan-ah'-ehk* of the Washoes; *Assut'te-Queh-nah'* of the Paiutes; *Pe'ah-Gueh-nah'* of the Shoshones)

Falco sancti-johannis, GMELIN, Syst. Nat., I, 1788, 273.

Archibuteo sancti-johannis, GRAY, Genera of Birds, —. —CASSIN, Baird's Birds N. Am., 1858, 33.—BAIRD, Cat. N. Am. Birds, 1859, No. 31.—COOPER, Orn. Cal., I, 1870, 485.

Archibuteo lagopus var. *sancti-johannis*, RIDGWAY, Pr. Ac. Nat. Sci. Philad., 1870, 142.—COUES, Key, 1872, 218; Check List, 1873, No. 356; Birds N.W., 1874, 361.—B. B. & R., Hist. N. Am. Birds, III, 1874, 304.—HENSCHAW, 1875, 425.

Archibuteo lagopus, CASSIN, Baird's Birds N. Am., 1858, 32 (not of GRAY, *ex* BRUNN, 1764).—BAIRD, Cat. N. Am. Birds, 1859, No. 30.—COOPER, Orn. Cal., I, 1870, 483.

This common species was observed nearly everywhere in the vicinity of the fertile valleys. It appears to be resident in western Nevada, for it was extremely abundant in July at the Truckee Meadows, where during the day half a dozen or more were often noticed at one time sailing in broad circles over the meadows. The flight of this Hawk is extremely similar to that of the Golden Eagle, a fact which probably explains why the Indians class it with the Eagles instead of with the Hen Hawks (*Buteo*).¹ Most of those seen were in the light-colored, or normal, phase of plumage; in fact, but one individual was seen which might have been the black phase of this species, although it is by no means certain it was not an adult specimen of *Buteo abbreviatus*.² This specimen was seen in the latter part of February, high overhead, sailing in a direct line from the eastward toward the Sierra Nevada. Its color was an intense black, relieved by a conspicuous white patch under the primaries and several distinct bands of the same across the tail.

List of specimens.

348, ♀ *juv.*; Truckee Reservation, near Pyramid Lake, December 9, 1867. $23\frac{1}{2}$ — 56 — $18\frac{1}{4}$ — 15 — $1\frac{3}{16}$ —(?)— 10 — $5\frac{1}{8}$. Bill, deep black, becoming pale blue on the basal half

¹ See Indian names above, and compare with those of *Aquila canadensis* (page 590).

² *Buteo zonocercus*, SCL., B. B. & R., Hist. N. Am. Birds, III, p. 272.

of the lower mandible, and on the base of the upper, below the cere; cere and rictus, light yellowish-green; naked eyebrow, plumbeous; iris, deep light-hazel; toes, pure light lemon-yellow; claws, deep black.

ARCHIBUTEO FERRUGINEUS.

Squirrel Hawk.

Buteo ferrugineus, LICHT., Tr. Berlin Acad., 1838, 429.

Archibuteo ferrugineus, GRAY, Genera of Birds, —, —, pl. VI (name *A. regalis* on plate).—CASSIN, Baird's Birds N. Am., 1858, 34.—BAIRD, Cat. N. Am. Birds, 1859, No. 32.—COOPER, Orn. Cal., I, 1870, 482.—COUES, Key, 1872, 218; Check List, 1873, No. 357; Birds N.W., 1874, 363.—B. B. & R., Hist. N. Am. Birds, III, 1874, 300.—HENSCHAW, 1875, 425.

This magnificent Hawk, which Dr. Coues justly calls the "handsomest of the North American Falconidæ," was much less frequently seen than its relative, the common Rough-leg (*A. sancti-johannis*). The few observed were sailing majestically overhead, describing broad circles, and resembling the Golden Eagle in the manner of their flight. At such times it may be immediately distinguished from *A. sancti-johannis* by the snowy white of its lower plumage, which, as seen from below, is the predominating color of the bird.

AQUILA CHRYSÆTOS.

Golden Eagle.

β. canadensis.

(*Poh-tahl'-ing-ehk* of the Washoes; *Queh-nah'* of the Paiutes; *Gueh'-nah* of the Shoshones.)

Falco canadensis, LINN., Syst. Nat., I, 1753, 88.

Aquila canadensis, CASSIN, Baird's Birds N. Am., 1858, 41.—BAIRD, Cat. N. Am. Birds, 1859, No. 39.—COOPER, Orn. Cal., I, 1870, 449.

Aquila chrysaetos var. *canadensis*, RIDGWAY, B. B. & R., Hist. N. Am. B., III, 1874, 314.—HENSCHAW, 1875, 426.

Aquila chrysaetos, COUES, Key, 1872, 219; Check List, 1873, No. 361; Birds N.W., 1874, 368.

The magnificent Golden Eagle is an almost daily sight in the mountain-regions of the Interior. At Carson City we scarcely ever went among the hills without seeing it, soaring about, generally in pairs, overhead. We first met with it in July, 1867, near the summit of the western slope of the

Sierra Nevada; afterward, it was continually observed on all the high ranges to the eastward, such as the Toyabe and the West and East Humboldt, being particularly common among the rocky heights of the latter. At Camp 19, on the last-named mountains, on the 29th of July, we were so fortunate as to witness the chase and capture of a Sage-Hen (*Centrocercus urophasianus*) by a pair of these Eagles. We were standing a few yards in the rear of a tent, when our attention was arrested by a rushing noise, and upon looking up the slope of the mountain we saw flying down its wooded side, with the rapidity of an arrow, a Sage-Hen, pursued by two Eagles. The Hen was about twenty yards in advance of her pursuers, exerting herself to the utmost to escape; her wings, from their rapid motion, being scarcely visible. The Eagles in hot pursuit (the larger of the two leading), followed every undulation of the fugitive's course, steadily lessening the distance between them and the object of their pursuit; their wings not moving, except when a slight inclination was necessary to enable them to follow a curve in the course of the fugitive. So intent were they in the chase that they passed within twenty yards of us. They had scarcely gone by, however, when the Sage-Hen, wearied by her continued exertion, and hoping, probably, to conceal herself among the bushes, dropped to the ground; but no sooner had she touched it than she was immediately snatched up by the foremost of her relentless pursuers, who, not stopping in its flight, bore the prize rapidly toward the rocky summits of the higher peaks, accompanied by its mate. Some moments later, we again saw them soaring overhead, describing circles as they rose higher and higher, when, taking a direct course for some distant range, they disappeared from view. At the Overland Rancho, in Ruby Valley, one of these powerful birds was in captivity; he was one of the largest size, and a truly noble-looking creature. He was kept tied to a horizontal pole, which served him for a perch, in a kind of bower constructed of green branches; none but his keeper could handle him, and every motion of a person who approached was followed by the quick fiery glance of his watchful eye, which did not permit even the slightest movement to pass unobserved. Specimens of the "Mountain-Eagle," as this bird is there called, may be found in captivity in almost any settlement in the mountain-regions of the West.

HALIAËTUS LEUCOCEPHALUS.

Bald Eagle.

Falco leucocephalus, LINN., Syst. Nat., I, 1766, 124.

Haliaëtus leucocephalus, SAVIGNY.—CUV., Règ. An., ed. 2, I, 1817, 326.—CASSIN Baird's Birds N. Am., 1858, 43.—BAIRD, Cat. N. Am. Birds, 1859, No. 43.—COOPER, Orn. Cal., I, 1870, 451.—COUES, Key, 1872, 219; Check List, 1873, No. 362; Birds N.W., 1874, 369.—B. B. & R., Hist. N. Am. Birds, III, 1874, 326.—HENSHAW, 1875, 427.

The Bald Eagle was met with only in the neighborhood of Pyramid Lake, where it was rare. One individual was seen some thirty or forty miles from the lake, in the pass of the Truckee River through the Virginia Mountains; it was an adult, and was flying along the stream. In August, 1867, when we visited the main island in Pyramid Lake, Mr. H. G. Parker pointed out to us the nest of a pair of these Eagles which had been occupied the preceding season. This nest was placed inside an oven-like cave about half-way up the side of the perpendicular rocks which formed this portion of the shore. The entrance was about fifteen feet from the top of the rock, and the same distance from the water, so it was inaccessible by any means then at command; but it could be plainly seen by looking through a crevice in the top of the rock. This nest was a huge bed of coarse sticks laid on the floor of the cave, and scattered about were the bones of numerous animals which were carried as food to the young. Mr. Parker remarked that on a former visit to the island the nest was occupied, and that he had seen the owners destroy the nest of a pair of wild geese (*Branta canadensis*) which had been established on the ground near by. The nest had doubtless been abandoned in consequence of frequent visits to the island by persons who came after Gull's eggs.

ELANUS LEUCURUS.

White-tailed Kite.

Milvus leucurus, VIEILLLOT, Nouv. Dict. d'Hist. Nat., XX, 1816, 556.

Elanus leucurus, BONAP., Comp. & Geog. List, 1838, 4.—CASSIN, Baird's Birds N. Am., 1858, 37.—BAIRD, Cat. N. Am. Birds, 1859, No. 35.—COOPER, Orn. Cal., I, 1870, 488, COUES, Key, 1872, 211; Check List, 1873, No. 336.—B. B. & R., Hist. N. Am. Birds, III, 1874, 198.

We did not see this species, but it is represented in the collection by a

fine specimen presented by Mr. Parker, and obtained by that gentleman in the neighborhood of San Francisco, California, where it is said to be a common bird in the marshy tracts.

List of specimens.

421, "♀ *ad.*; San Francisco, February 11, 1868. 16 $\frac{3}{4}$ —42—7—11 $\frac{1}{4}$. Bill, black; eyes, orange-red; tarsi and toes, yellow." (Presented by Mr. H. G. Parker.)

PANDION HALIAËTUS.

Osprey; Fish-Hawk.

β. carolinensis.

Falco carolinensis, GMELIN, Syst. Nat., I, 1788, 263.

Pandion carolinensis, BONAP., Comp. and Geog. List, 1838, 3.—CASSIN, Baird's B. N. Am., 1858, 44.—BAIRD, Cat. N. Am. Birds, 1859, No. 44.—COOPER, Orn. Cal., I, 1870, 454.

Pandion haliaëtus var. *carolinensis*, RIDGW., Pr. Ac. Nat. Sci. Philad., 1870, 143; in B. B. & R., Hist. N. Am. B., III, 1874, 184.—HENSHAW, 1875, 415.

Pandion haliaëtus, COUES, Key, 1872, 219; Check List, 1873, No. 360; B. N.W., 1874, 367.

The Fish-Hawk, like the Bald Eagle, was seen only along the lower portion of the Truckee River, near Pyramid Lake, where it was rather common in May. It no doubt bred in that locality, since it was often observed flying up the river, bearing fish in its talons, as if going to its nest.

FAMILY CATHARTIDÆ—AMERICAN VULTURES.

RHINOGRYPHUS AURA.

Turkey-Buzzard.

(*Ho'-shim* of the Washoes.)

Vultur aura, LINN., Syst. Nat., I, 1766, 122.

Cathartes aura, ILLIGER,* Prodomus, 1811, 236.—CASSIN, in Baird's B. N. Am., 1858, 4.—BAIRD, Cat. N. Am. B., 1859, No. 1.—COOPER, Orn. Cal., I, 1870, 502.—COUES, Key, 1872, 222; Check List, 1873, No. 365; B. N.W., 1874, 379.

Rhinogryphus aura, RIDGWAY, in B. B. & R., Hist. N. Am. B., III, 1874, 344.—HENSHAW, 1875, 428.

In the Sacramento Valley, the Turkey-Buzzard was so rare that not more than three or four individuals were seen during the entire month of

June, these being observed sailing over the plains toward the foot-hills of the Sierra Nevada. In the Interior, however, it was abundant throughout the summer, when it was found in nearly all localities; but during the winter months they seemed to have all retired to the southward, none having been seen in the latitude of Carson City earlier than the middle of March. It was more numerous in the vicinity of Pyramid Lake than anywhere else, for there the surf cast up many dead fish, thus affording them a plentiful supply of food. At this place they were almost constantly seen sailing quite low along the shore of the lake searching for their food. During rainy weather we frequently observed them perched among the cotton-wood trees along the river in such numbers as to completely cover the branches. Throughout the Interior the distribution of the Turkey-Buzzard was so general that it might be met with in any sort of locality; thus, on the 19th of April we shot a fine specimen from the top of a dead pine in a ravine of the Sierra Nevada, near Carson City, the spot being in the midst of a dense forest, while on the 29th of June a group, consisting of about a dozen individuals, was seen near "Sand Springs" Station, on the Carson Desert, and one of them killed with a rifle. They had collected about a small pool of putrid water in a portion of the desert so completely sterile as to be almost devoid of even the usual alkaline shrubs. Throughout the country to the eastward, the Turkey Buzzard was continually met with, both in the valleys and on the mountains, and at all elevations, the latest individual of the season being seen October 3d, at the "City of Rocks," in southern Idaho (latitude about 42°). In securing No. 130 of the collection, we went to an amount of trouble worthy of a better result. It was perched upon a high crag of the northern peak of the island, several hundred feet above us, but even at this distance its head appeared to be partly *white*, as if there might be a ruff of feathers of this color across the occiput; this appearance was only more distinct as we scanned it closely through a field-glass, so it was determined to secure the specimen if it were possible to do so. We accordingly began climbing cautiously toward it, but long before getting within range it flew. We kept on, however, until arrived nearly to the spot where it had been perched, and sitting down to rest, had remained there but a few moments when it was observed sailing

slowly back again, and approaching within gunshot, was fired at, when it fell with a thump on the rocks below. Other individuals similar to this one were seen as they soared majestically, in broad circles, about the higher cliffs, but none of them came within range. Upon descending to where our supposed prize lay, we were considerably disappointed to find it but the young of the common species, its peculiar appearance being caused by a patch of dense white down which still covered the occiput. Upon dissection, this specimen was found to have been last feeding entirely on dead fish.

List of specimens.

128, ♂ *ad.*; eastern shore of Pyramid Lake, August 16, 1867. $27\frac{1}{4}$ —69— $20\frac{1}{2}$ — $16\frac{1}{2}$ — $1\frac{3}{16}$ —2— $11\frac{1}{2}$ — $7\frac{1}{2}$. Bill, chalk-white; iris, raw-umber; head and naked portion of the neck, livid crimson, deepest on the forehead and occiput; across the vertex, from eye to eye, a broad band of livid whitish papillæ; tarsi and toes, dirty livid yellowish-white.

130, ♀ *juv.*; island in Pyramid Lake, August 16, 1867. $27\frac{7}{8}$ — $70\frac{1}{2}$ — $21\frac{1}{2}$ —17— $1\frac{1}{8}$ —2— $11\frac{1}{2}$ — $7\frac{1}{2}$. Bill, dull black; iris, light yellowish-brown; head and naked portion of the neck, livid brownish-black; tarsi and toes, dirty livid ashy-white.

FAMILY COLUMBIDÆ—PIGEONS or DOVES.

COLUMBA FASCIATA.

Band-tailed Pigeon.

Columba fasciata, SAY, Long's Exped., II, 1823, 10.—BAIRD, Birds N. Am., 1858, 597; Cat. N. Am. Birds, 1859, No. 445.—COOPER, Orn. Cal., I, 1870, 506.—COUES, Key, 1872, 225; Check List, 1873, No. 367; Birds N.W., 1874, 385.—B. B. & R., Hist. N. Am. Birds, III, 1874, 360, pl. LVII, fig. 2.—HENSHAW, 1875, 429.

On the 19th of November, 1867, we saw a single individual of what must have been this species, flying to the southward over the Truckee Meadows. Its appearance and size was very much that of the common House-Pigeon, but, from the manner of its flight, it was evidently a wild bird. The specimens in our collection were presented by Mr. Parker, who obtained them in the neighborhood of San Francisco.

List of specimens.

426, "♀" *ad.*; "San Francisco, California, January 31, 1868. 16— $26\frac{3}{4}$ —(?)— $7\frac{3}{16}$. Bill, yellow, the tip black; eye, pink-red; lids, vermilion-red; feet, yellow."

427, "♂" (?) *ad.*; "San Francisco, January 31, 1868. $15\frac{3}{4}$ — $26\frac{1}{2}$ —(?)— $7\frac{1}{4}$." Same remarks.

ECTOPISTES MIGRATORIA.

Passenger Pigeon.

Columba migratoria, LINN., Syst. Nat., I, 1766, 285.

Ectopistes migratoria, SWAINS., Zool. Jour., III, 1827, 355.—BAIRD, Birds N. Am., 1858, 600; Cat. N. Am. Birds, 1859, No. 448.—COOPER, Orn. Cal., I, 1870, 509.—COUES, Key, 1872, 225, fig. 145; Check List, 1873, No. 370; Birds N.W., 1874, 387.—B. B. & R., Hist. N. Am. Birds, III, 1874, 308, pl. LVII, fig. 4.

Only a stray individual of this species was met with by us, and it cannot be considered as more than an occasional straggler in the country west of the Rocky Mountains. The specimen obtained flew rapidly past one morning, and alighted a short distance from us, upon a stick by the edge of a stream, whither it had probably come for water. Upon dissection it was found to have been feeding upon the berries of a small cornel (*Cornus pubescens*), which grew abundantly in the mountains.

List of specimens.

179, ♀ juv.; West Humboldt Mountains (Camp 18), Nevada, September 10, 1867. $13\frac{1}{2}$ — $21\frac{5}{8}$ — $7\frac{3}{8}$ — $6\frac{1}{8}$ — $\frac{5}{8}$ — $\frac{7}{8}$ — $5\frac{1}{16}$ —3. Bill, black, the rictus pinkish; iris, brownish, with a narrow outer ring of carmine; tarsi and toes, pale livid salmon-color, the scutellæ more brownish; claws, blackish.

ZENÆDURA CAROLINENSIS.

Mourning Dove.

(*Hung'-o-ho'-ah* of the Washoes; *We-ho'-pe* of the Paiutes.)

Columba carolinensis, LINN., Syst. Nat., I, 1766, 286.

Zenaidura carolinensis, BONAP., Consp., II, 1854, 84.—BAIRD, Birds N. Am., 1858, 604; Cat. N. Am. Birds, 1859, No. 451.—COOPER, Orn. Cal., I, 1870, 512.—COUES, Key, 1872, 226, fig. 146; Check List, 1873, No. 371; Birds N.W., 1874, 389.—B. B. & R., Hist. N. Am. Birds, III, 1874, 383, pl. LVIII, fig. 2.—HENSHAW, 1875, 431.

Perhaps no bird, not even the Raven, is more universally distributed through the Interior, without regard to the nature of the country, than the common Mourning Dove, and certainly none is more abundant. It occurred about the corrals of the stage-stations in the midst of the most extensive deserts, many miles from any cultivated or wooded district, or natural

water-courses, while it was also met with on the equally barren mountains and plains far from the abode of man. In the arid portions of the country, however, it is far less common than in the fertile localities, where it sometimes literally abounds. Such was particularly the case at the Truckee Meadows, where one November evening, after supper, we killed over thirty specimens for the "pot," in the immediate vicinity of our camp. In the Sacramento Valley it was no less abundant than in the Interior.

List of specimens.

31, nest and eggs (2); Sacramento, California, June 11, 1867. Nest about six feet from ground, in small aspen, in copse.

53, nest and eggs (2); Sacramento, June 18, 1867. Nest in oak-tree, in grove, about fifteen feet from ground.

110, nest and eggs (2); Big Bend of Truckee (Camp 12), Nevada, July 26, 1867. Nest on the arid mesa, *two miles from water*, on the ground, beneath a sage-bush.

112, nest and eggs (2); Camp 12, July 29, 1867. Same locality and situation as No. 110.

192, ♀ *juv.*; West Humboldt Mountains (Camp 19), September 18, 1867. $10\frac{5}{16}$ — 17 — 6 — 5 — $\frac{1}{2}$ — $1\frac{3}{8}$ — $4\frac{1}{2}$ — $2\frac{1}{8}$. Bill, slate-black, bluish-slate at base; rictus, pinkish; iris, hazel; bare eyelids, bluish; tarsi and toes, pale lake-red; claws, blackish.

516, ♂ *ad.*; Carson City, April 23, 1868. $12\frac{3}{4}$ — $17\frac{1}{2}$ — 6 — $4\frac{7}{8}$. Bill, deep black, becoming slaty-bluish on the soft nasal membrane; rictus and interior of mouth, deep lake-red; bare orbital region, delicate pale blue, with a greenish tinge beneath the eye; iris, deep sepia; tarsi and toes, deep lake or coral-red; claws, deep black.

786, eggs (2); Virginia Mountains, near Pyramid Lake, June 3, 1868. Nest on ground, beneath sage-bush, on side of ravine.

1170, eggs (2); Salt Lake City, June 16, 1869. Nest on ground, beneath sage-bush.

1184, nest and eggs (2); near Salt Lake City (City Creek Cañon), June 18, 1869. Nest on mountain-mahogany tree.

1293, eggs (2); Parley's Park, Utah, June 26, 1869. Nest in aspen tree.

1294, eggs (2); Parley's Park, June 26, 1869. Same remarks.

1340, eggs (2); Parley's Park, June 28, 1869. Same remarks.

1341, eggs (2); Parley's Park, June 28, 1869. Same remarks.

1385, nest and egg (1); Provo River, July 10, 1869. Nest on bush leaning over river-bank.

1386, nest and egg (1); Provo River, July 10, 1869. Nest on bush on river-bank.

1417, eggs (2); Parley's Park, July 16, 1869. Nest among willows, along stream.

1522, egg (1); Gash Valley, Utah, July, 1869. [Collected by J. C. Olmstead.]

FAMILY TETRAONIDÆ—GROUSE.

CANACE OBSCURA.

Dusky Grouse.

Tetrao obscurus, SAY, Long's Exped., II, 1823, 14, 202.—BAIRD, Birds N. Am., 1858, 620; Cat. N. Am. Birds, 1859, No. 459.—COOPER, Orn. Cal., I, 1870, 526.—COUES, Key, 1872, 233; Check List, 1873, No. 381; Birds N.W., 1874, 395.
Canace obscura, BONAP., Comp. Rend., XLV, 1857, 428.—B. B. & R., Hist. N. Am. Birds, III, 1874, 422, pl. LIX, figs. 1, 2.

The "Mountain Grouse," or "Blue Grouse," was a more or less common species on all the ranges clothed with a sufficient extent of pine forests, the existence of which seemed to strictly govern its distribution. It was found on the Sierra Nevada, near Carson City, and on several of the higher ranges of the Great Basin; but it did not occur in abundance until we arrived at the Wahsatch and Uintah Mountains, where it literally abounded in certain localities, particularly on the latter range.

Although seldom seen in the dense pine forests, we always found these Grouse in their vicinity, usually in the open glades with scattered trees and brush, with thicker woods on either side. Our acquaintance with this species being made wholly in the fall and latter part of summer, we did not learn much regarding its habits. We can testify, however, to the excellence of its flesh, which is white and tender as that of a partridge.

List of specimens.

891, ♂ *ad.*; East Humboldt Mountains (near Camp 22), September 4, 1868. 21—31½—7½. Weight, 2¾ lbs. Bill black, the lower mandible slightly variegated with whitish at the base; iris, raw-umber; bare space over eye, orange-yellow; toes, brownish-gray; claws, black.

954, ♀ *ad.*; Wahsatch Mountains, near Salt Lake City, October, 1868.

1290, ♂ *ad.*; Parley's Park, June 25, 1869. 22—31½. Weight, 3½ lbs. Bill, black; iris, raw-umber; naked superciliary space, orange; toes, lilaceous-gray.

1370, ♀ *ad.*; Pack's Cañon, Uintah Mountains, July 5, 1869. 19—29. Bill, black; iris, raw-umber; toes, ashy.

1371, ♀ *ad.*; Pack's Cañon, July 5, 1869. Same remarks.

1372, *juv.*; same date and locality.

1382, *juv.*; Pack's Cañon, July 8.

1444, ♂ *juv.*; Parley's Park, July 23.

BONASA UMBELLUS.

Ruffed Grouse.*β. umbelloides*—Gray Ruffed Grouse.*Tetrao umbelloides*, DOUGLAS, Trans. Linn. Soc., XVI, 1829, 148.*Bonasa umbellus* var. *umbelloides*, BAIRD, Birds N. Am., 1858, 925; Cat. N. Am. Birds, 1859, No. 465.—COUES, Key, 1872, 235; Check List, 1873, No. 385a; Birds N.W., 1874, 425.—B. B. & R., Hist. N. Am. Birds, III, 1874, 453, pl. LXI, fig. 10.

This bird we did not see alive, but dead specimens were occasionally seen in the hands of hunters. It was said to be common in the pine forests of the Wahsatch, where it is known as the "Pine-Hen."

List of specimens.

955, ♂ ad.; Wahsatch Mountains, near Salt Lake City, October, 1868.

PEDIÆCETES PHASIANELLUS.

Sharp-tailed Grouse.*β. columbianus*—Western Prairie Chicken.*Phasianus columbianus*, ORD, Guthrie's Geog., 2d Am. ed., 1815, 317.*Pediæcetes columbianus*, ELLIOT, Pr. Philad. Acad., 1862, 403.—COOPER, Orn. Cal., I, 1870, 532.*Pediæcetes phasianellus* var. *columbianus*, COUES, Key, 1872, 234; Check List, 1873, No. 383a; Birds N.W., 1874, 407.—B. B. & R., Hist. N. Am. Birds, III, 1874, 436, pl. LX, fig. 1.*Pediæcetes phasianellus*, BAIRD, Birds N. Am., 1858, 626 (not *Tetrao phasianellus*, LINN., 1758, = *Pediæcetes*); Cat. N. Am. Birds, 1859, No. 463.

This Grouse, known universally among the western people as the "Prairie Chicken," we found only in the Upper Humboldt Valley, near Trout Creek, where it was abundant in the rye-grass meadows at the base of the Clover Mountains, and in a very few similar localities in the Wahsatch district.

List of specimens.

927, ♀ ad.; Upper Humboldt Valley (Camp 25), September 16, 1868. 15—25—(?)—6. Bill, black, the lower mandible more ashy basally; iris, raw-sienna; toes, ashy horn-color.

CENTROCERCUS UROPHASIANUS.

Sage-Hen.

(See-yuh' of the Washoes.)

Tetrao urophasianus, BONAP., Zool. Journ., III, 1828, 214.*Tetrao* (*Centrocercus*) *urophasianus*, SWAINS., Fauna Bor.-Am., II, 1831, 358, pl. 58.*Centrocercus urophasianus*, JARDINE, Nat. Lib. Birds, —, 1840, pl. xvii.—BAIRD, B. N. Am., 1858, 624; Cat. N. Am. B., 1859, No. 462.—COOPER, Orn. Cal., I, 1870, 536.—COUES, Key, 1872, 233; Check List, 1873, No. 382; Birds N.W., 1874, 400.—B. B. & R., Hist. N. Am. Birds, III, 1874, 429, pl. LX, figs. 2, 4.

Although this large and well-known Grouse was met with throughout the sage-brush country between the Sierra Nevada and the Wahsatch, we saw it so seldom that little was learned of its habits, particularly during the breeding-season. It came under our notice only late in summer and during the autumn, when it was found to be abundant in certain localities, but by no means uniformly distributed. When startled, the Sage-Hen rises with a noisy and apparently laborious fluttering, and then flies off, with a heavy but well-sustained flight, a few yards above the ground, and usually goes a long way before alighting; indeed, if allowed to escape after being once flushed there is generally little hope of getting a second opportunity for a shot. As an article of food the Sage-Hen cannot be recommended, unless the precaution is taken to flay it immediately, for its flesh soon becomes permeated with the disagreeable odor of the sage-brush, the leaves of which form its principal food. In fact, it is often found necessary to soak the carcase in salt-water over night before the flesh becomes palatable. The leaves of the *Artemisia* do not form the exclusive food of this species, however, but during the season when grasshoppers abound it feeds largely on these insects, several specimens killed in Parley's Park during a flight of these pests in August having nothing else in their crops. It is a well-known fact among western hunters that the Sage-Hen "has no gizzard," and the truth of this statement, which was often told us, we confirmed by the dissection of numerous specimens; the stomach being merely membranous, or at most but slightly muscular, like that of a bird of prey, and nothing like the thick and powerful grinding machine of other *Gallinæ*.¹

¹See *American Naturalist*, April, 1874, p. 240, where this remarkable peculiarity of the Sage-Hen is referred to, by the writer.

List of specimens.

214, ♂ *ad.*; West Humboldt Mountains (Camp 19), September 23, 1867. 29—40½—12¾—10—1½—2¼—11½—3½. Weight, 4½ pounds. Bill, deep black; iris, light hazel; cervical sac, light leaden-blue; toes, grayish-olive.

311, ♀ *ad.*; Pea-Vine district, Western Nevada, November 21, 1867. 23—36½—12¼—8½—1½—1¾—7¾—2¾. Bill, deep black; iris, light brown; toes, blackish horn-color.

312, ♀ *ad.*; same locality and date. 21½—34—10½—8—1¼—1½—7¼—3. Same remarks.

313, ♀ *ad.*; same locality and date. 21½—34—10¾—8—1½—1¾—7½—2½. Same remarks.

943, ♀ *ad.*; City of Rocks, Idaho, October 3, 1868. 22—35—(?)—8¼. Same remarks.

FAMILY PERDICIDÆ—PARTRIDGES and QUAILS.

OREORTYX PICTUS.

Mountain Quail or Partridge.

*β. plumiferus.*¹

(*Mah'-tem-ah'-tek* and *Tu-ehk'-tuddle* of the Washoes; *Kih'-hik* of the Paiutes.)

Ortyx plumifera, GOULD, Proc. Zool. Soc. Lond., V, 1837, 42.

Oreortyx pictus var. *plumiferus*, B. B. & R., Hist. N. Am. Birds, III, 1874, p. 476.

Oreortyx pictus, AUCT. (part).

This superb bird occurred rather sparingly among the mountains and hills immediately adjacent to the eastern base of the Sierra Nevada, as well as on the eastern slope of that range itself. It was so rare, however, or at least so difficult to find, that we could learn but little concerning its habits. We first met with it in a broad cañon of the Virginia Mountains fronting on Pyramid Lake, where the slopes were covered, more or less, by the tall rye-grass, interspersed with scattered cedars. Here a flock of perhaps a

¹The typical form, which inhabits the *coast districts* of California and Oregon (the present one inhabiting the Sierra Nevada and the peninsula of Lower California), differs in darker, browner colors. Its synonymy is as follows:—

Ortyx picta, DOUGLAS, Trans. Linn. Soc., XVI, 1829, 143.

Oreortyx pictus, BAIRD, Birds N. Am., 1858, 642; Cat. N. Am. Birds, 1859, No. 473. —COOPER, Orn. Cal., I, 1870, 546 (part). —COUES, Key, 1872, 237; Check List, 1873, No. 390; Birds N.W., 1874, 440.—B. B. & R., Hist. N. Am. Birds, III, 1874, 475, pl. LXIII, fig. 5 (part).

dozen individuals was flushed on the 27th of December, 1867, and one of them secured. Before they rose they uttered a confused chuckling, somewhat like the alarm-notes of the eastern Bob-White (*Ortyx virginianus*), and after they had been separated for some time, commenced calling to one another in a manner exactly similar to young Turkeys (*Meleagris*) under the same circumstances. Its love-notes we have never heard.

In western Nevada, where the statement seems to be generally believed, we were informed that the Mountain Quail was not an inhabitant of the country eastward of the summit of the Sierra Nevada until after the settlement of that country by the whites, when they began following the wagon-roads over the mountains for the purpose of picking up the grain scattered along the way. This may possibly be true; but judging from the fact that a number of essentially Californian birds and mammals, and even plants, occur plentifully along the eastern base of the Sierra Nevada, in an exactly similar manner, we rather incline to the opinion that it is a true native, in support of which view of the case, we were informed by the Indians at the Truckee Reservation that it had always been found on the neighboring mountains.

List of specimens.

319, ♂ *ad.*; Carson City, Nevada, November, 1867. (Presented by Mr. H. G. Parker.)

386, ♂ *ad.*; Virginia Mountains, near Pyramid Lake, December 27, 1867. $11\frac{1}{4}$ — 17 — $5\frac{3}{8}$ — $4\frac{3}{8}$ — $\frac{9}{16}$ — $1\frac{3}{16}$ — $3\frac{1}{2}$ — $\frac{1}{4}$. Bill, dull black, more brownish terminally; iris, deep brown; tarsi and toes, dilute brownish.

440, ♂ *ad.*; Carson City, Nevada, March 10, 1868. (Cedar-groves.) $11\frac{3}{8}$ — $16\frac{3}{4}$ — $5\frac{3}{8}$ — $4\frac{1}{4}$. Bill, black, slightly brownish terminally; iris, vandyke-brown; tarsi and toes, dilute sepia.

441, ♀ *ad.* (mate of No. 440); same locality and date. $11\frac{1}{4}$ — $16\frac{5}{8}$ — $5\frac{1}{2}$ — $4\frac{1}{4}$. Same remarks.

LOPHORTYX CALIFORNICUS.

California Valley Quail.

Tetrao californicus, SHAW, Nat. Misc., —, pl. 345.

Lophortyx californicus, BONAP., Comp. & Geog. List, 1838, 42.—BAIRD, Birds N. Am., 1858, 644; Cat. N. Am. Birds, 1859, No. 474.—COOPER, Orn. Cal., I, 1870, 549.—COUES, Key, 1872, 238; Check List, 1873, No. 391; Birds N.W., 1874, 439.—B. B. & R., Hist. N. Am. Birds, III, 1874, 479, pl. XLIV, figs. 1, 2.

The "Valley Quail" of California was met with only among the western

foot-hills of the Sierra Nevada, where it seemed to be an abundant species. It continued along our route up to the beginning of the continuous pine forest, or to an altitude of about 5,000 feet, where a specimen, a fine adult male, was killed among the brushwood of a ravine by the roadside. There were evidently others in the locality, since the one killed was in a small tree, anxiously calling, his note being a sharp *chip*, almost exactly like the common note of the Cardinal Grosbeak (*Cardinalis virginianus*). We unfortunately had little opportunity to observe the habits of this beautiful species.

List of specimens.

316, ♂ *ad.*; 317, ♂ *ad.*; 318, ♀ *ad.*; "Coast of California, near San Francisco." (H. G. Parker.)

FAMILY CHARADRIIDÆ—PLOVERS.

ÆGIALITIS VOCIFERUS.

Kill-deer.

Charadrius vociferus, LINN., Syst. Nat., I, 1766. 253.

Ægialitis vociferus, BONAP., Comp. & Geog. List, 1838, 45.—CASSIN, in Baird's Birds N. Am., 1858, 692.—BAIRD, Cat. N. Am. Birds, 1859, No. 504.—COUES, Key, 1872, 244, fig. 156; Check List, 1873, No. 397; Birds N.W., 1874, 452 (*vocifera*).—HENSHAW, 1875, 445.

The common Kill-deer was found to be by far the most abundant and generally distributed bird of the order, since it was found about every stream or other body of water, while it was common wherever it occurred. It was also resident, but more numerous in summer than in winter.

List of specimens.

431, ♂ *ad.*; Carson City, Nevada, March 7, 1868. $10\frac{1}{2}$ — $20\frac{1}{4}$ —7— $5\frac{5}{8}$. Bill, black; iris, bistre; eyelids, orange-red; tarsi and toes, pale ashy naples-yellow.

472, ♂ *ad.*; Carson City, March 28, 1868. 10 — $20\frac{1}{2}$ — $6\frac{1}{8}$ — $5\frac{5}{8}$. Same remarks.

1154, eggs (4); Antelope Island, Great Salt Lake, June 9, 1869. Eggs deposited on the bare sand, in a slight depression, near the shore.

ÆGIALITIS CANTIANUS.**Kentish Plover.***β. nivosus*—*Snowy Plover*.*Ægialitis (Leucopoliis) nivosus*, CASSIN, in Baird's Birds N. Am., 1858, 696.*Ægialitis nivosus*, BAIRD, Cat. N. Am. Birds, 1859, No. 509.*Ægialitis cantianus*, COUES, Key, 1872, 245 (not of LATHAM); Check List, 1873, No. 401.*Ægialitis cantianus* var. *nivosus*, RIDGWAY, Am. Nat., VIII, 1874, 109.—COUES, Check List, App., No. 401.*Ægialitis cantiana* var. *nivosa*, COUES, Birds N.W., 1874, 456.

This handsome and graceful little Plover was exceedingly numerous in May on the bare mud-flats around Warm Spring Lake, near Salt Lake City. It kept in flocks, running nimbly and very swiftly over the ground, all the while uttering a soft and rather musical whistling note.

List of specimens.

969, ♂ *ad.*; Salt Lake City, Utah, May 21, 1869. 7—13 $\frac{3}{4}$. Bill, deep black; iris, burnt-sienna; eyelids, deep black; interior of mouth, fleshy-white; tarsi, slate-color; toes, black.

1026, ♂ *ad.*; near Salt Lake City, Utah, May 22, 1869. 7—13 $\frac{5}{8}$. Bill, deep black; eyelids, black; iris, deep brown; tarsi, dull slate; toes, black.

1027, ♂ *ad.*; same locality and date. 6 $\frac{1}{2}$ —13 $\frac{1}{2}$. Same remarks.

1028, ♀ *ad.*; same locality and date. 6 $\frac{1}{4}$ —12 $\frac{1}{2}$. Same remarks.

1029, ♂ *ad.*; same locality and date. 6 $\frac{1}{2}$ —13. Same remarks.

1030, ♂ *ad.*; same locality and date. 6 $\frac{3}{4}$ —14 $\frac{3}{4}$. Same remarks.

1031, ♀ *ad.*; same locality and date. 6 $\frac{5}{8}$ —13 $\frac{1}{2}$. Same remarks.

FAMILY PHALAROPODIDÆ—PHALAROPES.**STEGANOPUS WILSONI.****Wilson's Phalarope.**

Phalaropus wilsoni, SABINE, App. Franklin's Journal, 1823, 691.—CASSIN, in Baird's B. N. Am., 1858, 705.—BAIRD, Cat. N. Am. B., 1859, No. 519.

Phalaropus (Steganopus) wilsoni, GRAY, Hand List, III, 1871, 55, No. 10,362.

Steganopus wilsoni, COUES, Ibis, April, 1865, —; Key, 1872, 248, fig. 161; Check List, 1873, No. 409; Birds N.W., 1874, 467.—HENSHAW, 1875, 451.

This species was shot from a flock of Sandpipers (*Tringa alpina americana*, *T. minutilla*, *T. bairdi*, and *Ereunetes pusillus*), at Pyramid Lake, in

May, 1868, and was again seen swimming in the alkaline ponds along the southern shore of Great Salt Lake, in June, 1869.

FAMILY RECURVIROSTRIDÆ—AVOCETS and STILTS.

RECURVIROSTRA AMERICANA.

American Avocet.

Recurvirostra americana, GMELIN, Syst. Nat., I, 1788, 693.—CASSIN, in Baird's B. N. Am., 1858, 703.—BAIRD, Cat. N. Am. B., 1859, No. 517.—COUES, Key, 1872, 147, fig. 159; Check List, 1873, No. 407; Birds N.W., 1874, 460.—HENSCHAW, 1875, 448.

This abundant bird is confined chiefly to the vicinity of the alkaline ponds or lakes, where it is usually found in the most barren places, or where the bare earth is covered chiefly with an alkaline efflorescence. At the Soda Lakes, on the Carson Desert, it was particularly abundant, and appeared to be feeding on a kind of insect thrown by the surf upon the beach. It was not met with in the Sacramento Valley, but was first seen at the Truckee Meadows, where it was abundant in July in some alkaline marshes. Its local names are "Lawyer" and "Yelper" in most localities where it is known.

List of specimens.

811, ♂ *ad.*; Soda Lake, Carson Desert, Nevada, June 28, 1868. 18—29 $\frac{3}{4}$ —(?)—7. Bill deep black; iris, burnt-umber; tarsi and toes, ashy-blue.

812, eggs (4); 813, eggs (3); 814, egg (1). Same locality and date. Eggs deposited in depressions in the alkaline deposit.

1071, ♂ *ad.*; near Salt Lake City, May 29, 1869. 18 $\frac{3}{4}$ —36 $\frac{1}{2}$. Bill, deep black; iris, brown; legs and feet, plumbeous-blue.

1107, ♂ *ad.*; Antelope Island, Salt Lake, June 5, 1869. 18 $\frac{1}{2}$ —31. Same remarks.

1218, 1219, 1220, 1221 (eggs); Carrington Island, Salt Lake, June 17, 1869. (Collected by Mr. R. N. Davis and Mr. S. Watson.)

HIMANTOPUS MEXICANUS.

American Stilt.

(Pahn-tuy'-he of the Shoshones.)

Charadrius mexicanus, MÜLLER, Syst. Nat., 1776, 117.*Himantopus mexicanus*, ORD (ed. Wils.), Am. Orn., VII, 1824, 52.*Himantopus nigricollis*, VIEILLOT, Nouv. Diet. d'Hist. Nat., X, 1817, 42.—CASSIN, in Baird's Birds N. Am. 1858, 704.—BAIRD, Cat. N. Am. Birds, 1859, No. 518.—COUES, Key, 1872, 247, fig. 160; Check List, 1873, No. 408; Birds N.W., 1874, 462.—HENSHAW, 1875, 450.

This species was almost invariably found in the same localities with the Avocet (*Recurvirostra*), but it was everywhere less abundant than that species. It was more numerous about the southeastern portion of the Great Salt Lake than at any other locality visited by us.

List of specimens.

815, ♂ *ad.*; Soda Lake, Carson Desert, June 28, 1868. 15—29½—(?)—7¾. Bill, deep black; iris, grayish-brown next the pupil, with a wide outer ring of clear rosy-carmine; legs and feet, deep light rose-pink or lake-red.

1018, eggs (4); near Salt Lake City, May 22, 1869. Nest on the ground, on small grassy island in Warm Spring Lake.

1072, ♀ *ad.*; near Salt Lake City, May 29, 1869. 14¾—27½. Same remarks as to No. 815.

1084, ♂ *ad.*; mouth of Jordan River, Utah, June 2, 1869. 15½—30. Iris, rich fine carmine.

FAMILY SCOLOPACIDÆ—SNIPE, SANDPIPERS, ETC.

GALLINAGO WILSONI.

Wilson's Snipe.

(Tuttoo-hoy'-ehk and Kay'-lehk of the Washoes; Si'-yeheh of the Shoshones.)

Scolopax wilsonii, TEMM., Pl. Col. v, *lirr.* LXVIII (in text).*Gallinago wilsoni*, BONAP., Comp. & Geog. List, 1838, 52.—CASSIN, in Baird's Birds N. Am., 1858, 710.—BAIRD, Cat. N. Am. Birds, 1859, No. 523.—COUES, Key, 1872, 262, fig. 163; Check List, 1873, No. 414; Birds N.W., 1874, 475.—HENSHAW, 1875, 452.*Gallinago gallinaria* var. *wilsoni*, RIDGWAY, Ann. Lyc. N. Y., X, 1874, 383.

The Common Snipe was an abundant species during the spring and

autumn, in all wet and grassy places. In Parley's Park, either this species or *Macrorhamphus griseus* was breeding, but we found it impossible to positively determine the species. In the lower portion of the park, about a quarter of a mile from our camp, was an extensive meadow, portions of which were quite wet or marshy; and in this direction we would hear every evening a peculiar hollow gurgling sound, somewhat like the noise produced by water escaping from a nearly full jug. This was heard only just before dark, and, as we soon ascertained, was produced by a kind of "Snipe," as it pitched downward from a great height. We found it impossible to obtain a specimen, but conclude that the bird must have been this species, since we shot specimens along a brook in the same locality at about the same time.

List of specimens.

259, ♀ *ad.*; Truckee Meadows (Camp 26), Nevada, November 7, 1867. $11\frac{3}{8}$ — $17\frac{1}{2}$ — $5\frac{5}{8}$ — $4\frac{1}{2}$ — $2\frac{11}{16}$ — $1\frac{3}{16}$ — $2\frac{1}{2}$ — $\frac{9}{16}$. Bill, blackish for terminal third, greenish-ashy basally, the lower mandible rather paler than the upper; iris, bistre; tarsi and toes, pale greenish-ashy; claws, black.

260, ♂ *ad.*; Camp 12, November 7, 1867. $11\frac{1}{8}$ — $17\frac{1}{2}$ — $5\frac{5}{8}$ — $4\frac{1}{2}$ — $2\frac{9}{16}$ — $1\frac{3}{16}$ — $2\frac{1}{2}$ — $\frac{9}{16}$. Same remarks.

261, ♂ *ad.*; same locality and date. $10\frac{1}{8}$ — $16\frac{7}{8}$ — $5\frac{1}{2}$ — $4\frac{7}{16}$ — $2\frac{7}{16}$ — $1\frac{1}{16}$ — $2\frac{3}{8}$ —(?) . Same remarks.

262, ♂ *ad.*; same locality and date. $10\frac{1}{2}$ — $16\frac{5}{8}$ — $5\frac{1}{4}$ — $4\frac{3}{16}$ — $2\frac{3}{8}$ — $1\frac{1}{8}$ — $2\frac{1}{2}$ — $\frac{3}{8}$. Same remarks.

1453, ♀ *ad.*; Parley's Park, Utah, July 26, 1869. $11\frac{1}{8}$ — $17\frac{1}{2}$. Bill, black, growing gradually greenish horn-color basally; iris, dark brown; tarsi and toes, light ash, with distinct yellowish-green wash on the scutellæ.

1454, ♀ *ad.*; same locality and date. $10\frac{3}{4}$ — $16\frac{3}{4}$. Same remarks.

1455, ♀ *ad.*; same locality and date. 11 — $16\frac{3}{4}$. Same remarks.

TRINGA ALPINA.

Red-backed Sandpiper.

β. americana.

Tringa (Schoeniclus) alpina var. *americana*, CASSIN, in Baird's Birds N. Am., 1858, 719.

Tringa alpina var. *americana*, BAIRD, Cat. N. Am. Birds, 1859, No. 530.—COUES, Key, 1872, 256, fig. 166; Check List, 1873, No. 424; Birds N.W., 1874, 489.

This species occurred among the large flocks of Sandpipers and other

small waders found in the vicinity of Pyramid Lake in May, along with *Steganopus wilsoni*, *Tringa bairdi*, *T. minutilla*, and *Ereunetes pusillus*, all of which were killed at a single shot.

TRINGA BAIRDI.

Baird's Sandpiper.

Actodromus bairdii, COUES, Pr. Ac. Nat. Sci. Philad., 1861, 194.—HENSHAW, 1875, 455.

Tringa bairdii, SCL., Proc. Zool. Soc. Lond., 1867, 332.—COUES, Key, 1872, 255; Check List, 1873, No. 419; Birds N.W., 1874, 484.

Found about Pyramid Lake in May, and at the Humboldt Marshes in August.

List of specimens.

133, ♀ *juv.*; Humboldt Marshes (Camp 15), August 26, 1867. $7\frac{9}{16}$ —15— $5\frac{1}{8}$ — $4\frac{5}{16}$ — $1\frac{5}{16}$ — $2\frac{1}{16}$ — $\frac{5}{8}$. Bill, black; iris, brown; tarsi and toes, slate-black

TRINGA MINUTILLA.

Least Sandpiper.

Tringa minutilla, VIEILLOT, Nouv. Dict. d'Hist. Nat., XXXIV, 1819, 452.—COUES, Key, 1872, 254; Check List, 1873, No. 418; Birds N.W., 1874, 482.

Actodromus minutilla, COUES, Pr. Phil. Ac., 1861, 191, 230.—HENSHAW, 1875, 455.

Tringa wilsonii, NUTTALL, Man. Orn., II, 1834, 121.—CASSIN, in Baird's Birds N. Am., 1858, 721.—BAIRD, Cat. N. Am. B., 1859, No. 532.

Vicinity of Pyramid Lake in May, about Salt Lake throughout the summer, and at the Humboldt Marshes in August.

List of specimens.

134, ♂ *juv.*; Camp 15, August 26, 1867. $6\frac{3}{16}$ — $11\frac{3}{4}$ — $3\frac{7}{8}$ — $3\frac{3}{16}$ — $\frac{15}{16}$ — $\frac{15}{16}$ — $1\frac{9}{16}$ — $\frac{7}{16}$. Bill, black; iris, brown; tarsi and toes, slate-black.

135, ♀ *juv.*; same locality and date. $6\frac{5}{8}$ — $12\frac{7}{16}$ — $4\frac{1}{16}$ — $3\frac{7}{16}$ — $1\frac{1}{16}$ — $\frac{15}{16}$ — $1\frac{5}{8}$ — $\frac{11}{16}$. Same remarks.

136, ♀ *juv.*; same locality and date. $5\frac{3}{4}$ —11— $3\frac{11}{16}$ —3— $\frac{11}{16}$ — $\frac{3}{4}$ — $1\frac{5}{8}$ — $\frac{1}{2}$. Bill, dull black; iris, hazel; tarsi and toes, grayish-olive.

EREUNETES PUSILLUS.

Semipalmated Sandpiper.

Tringa pusilla, LINN., Syst. Nat., I, 1766, 252.

Ereunetes pusillus, CASSIN, Pr. Ac. Nat. Sci. Philad., XIII, 1860, 195.—COUES, Key, 1872, 254, fig. 165; Check List, 1873, No. 417; Birds N.W., 1874, 481.—HENSHAW, 1875, 454.

Ereunetes petrificatus, ILLIGER, Prodrum, 1811, 262.—CASSIN, in Baird's Birds N. Am., 1858, 724.—BAIRD, Cat. N. Am. B., 1859, No. 535.

Ereunetes occidentalis, LAWR., Pr. Philad. Acad., 1864, 107.

Ereunetes pusillus var. *occidentalis*, COUES, Key, 1872, 254; Check List, 1873, No. 417a.

Vicinity of Pyramid Lake in May, and Humboldt Marshes in August, in flocks with *Tringa bairdi* and *T. minutilla*. [All the specimens of these three species shot from one flock at a single discharge.]

List of specimens.

137, ♂ *juv.*; Camp 15, August 26, 1867. $5\frac{3}{4}$ — $11\frac{1}{8}$ — $3\frac{5}{8}$ —3— $1\frac{1}{6}$ — $1\frac{3}{8}$ — $1\frac{1}{2}$ — $\frac{7}{16}$. Bill, black, becoming greenish-olive on base of lower mandible; iris, brown; tarsi and toes, greenish-olive.

138, ♀ *juv.*; same locality and date. $5\frac{3}{8}$ —11— $3\frac{9}{16}$ — $2\frac{1}{8}$ — $\frac{3}{4}$ — $\frac{3}{4}$ — $1\frac{9}{16}$ — $\frac{7}{16}$. Same remarks.

139, ♀ *juv.*; same locality and date. $6\frac{1}{4}$ — $11\frac{1}{2}$ — $3\frac{3}{4}$ — $3\frac{1}{8}$ — $1\frac{3}{8}$ — $1\frac{3}{8}$ — $1\frac{1}{16}$ — $\frac{7}{16}$. Same remarks.

SYMPHEMIA SEMIPALMATA.

Willet.

Scolopax semipalmata, GMELIN, Syst. Nat., I, 1788, 639.

Totanus semipalmatus, TEMM., Man. Orn., II, —, 637.—COUES, Key, 1872, 258; Check List, 1873, No. 431; Birds N.W., 1874, 494.—HENSHAW, 1875, 457.

Symphemia semipalmata, HARTLAUB, Rev. Zool., 1845, 342.—CASSIN, in Baird's Birds N. Am., 1858, 729.—BAIRD, Cat. N. Am. Birds, 1859, No. 537.

This large and conspicuous Snipe, readily distinguished at sight from other species by the conspicuous white patch on the wings, was found breeding in nearly all marshy localities. It was particularly numerous on the grassy flats along the southern shore of the Great Salt Lake, near the mouth of the Jordan River, where it was found in company with the Long-billed Curlew (*Numenius longirostris*) and various species of Ducks.

List of specimens.

1160, ♀ *ad.*; southern shore of Great Salt Lake, Utah, June 11, 1869. 16— $29\frac{1}{2}$. Bill, black; iris, brown; tarsi and toes, slate-color.

RHYACOPHILUS SOLITARIUS.

Solitary Sandpiper.

Tringa solitaria, WILSON, Am. Orn., VII, 1813, 53, pl. 58, fig. 3.

Totanus solitarius, AUDUBON, Synop., 1839, 242.—COUES, Key, 1872, 259; Check List, 1873, No. 435; Birds N.W., 1874, 498.—HENSHAW, 1875, 459.

Rhyacophilus solitarius, CASSIN, Baird's Birds N. Am., 1858, 733.—BAIRD, Cat. N. Am. B., 1859, No. 541.

This species seemed to be exceedingly rare in the Interior, since it was seen on but two or three occasions; it was noticed in the Truckee Valley, May 13, 1868, while a pair were observed at the Glendale Meadows in July, 1867; a single individual was also observed in Parley's Park, in August. It was not met with in the Sacramento Valley.

TRINGOIDES MACULARIUS.

Spotted Sandpiper.

Tringa macularia, LINN., Syst. Nat., I, 1766, 249.

Tringoides macularius, GRAY, Genera of Birds, III, 1849, 574.—CASSIN, in Baird's Birds N. Am., 1858, 735.—BAIRD, Cat. N. Am. Birds, 1859, No. 543.—COUES, Key, 1872, 260; Check List, 1873, No. 436; Birds N.W., 1874, 501.—HENSHAW, 1875, 460.

Next to the Kill-deer (*Ægialitis vociferus*), the Spotted Sandpiper is probably the most abundant and generally-distributed of the small waders in the Great Basin. It was found breeding from the lowest valleys up to an altitude of more than 7,000 feet, its favorite haunts being the gravelly banks of running streams rather than the vicinity of ponds or lakes. Its first arrival at Carson City was noted on the 29th of April, 1868.

List of specimens.

562, ♂ *ad.*; Carson City, April 29, 1868. $7\frac{3}{4}$ — $13\frac{7}{8}$ — $4\frac{3}{8}$ — $3\frac{5}{8}$. Commissure and whole of the lower mandible, dilute wax-yellow; rest of the bill, black; iris, vandyke-brown; tarsi and toes, dilute ashy-olive.

1362, eggs (2); Pack's Cañon, Uintah Mountains, July 3, 1869. Nest, a very neat one of sticks, in a slight depression on the gravelly bank of a brook. Eggs nearly hatched.

1468, *juv.*; Parley's Park, July 28, 1869. Bill, black, lower mandible purplish basally; iris, dark brown; tarsi and toes, olive.

ACTITURUS BARTRAMIUS.

Bartram's Tatler.

Tringa bartramia, WILSON, Am. Orn., VII, 1813, 63, pl. 59, fig. 2.

Actiturus bartramius, BONAP., Saggio, 1831, —.—CASSIN, in Baird's Birds N. Am., 1858, 737.—BAIRD, Cat. N. Am. Birds, 1859, No. 545.—COUES, Key, 1872, 260; Check List, 1873, No. 438; Birds N.W., 1874, 502.

This eastern species was rather common in July in the grassy fields of Kamas Prairie, Utah, but none were seen anywhere else.

NUMENIUS LONGIROSTRIS.

Long-billed Curlew.

Numenius longirostris, WILSON, Am. Orn., VIII, 1814, 24, pl. 64, fig. 4.—CASSIN, in Baird's Birds N. Am., 1858, 743.—BAIRD, Cat. N. Am. Birds, 1859, No. 549.—COUES, Key, 1872, 262, fig. 174; Check List, 1873, No. 441; Birds N.W., 1874, 508.—HENSHAW, 1875, 461.

This large Curlew, called "Snipe" by the people of the Salt Lake Valley, was distributed in summer throughout the Interior in the vicinity of marshes, the wet meadows near the shores of the larger lakes being its favorite resort. It was particularly abundant along the southern shore of the Great Salt Lake, and on some of the larger islands.

List of specimens.

1088, ♂ *ad.*; Antelope Island, Great Salt Lake, June 4, 1869. 22½—39. Bill, black, becoming dull lilaceous on the basal half of the lower mandible; iris, vandyke-brown; legs and feet, ashy.

1110, ♂ *ad.*; Antelope Island, June 5, 1869. 23½—39. Same remarks.

1111, *pullus*; 1112, *pullus*; same locality and date.

1159, ♀; south shore of Great Salt Lake, June 11, 1869. 26—41¾. Same remarks as to No. 1088.

FAMILY GRUIDÆ—CRANES.

GRUS CANADENSIS.

Sand-hill Crane.

Ardea canadensis, LINN., Syst. Nat., I, 1766, 234.

Grus canadensis, TEMM., Anal. p. c.—BAIRD, Birds N. Am., 1858, 655; Cat. N. Am. Birds, 1859, No. 479.—COUES, Key, 1872, 271; Check List, 1873, No. 463; Birds N. W., 1874, 532.—HENSHAW, 1875, 467.

The Sand-hill Crane was an abundant species in nearly all localities where extensive grassy marshes or wet meadows existed. A friend living

in Carson Valley had a tame bird of this species which had been caught in an adjoining meadow when very young. Our introduction to this remarkable pet was somewhat amusing, the circumstances being as follows: Just before coming to the house we had shot a Snow-bird (*Junco oregonus*), and hastily thrust it into our coat pocket, before opening the gate of the front yard to walk in. We had scarcely entered, when his craneship, having seen the movement, walked familiarly up, and deliberately snatching the bird, proceeded, without further ceremony, to beat it upon the ground until nearly denuded of its feathers, when he swallowed it whole; he then carefully examined our person for more birds. Not finding any, however, he turned away and with stately steps walked off across the yard. This bird was a great friend of the children belonging to the family, and would frequently join them in their sports. Often, while they were indoors, he would walk upon the porch, and going to the window would look inside, and if the young folks took the least notice of him he would show his pleasure by amusing gesticulations

FAMILY RALLIDÆ--RAILS, GALLINULES, and COOTS.

RALLUS VIRGINIANUS.

Virginia Rail.

Rallus virginianus, LINN., Syst. Nat., I, 1766, 263.—CASSIN, in Baird's Birds N. Am., 1858, 748.—BAIRD, Cat. N. Am. Birds, 1859, No. 554.—COUES, Key, 1872, 273; Check List, 1873, No. 467; Birds N.W., 1874, 536.—HENSHAW, 1875, 468.

Two or three specimens of this Rail were seen in May, among the sedges bordering a pond near Pyramid Lake.

PORZANA CAROLINA.

Sora Rail.

Rallus carolinus, LINN., Syst. Nat., I, 1766, 263.
Porzana carolina, CASSIN, in Baird's Birds N. Am., 1858, 749.—BAIRD, Cat. N. Am. Birds, 1859, No. 555.—COUES, Key, 1872, 273; Check List, 1873, No. 468; Birds N.W., 1874, 538.—HENSHAW, 1875, 468.

The Common Rail was constantly met with in all suitable localities in the Interior; it was not identified at Sacramento, where, however, it no doubt occurs also.

List of specimens.

1019, nest and eggs (6); near Salt Lake City, May 22, 1869. Nest in the coarse grass and sedges of a pond, near Warm Spring Lake.

1456, ♂ *ad.*; Parley's Park, Wahsatch Mountains, July 26, 1869. 9—13½. Bill yellow, the upper mandible chiefly greenish-olive; iris, brown; tarsi and toes, olive, deepening into yellow on the scutellæ.

? PORZANA JAMAICENSIS.

Little Black Rail.

Rallus jamaicensis, GMELIN, Syst. Nat., I, 1788, 718.

Porzana jamaicensis, CASSIN, in Baird's Birds N. Am., 1858, 749.—BAIRD, Cat. N. Am. Birds, 1859, 556.—COUES, Key, 1872, 274; Check List, 1873, No. 470; Birds N.W., 1874, 540.

On several occasions, and at widely-distant localities, we met with a small Rail of a black color, which must have been this species, unless it should prove to be one at present undescribed. It was first seen on the 5th of September, 1868, in Ruby Valley. We happened to be riding horseback through a wet meadow, when the bird sprang up before us, but suddenly dropped into the grass at the edge of a dense willow thicket. We dismounted and attempted to flush it, but without success, for it had evidently escaped into the densest portion of the thicket where it could not be found. This bird appeared to be of about the size of *Porzana carolina*, though it may have been smaller, and was of a uniform blackish color, with white along the hinder edge of the wing, showing conspicuously as it flew. The same species was again met with in Parley's Park, in June, July, and August, where several were killed, but all lost in the tall grass and sedges among which they fell. We are well aware that the above description does not correspond with *Porzana jamaicensis*, but it could have been no other species at present known.

GALLINULA GALEATA

American Gallinule.

Orex galeata, LICHTENSTEIN, Verz. Doubl., 1823, 80, No. 826.

Gallinula galeata, BONAP., Am. Orn., IV, 1832, 128.—CASSIN, in Baird's Birds N. Am., 1858, 752.—BAIRD, Cat. N. Am. Birds, 1859, No. 560.—COUES, Key, 1872, 275; Check List, 1873, No. 472; Birds N.W., 1874, 540.

The "Red-billed Mud-hen" was a very abundant species in the *tule*

sloughs near Sacramento, where it was found in company with the Coot, or "White-billed Mud-hen" (*Fulica americana*). It was not seen in the Interior, where the latter bird was extremely numerous.

List of specimens.

40, ♀ *ad.*; Sacramento, California, June 13, 1867. 13—21—6 $\frac{5}{8}$ —5 $\frac{1}{8}$ —1 $\frac{1}{2}$ —1 $\frac{1}{16}$ —1 $\frac{3}{8}$ —2 $\frac{3}{4}$ —1 $\frac{1}{8}$. Bill and frontal plate, bright veinous-scarlet; tip of bill, abruptly, yellowish-green; *iris*, brown; tarsal scutellæ, bright yellowish-green, scutellæ of the toes, deeper green; knees, and joints of toes, fine ashy-blue; upper half of tibia, all round, bright scarlet.

FULICA AMERICANA.

American Coot.

(*Sî'-yeh-eh* of the Shoshones.)

Fulica americana, GMELIN, Syst. Nat., 1, 1788, 704.—CASSIN, in Baird's Birds N. Am., 1858, 751.—BAIRD, Cat. N. Am. Birds, 1859, No. 559.—COUES, Key, 1872, 275; Check List, 1873, No. 474; Birds N.W., 1874, 541.—HENSHAW, 1875, 469.

The Coot, or "White-billed Mud-hen," as it is sometimes called, was extremely numerous in all extensive marshes, both in the Sacramento Valley and eastward of the Sierra Nevada. In the latter region it was resident, though most abundant in summer.

List of specimens.

841, ♀ *ad.*; Camp 19, Ruby Valley, Nevada, July 15, 1868. 15 $\frac{3}{4}$ —26 $\frac{7}{8}$ —(?)—6. Bill, opaque milk-white (purest basally), with a very faint lilaceous glow in the middle portion, assuming terminally a pale bluish-cast; spot at base of frontal plate, and near tip of each mandible, dark hepatic-sepia, each spot bordered anteriorly with dragon's-blood-red; *iris*, carmine; prevailing hue of tibia, tarsi, and toes, delicate pale ashy-blue, but this overlaid on tarsi (all round) and on upper surface of toes (except on joints) with bright yellowish-green; claws, black.

¹To posterior end of frontal plate,

FAMILY TANTALIDÆ—IBISES.

FALCINELLUS GUARAUNA.

Bronzed Ibis.

Scolopax guarauna, LINN., Syst. Nat., I, 1766, 242.

Ibis guarauna, RIDGWAY, Am. Nat., Feb., 1874, 110, 111.—COUES, Check List, App., No. 445 bis.—HENSHAW, 1875, 463.

"*Ibis ordii*, BONAP."—BAIRD, Birds N. Am., 1858, 685 (excl. syn.); Cat. N. Am. B., 1859, No. 500.

Ibis falcinellus var. *ordii* (part), COUES, Key, 1872, 263; Check List, 1873, No. 445.

The Bronzed Ibis was an abundant bird at Franklin Lake, in August and September, but being without a boat we were unable to obtain specimens; a few were also seen at the Great Salt Lake in May and June. Like the following species, from which it may possibly not be distinct, it is known to the inhabitants of the country as the "Black Curlew," or "Black Snipe."

FALCINELLUS THALASSINUS.

Green Ibis.

"*Ibis guarauna*, LINN."—BAIRD, Birds N. Am., ed. 1860, pl. LXXXVII; Cat. N. Am. Birds, 1859, No. 500a.

Ibis thalassinus, RIDGWAY, Am. Nat., Feb., 1874, 110, 111.—COUES, Check List, 1873, App., No. 445, ter.—HENSHAW, 1875, 464.

This bird, known locally as the "Black Curlew," or "Black Snipe," was first observed in September, at the Humboldt Marshes, where it was one of the most abundant of the water-birds, since it sometimes occurred in flocks composed of hundreds of individuals. They were generally seen about the margin of the pools, standing in a single line along the edge of the water. At Oreana, about forty miles farther up the river, they were almost constantly seen passing back and forth over our camp by the river, the flocks usually formed with a widely-extended front, but oftener arranged in a V-shaped form. They flew quite low, rarely higher than fifty yards, and quite swiftly; and at this distance appeared of a uniform black color, and much like *Numenius longirostris* in size and form, whence their common name. Only once was a flock seen to alight at this locality,

and from this we obtained the three specimens enumerated below, killing them all at a single shot. We approached them under cover of the willows along the river, and found them busily engaged in feeding among the aquatic plants in a slough entirely hemmed in by a dense growth of willows, each individual uttering a hoarse, but low, croaking note, as it waded about. It is still an unsettled question whether this bird is not merely the first plumage of the *I. guarauna*; but there are important considerations, geographical and otherwise, which induce us to consider it a distinct species until future developments prove the contrary.

List of specimens.

159, ♂ *ad.*; Humboldt River, Nevada (Camp 17), September 3, 1867. $23-38\frac{3}{4}-11-8\frac{5}{8}-5\frac{3}{16}-4-4-2\frac{3}{8}$. Bill, pale greenish horn-blue, becoming blackish terminally and basally; iris, hazel; tarsi and toes, deep black.

160, ♀ *ad.*; same locality and date. $21-37-10\frac{3}{8}-8\frac{1}{16}-4\frac{7}{16}-3\frac{5}{16}-3\frac{3}{4}-11\frac{5}{16}$. Same remarks.

161, ♀ *juv.*; same locality and date. $19\frac{3}{8}-34\frac{1}{4}-10-7\frac{7}{8}-4-2\frac{7}{8}-3\frac{1}{2}-1\frac{3}{4}$. Same remarks.

FAMILY ARDEIDÆ—HERONS.

ARDEA HERODIAS.

Great Blue Heron.

Ardea herodias, LINN., Syst. Nat., I, 1766, 237.—BAIRD, Birds N. Am., 1858, 667; Cat. N. Am. Birds, 1859, No. 487.—COUES, Key, 1872, 267; Check List, 1873, No. 449; Birds N.W., 1874, 517.—HENSHAW, 1875, 464.

The Great Blue Heron was abundant about all bodies of water affording it a plentiful supply of food. It was particularly numerous at Pyramid Lake, where it built upon the rocky islands. One colony had their nests on the large grease-wood bushes on the southern portion of the main island, each nest being placed directly on top of the bush, at a height of about five or six feet from the ground. These nests were very bulky, being several feet in diameter and of proportionate depth, but they were elaborately made; each contained from three to four young, about half-fledged, but very active and saucy, who, when disturbed, opened wide their bills and made spiteful thrusts, at the same time uttering an admonishing hiss. On the Pyramid were several other nests, placed among the naked rocks at varying heights from the water.

List of specimens.

763, eggs (4); Pyramid Lake, Nevada, May 23, 1868. Nest on the "Pyramid," among the rocks, about 150 feet above the surface of the lake.

HERODIAS EGRETTE.

Great White Heron.

Ardea egretta, GMELIN, Syst. Nat., I, 1788, 629.—COUES, Key, 1872, 267; Check List, 1873, No. 452; Birds N.W., 1874, 519.

Herodias egretta, GRAY, Genera of Birds, III, 1849, —.—BAIRD, Birds N. Am., 1858, 666; Cat. N. Am. Birds, 1859, No. 486.—HENSHAW, 1875, 465.

Herodias egretta var. *californica*, BAIRD, Birds N. Am., 1858, 667; Cat. N. Am. Birds, 1859, No. 486a.

This handsome Heron we saw at Sacramento in June, and along the lower Truckee in May, a single individual only having been observed at each place.

BUTORIDES VIRESCENS.

Green Heron.

Ardea virescens, LINN., Syst. Nat., I, 1766, 238.—COUES, Key, 1872, 268; Check List, 1873, No. 457; Birds N.W., 1874, 522.

Butorides virescens, BONAP., Conspectus Avium, II, 1855, 128.—BAIRD, Birds N. Am., 1858, 676; Cat. N. Am. Birds, 1859, No. 493.—HENSHAW, 1875, 465.

This common bird was observed only in the vicinity of Sacramento, where it was abundant, as it usually is in all parts of its range. It appeared to be entirely wanting in the Great Basin—at least we could never find it, even in localities where other species of the family were found in the usual numbers.¹

List of specimens.

14, ♀ ad.; Sacramento, California, June 10, 1867. Shallow pond along edge of oak-grove. $18\frac{1}{2}$ — $27\frac{1}{2}$ — $7\frac{3}{4}$ — $6\frac{1}{4}$ — $2\frac{7}{16}$ —2—3—1. Bill, deep black, pale greenish-yellow along gonys; naked loreal and orbital space, greenish-yellow; iris, gamboge-yellow; tarsi and toes, dull olivaceous-yellow, olive-greenish on scutellæ.

58, ♂ ad.; Sacramento, June 19, 1867. Willows along slough near river. $18\frac{1}{2}$ — $27\frac{1}{4}$ —8— $6\frac{3}{8}$ — $2\frac{1}{4}$ — $1\frac{7}{8}$ —3— $1\frac{1}{4}$. Same remarks.

¹ A parallel case is apparently afforded in *Gallinula galeata*, which we found abundant at Sacramento, in company with *Fulica americana*, but which we did not detect in the Interior, where the latter was everywhere exceedingly numerous, in suitable localities.

ARDETTA EXILIS.

Least Bittern.

Ardea exilis, GMELIN, Syst. Nat., I, 1788, 645.

Ardetta exilis, GRAY, Genera of Birds, III, 1849, —.—BAIRD, Birds N. Am., 1858, 673; Cat. N. Am. Birds, 1859, No. 491.—COUES, Key, 1872, 270; Check List, 1873, No. 461; Birds N.W., 1874, 528.

One individual of this diminutive Heron was seen in May, among the willows along the lower Truckee, the one in question being startled by the approach of our boat.

NYCTIARDEA GRISEA.

Night Heron.

β. nœvia.

Ardea nœvia, BODDAERT, Planch. Enl. Tabl., 1784, pl. 939.

Nyctiardea nœvia, GRAY, Genera of Birds, III, 1849, 558.

Nyctiardea grisea var. *nœvia*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 182.—COUES, Key, 1872, 269; Check List, 1873, No. 458; Birds N.W., 1874, 523.—HENSHAW, 1875, 466.

Ardea gardeni, GMELIN, Syst. Nat., I, 1788, 645.

Nyctiardea gardeni, BAIRD, Birds N. Am., 1858, 678; Cat. N. Am. Birds, 1859, No. 495.

This Heron was common both in the vicinity of Sacramento and in the wooded river-valleys of the Interior. Near our camp at the former place was a small pond, where, just at dusk, one of these birds alighted regularly to feed.

BOTAURUS MINOR.

American Bittern.

(*Ioo'-kem-o* of the Washoes; *Tah'-bah-bo-ne-kah'-bah* of the Paiutes.)

Ardea stellaris var. *β. minor*, GMELIN, Syst. Nat., I, 1788, 635.

Ardea minor, WILSON, Am. Orn., VIII, 1814, 35, pl. 65, fig. 3.

Botaurus minor, BOIE, Isis, 1826, 979.—COUES, Key, 1872, 269; Check List, 1873, No. 460; Birds N.W., 1874, 523.—HENSHAW, 1875, 466.

Ardea lentiginosa, MONTAGUE, Orn. Diet., Suppl., 1813, —.

Botaurus lentiginosus, STEPHENS, Shaw's Gen. Zool., XI, 1819, 596.—BAIRD, Birds N. Am., 1858, 674; Cat. N. Am. Birds, 1859, No. 492.

The common Bittern was constantly found in all marshy situations in the Interior, where it appeared to be resident all the year.

List of specimens.

288, ♂ *ad.*; Camp 26, Truckee Meadows, Nevada, November 18, 1867. Wet meadow. 28—43 $\frac{3}{8}$ —12 $\frac{1}{2}$ —9 $\frac{3}{8}$ —3 $\frac{1}{8}$ —3 $\frac{1}{2}$ —4 $\frac{1}{2}$ —1 $\frac{1}{4}$. Upper half of upper mandible, brownish olivaceous-black, growing more brownish basally, this color continuing in a broad stripe over the lore to the eye; sharply-defined stripe of pure lemon-yellow above this, on upper edge of bare loreal space, and involving upper eyelid; stripe of same on lower edge of bare loreal space, along angle of mouth, and continuing in a well-defined stripe along the commissure, terminally blending into the brownish of the mandible. Lower mandible, pale lemon-yellow, deepest basally; stripe of dusky brownish along upper posterior portion. Iris, clear light sulphur-yellow next the pupil, shading exteriorly into orange-brownish, this encircled narrowly with black. Tarsi and toes, bright yellowish-green. Claws, pale brown, dusky toward point.

350, ♀ *ad.*; salt marshes, shore of Pyramid Lake, near mouth of Truckee, December 11, 1867. 24 $\frac{1}{4}$ —37—11—8 $\frac{1}{4}$ —2 $\frac{5}{8}$ —3 $\frac{1}{4}$ —3 $\frac{1}{2}$ —1 $\frac{1}{4}$. Same remarks.

FAMILY ANATIDÆ—SWANS, GEESE, and DUCKS.¹

CYGNUS BUCCINATOR.?

Trumpeter Swan.

Cygnus buccinator, RICHARDSON, Fauna Bor. Am., II, 1831, 464.—BAIRD, Birds N. Am., 1858, 758; Cat. N. Am. Birds, 1859, No. 562.—COUES, Key, 1872, 281; Check List, 1873, No. 476; Birds N.W., 1874, 544.

In December, 1867, Swans were exceedingly numerous in the vicinity of Pyramid Lake, but as no specimens were obtained, we do not know certainly whether they were the Trumpeter or Whistler (*C. americanus*). Their note was almost exactly like that of the Sand-hill Crane (*Grus canadensis*).

ANSER ALBATUS.

Lesser Snow-Goose.

Anser albatus, CASSIN, Pr. Ac. Nat. Sci. Philad., 1856, 41.—BAIRD, Birds N. Am., 1858, 925; Cat. N. Am. Birds, 1859, No. 563a.

Anser hyperboreus var. *albatus*, COUES, Key, 1872, 282; Check List, 1873, No. 480a.

Anser hyperboreus b. *albatus*, COUES, Birds N.W., 1874, 549.

Anser hyperboreus, HENSHAW, 1875, 470 (?).

This Goose, almost universally known as the "White Brant," was an abundant winter visitant to the lakes of the Great Basin.

¹Our notes on many of the Anatidæ are necessarily very brief, from the fact that they are more difficult to observe than most other birds, except at certain times, when the habits of all the species appear much the same. Many of them are also migratory, and thus were seen only for a brief season. We must therefore pass by certain species without further remarks than to note the season when observed, or a few similar facts.

List of specimens.

255, *juv.*; Humboldt Marshes (Camp 22), October 31, 1867. Bill, blackish dusky, greenish-slate on upper basal portion; iris, brown; tarsi and toes, greenish-slate.

388, ♂ *ad.*; eastern shore of Pyramid Lake, December 28, 1867. 28—(?)—17 $\frac{1}{8}$ —13 $\frac{3}{4}$ —2 $\frac{5}{16}$ —2 $\frac{3}{4}$ —(?)—(?). Weight, 5 pounds. Bill, dull light salmon-purple, becoming whitish terminally; deepest salmon-color on the culmen, and most purplish basally; commissure deep black, separated from the general purplish hue by a backward continuation of the white of the nail; eyelids, flesh-color; iris, vandyke-brown; tarsi and toes, deep salmon-purple; claws, black.

BRANTA CANADENSIS.

Canada Goose.

Anas canadensis, LINN., Syst. Nat., I, 1766, 198.

Bernicla canadensis, BOIE, Isis, 1826, 921.—BAIRD, Cat. N. Am. Birds, 1859, No. 567.

Bernicla (Leucoblepharon) canadensis, BAIRD, Birds N. Am., 1858, 764.

Branta canadensis, BANNISTER, Proc. Ac. Nat. Sci., Phila., 1870, 131.—COUES, Key, 1872, 283, fig. 185a; Check List, 1873, No. 485; Birds N.W., 1874, 554.—HENSIAW, 1875, 471.

This species was the only one of the genus found breeding in the Great Basin, where it remained throughout the year about all the larger lakes. Several goslings were caught in May, at Pyramid Lake, and their parents likewise secured; the latter were unable to fly, having molted their quill-feathers, but it required strong rowing far out into the lake to get within gunshot of them, for they were fast swimmers, and took to the open water when pursued. This species was also breeding at Great Salt Lake.

List of specimens.

1222, egg; Carrington Island, Great Salt Lake, June 17, 1869. Collected by Mr. R. N. Davis.

BRANTA HUTCHINSI.

Hutchins's Goose.

Anser hutchinsii, SWAINS. & RICH., Fauna Bor.-Am., II, 1831, 470.

Bernicla hutchinsii, WOODHOUSE, Sitgreave's Exped., 1823, 102.—BAIRD, Cat. N. Am. Birds, 1859, No. 569.

Bernicla (Leucoblepharon) hutchinsii, BAIRD, Birds N. Am., 1858, pp. XLIX, 766.

Branta hutchinsii, BANNISTER, Pr. Ac. Nat. Sci. Philad., 1870, 131.

Branta canadensis var. *hutchinsii*, COUES, Key, 1872, 284; Check List, 1873, No. 485b.

Branta canadensis. c. *hutchinsii*, COUES, Birds N.W., 1874, 554.

This miniature of the Canada Goose was an abundant winter visitant in western Nevada, but it was not seen anywhere in summer, when all had gone northward to breed.

List of specimens.

257, ♂ *ad.*; Truckee Meadows (Camp 26), Nevada, November 5, 1867. $34\frac{1}{4}$ —60—18— $13\frac{3}{8}$ — $11\frac{3}{8}$ — $2\frac{5}{8}$ —6— $3\frac{1}{4}$. Bill, deep black; iris, vandyke-brown; tarsi and toes, dull brownish slaty-black.

258, ♂ *ad.*; Camp 26, November 6, 1867. $30\frac{1}{2}$ — $61\frac{1}{2}$ —18—14— $1\frac{3}{4}$ — $2\frac{1}{2}$ —6— $2\frac{1}{2}$. Same remarks.

BRANTA NIGRICANS.

Black Brant.

Anser nigricans, LAWRENCE, Ann. Lyc. Nat. Hist. N. Y., IV, 1846, 171, pl. —.

Bernicla nigricans, CASSIN, Illust. Birds Cal., Tex., &c., 1853, 53, pl. 10.—BAIRD, Birds N. Am., 1858, 767; Cat. N. Am. Birds, 1859, No. 571.

Branta nigricans, BANNISTER, Pr. Ac. Nat. Sci. Philad., 1870, 131.

Branta bernicla var. *nigricans*, COUES, Key, 1872, 284, fig. 184b.—HENSLOW, 1875, 472.

Branta bernicla. b. *nigricans*, COUES, Birds N.W., 1874, 557.

The Black Brant was a rare winter visitant to Pyramid Lake, where we noticed it in December, 1867, but did not obtain specimens.

ANAS BOSCHAS

Mallard.

(*Te'-lehk* of the Washoes.)

Anas boschas, LINN., Syst. Nat., I, 1766, 205.—BAIRD, Birds N. Am., 1858, 774; Cat. N. Am. Birds, 1859, No. 576.—COUES, Key, 1872, 285; Check List, 1873, No. 488; Birds N.W., 1874, 559.—HENSLOW, 1875, 472.

The "Green-head" is one of the most abundant ducks of the Interior; it is likewise a resident, though most numerous in summer. In July, this species, with several others, particularly the Cinnamon Teal (*Querquedula cyanoptera*) and Gadwall, were found in great abundance at the Glendale Meadows, where they were breeding; at that time they were molting, and having lost their quill-feathers, many were run down and killed with sticks; thirteen, including the several species, being thus obtained in a single forenoon.

List of specimens.

119, ♀ *ad.*; Big Bend of the Truckee (Camp 12), August 4, 1867. $21\frac{1}{4}$ — $23\frac{1}{8}$ — $9\frac{1}{2}$ — $7\frac{1}{8}$ —2— $1\frac{9}{16}$ —(?)—(?). Bill, dark greenish, becoming olivaceous-yellow along the commissure; iris, brown; tarsi and toes, fine orange-chrome.

1161, eggs (8); south shore of Great Salt Lake, June 11, 1869. Nest in the grass, about a rod from the shore.

CHAULELASMUS STREPERUS.

Gadwall.

Anas strepera, LINN., Syst. Nat., I, 1766, 200.

Chaulelasmus streperus, GRAY, 1838.—BAIRD, Birds N. Am., 1858, 782; Cat. N. Am. Birds, 1859, No. 584.—COUES, Key, 1872, 286; Check List, 1873, No. 491; Birds N.W., 1874, 563.—HENSHAW, 1875, 474.

During the breeding-season this was by far the most abundant of the Ducks in the Lower Truckee Valley, where in May it outnumbered all other species together. The specimens killed were in fine condition and of excellent flavor, affording a delicious addition to our larder.

List of specimens.

770, eggs (9); Truckee Reservation, near Pyramid Lake, May 29, 1868. Nest of down, placed on top of a dilapidated nest of a Magpie, in a willow-tree, about 8 feet from the ground.

MARECA AMERICANA.

Bald-pate.

Anas americana, GMELIN, Syst. Nat., I, 1788, 526.

Mareca americana, STEPHENS, Shaw's Gen. Zool., XII, 1824, 135.—BAIRD, Birds N. Am., 1858, 783; Cat. N. Am. Birds, 1859, No. 585.—COUES, Key, 1872, 286; Check List, 1873, No. 493; Birds N.W., 1874, 564.—HENSHAW, 1875, 475.

A rather common summer resident.

List of specimens.

1162, eggs (10); Rabbit Island, Great Salt Lake, June 11, 1869. Nest of down, under a grease-wood bush, near the shore.

DAFILA ACUTA.

Pin-tail.

Anas acuta, LINN., Syst. Nat., I, 1766, 202.

Dafila acuta, BONAP., Comp. & Geog. List, 1838, 56.—BAIRD, Birds N. Am., 1858, 776; Cat. N. Am. Birds, 1859, No. 578.—COUES, Key, 1872, 286, fig. 186; Check List, 1873, No. 490; Birds N.W., 1874, 561.—HENSHAW, 1875, 473.

Not abundant, but observed in November at the Truckee Meadows, and in December near Pyramid Lake. Not seen during the breeding-season.

NETTION CAROLINENSIS

Green-winged Teal.

Anas carolinensis, GMELIN, Syst. Nat., I, 1788, 533.

Querquedula carolinensis, STEPHENS, Shaw's Gen. Zool., XII, 1824, 128.—COUES, Key, 1872, 287; Check List, 1873, No. 495; Birds N.W., 1874, 565.—HENSCHAW, 1875, 475.

Nettion carolinensis, BAIRD, Birds N. Am., 1858, 777; Cat. N. Am. Birds, 1859, No. 579.

Not common, but shot in June on Antelope Island, Great Salt Lake.

QUERQUEDULA DISCORS.

Blue-winged Teal.

Anas discors, LINN., Syst. Nat., I, 1766, 205.

Querquedula discors, STEPHENS, Shaw's Gen. Zool., XII, 1824, 149.—BAIRD, Birds N. Am., 1858, 779; Cat. N. Am. Birds, 1859, No. 581.—COUES, Key, 1872, 287; Check List, 1873, No. 496; Birds N.W., 1874, 566.—HENSCHAW, 1875, 476.

Rather common in May at Pyramid Lake, where breeding in the meadows.

QUERQUEDULA CYANOPTERA.

Cinnamon Teal.

Anas cyanoptera, VIEILLOT, Nouv. Dict. d'Hist. Nat., V, 1816, 104.

Querquedula cyanoptera, CASSIN, U. S. N. (Gilliss') Astron. Exp., II, 1855, 202.—BAIRD, Birds N. Am., 1858, 780; Cat. N. Am. Birds, 1859, No. 582.—COUES, Key, 1872, 288; Check List, 1873, No. 497; Birds N.W., 1874, 567.—HENSCHAW, 1875, 477.

This handsome species was common, though not abundant, throughout the West, both in the Sacramento Valley and in the Interior.

List of specimens.

100, nest and eggs (8); Truckee Meadows, Nevada, July 16, 1867. Nest in tuft of grass in meadow, about two rods from the river.

775, eggs (9); Truckee Reservation, June 1, 1868. Nest in a grease-wood bush, near the water.

1086, ♂ *ad.*; mouth of Jordan River, Utah, June 3, 1869. 16½—24½. Bill, black; iris, orange; tarsi and toes, orange, joints and webs blackish.

1087, ♀ *ad.*; same locality and date. 15½—24. Bill, dusky, paler along edge and beneath; iris, brown; tarsi and toes, ochraceous-drab.

SPATULA CLYPEATA.

Shoveller.

Anas clypeata, LINN., Syst. Nat., I, 1766, 200.

Spatula clypeata, BOIE, Isis, 1822, 564.—BAIRD, Birds N. Am., 1858, 781; Cat. N. Am. Birds, 1859, No. 583.—COUES, Key, 1872, 288; Check List, 1873, No. 498; Birds N.W., 1874, 570.—HENSIAW, 1875, 478.

Common at Pyramid Lake in May

AIX SPONSA.

Wood Duck.

Anas sponsa, LINN., Syst. Nat., I, 1766, 207.

Aix sponsa, BOIE, Isis, 1826, 329.—BAIRD, Birds N. Am., 1858, 785; Cat. N. Am. Birds, 1859, No. 587.—COUES, Key, 1872, 288; Check List, 1873, No. 499; Birds N. W., 1874, 571.

One pair of this superb Duck was seen in July, among the cottonwoods of the Truckee.

AYTHYA AMERICANA.

Red-head.

Fuligula americana, EYTON, Monograph Anatidæ, 1838, 155.

Aythya americana, BONAP., Comp. Rend., 1856, —.—BAIRD, Birds N. Am., 1858, 793; Cat. N. Am. Birds, 1859, No. 591.

Aythya ferina var. *americana*, ALLEN, Bull. Mus. Comp. Zool., III, 1872, 183.

Fuligula ferina var. *americana*, COUES, Key, 1872, 289; Check List, 1873, No. 503; Birds N.W., 1874, 575.—HENSIAW, 1875, 480.

In winter this is an abundant species on the lakes of the Great Basin. It and the succeeding species are frequently used by the Paiute Indians in making very artistic and elaborate decoys, which have a body of bent and twisted dry *tules* (*Scirpus*), with the skin stretched over it, the head prepared and poised in a style equal to that of the most accomplished taxidermist. The floating decoy is anchored by a stone tied to a string, the other end of which is fastened to the bill.

AYTHYA VALLISNERIA.

Canvas-back.

Anas vallisneria, WILSON, Am. Orn., VIII, 1814, 103, pl. 7, fig. 3.

Fuligula vallisneria, STEPHENS, Shaw's Gen. Zool., XII, pt. II, 1824, 196.—COUES, Key, 1872, 290; Check List, 1873, No. 504; Birds N.W., 1874, 575.

Aythya vallisneria, BOIE, Isis, 1826, 980.—BAIRD, Cat. N. Am. Birds, 1859, No. 592.

The Canvas-back was abundant in winter at the lakes and marshes of the Great Basin, and it was also shot in May at Pyramid Lake, when other species were breeding. In June, either this species or the Red-head was very abundant in the tule-sloughs in the vicinity of Sacramento, where they were undoubtedly breeding. We could obtain no specimens, however, although numbers were seen, and are consequently doubtful as to the species.

FULIX MARILA.

Big Black-head.

Anas marila, LINN., Syst. Nat., I, 1766, 196.

Fuligula marila, STEPHENS, Shaw's Gen. Zool., XII, pt. II, 1824, 198.—COUES, Key, 1872, 289; Check List, 1873, No. 500; Birds N.W., 1874, 573.—HENSLEY, 1875, 479.

Fulix marila, BAIRD, Birds N. Am., 1858, 791; Cat. N. Am. Birds, 1859, No. 588.

Winter visitant to Pyramid Lake.

FULIX AFFINIS.

Little Black-head.

Fuligula affinis, EYTON, Monograph Anatidæ, 1838, 157.—COUES, Key, 1872, 289; Check List, 1873, No. 501; Birds N.W., 1874, 573.

Fulix affinis, BAIRD, Birds N. Am., 1858, 791; Cat. N. Am. Birds, 1859, No. 589.

Winter visitant to Pyramid Lake.

FULIX COLLARIS.

Ring-bill.

Anas collaris, DONOVAN, British Birds, VI, 1809, pl. 147.

Fuligula collaris, BONAP., List Birds Eur., 1842, —.—COUES, Key, 1872, 289; Check List, 1873, No. 502; Birds N.W., 1874, 574.—HENSLEY, 1875, 479.

Fulix collaris, BAIRD, Birds N. Am., 1858, 792; Cat. N. Am. Birds, 1859, No. 590.

Pyramid Lake, in December.

BUCEPHALA CLANGULA.

Golden-eye.*β. americana.*

Clangula americana, BONAP., Comp. & Geog. List, 1838, 53.

Bucephala americana, BAIRD, Birds N. Am., 1858, 796; Cat. N. Am. Birds, 1859, No. 593.

Bucephala clangula, COUES, Key, 1872, 290 (not *Anas clangula*, LINN., = *Bucephala*); Check List, 1873, No. 505; Birds N.W., 1874, 576.—HENSHAW, 1875, 480.

Pyramid Lake, in December.

BUCEPHALA ALBEOLA.

Butter-ball.

Anas albeola, LINN., Syst. Nat., I, 1766, 199.

Bucephala albeola, BAIRD, Birds N. Am., 1858, 797; Cat. N. Am. Birds, 1859, No. 595.—COUES, Key, 1872, 290; Check List, 1873, No. 507; Birds N.W., 1874, 577.—HENSHAW, 1875, 482.

Winter resident on the lakes and larger rivers of the Interior.

List of specimens.

387, ♂ *ad.*; Pyramid Lake, December 27, 1867. $14\frac{1}{4}$ — $24\frac{1}{2}$ — $7\frac{1}{4}$ — $5\frac{9}{16}$ — $1\frac{3}{16}$ — $1\frac{1}{8}$ — $3\frac{1}{2}$. Bill, deep leaden-blue, dusky on the nail, on the basal portion of the culmen, and behind the nostril; *iris*, dark vandyke-brown; tarsi and feet, clear pinkish-white, with a slight lilac tinge.

ERISMATURA RUBIDA.

Ruddy Duck.

Anas rubida, WILSON, Am. Orn., VIII, 1814, 128, 130, pl. 71, figs. 5, 6.

Erismatura rubida, BONAP., Comp. & Geog. List, 1838, 59.—BAIRD, Birds N. Am., 1858, 811; Cat. N. Am. Birds, 1859, No. 609.—COUES, Key, 1872, 295; Check List, 1873, No. 519; Birds N.W., 1874, 583.—HENSHAW, 1875, 483.

This Duck, the adult male of which is very conspicuous from its peculiar markings, was abundant in the lagoons near Sacramento. In the Interior it seemed to be rare, a female killed at Pyramid Lake, in December, being about the only one seen.

MERGUS MERGANSER.

Buff-breasted Sheldrake.

β. americanus.

Mergus castor var. *americanus*, BONAP., Comp. Rend., XLIII, 1856, —.

Mergus americanus, CASSIN, Pr. Acad. Nat. Sci. Philad., 1853, 187.—BAIRD, Birds N. Am., 1858, 813; Cat. N. Am. Birds, 1859, No. 611.

Mergus merganser, COUES, Key, 1872, 296; Check List, 1873, No. 521; Birds N. W., 1874, 583 (not of LINN.).—HENSHAW, 1875, 483.

Truckee and Carson Rivers, during the winter.

MERGUS SERRATOR.

Red-breasted Sheldrake.

Mergus serrator, LINN., Syst. Nat., I, 1766, 208.—BAIRD, Birds N. Am., 1858, 814; Cat. N. Am. Birds, 1859, No. 612.—COUES, Key, 1872, 296; Check List, 1873, No. 522; Birds N.W., 1874, 584.—HENSHAW, 1875, 484.

Truckee River and Pyramid Lake, in December.

LOPHODYTES CUCULLATUS.

Hooded Sheldrake.

Mergus cucullatus, LINN., Syst. Nat., I, 1766, 207.—COUES, Key, 1872, 296; Check List, 1873, No. 523; Birds N.W., 1874, 584.—HENSHAW, 1875, 484.

Lophodytes cucullatus, REICH., Syst. Av., 1852, IX.—BAIRD, Birds N. Am., 1858, 816; Cat. N. Am. Birds, 1859, No. 613.

This handsome species was occasionally met with in summer in the wooded valleys of the Truckee and Carson Rivers, but it seemed to be very rare

FAMILY PELECANIDÆ—PELICANS

PELECANUS ERYTHORHYNCHUS.

American Pelican.

(*Bahns* or *Bah'-nus* of the Paiutes.)

Pelecanus erythrorhynchus, GMELIN, Syst. Nat., I, 1788, 571.—BAIRD, Birds N. Am., 1858, 868; Cat. N. Am. Birds, 1859, No. 615.

Pelecanus trachyrhynchus, LATHAM, Index Orn., II, 1790, 884.—COUES, Key, 1872, 300; Check List, 1873, No. 526; Birds N.W., 1874, 586.—HENSHAW, 1875, 484.

Pelecanus occipitalis, RIDGWAY, American Sportsman, Vol. IV, No. 19, Aug. 8, 1874, p. 297. [Name proposed in case the western birds prove distinct from the eastern.¹]

In July, 1867, when encamped at the Big Bend of the Truckee River, about fifteen miles from Pyramid Lake, our first opportunity was afforded to observe the habits of the White Pelican. At that time few

¹In the author's paper, above cited ["Breeding-ground of White Pelicans at Pyramid Lake, Nevada"], certain discrepancies between the descriptions given by various authors, of the breeding plumage, and form of the mandibular crest, of the White Pelicans of the northern and eastern portions of the continent, and the characters of those observed at Pyramid Lake, are noted; these consisting, in brief, of the possession by the latter of a conspicuous patch of dusky-grayish on the occiput, which is wanting in the former, the absence of a yellowish occipital crest and a rosy tint to the plumage, which is mentioned in nearly all descriptions, the smaller general size, and other minor points of difference. Captain Bendire, however, who found these birds breeding at Lake Milheur, southeastern Oregon (see *Rod and Gun*, June 19, 1875, p. 194), says that those observed by him had a *white* occipital crest, while he does not mention any dusky occipital spot. This apparent difference between the birds of two quite adjacent localities is explained, however, by Mr. C. J. Maynard, who from observations on a specimen kept in confinement, ascertained that this dusky spot appears *only after the occipital crest is dropped*; and that this takes place just at the close of the breeding-season is proven by the fact that our visit to Pyramid Lake was in the latter part of May, when these birds had just made their *second* attempt to raise a brood of young, the first effort having been foiled by the gulls, who had broken and eaten the eggs. It is a notable fact, in this connection, that our birds possessing the dusky occipital spot *had dropped the mandibular excrescence*. Mr. Maynard's bird was obtained in Florida (the date of capture is not mentioned), and had then the mandibular excrescence and an occipital crest; these were both thrown off early in May, *when the dusky spot on the occiput made its appearance*, the general plumage and the colors of the soft parts at the same time undergoing certain changes—the brilliant orange of the gular sac and orbital region fading to yellow. At the same time, however, Mr. Maynard's specimen differed in certain respects from all western examples which we have seen, which still renders it likely that, as we suggested, the eastern and western birds of this species may prove to be different races. As to this, Mr. Maynard, in the article cited above, says: "When captured he [the Florida specimen] had a fine occipital crest three or four inches in length, *of a pale straw-color* [italics our own]. * * The feathers of the back, usually the tertiaries, had *an elongated central spot of pale roseate*. *The center of the tail-feathers were also of a beautiful roseate tinge*. *Others shot at the same time agreed with the description given above.*" Mr. Maynard also states that his bird had *hazel* eyes instead of *white*, and that the eyelids were yellow instead of red; and that "although Audubon and Mr. Ridgway state that Pelicans have white eyes, all that I have examined have hazel." It may yet be ascertained, however, that at the proper season (the height of the pairing-season) the western White Pelicans may also possess the rosy tinge to the plumage, the yellow crest, etc., and that the color of the iris may be to a certain extent dependent on age.

of these birds were seen, only a solitary individual being now and then startled from a bed of driftwood in the river or noticed flying overhead. In August, a portion of the party, accompanied by Mr. H. G. Parker, United States Superintendent of Indian Affairs for Nevada, started on an excursion to explore the lake and visit the abode of the Pelicans on the island therein. As we descended the river the number of Pelicans seen increased hourly, and when we reached the large open sheets of water protected from the gales and swells of the lake by the intervening areas of rushes and reeds (*tules*), bodies of hundreds of these melancholy-looking birds were seen floating quietly upon the surface. They were exceedingly unsuspicious, and so unmindful of our approach that when we stopped our boat one old fellow swam slowly toward it until his curiosity brought him within gunshot and to his death. Upon reaching the lake we encamped on the sandy-shore about three quarters of a mile from the mouth of the river. There we could see during the day thousands of Pelicans, as they dotted the bosom of the lake, and in the morning, about sunrise, "strings" of several hundreds were observed flying from the island, about twelve miles distant, where they had passed the night, to their feeding-grounds at the mouth of the river. At such times they flew single-file, their manner of flight being a succession of slow regular flaps of the wings, which at intervals were extended to their full length, the birds sailing thus for a few rods, when the flapping was resumed. In their flight, the line preserved the utmost order and method; the leader being invariably the first to beat or extend his wings, each one of the line following in succession. Occasionally an individual would break the rank and alight upon the water, often remaining in one spot for hours, and appearing in the distance like a white boat at anchor. We remained here at our shore-camp about three days, when, two more of the party joining us, we started about ten o'clock one moonlight night for the island, which we reached after a hard row of about three hours. Our arrival at the island startled the thousands of Pelicans which were slumbering on the beach, and as they rose into the air the noise caused by their confusion was so great that we could scarcely hear one another's voices. When we landed they had all flown save a few sick or old birds, that swam silently away from the shore; they could be plainly seen, how-

over, in the bright moonlight, floating as a mass some distance out upon the water; and no sooner had we left the boat than they turned and swam slowly back again. Our blankets were spread upon the higher ground, some distance from the boat, in order to avoid the offensive smell of the roosting-ground. No sooner had we retired than the Pelicans all returned, and in the morning, when we awoke, the whole beach about fifty yards distant was covered with a dense crowd of these gigantic snow-white creatures, who scarcely heeded us as we arose from our blankets; as we approached them, however, they pushed one another awkwardly into the water, or rose heavily and confusedly from the ground, and flying some distance out upon the lake, alighted on the water. Now and then, one swimming from the shore would turn its head and gaze upon us with a melancholy look; but the majority of the flock remained upon the water only a short time, when they arose and flew over us, divided into battalions, each turning its head and looking down upon us as it went by.

In this connection, it may perhaps be well to remark that of the many individuals killed, including old and young of both sexes, and of the thousands seen, not one possessed at this time the horny appendage to the culmen of the upper mandible, so characteristic of the species during the breeding-season. Three specimens, an adult male and female and a full-grown young bird of the year, were prepared; but our return to camp being attended by many difficulties, they were lost.

The next visit to the lake was made in December, following, when Mr. Parker extended us an invitation to accompany him to the agency of the reservation; but during our stay of about a month we did not see a single Pelican, all having retired to the southward. Their return was first observed about the twentieth of the following March, when we noticed, at Carson City, immense flocks of them passing northward, in the direction of the lake. They flew at a great height, and at times appeared bewildered, moving in circles and deviating from the course they had pursued, as if uncertain of their way.

In May, 1868, the lake was again repaired to, and at this time we found the Pelicans in as great abundance as during our visit the summer previous; they appeared to be much more active, however, pairs, small

companies, or single birds flying up and down the river, quite near the ground; and it was noticed that only a portion of them possessed the "center-board," although all exhibited the high-colors of the feet and pouch found only in the fully adult birds in the breeding-season.

A few days after our arrival, we visited the island before mentioned. This island is situated about twelve miles from the mouth of the river, on the southeastern shore, and about three miles from the nearest point on the eastern side, just off which is the remarkable "Pyramid," from which the lake receives its name—a wonderfully regular pyramidal rock about three hundred feet high, with a triangular base. The island itself is about three miles in circuit; its central portion culminates in two peaks having a height of about five hundred feet above the surface of the lake, while the northern and southern extremities run out in long, pointed beaches, the intervening eastern shore being a sloping plateau, with a water-front of perpendicular though broken rocks. In a cave on this rocky shore was the eyrie of a Bald Eagle, which was inaccessible from any point, although it could be plainly seen from above through a crevice in the rocks. The southern point of the island was overgrown by grease-wood bushes of an unusually large size, and on the top of each of these was the nest of a pair of Great Blue Herons (*Ardea herodias*); the more elevated and rocky northern shore was covered by the nests of an immense colony of Gulls (*Larus californicus*), while the northeastern point, a long strip of low gravelly beach, extending for a hundred yards or more out into the lake from the main shore, was the portion of the island which had been selected by the Pelicans as their breeding-ground. This drove of Pelicans, which comprised several hundred pairs, had previously, during the same season, laid their eggs on the highest part of the eastern plateau, where we found the fragments of their eggs, which had been destroyed by their incessant enemies, the Gulls, strewn over an area of about two acres' extent. This old breeding-ground was discovered by us during our first exploration of the island, and it was not until a week or so later that we found the new settlement. The site of the latter was a low gravelly point extending a hundred yards or more beyond the main beach, and when first discovered was covered by a compact body of Pelicans, which to all appearance were merely resting, since

many of them were standing. Upon proceeding to the spot, however, it was found that the latter were male birds, standing beside their mates, who were, themselves, sitting on their eggs. At our approach all of them flew, and alighted some distance out upon the water. The ground was then found to be literally covered with their nests, which occupied nearly if not quite one-half of the surface, each nest consisting merely of a heap of gravel raked into a pile and flattened on top, and without any additional material, such as sticks and feathers, like those of the Gulls. No nest contained more than a single egg, which is no doubt explained by the fact that they had laid once before that season. One hundred and nine, altogether, were picked up, and when blown were found to be perfectly fresh. Many nests were empty, so that it is altogether likely some of the birds had not laid yet. These eggs were, with scarcely an exception, conspicuously blood-stained, caused in part by their large size, but chiefly by the roughness of their calcareous coating; the hæmorrhage being in some instances so copious that half the surface was discolored.

It was during this visit to Pyramid Lake that the fact that the mandibular excrescence characteristic of this species is deciduous was confirmed, it having been first ascertained, so far as we know, several years previous, by Mr. H. G. Parker, of Carson City, a very careful and intelligent observer, at that time United State Superintendent of Indian Affairs for Nevada, who accompanied us upon our several visits to the lake. Upon our arrival there, early in May, it was noticed that quite a number of the Pelicans did not possess this appendage, but it was supposed that these were females; and it was also observed that there was a very perceptible daily increase in the number of such individuals. When we first visited the island none of these curious appendages, appropriately styled by Mr. Parker "center-boards," were noticed; but in the course of a few days they became so numerous that a bushel of them could have been picked up in a short time. Some had been recently dropped, as was readily detected from the soft texture of the surface where they had been joined to the culmen, while others were dried and warped by the sun, having been cast for some time. Among the large number examined, we found none corresponding in shape with that figured and described by Mr. Audubon, namely, "about one inch high * *

and about three inches in length, in some specimens as much as five inches," and "continued forward, of less elevation, to the extent of an inch farther"¹—all being of quite regular and firm outline, the top convex or arched; the width at the base greater than that through the middle; they were also without anterior or posterior continuations. The usual size was about two and a half inches in vertical length, and the same in width at the base, the largest specimen found being three and a half inches high by three wide. Of two now before us, one measures two and a half inches from the center of the top to the posterior lower angle, three and a quarter from the same point to the anterior lower corner, and a little more than two and a half inches along its base, its transverse thickness being three-tenths of an inch. The other measures one inch and eight-tenths in height (the fibers running perpendicularly, instead of very obliquely backward, toward the top) by two inches and seven-tenths in width at the base. In some examples the two edges were nearly parallel, the general form being thus very nearly semi-elliptical; but such specimens were rare, the usual form being an irregular arch.

In a former account of the habits of the White Pelican as observed at Pyramid Lake, published in the *American Sportsman* (Vol. IV, No. 19, pp. 289 and 297), we stated that the horny excrescence, characteristic of this species in the breeding-season, was peculiar to the male. We were led to make this statement by the fact that of the several specimens dissected every one possessed of this appendage proved to be a male, while nearly all those in which it was absent were females. We did not, unfortunately, take into consideration the circumstance that the breeding-season was nearly over, and that, as a consequence, a very large proportion (a considerable majority, in fact) of these birds had shed, or cast, this curious deciduous growth. We are glad, however, to have our error corrected, as has been done by several observers having opportunities which were not afforded ourselves for deciding the point, and who furnish satisfactory evidence that both sexes possess the so-called "center-board." According to Dr. T. M. Brewer (*Rod and Gun*, June 19, 1875, p. 194), the error of our statement was perhaps first ascertained by Captain Charles Bendire, U. S. A.,

¹ *Birds of America*, Oct. ed., Vol. VII, p. 26, pl. 422.

who found these birds breeding in immense numbers at Lake Malheur, in southeastern Oregon, on the 16th of April, 1865; but we had been previously corrected by Professor F. S. Snow, in the *Observer of Nature* (Lawrence, Kansas), June 4, 1875, and by Mr. N. S. Goss, of Neosho Falls, Kansas, in the *Rod and Gun* for June 12, 1875 (page 167). That the mandibular crest of this species is really deciduous, however, has been fully confirmed by recent observers; and regarding this remarkable fact, it may be proper to state here, that it was first discovered by Mr. H. G. Parker, of Carson City, Nevada (in about 1865), and first published by us, through Professor Baird, in *The Ibis* (London), in 1869 (p. 350).

The length of time required for the perfect development of this appendage is not known. From the articles cited above, however, we know that it is to be found from the 16th of April until June 3d, so that it may therefore fairly be presumed that its growth commences early in the spring or late in winter; and we have also positive proof that it falls off of many individuals as soon as the beginning of May, and that by the end of the latter month exceedingly few which possess it are to be found; while it is also certain that it does not exist on any specimens during the latter part of summer, in fall, or in the early part of winter. As to the use of this appendage, no plausible theory has yet been proposed, so far as we know; it certainly is not a weapon of defense or offense, since in that case it would hardly be possessed by both sexes, while it is also well known that few birds are less combative than the Pelican.

There are many seasonal changes of plumage in this species which are, as yet, only very imperfectly understood, but which we hope soon to see made clear by the observations of those who have the opportunity to study these birds in nature during different times of the year. These problems have been fully discussed by us in the paper in the *American Sportsman*, alluded to above, to which the reader is referred for information on this point.

List of specimens.

749, ♀ *ad.*; Pyramid Lake, Nevada, May 19, 1868. 62—106—25½—19. Weight, 15 pounds. General hue of the bill, reddish salmon-color, the culmen dirty whitish, the reddish deepening on the nail and edges of the mandibles into orange-red; lower mandible deeper reddish than the upper, and growing more intense, or brick-red,

basally; gular pouch, passing from nearly white anteriorly, through rich yellow and then orange, into intense dragon's-blood- or brick-red at the base, and with a blackish suffusion anteriorly; loose, flabby skin of the lores and orbital region, rich orange-yellow; eyelids, dark dragon's-blood-red; iris, clear pearl-white; naked portion of the tibia, tarsi, and feet, intense orange-red, so deep as to have the appearance of having been dyed. [*Without the mandibular process.*]

766, ♂ *ad.*; Pyramid Lake, May 28, 1868. 62—101—24½—18½. Weight, 17 pounds. Same remarks. [*Without the mandibular process.*]

570-679, eggs; island in Pyramid Lake, May 16, 1868. One hundred and nine eggs, *from as many nests*. Nests, mere heaps of gravel, with a slight depression on top, crowded together on a narrow point of the island, only a few feet above the surface of the lake.

FAMILY GRACULIDÆ—CORMORANTS.

GRACULUS DILOPHUS.

Double-crested Cormorant.

β. floridanus.

(*Pah-tsik'-wy-he* or *Pah-tsik'-we* of the Paiutes.)

Phalacrocorax floridanus, AUDUBON, Orn. Biog., III, 1835, 387; B. Am., oct. ed., VI, 430, pl. 417.

Graculus floridanus, BONAP., Consp. Av., II, 1855, 172.—LAWRENCE, in Baird's Birds N. Am., 1858, 879.—BAIRD, Cat. N. Am. Birds, 1859, No. 624.

Graculus dilophus var. *floridanus*, COUES, Key, 1872, 303; Check List, 1873, No. 530a.

Graculus dilophus. b. floridanus, COUES, Birds N.W., 1874, 587.

This Cormorant was very abundant at Pyramid Lake and along the lower portion of the Truckee River, being the only species of the family occurring in that vicinity. It was found from May until August, but in December none were observed. Small congregations were frequently to be seen during the summer-time, perched upon the snags far out in the lake, the latter being nearly submerged cotton-wood trees which marked, at that time, the former course of the river when the lake occupied more restricted limits.¹

¹As is the case with the Great Salt Lake, Pyramid Lake has risen many feet within the last few years, the principal encroachment being on the low land adjacent to the mouth of the Truckee River, which at the time of our last visit was thrown a mile or more back from its former location, as marked by the line of partly-submerged trees alluded to above.

On these tree-tops many of their nests were found, these being composed of sticks, and containing one to three eggs each.

Besides the specimen in our collection, an adult, in the nuptial plumage, was killed in May, but was not preserved; in this specimen the following differences were noted in the colors of the soft parts: Iris, brilliant green; eyelids, and whole interior of the mouth, bright cobalt-blue; gular sac, deep orange.

List of specimens.

127, ♀ *juv.*; Pyramid Lake, August 13, 1867. 33½—52½. Bill, dull brownish-yellow, nearly black on the culmen; gular sac, dull chrome-yellow; iris, greenish-gray; tarsi and toes, deep black.

735, egg (1); Pyramid Lake, May 17, 1868. Nest in top of cotton-wood tree, at mouth of the river.

751, egg (1); Pyramid Lake, May 20, 1868. Same remarks.

FAMILY LARIDÆ—GULLS and TERNS.

BLASIPUS HEERMANNI.

Heermann's Gull.

Larus heermanni, CASSIN, Pr. Ac. Nat. Sci. Philad., VI, 1852, 187.

Blasipus heermanni, BONAP., Consp. Av., II, 1856, 211.—LAWRENCE, in Baird's Birds N. Am., 1858, 848.—BAIRD, Cat. N. Am. Birds, 1859, No. 666.

Larus (Blasipus) heermanni, SCL. & SALV., Proc. Zool. Soc. Lond., 1875, 574 (fig.).—COUES, Birds N.W., 1874, 641.

Larus belcheri, SCHLEG., Mus. Pays-Bas, *Lari*, 9 (part).—COUES, Check List, 1873, No. 531.

Larus (Blasipus) belcheri, COUES, Key, 1872, 314.

Found only along the Pacific coast. Represented in our collection by a specimen presented by Mr. Parker.

List of specimens.

429, "♂ *juv.*"; Bay of San Francisco, February 20, 1868. 17¾—42—(?)—10." (Presented by H. G. Parker.)

LARUS CALIFORNICUS.

California Gull.

(*Que-nahk'-et* or *Gui-ni'-heet* of the Paiutes.)

? *Larus argentatoides*, BONAP., Synop., 1828, 360.

Larus californicus, LAWRENCE, Ann. Lyc. Nat. Hist. N. Y., VI, 1854, 79; in Baird's Birds N. Am., 1858, 846.—BAIRD, Cat. N. Am. Birds, 1859, No. 663.—COUES, Birds N. W., 1874, 634.

Larus delawarensis var. *californicus*, COUES, Key, 1872, 313; Check List, 1873, No. 548a.

This species was the only Gull found in the Great Basin during summer, but it was apparently entirely absent in winter, when its place was supplied by *L. delawarensis*. It was abundant both at Pyramid Lake and Great Salt Lake, on the rocky islands of which it nested in immense colonies. At the former locality, many hundred pairs occupied a portion of the northern shore of the main island, where the ground was elevated many feet above the lake, with a broken ledge of rock along the shore as well as above their breeding-ground. Here their nests covered several acres of ground, and were thickly strewn over the surface; each consisted of an external rim of gravel and other rubbish raked into a pile, the center hollowed out and lined with a few feathers and sticks; the number of eggs, of which many bushels were gathered for food, varied from one to four in a nest, and among this immense quantity we noticed very remarkable extremes of form, size, and colors, the series selected for preservation illustrating the principal of these variations. While their nests were being despoiled, the Gulls kept up a constant clamor, some hovering over our heads, but most of them perched in rows on the ledge of rocks back from the breeding-ground. Over fifty specimens were shot, and among these slight individual discrepancies were noted, the principal one being in the distinctness of the black spots near the end of the bill, which in a few were entirely obsolete, in some distinct on both mandibles, and in others of intermediate development. The examples in the collection, enumerated below, were selected with a view to represent the extreme variations detected in the large series examined.

List of specimens.

111, ♂ *ad.*; Truckee River, at Big Bend, July 29, 1867. $21\frac{5}{8}$ — 53 — $15\frac{3}{4}$ — 12 — $2\frac{1}{4}$ — $2\frac{1}{8}$ — $6\frac{1}{8}$ — $2\frac{1}{4}$. Bill, greenish lemon-yellow, the terminal third of the lower mandible bright orange-red, tinged with carmine, the tip again yellow; a distinct dusky spot in the middle of the red, and one immediately above it, near end of upper mandible; rictus and eyelids, vermilion-red; *iris*, dark hazel; *tarsi and toes*, light ashy pea-green; claws, black.

680-734, eggs; island in Pyramid Lake, May 16, 1868.

739-747, eggs; same locality, May 18, 1868.

752, ♂ *ad.*; island in Pyramid Lake, May 20, 1868. 22 — 54 — $13\frac{1}{4}$. Bill, deep naples-yellow, tinged with chrome, and having a distinct band of dusky near the end, which is grayish-white; the dusky spot on the lower mandible followed posteriorly by a spot of deep orange-red; rictus and eyelids, vermilion; *iris*, vandyke brown; *tarsi and toes*, pale pea-green. [Compare with notes on *L. delawarensis*, as given below.]

753-760, eggs; same locality, May 22, 1868.

800, ♂ *ad.*; same locality, May 25, 1868. $22\frac{3}{4}$ — $55\frac{1}{2}$ —(?)— $13\frac{1}{2}$. Same remarks as to No. 111, but black spots of the bill obsolete.

801, ♂ *ad.*; same locality and date. $22\frac{1}{2}$ — $55\frac{1}{2}$ —(?)— $13\frac{1}{2}$. Same remarks; black spots distinct.

802, ♀ *ad.*; same locality and date. $21\frac{1}{2}$ — $51\frac{1}{4}$ —(?)— $12\frac{3}{4}$. Black spots obsolete.

1199-1217, eggs; Carrington Island, Great Salt Lake, June 17, 1869. (Collected by R. N. Davis and S. Watson.)

LARUS DELAWARENSIS.

Ring-billed Gull.

(*Que-nahk'-et* of the Paiutes.)

Larus delawarensis, ORD, Guthrie's Geog., 2d Am. ed., II, 1815, 319.—LAWR., in Baird's Birds N. Am., 1858, 846.—BAIRD, Cat. N. Am. Birds, 1859, No. 664.—COUES, Key, 1872, 313; Check List, 1873, No. 548; Birds N.W., 1874, 636.—HENSHAW, 1875, 485.

This Gull was observed only as a winter sojourner at Pyramid Lake, being entirely absent from there in summer.

List of specimens.

365, ♀ *ad.*; Pyramid Lake, Nevada, December 21, 1867. 18 — 45 — $14\frac{1}{2}$ — $12\frac{1}{4}$ — $1\frac{1}{2}$ — $1\frac{3}{8}$ — $5\frac{3}{4}$ — $2\frac{1}{8}$. Bill, greenish naples-yellow, with a transverse band of deep black near the end; rictus and eyelids, vermilion-red; interior of the mouth, deep orange-red, growing more intense posteriorly; *iris*, light naples-yellow; *tarsi and feet*, deep, light, naples-yellow. [Compare with notes on *L. californicus*, given above.]

CHRÆCOCEPHALUS PHILADELPHIA.

Bonaparte's Gull.

Sterna philadelphia, ORD, Guthrie's Geog., 2d Am. ed., II, 1815, 319.

Chræcocephalus philadelphia, LAWR., in Baird's Birds N. Am. 1858, 852.—BAIRD, Cat. N. Am. Birds, 1859, No. 670.

Larus philadelphia, GRAY, List. Br. Birds, 1863, 235.—COUES, Key, 1872, 316; Check List, 1873, No. 556.

Larus (Chræcocephalus) philadelphia, COUES, Birds N.W., 1874, 655.

Not seen by us.

List of specimens.

430, "♀ ad.; Bay of San Francisco, February 1, 1868. 13¼—31½—(?)—8¼." (Presented by H. G. Parker.)

STERNA REGIA.

Royal Tern.

Sterna regia, GAMBEL, Pr. Ac. Nat. Sci. Philad., IV, 1848, 228.—LAWR., in Baird's Birds N. Am., 1858, 859.—BAIRD, Cat. N. Am., B., 1859, No. 683.—COUES, Key, 1872, 319; Check List, 1873, No. 562.

Thalasseus regius, GAMBEL, Jour. Ac. Nat. Sci. Philad., I, 2d ser., 1849, 228.

Sterna (Thalasseus) regia, COUES, Birds N.W., 1874, 669.

This powerful Tern was more or less common in May at Washoe Lake and near Pyramid Lake, in September at the Humboldt Marshes, and among the marshes near Salt Lake City in June and July.

STERNA FORSTERI.

Forster's Tern.

Sterna forsteri, NUTTALL, Man. Orn., II, 1834, 274 (foot-note).—LAWR., in Baird's Birds N. Am., 1858, 862.—BAIRD, Cat. N. Am. Birds, 1859, No. 691.—COUES, Key, 1872, 321; Check List, 1873, No. 566; Birds N.W., 1874, 676.—HENSLEY, 1875, 486.

Sterna havelli, AUDUBON, Orn. Biog., V, 1839, 122, pl. 409, fig. 1 (= young).—LAWR., in Baird's Birds N. Am., 1858, 861.—BAIRD, Cat. N. Am. Birds, 1859, No. 686.

Forster's Tern was very common in June at Sacramento, and throughout the summer in the vicinity of Pyramid, Ruby, and Franklin Lakes, and

the Humboldt Marshes. It was met with afterward at Great Salt Lake, where it was the most abundant species, far exceeding in numbers even the *Hydrochelidon lariformis*.

List of specimens.

1085, ♂ *juv.*; Salt Lake City, Utah, June 2, 1869. $14\frac{1}{2}$ — $30\frac{1}{2}$. Terminal half of bill, black; basal half, dull orange-red; iris, brown; tarsi and toes, beautiful rich orange-red.

HYDROCHELIDON LARIFORMIS.

Black Tern.

Rallus lariformis, LINN., Syst. Nat., I, ed. 10, 1758, 153 (*European*).

Hydrochelidon lariformis, COUES, Birds N.W., 1874, 704.—HENSHAW, 1875, 487.

Sterna fassipes, LINN., Syst. Nat., I, 1766, 228 (*European*).

Hydrochelidon fassipes, GRAY, Genera of Birds, III, 1849, 660 (*European*).—COUES, Pr. Ac. Nat. Sci. Philad., 1862, 554; Key, 1872, 323; Check List, 1873, No. 575 (*American*).

Sterna plumbea, WILSON, Am. Orn., VII, 1813, 83, pl. LXIX, fig. —(*American*).

Hydrochelidon plumbea, LAWR., in Baird's Birds N. Am., 1858, 864.—BAIRD, Cat. N. Am. Birds, 1859, No. 695.

This lively and interesting Tern was an exceedingly numerous species at Sacramento, as well as about the extensive marshes of the Interior. At the former locality they were seen about every pool in the outskirts of the city, flitting over the surface of the water, and across the meadows, uttering their harsh note of *krik, krik, krik*, as they flew. They were so unsuspicious that the town boys often killed them with stones or clubs thrown at them when flying.

List of specimens.

59 ♂ *ad.*; Sacramento City, California, June 19, 1867. $9\frac{7}{8}$ — $24\frac{1}{4}$ — $8\frac{1}{2}$ — $6\frac{3}{4}$ — $1\frac{1}{8}$ — $\frac{9}{16}$ — $3\frac{1}{4}$ — $1\frac{1}{2}$. Bill, deep black; rictus, purplish lake-red; interior of mouth, lavender-pink; iris, hazel; tarsi and toes, dark purple; claws, black.

FAMILY PODICIPIDÆ—GREBES.

PODICEPS OCCIDENTALIS.

Western Grebe.

Podiceps occidentalis, LAWRENCE, in Baird's Birds N. Am., 1858, 894.—BAIRD, Cat. N. Am. Birds, 1859, No. 704.—COUES, Key, 1872, 336; Check List, 1873, No. 608.—HENSHAW, 1875, 488.

Æchmophorus occidentalis, COUES, Pr. Ac. Nat. Sci. Philad., 1862, 229.

Podiceps (Æchmophorus) occidentalis. a. occidentalis, COUES, Birds N.W., 1874, 727.

This large Grebe was very abundant in Pyramid Lake, where it appeared to be a permanent resident. The specimen in the collection was found "snow-bound" in the sage-brush near Carson City, being discovered by its tracks in the deep snow, where it had scrambled along for a hundred yards or more. It was headed toward the Carson River, and had evidently come from Washoe Lake, about five miles distant, and becoming exhausted by the long flight had fallen to the ground. In Pyramid Lake, these Grebes were exceedingly abundant in May, and were constantly in sight from our boat. When fired at with a rifle they would dive at the report, and upon their reappearance generally showed only the head or head and neck above the surface; but they swam so low in the water that we found it exceedingly difficult to kill them; one was shot, however, and was found to agree exactly in colors and other respects with the specimen in our collection.¹

List of specimens.

402, ♂ *ad.*; Carson City, Nevada, January 13, 1868. 26—40—8—5½—3—2¾—(?) —(?). Bill, dull, rather light yellow, the lower mandible deepening into orange terminally; culmen and broad longitudinal space on the side of the basal two-thirds of the lower mandible, dark olive-green, the former nearly black; iris, pure carmine (having much the appearance of a red currant), growing narrowly whitish around the pupil; tarsi and toes, dull olivaceous-yellow, the outer side of the tarsus and joints of the toes nearly black.

¹ The seasonal changes of plumage, so remarkable in most Grebes, do not manifest themselves in the species of this group (*P. occidentalis* and *P. clarki*), the colors and markings being identical in winter and in the breeding-season. Even the young do not differ appreciably from the adult, as is seen from a specimen collected the past season in Nevada, by Mr. HENSHAW. In view of these facts, as well as in justice to important peculiarities of form, we should now use the generic name *Æchmophorus*, proposed by Dr. COUES, for this group.

PODICEPS CRISTATUS.

Crested Grebe.

Colymbus cristatus, LINN., Syst. Nat., I, 1766, 222.

Podiceps cristatus, LATHAM, Ind. Orn., II, 1790, 780.—LAWR., in Baird's Birds N. Am., 1858, 893.—BAIRD, Cat. N. Am. Birds, 1859, No. 703.—COUES, Key, 1872, 336; Check List, 1873, No. 609; Birds N.W., 1874, 729.

This species was quite numerous in August and September in Franklin Lake, but no specimens could be obtained. It is no doubt a summer-resident in suitable localities throughout the Basin.

PODICEPS AURITUS.

Eared Grebe.

β. californicus—*California Grebe*.

Podiceps californicus, HEERMANN, Pr. Ac. Nat. Sci. Philad., 1854, 179.—LAWR., in Baird's Birds N. Am., 1858, 896.—BAIRD, Cat. N. Am. Birds, 1859, No. 707.

Podiceps auritus var. *californicus*, COUES, Key, 1872, 337; Check List, 1873, No. 612; Birds N.W., 1874, 733.—HENSHAW, 1875, 489.

This little Grebe was usually found in the same localities with *P. occidentalis*, and like it was a constant resident. In Soda Lake, on the Carson Desert, we observed a very large flock of what was probably this species, but they kept so far from the shore that the species could not be determined beyond doubt. They were exceedingly clamorous.

List of specimens.

366, ♂ *ad.*; Pyramid Lake (mouth of the Truckee River), December 21, 1867. 12—21—5—3 $\frac{3}{4}$. Upper mandible, greenish-black, growing pale ashy olive-green on basal third of the commissure (broadly) and on the culmen; lower mandible, ashy olive-green, paler below, and more yellowish basally; iris, bright orange-red, more scarlet outwardly, and with a fine thread-like white ring around the pupil; tarsi and toes, dull blackish on outer side, passing on the edges into olive green; inner side, dull light yellowish-green; inner toe, apple-green. [*In winter plumage.*]

PODILYMBUS PODICEPS

Thick-billed Grebe.

Colymbus podiceps, LINN., Syst. Nat., I, 1766, 223.

Podilymbus podiceps, LAWRENCE, Baird's Birds N. Am., 1858, 898.—BAIRD, Cat. N. Am. Birds, 1859, No. 709.—COUES, Key, 1872, 338; Check List, 1873, No. 614; Birds N.W., 1874, 737.—HENSHAW, 1875, 490.

This common Grebe was a resident species in all suitable localities.

List of specimens.

264, *juv.*; Truckee River (Camp 26), November 18, 1867. 15—22—5½—4—1⁵/₁₆—1³/₈—(?)—(?). Bill, horn-color, becoming blackish basally and on the culmen; lower mandible, more lilaceous, with a dusky lateral stripe; iris, of three distinct colors, disposed in concentric rings, the first (around the pupil) clear milk-white, the next dark olive-brown, the outer pale ochraceous-brown, the dark ring reticulated into the lighter; tarsi and toes, greenish-slate, the joints darker.

454, ♀ *ad.*; Carson City, March 24, 1868. 13¼—21¾—5—3½. Bill, clear opaque white, or milk-white, purest posterior to a black band across its terminal third, the anterior portion with a strong tinge of slaty-blue; eyelids, pure white; lores, more bluish; iris, rich dark brown, with a narrow outer ring of ochraceous-white, the two colors reticulated together; next the pupil, a fine thread-like ring of white; tarsi and toes, greenish slate-black on the outer side, plumbeous on the inner side.

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