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CHARLES D. WALCOTT, DIRECTOR

A SYNOPSIS

OF

AMERICAN FOSSIL BRACHIOPODA

INCLUDING

BIBLIOGRAPHY AND SYNONYMY

BY

CHARLES SCHUCHERT

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CONTENTS.

ILLUSTRATIONS.

LETTER OF TRANSMITTAL.

UNITED STATES NATIONAL MUSEUM,
Washington, D. C., January 9, 1897.

SIR: I have the honor to transmit herewith the manuscript of A Synopsis of American Fossil Brachiopoda, including Bibliography and Synonymy, which has been prepared out of official hours. It is presented with a view to its publication as a bulletin by the United States Geological Survey.

CHARLES SCHUCHERT.

Hon. CHARLES D. WALCOTT,
Director of the United States Geological Survey.

PREFACE.

Probably no continent is more productive of well-preserved Paleozoic brachiopods than North America. Throughout the vast territory of the United States which is drained by the Mississippi River the strata have suffered little change, and it is this region which has furnished nearly all the material, from the Middle Ordovician to the top of the Upper Carboniferous. The numerous species of American Cambrian brachiopods which are found scattered along the margins of this great interior plateau and throughout New Brunswick have also aided largely in determining the evolution of the class. To Mr. Walcott, Director of the United States Geological Survey, much honor is due for making clear the structure of brachiopods from this system.

The present synopsis was begun in Cincinnati eleven years ago, while the writer was engaged in paleontologic work with Mr. E. O. Ulrich. In 1887, when the list had increased to about 700 cards, the position of assistant to Prof. James Hall was entered upon. A nearly complete library of American paleontologic literature thus became available to the writer, and during the next two years the greater part of his leisure was devoted to recording brachiopod literature. The large private collection of brachiopods belonging to Professor Hall, together with the many public and private collections then under investigation by Hall and Clarke, also afforded the writer abundant facilities and a rare opportunity for the study of this class. Every occasion was embraced to examine into the synonymy suggested by authors, and in this work it is believed much has been attained. In addition to the above collections and to the material in his own possession, the writer has also studied the specimens belonging to this class in the American Museum of Natural History, Yale University Museum, Cincinnati Society of Natural History, and the United States National Museum. In 1890 the present catalogue comprised upward of 3,500 cards, arranged in boxes having a united length of about 4 feet. It now includes nearly 10,000 references relating to North and South American fossil brachiopods.

It is believed that with the exception of local faunal lists all the literature of North and South America pertaining to this subject is recorded in the following synopsis. Much possible synonymy which the writer could not satisfactorily determine is noted under "Observations." The complete known distribution of widely dispersed species is not always given, only the more important localities being cited. In every case, however, the locality first mentioned is believed to be the original one.

For the proper generic disposition of the species the work of Hall and Clarke[1] has been closely followed, and the entire synopsis is arranged alphabetically to facilitate easy finding. The geologic distribution of the genera is given at the end of Chapter I, and their systematic position in the classification in Chapter V. The evolution of the lophophore, from the simple crescentic condition with few tentacles of the protegulum to the most complex condition in the Terebratulacea, described in Chapter IV, is wholly the work of Dr. Beecher. From the development of this organ in recent species the peculiarly complicated growth of the lophophore in the Spiriferacea is also explained. Some of the embryonic brachial conditions are likewise indicated as probably existing in a mature condition in early Paleozoic genera.

The danger of neglecting young or small specimens of any organism can not be too often impressed upon collectors. Often by means of such fossils intricate problems in phylogeny or life history may be solved. To have much value, however, young specimens must be very small, and these can not be picked up in the field. Where brachiopods abound, whether in clay or of a siliceous nature in limestone, material should be collected in bulk and prepared later by washing or etching with weak muriatic acid. This method of collecting generally results in securing fossils that otherwise will not be observed.

To Dr. Charles E. Beecher, of Yale University Museum, the best thanks of the writer are especially due for the continued interest taken in this catalogue, as well as for valuable suggestions regarding classification; and to Mr. Charles D. Walcott, Director of the United States Geological Survey, for favors relating to the publication of the paper.

To the following gentlemen the grateful acknowledgments of the writer are due for specimens or for suggestions in synonymy: Prof. J. F. Whiteaves, Canadian Geological Survey; Prof. H. S. Williams, Yale University; Director Charles D. Walcott, Dr. W. H. Dall, Dr. T. W. Stanton, and Dr. George H. Girty, United States Geological Survey; Prof. R. P. Whitfield, American Museum of Natural History; Prof. N. H. Winchell, State geologist of Minnesota; Mr. E. O. Ulrich, Newport, Kentucky; Mr. S. A. Miller, Cincinnati, Ohio; Mr. R. R. Rowley, Louisiana, Missouri, and Mr. D. K. Gregor, Fulton, Missouri; and to Dr. C. Davies Sherborn, of the British Museum, for valuable suggestions in bibliography.

C. S.

[1] Palæontology of New York, Vol. VIII, 1892-95.

A SYNOPSIS OF AMERICAN FOSSIL BRACHIOPODA, INCLUDING BIBLIOGRAPHY AND SYNONYMY.

By Charles Schuchert.

CHAPTER I.

GEOLOGIC DEVELOPMENT AND GEOGRAPHIC DISTRIBUTION OF AMERICAN FOSSIL BRACHIOPODA.

GEOLOGIC DEVELOPMENT.

Upward of 2,500 species of brachiopods have been described or identified from the sediments of the North and South American continents and adjacent islands. Of these, 2,053 are recognized in this catalogue, the other species, about 20 per cent, being considered as synonyms.

Little is known of the fossil forms from South America. Forty-eight genera are represented by 159 species, ranging from the Cambrian upward. Of these, 125 are from the Paleozoic and 34 from the Mesozoic. The Cambrian, Ordovician, and Jurassic brachiopods require further study, since authors have given little or no attention to their internal characters, and also have too readily identified them with well-known European species.

In North America there are 1,922 species, of which 1,859 are restricted to the Paleozoic. In 1880 Zittel,[1] on the basis of Bigsby's Thesaurus, gave a total of 4,243 species of Paleozoic Brachiopoda. Since Bigsby's compilation the total has probably been increased to 6,000 species, about one-third of which occur in North America. On account of their good preservation and great abundance, both in species and individuals, throughout the Paleozoic, the brachiopods in North America are of particular value in stratigraphic and correlative geology.

In the Mesozoic there is a remarkable scarcity of brachiopods, since but 49 species have been recorded, and many of these are rare. The Cenozoic representation is even smaller, there being but 14 species. This scarcity of post-Paleozoic brachiopods is very apparent in the oldest system of the Mesozoic, the Triassic, from which but 11 species have been described, whereas in the Carboniferous there are 478

[1] Handbuch der Palæontologie, Vol. I, 1880, pp. 709–710.

species. In marked contrast, also, is this lack of brachiopod continuity when compared with the Alpine Trias, from which Bittner has described 380 species; but nowhere else is this system known to have so large a development. This evidence not only indicates a decadence of the class during late Paleozoic, but epeirogenic movements as well near the close of the American Carboniferous, for none of the 478 species of this system pass into the Trias.

With the Trias a new facies of brachiopod life is initiated; many of the familiar types of Paleozoic shells had, at that time, long since ceased to live or had ended in the Carboniferous or Permian. The superfamilies Acrotretacea, Obolacea, and Pentameracea have died out, while the Lingulacea, Discinacea, Craniacea, Strophomenacea, and Spiriferacea are sparingly represented, and commonly by small species. Before the close of the Jurassic system the Spiriferacea also disappeared, so that since the Cretaceous era the class is practically represented by rhynchonellas and terebratulas, with a few scattering species of Lingula, Crania, and Discinisca.

In the American Jurassic there are but 13 species, and all are rare. How remarkable is this representation when contrasted with the Jura of Europe, where certain beds of the Lias, Dogger, and Malm terranes contain millions of specimens of a few species belonging to the families Terebratulidæ and Rhynchonellidæ.[1] The Cretaceous has 26 species, also a meager representation, and yet "outside of Europe, North America is the most important for the occurrence of Cretaceous Brachiopoda."[2] The American Eocene has 9 species and the Neocene 5. The disparity between the European and American Cenozoic brachiopod faunas is partly due to the scarcity of marine deposits representing the different horizons in America.

The geographic distribution of the 63 post-Paleozoic species shows that 30 are found along the eastern and southern border of the United States, 15 on the Pacific Coast, and 18 from the Arctic Circle south to about the fortieth parallel and between the one hundredth and the one hundred and twentieth meridians.

The Trias of eastern North America, with its unfavorable shore deposits, has but one species, while the Cordilleran Sea[3] to the east of the Rocky Mountains has 7, and these were there followed by 5 other species in the Jurassic system. A larger brachiopod fauna may have existed in the deeper waters of the Atlantic Trias, but nothing of it is known. In Cretaceous times conditions were again more favorable, 10 forms being recorded from the Atlantic border of North America, 10 from the Pacific, and 6 from the interior Cordilleran Sea. Toward the close of the Cretaceous the Cordilleran Sea became more and more

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[1] Zittel, op. cit., p. 714.

[2] Ibid., p. 716.

[3] For the areas covered by this and the Mississippian and Appalachian seas, see Walcott's presidential address, Geologic time as indicated by the sedimentary rocks of North America: Proc. Am. Assoc. Adv. Sci., Vol. XLII, 1893.

unfit for marine life, and no brachiopods are known from the Tertiary deposits of this area. From the eastern North American Tertiary 9 species are known, but only 2 from the Pacific border. In recent times conditions are apparently more favorable for the introduction and existence of brachiopods from other areas, as 14 species have been dredged from the Atlantic and 24 from the Pacific continental plateaus of North America.

The living forms are universally distributed in the seas of the world. Their range in depth is no less extended. They occur in shallow waters, at low-water mark, and varying degrees of depth, from 200 to 600 fathoms being the usual limit of the majority of species. Several far-ranging abyssal species were dredged in from 1,000 to 2,000 fathoms. The delicate transparent shell of that interesting little Terebratuloid, Liothyrina Wyvillei Davidson, was actually obtained in a living condition by the *Challenger* expedition from the enormous depth of 2,900 fathoms, or 3¼ miles, at the bottom of the South Atlantic Ocean.[1]

In the North American Cambrian there are 116 species described, a far greater development than in any other country. Davidson records but 14 species in Great Britain, while Bigsby, in 1868, gave the total for this system as 126 for all countries. In the next, or Ordovician, system the rapidity of brachiopod differentiation is remarkable. There are 319 species known in North America, an increase nearly three times that of the Cambrian. Bigsby's percentage of increase for this system is even greater, since in 1868 he listed 556 Ordovician species, which represent a growth of nearly four and one-half times that of his Cambrian total of 126.

While there is much specific differentiation throughout the Ordovician, it is a notable fact that the essential types of brachiopods of this system are also found near its base in the Calciferous. In the Chazy, or next younger horizon, the species are very much like those of the Trenton, where this class has great and varied representation, which is maintained to the end of the Ordovician. It is also true that the species become more generalized structurally as the Cambrian is approached, and most rapidly so toward the base of the Ordovician.

The evolution of the Cambrian brachiopods is similar in its history to that of the Ordovician, except that there the differentiation was along more fundamental structural lines. In the following table it is seen that the four orders of the class Brachiopoda began with the Lower Cambrian, and that throughout this system differentiation was mainly of family importance, since none of these divisions has many genera or species. Where minor groups occur in quantity it is always in the more primitive divisions, as in the Atremata. In none of the other three orders is there a similar rapid differentiation in the Cambrian.

[1]Agnes Crane, Geol. Mag., Dec. IV, Vol. II, 1895, p. 3 (extract).

Table showing the differentiation of the Brachiopoda during Cambrian time.

	Number of species.	Number of genera.	Number of families.	Atremata species.	Neotremata species.	Protremata species.	Telotremata species.
Upper Cambrian	51	14	8	30	4	17	....
Middle Cambrian	39	12	5	19	16	4	....
Lower Cambrian	31	12	7	17	5	8	2

The earliest deep-water deposits of the Silurian, the Clinton formation, have a brachiopod fauna which is quite different from that of the Ordovician. The Atremata, Neotremata, and Protremata are much like those of the Ordovician, but the Spiriferacea of the Telotremata, the most characteristic brachiopods of the Silurian, have here attained a great variety of forms, with varied brachydial structures. Throughout the American Silurian the brachiopods show little structural differentiation, but in the Lower Helderberg, at the base of the Devonian, the spire-bearers are changing and assuming characters which are fully developed in the higher Devonian. Here also occur the oldest loop-bearers, or Terebratulacea, though the ontogeny of Zygospira seems to show that this superfamily originated in the Ordovician.

In the Mississippian Sea deposition was apparently quite continuous throughout Devonian and Carboniferous times, and not much interrupted by earth movements. The faunas of these systems in this area show no rapid evolution along any of the brachiopod phyla. The species of the basal member of the Carboniferous, the Waverly or Kinderhook, are not unlike those of the Chemung of the Upper Devonian, nor is there any great faunal difference between the Kaskaskia of the Lower Carboniferous and the productive Coal Measures above.

From the foregoing rapid summary of the geologic history of American brachiopods, it follows that differentiation in the Paleozoic is most rapid near the base of the older systems, and diminishes in force from the older to the younger geologic divisions. While earth movements in America were greater and more numerous during the early Paleozoic than later in and just previous to the close of this time, yet the early and rapid evolution of the class is probably due not only to the varying conditions produced by these movements but also to the greater plasticity of the class during the Cambrian and Ordovician eras.

There are 311 species in the American Silurian, increasing to 662 in the Devonian, while the Carboniferous representation declines to 478 species. In 1880 Zittel gave a total of 1,366 species for the Devonian, 871 for the Carboniferous, and but 30 for the Permian. Waagen's researches in the Permian of India, however, have increased this representation considerably.

There is nó more striking evidence than these figures needed to show the very rapid increase of the class during the Ordovician, its culmination in the Devonian era, and its rapid decline in the Carboniferous.

Of the 230 established Paleozoic genera, not fewer than 186 are represented in North America.

GEOGRAPHIC DISTRIBUTION.

The geographic distribution of North American Paleozoic brachiopods is extensive, since 30 per cent, or 537 species, had great areal or horizontal dispersion. One hundred and seventeen species are found in both the Mississippian and Cordilleran seas, and of these 36 are also known to occur in foreign countries. The number of species common to North America and other continents, however, is 121.

When considered chronologically, it is observed that 20 per cent of the Cambrian brachiopods have great geographic distribution, and that this increases to 32 per cent in the Ordovician, Silurian, and Devonian, and declines to 28 per cent in the Carboniferous. Greatest specific dispersion, however, is most noticeable in the Devonian and Carboniferous, where *Atrypa reticularis*, *Leptæna rhomboidalis*, *Orthothetes crenistriatus*, *Productus semireticulatus*, *P. punctatus*, *Rhynchonella pleurodon*, *Spirifer disjunctus*, and *S. striatus* have almost world-wide distribution and great vertical or chronologic range. Many similar species common to America and several European countries could be mentioned.

Specific distribution increases with ordinal rank. In the radical order Atremata 25 per cent had dispersion, increasing to 27 per cent in the Neotremata, and to 32 per cent in the Protremata and Telotremata.

From the above considerations it is evident that brachiopods, as a rule, can not be of great value in correlating over wide areas minor Devonian, but particularly Carboniferous, horizons. In the Cambrian, Ordovician, and Silurian, however, these fossils are of great value for stratigraphic purposes. Since post-Paleozoic brachiopods are not common in America, they can have little stratigraphic value, but in the Trias and Jura of Europe, where species and individuals are common, reliance can be placed upon them, and they are there regarded as next in importance to the Ammonoidea for correlation. When paleontology shall have advanced sufficiently, so that extracontinental correlation of Paleozoic formations can be taken up in detail, it will be seen that brachiopods, because of their wide dispersion, abundance, and favorable preservation, will be of great service in working out paths of migration and intercommunicating oceanic basins.

TABLE I.—*Brachiopod genera alphabetically arranged, their geologic distribution, and North American specific representation.*

[In the column "Ordinal rank" A., N., P., T. equal the first letters of Atremata, Neotremata, Protremata, and Telotremata, respectively. The geologic occurrence of non-American genera or the earlier appearance or later continuance of American genera in other countries is indicated by a black line. Small superior numerals indicate the number of species having distribution.]

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Acambona White	T.		2					2					
Acanthothyris d'Orbigny	T.									—			
Acrothele Linnarson	N.		5	5^{1}									
Acrotreta Kutorga	N.		5	5^{1}									
Actinoconchus McCoy	T.							—					
Agulhasia King	T.										—	—	—
Ambocœlia Hall	T.		7				5^{2}	2					
Amphiclina Bittner	T.								—				
Amphiclinodonta Bittner	T.								—				
Amphigenia Hall	P.	1	4				4^{1}						
Amphitomella Bittner	T.								—				
Anabia Clarke	T.	1				—							
Anastrophia Hall	P.		4			4^{2}							
Ancistrocrania Dall	N.										—		
Anisactinella Bittner	T.								—				
Anomactinella Bittner	T.								—				
Anoplia Hall and Clarke	P.		1				1^{1}						
Anoplotheca Sandberger	T.	1	10			3^{2}	7^{2}						
Antiptychina Zittel	T.									—	—		
Athyris McCoy	T.		29			3	9^{3}	17^{5}	—				
Atrypa Dalman	T.	1	20			10^{5}	11^{5}						
Atrypina Hall and Clarke	T.		4			3^{1}	1^{1}						
Aulacorhynchus Dittmar	P.		1					1^{1}					
Aulacothyris Douville	T.								—	—	—		
Aulosteges Helmersen	P.							—					
Austriella Bittner	T.								—	—			
Barroisella Hall and Clarke	A.		1				1^{1}						
Beachia Hall and Clarke	T.		1				1^{1}						
Beecheria Hall and Clarke	T.		1					1					
Billingsella Hall and Clarke	P.		12	9^{2}	2	?1							
Bilobites Linnæus	P.		3			2^{1}	1^{1}						
Bittnerula Hall and Clarke	T.								—				
Botsfordia Matthew	A.		1	1									
Bouchardia Davidson	T.												—
Branconia Caegel	P.						—						
Cadomella M. Chalmas	P.									—			
Camarella Billings	P.		10		9^{2}	1							
Camarophorella Hall and Clarke	P.		1					1					
Camarophoria King	P.		9				1	8^{3}					
Camarospira Hall and Clarke	T.		1				1^{1}						
Camarotœchia Hall and Clarke	T.	1	32		1^{1}	9^{2}	20^{10}	4^{2}					
Camerothyris Bittner	T.								—	—			
Capellinia Hall and Clarke	P.		1			1							
Cardinocrania Waagen	N.							—					

TABLE I.—*Brachiopod genera alphabetically arranged, etc.*—Continued.

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Catazyga Hall and Clarke	T.		3		3^{2}								
Centronella Billings	T.	2	10				7^{2}	3^{1}					
Charionella Billings	T.		1				1^{1}						
Chascothyris Holzapfel	T.						—						
Chonetella Waagen	P.							—					
Chonetes Fischer de Waldheim	P.	13	47			5^{2}	22^{10}	22^{12}					
Chonetina Krotow	P.							—					
Chonopectus Hall and Clarke	P.		1					1^{1}					
Chonostrophia Hall and Clarke	P.	1	4				4^{2}						
Christiania Hall and Clarke	P.		1				1						
Cincta Quenstedt	T.									—			
Cistella Gray	T.										—	—	—
Cleiothyris King	T.	1	10					10^{3}					
Clintonella Hall and Clarke	T.		1			1							
Clitambonites Pander	P.	1	3		3^{1}								
Clorinda Barrande	P.		5			5^{2}							
Cœnothyris Douvillé	T.								—				
Conchidium Linnæus	P.		20			18^{3}	?2						
Conotreta Walcott	N.		1		1^{1}								
Cranæna Hall and Clarke	T.		2				2^{2}						
Crania Retzius	N.		34	?1	9^{3}	9^{1}	11^{3}	4^{1}	—	—	—	—	—
Craniella Œhlert	N.		3		?1	?1	1^{1}						
Craniscus Dall	N.									—			
Cruratula Bittner	T.								—				
Cryptacanthia White and St. John	T.		1					1					
Cryptonella Hall	T.		11			1	9^{3}	3^{1}					
Cryptopora Jefferys	T.												—
Cyclorhina Hall and Clarke	T.		1				1^{1}						
Cyclospira Hall and Clarke	T.		2		1^{1}	?1							
Cyrtia Dalman	T.		6			3^{3}	2^{1}	1^{1}					
Cyrtina Davidson	T.	1	21			1^{1}	15^{6}	5	—				
Dallina Beecher	T.											—	—
Dalmanella Hall and Clarke	P.	1	38		22^{10}	4^{2}	11^{4}						
Davidsonella M. Chalmas	P.									—			
Davidsonia Bouchard	P.						—						
Daviesiella Waagen	P.							—					
Dayia Davidson	T.					—							
Delthyris Dalman	T.		7			2^{1}	5^{4}						
Derbya Waagen	P.	1	12					12^{2}					
Dicamara Hall and Clarke	T.						—						
Dictyonella Hall	P.		5			5^{1}							
Dictyothyris Douvillé	T.									—			
Dielasma King	T.	2	11				1^{1}	10^{6}					
Dielasmina Waagen	T.							—					
Dignomia Hall	A.		1				1						
Dimerella Zittel	T.								—				
Dinarella Bittner	T.								—				
Dinobolus Hall	A.		4		3^{1}	1^{1}							
Dinorthis Hall and Clarke	P.		12		12^{8}								
Dioristella Bittner	T.								—				

TABLE I.—*Brachiopod genera alphabetically arranged, etc.*—Continued.

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Diplospirella Bittner	T.								—				
Discina Lamarck	N.		6	?1	?1			?1	—	—	3	—	—
Discinisca Dall	N.		2									2[2]	—
Discinolepis Waagen	N.			—									
Discinopsis Matthew	N.		1	1									
Discolia Fischer and Œhlert	T.												—
Disculina Deslongchamps	T.									—			
Eatonia Hall	T.		9				9[2]						
Eichwaldia Billings	P.		1		1								
Elkania Ford	A.		2	1	1								
Enantiosphen Whidborne	P.						—						
Enteletes Fischer de Waldheim	P.	2	1					1[1]					
Epicyrta Deslongchamps	T.									—			
Etheridgina Œhlert	P.							—					
Eucalathis Fischer and Œhlert	T.												—
Eudesella M. Chalmas	P.									—			
Eudesia King	T.									—			
Eumetria Hall	T.		4					4[1]					
Eunella Hall and Clarke	T.		4				4[3]						
Euractinella Bittner	T.								—				
Fimbriothyris Deslongchamps	T.									—	—	—	
Frenulina Dall	T.												—
Frieleia Dall	T.												—
Glassia Davidson	T.		1		1	—							
Glassina Hall and Clarke	T.					—							
Glossina Phillips	A.	2	13		5[1]	1	3[1]	4[1]					
Glossothyris Douvillé	T.									—	—		
Glottidia Dall	A.												—
Grunewaldtia Tschernyschew	T.					—	—						
Gwynia King	T.												—
Gypidula Hall	P.		14			6	8[2]						
Harttina Hall and Clarke	T.	1	1					1					
Hebertella Hall and Clarke	P.		12		10[5]	2							
Helmersenia Pander	N.				—								
Hemipronites Pander	P.				—								
Hemiptychina Waagen	T.							—	—	—	—		
Hemithyris d'Orbigny	T.		1									1	—
Heterorthis Hall and Clarke	P.		1		1								
Hindella Davidson	T.		2			2[1]							
Hipparionyx Vanuxem	P.		1				1[1]						
Homœospira Hall and Clarke	T.		3			3							
Hustedia Hall and Clarke	T.	1	4					4[1]					
Hyattella Hall and Clarke	T.		2			2[1]							
Hynniphoria Suess	T.									—			
Hypothyris King	T.		3				3[2]						
Iphidea Billings	N.		8	8[3]									
Ismenia King	T.									—			
Juvavella Bittner	T.								—				
Juvavellina Bittner	T.								—				
Karpinskya Tschernyschew	T.						—						

TABLE I.—*Brachiopod genera alphabetically arranged, etc.*—Continued.

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Kayserella Hall and Clarke	P.						—						
Kayseria Davidson	T.						—						
Kingina Davidson	T.		2							—	2		
Koninckella M. Chalmas	T.									—			
Koninckina Suess	T.								—				
Koninckodonta Bittner	T.								—				
Kraussina Davidson	T.												—
Kutorgina Billings	P.		1	1									
Lacazella M. Chalmas	P.									—	—	—	—
Lacqueus Dall	T.												—
Lakmina Œhlert	A.			—									
Leiorhynchus Hall	T.		18				15^{7}	3					
Leptæna Dalman	P.	1	4		3^{2}	1^{1}	2^{2}	1					
Leptænisca Beecher	P.		3				3^{1}						
Leptella Hall and Clarke	P.		2		2^{1}								
Leptembolon Mickwitz	A.				—								
Leptobolus Hall	A.		4		4^{3}								
Lindstrœmella Hall and Clarke	N.		1				1						
Lingula Brugiere	A.	11	102	?7	36^{13}	12^{1}	28^{5}	17^{2}	—	1	3^{2}	—	—
Lingulasma Ulrich	A.		2		2^{1}								
Lingulella Salter	A.		21	19^{2}	3		?1^{1}						
Lingulepis Hall	A.		9	9^{3}	1								
Lingulodiscina Whitfield	N.		4				1	3^{1}					
Lingulobolus Matthew	A.		1	1									
Lingulops Hall	A.		3		2	1							
Linnarsonia Walcott	N.		4	4^{2}									
Liothyrina Œhlert	T.											—	—
Lissopleura Whitfield	T.		1				1						
Lycophoria Lahusen	P.					—							
Lyra Cumberland	T.										—		
Lyttonia Waagen	P.							—					
Macandrewia King	T.												—
Magas Sowerby	T.										—		
Magellania Bayle	T.		1							—	—	1	—
Mannia Dewalque	T.										—	—	
Martinia McCoy	T.		10				7^{1}	3^{2}	?				
Martiniopsis Waagen	T.							—	?				
Meekella White and St. John	P.		4					4^{1}					
Megalanteris Suess	T.		2				2						
Megathyris d'Orbigny	T.									—	—	—	—
Megerlina Deslongchamps	T.												—
Mentzelia Quenstedt	T.									—			
Merista Suess	T.		3				3						
Meristella Hall	T.	1	21				20^{9}	1					
Meristina Hall	T.		3			3^{2}							
Mesotreta Kutorga	N.				—								
Metaplasia Hall and Clarke	T.		2				2^{1}						
Mickwitzia Schmidt	A.			—									
Microthyris Deslongchamps	T.									—	—		
Mimulus Barrande	P.		1			1							
Monobolina Salter	N.				—								

TABLE I.—*Brachiopod genera alphabetically arranged, etc.*—Continued.

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Monomorella Billings	A.		9			9^{4}							
Muhlfeldtia Bayle	T.											—	—
Neobolus Waagen	A.			—									
Newberria Hall	T.		4				4						
Nœtlingia Hall and Clarke	P.				—								
Norella Bittner	T.								—				
Notothyris Waagen	T.	1						—					
Nucleatula Bittner	T.								—				
Nucleospira Hall	T.		7			2^{1}	4^{3}	1					
Obolella Billings	A.		12	12^{4}	2								
Obolus Eichwald	A.		2	2									
Oldhamina Waagen	P.							—					
Orbicella d'Orbigny	N.				—								
Orbiculoidea d'Orbigny	N.	2	40		1^{1}	5	16^{5}	18^{6}	—	—	—		
Oriskania Hall and Clarke	T.		1				1						
Orthidium Hall and Clarke	P.		1		1								
Orthis Dalman	P.	6	48	6	23^{6}	16^{1}	2	1					
Orthoidea Friren	T.									—			
Orthorhynchula Hall and Clarke	T.		1		1^{1}								
Orthostrophia Hall	P.		2			2^{1}							
Orthothetes Fischer de Waldheim	P.	2	21			4^{1}	12^{5}	6^{5}					
Orthotichia Hall and Clarke	P.	1						—					
Orthotrophia Hall and Clarke	P.		1			1							
Parastrophia Hall and Clarke	P.		10		5^{2}	5							
Parazyga Hall and Clarke	T.		2				2^{1}						
Paterula Barrande	A.		1		1								
Pentactinella Bittner	T.								—				
Pentagonia Cozzens	T.		1				1^{1}						
Pentamerella Hall	P.		9			1	8^{2}						
Pentamerus Sowerby	P.		7			7^{4}							
Peregrinella Œhlert	T.										—		
Pexidella Bittner	T.								—				
Pholidops Hall	N.		17		4^{1}	3^{2}	10						
Pholidostrophia Hall and Clarke	P.		1				1^{1}						
Platidia Costa	T.												—
Platystrophia King	P.		6		6^{1}	1							
Plectambonites Pander	P.	1	8		3^{1}	6^{1}							
Plectorthis Hall and Clarke	P.		11		10^{2}		1						
Plesiothyris Douville	T.									—	—		
Plicigera Bittner	T.								—				
Polytœchia Hall and Clarke	P.		1		1								
Pomatospirella Bittner	T.								—				
Porambonites Pander	P.				—								
Proboscidella Œhlert	P.		1					1					
Productella Hall	P.	1	32				28^{9}	6^{5}					
Productus Sowerby	P.	16	87					87^{27}					
Propygope Bittner	T.								—				
Protorhyncha Hall and Clarke	T.		3	2	1^{1}								
Pseudocrania McCoy	N.				—	—							
Pterophloios Gümbel	P.									—			

TABLE I.—*Brachiopod genera alphabetically arranged, etc.*—Continued.

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Ptychospira Hall and Clarke	T.		1					1					
Pugnax Hall and Clarke	T.		12				3^{2}	9^{3}					
Pygope Link	T.									—			
Rafinesquina Hall and Clarke	P.		21		20^{4}	$?1^{1}$							
Rensselæria Hall	T.		9				9^{2}						
Reticularia McCoy	T.	1	22			2^{1}	10^{1}	10^{4}					
Retzia King	T.	1	6		?1		2	?3	?				
Rhætina Waagen	T.								—				
Rhinobolus Hall	A.		2			2							
Rhipidomella Œhlert	P.	3	44			8^{2}	24^{7}	13^{5}					
Rhynchonella Fischer de Waldheim	T.	14	104		8^{2}	22^{6}	33^{1}	32^{3}	3	2	3	1	—
Rhynchonellina Gemmellaro	T.								—	—			
Rhynchopora Œhlert	T.		1					1^{1}					
Rhynchora Dalman	T.										—		
Rhynchorina Œhlert	T.										—	—	
Rhynchospira Hall	T.		10			3^{1}	5^{1}	2					
Rhynchotrema Hall	T.		8		7^{6}		1						
Rhynchotreta Hall	T.		1			1^{1}							
Richthofenia Kayser	P.							—					
Rœmerella Hall and Clarke	N.		1				1^{1}						
Romingerina Hall and Clarke	T.		1					1^{1}					
Scaphiocœlia Whitfield	T.	1					—						
Scenidium Hall	P.		5		2^{2}	1	2^{1}						
Schizambon Walcott	N.		4		4								
Schizobolus Ulrich	A.		1				1^{1}						
Schizocrania Hall and Whitfield	N.		5		3^{1}		2						
Schizopholis Waagen	P.			—									
Schizophoria King	P.	1	13			1	9^{5}	3^{3}					
Schizotreta Kutorga	N.		5		4^{2}	1^{1}							
Selenella Hall and Clarke	T.		1				1						
Seminula McCoy	T.	2	16					16^{4}					
Siphonotreta de Verneuil	N.		2		2^{1}	—							
Sphærobolus Matthew	A.		1	1									
Spirifer Sowerby	T.	23	177			15^{7}	92^{32}	70^{19}					
Spiriferina d'Orbigny	T.	4	19					15^{7}	4	—			
Spirigerella Waagen	T.	1						—					
Spondylobolus McCoy	A.				—								
Streptis Davidson	P.		1			1^{1}							
Streptorhynchus King	P.	1	2					2					
Stricklandinia Billings	P.		17			16^{3}		?1					
Stringocephalus Defrance	T.		1				1^{1}						
Strophalosia King	P.	1	12				5^{2}	7					
Stropheodonta Hall	P.	1	58			12^{2}	46^{17}						
Strophomena Blainville	P.	1	47		31^{11}	13	2	1					
Strophonella Hall	P.		16			4^{2}	12^{5}						
Suessia Deslongchamps	T.									—			
Syntrophia Hall and Clarke	P.		7	6^{1}	1								
Syringothyris Winchell	T.		9					9^{2}					
Terebratalia Beecher	T.												—

TABLE I.—*Brachiopod genera alphabetically arranged, etc*—Continued.

Genus.	Ordinal rank.	South American species.	North American species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Permian and Carboniferous.	Triassic.	Jurassic.	Cretaceous.	Tertiary.	Recent.
Terebratella d'Orbigny	T.		5							—	5	—	—
Terebratula Llhwyd	T.	20	22				3[1]	10	3	2	2	2	
Terebratulina d'Orbigny	T.		6							—	4	2	—
Terebratuloidea Waagen	T.							—					
Tetractinella Bittner	T.								—				
Thecidella M. Chalmas	P.									—			
Thecidia Defrance	P.								?		—		
Thecidiopsis M. Chalmas	P.										—		
Thecocyrtella Bittner	T.												
Thecospira Zügmeyer	T.								—	—			
Thysanotos Mickwitz	A.				—								
Tomasina Hall and Clarke	A.				—								
Torynifer Hall and Clarke	T.		1					1					
Trematis Sharpe	N.		14		14[2]								
Trematobolus Matthew	N.		1	1									
Trematospira Hall	T.		12			1	11[1]						
Trigeria (Bayle) Hall and Clarke	T.	2	3				3						
Trigonosemus Koenig	T.										—		
Trimerella Billings	A.		5			5[3]							
Triplecia Hall	P.		7		5	2							
Tropidoleptus Hall	T.		2				2[1]						
Uncinella Waagen	T.							—					
Uncinulus Bayle	T.		8			1[1]	7[3]						
Uncites Defrance	T.						—						
Verneuilia Hall and Clarke	T.						—	—					
Vitulina Hall	T.		1				1[1]						
Volborthia von Möller	N.			—									
Whitfieldella Hall and Clarke	T.		13			11[6]	2						
Wilsonia Kayser	T.		4			4[2]	1						
Zeilleria Bayle	T.								—				
Zellania Moore	T.									—			
Zugmeyeria Waagen	T.								—				
Zygospira Hall	T.		14		10[5]	3	1						
Total		154	1,894	103	311	320	655	482	10	5	22	9	32

TABLE II.—*North American Paleozoic representation of the orders, superfamilies, and families, geologically arranged.*

Order, superfamily, and family.	Number of species.	Number of genera.	Cambrian species.	Ordovician species.	Silurian species.	Devonian species.	Permian and Carboniferous species.
Order Atremata	196	19	57	60	31	30	21
Superf. Obolacea	43	9	22	6	17		
Fam. Paterinidæ	8	1	8^{2}				
Obolidæ	17	4	16^{4}	3			
Trimerellidæ	20	4		3^{1}	17^{8}		
Superf. Lingulacea	153	10	35	54	14	30	21
Fam. Lingulellidæ	35	4	28^{5}	9^{3}		1^{1}	
Lingulidæ	113	4	7	41^{14}	13^{1}	29^{5}	21^{3}
Lingulasmatidæ	5	2		4^{1}	1		
Order Neotremata	153	21	20	44	21	42	26
Superf. Discinacea	99	18	19	30	8	20	22
Fam. Trematidæ	24	4		17^{3}	2	2^{1}	3^{1}
Discinidæ	50	5	1	6^{3}	6^{1}	18^{6}	19^{6}
Acrotretidæ	16	5	15^{5}	1^{1}			
Siphonotretidæ	7	3	1	6^{1}			
Superf. Craniacea	54	3	1	14	13	22	4
Fam. Craniidæ	54	3	1	14^{4}	13^{3}	22^{4}	4^{1}
Order Protremata	735	62	22	173	161	210	179
Superf. Thecacea	608	45	16	152	96	185	169
Fam. Kutorginidæ	1	1	1				
Eichwaldiidæ	6	2		1	5^{1}		
Billingsellidæ	12	1	9^{2}	2	1		
Strophomenidæ	211	19		65^{19}	48^{10}	77^{31}	26^{8}
Productidæ	186	9			5^{1}	60^{24}	125^{46}
Orthidæ	192	13	6	84^{32}	37^{7}	48^{16}	18^{9}
Superf. Trullacea	127	17	6	21	65	25	10
Fam. Clitambonitidæ	9	3		6^{3}	1	2^{1}	
Syntrophiidæ	7	1	6^{1}	1			
Porambonitidæ	24	3		14^{4}	10^{3}		
Pentameridæ	87	10			54^{12}	23^{5}	10^{3}
Order Telotremata	762	76	2	20	109	369	269
Superf. Rostracea	197	14	2	18	37	94	49
Fam. Protorhynchidæ	3	1	2	1^{1}			
Rhynchonellidæ	194	13		17^{10}	37^{12}	94^{28}	49^{9}
Superf. Terebratulacea	79	19			1	50	30
Fam. Centronellidæ	30	8				26^{5}	4^{2}
Terebratulidæ	47	10			1	22^{11}	26^{7}
Tropidoleptiidæ	2	1				2^{1}	
Superf. Spiriferacea	486	43		2	71	225	190
Fam. Atrypidæ	45	8			14^{7}	18	14^{6}
Spiriferidæ	278	11		1^{1}	24^{13}	138^{48}	115^{35}
Athyridæ	163	24		1	33^{14}	69^{23}	61^{14}

TABLES OF NORTH AND SOUTH AMERICAN SPECIES GEOLOGICALLY ARRANGED.

TABLE III, CAMBRIAN.—TABLE IV, ORDOVICIAN.—TABLE V, SILURIAN.—TABLE VI, DEVONIAN.—TABLE VII, CARBONIFEROUS AND PERMIAN.—TABLE VIII, MESOZOIC.—TABLE IX, CENOZOIC AND RECENT.—TABLE X, SOUTH AMERICAN FOSSIL BRACHIOPODA.

TABLE III.—*Cambrian Brachiopoda.*

[Species preceded by an asterisk (*) are found in the Ordovician also.]

Species.	Lower Cambrian.	Middle Cambrian.	Upper Cambrian.
Acrothele (?) dichotoma Walcott	×		
Acrothele matthewi (Hartt)		×	
Acrothele matthewi costata Matthew		×	
Acrothele matthewi lata Matthew		×	
Acrothele matthewi prima Matthew		×	
Acrothele subsidua (White)	×	×	
Acrotreta baileyi Matthew		×	
Acrotreta gemma Billings	×	×	×
Acrotreta gemma depressa Walcott		×	
Acrotreta gemmula Matthew		×	
Acrotreta microscopica (Shumard)		×	
Billingsella alberta (Walcott)		×	
Billingsella billingsi (Hartt)		×	
Billingsella coloradoensis (Shumard)			×
Billingsella festinata (Billings)	×		
Billingsella latourensis (Matthew)		×	
Billingsella orientalis (Whitfield)	×		
Billingsella quacoensis (Matthew)		×	
Billingsella transversa (Walcott)	×		
Billingsella whitfieldi (Walcott)	×		
Botsfordia pulchra Matthew		×	
Crania (?) columbiana Walcott		×	
Dalmanella melita (Hall and Whitfield)			×
Discina (?) inutilis Hall			×
Discinopsis gulielmi Matthew		×	
Elkania desiderata (Billings)			×
Iphidea bella Billings	×		
Iphidea labradorica (Billings)	×		
Iphidea labradorica swantonensis (Walcott)	×		
Iphidea ornatella Hall and Clarke			×
Iphidea pannula (White)	×	×	
Iphidea prospectensis (Walcott)	×		
Iphidea sculptilis (Meek)			×
Iphidea stissingensis (Dwight)		×	
Kutorgina cingulata Billings	×		
Kutorgina (?) pterineoides Matthew		×	
Lingula (?) calumet N. H. Winchell			
Lingula (?) elliptica Emmons	?		
Lingula (?) manticula White			×
Lingula (?) mosia Hall			×
Lingula (?) murrayi Billings			×
*Lingula quebecensis Billings			×
Lingula (?) striata Emmons	× ?		
Lingulella ampla Owen		×	
Lingulella aurora Hall			×

TABLE III.—*Cambrian Brachiopoda*—Continued.

Species.	Lower Cambrian.	Middle Cambrian.	Upper Cambrian.
Lingulella (?) billingsana (Whiteaves)			×
Lingulella (?) cælata (Hall)	×		
Lingulella dawsoni Matthew		×	
Lingulella ella (Hall and Whitfield)	×	×	
Lingulella granvillensis Walcott	×		
Lingulella (?) inflata Matthew		×	
Lingulella (?) inflata ovalis Matthew		×	
*Lingulella irene (Billings)			×
Lingulella lævis Matthew			×
Lingulella lamborni Meek			×
Lingulella linguloides Matthew		×	
Lingulella macconelli Walcott		×	
Lingulella martinensis Matthew		×	
*Lingulella minuta Hall and Whitfield			×
Lingulella radula Matthew		×	
Lingulella starri Matthew		×	
Lingulella starri minor Matthew			×
Lingulella stoneana Whitfield			×
Lingulella winona Hall		×	
Lingulepis acuminata (Conrad)			×
Lingulepis acutangula (Roemer)			×
Lingulepis cuneolus Whitfield			×
*Lingulepis (?) mæra Hall and Whitfield			×
Lingulepis matinalis Hall			×
Lingulepis pinniformis Owen			×
Lingulepis prima (Hall)			×
Lingulepis primæformis Whitfield			×
Linnarsonia belti Davidson ?			×
Linnarsonia misera (Billings)		×	
Linnarsonia pretiosa (Billings)			×
Linnarsonia sagittalis taconica Walcott	×	×	
Linnarsonia transversa (Hartt)		×	
Obolella atlantica Walcott	×		
Obolella chromatica Billings	×		
Obolella circe Billings	×		
Obolella crassa (Hall)	×		
*Obolella (?) discoidea Hall and Whitfield			×
Obolella gemma Billings	×		
Obolella (?) gemmula Matthew			×
*Obolella (?) ida Billings			×
Obolella minuta (Hall and Whitfield)			×
Obolella nana Meek and Hayden		×	
Obolella nitida Ford	×		
Obolella pectenoides Whitfield			×
Obolella polita Hall		×	
Obolus (?) major Matthew	×		
Obolus (?) murrayi Billings		× ?	
Obolus pristinus Matthew		×	
Obolus pulcher Matthew			×
Obolus refulgens Matthew			×
Orbicula (?) excentrica Emmons	× ?		
Orthis (?) apicalis Billings			×
Orthis (?) eurekensis Walcott			×
Orthis (?) highlandensis Walcott	×		

TABLE III.—*Cambrian Brachiopoda*—Continued.

Species.	Lower Cambrian.	Middle Cambrian.	Upper Cambrian.
Orthis (?) lenticularis Wahlenberg			×
Orthis (?) lenticularis atrypoides Matthew			×
Orthis (?) lenticularis lyncioides Matthew			×
Orthis (?) lenticularis strophomenoides Matthew			×
Orthis (?) remnichia N. H. Winchell			×
Orthis (?) salemensis Walcott	×		
Orthis (?) sandbergi N. H. Winchell			×
Orthisina (?) johannensis Matthew			×
Protorhyncha (?) antiquata (Billings)	×		
Protorhyncha (?) minor (Walcott)	×		
Syntrophia arachne (Billings)			×
Syntrophia arethusa (Billings)			×
Syntrophia (?) armanda (Billings)			×
Syntrophia barabuensis (A. Winchell)			×
Syntrophia calcifera (Billings)			×
Syntrophia primordialis (Whitfield)			×
Trematobolus insignis Matthew		×	
Number of Cambrian species, 116.			
Number of species in each division	31	39	51
Number of species common to the Lower and the other divisions of the Cambrian		5	1
Number of species common to the Middle and the other divisions of the Cambrian	5		1
Number of species common to the Cambrian and Ordovician system, 6.			
Number of species passing from each division into the Ordovician	0	0	6

TABLE IV.—*Ordovician Brachiopoda.*

[Bi = Birdseye; BR = Black River; Ci = Cincinnati and Lorraine; EO = Eoordovician; MO = Mesoordovician; NO = Neoordovician; T = Trenton; U = Utica. Species preceded by an asterisk (*) are found in the Silurian also; by an obelisk (†), in the Cambrian.]

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Billingsella (?) grandæva (Billings)	×			
Billingsella (?) primordialis (Whitfield)	×			
Camarella ambigua (Hall)			T	
Camarella breviplicata Billings	×			
Camarella (?) costata Billings	×			
Camarella longirostrum Billings		×		
Camarella panderi Billings			BR	
Camarella parva Billings	×			
Camarella polita Billings	×			
Camarella varians Billings	×	×		
Camarella volborthi Billings			BR	
Camarotœchia plena Hall		×		
Catazyga erratica Hall				Ci
Catazyga headi (Billings)				U, Ci
Clitambonites (?) borealis (Castelnau)			T	
Clitambonites diversa (Shaler)			T	Ci
Clitambonites diversa altissima Winchell and Schuchert			T	
Clitambonites plana retroflexa de Verneuil	× ?			
Conotreta rusti Walcott			T	
Crania albersi Miller and Faber				U
Crania (?) deformis (Hall)		×		
Crania dyeri Miller				U
Crania granulosa N. H. Winchell			T	
Crania lælia Hall				U, Ci
Crania (?) reversa Sardeson		×		
Crania scabiosa Hall				U, Ci
Crania setigera Hall			T	Ci
Crania socialis Ulrich				U
Crania trentonensis Hall			T	
Craniella (?) ulrichi Hall and Clarke			T	
Cyclospira bisulcata (Emmons)			T	
Dalmanella amœna N. H. Winchell			T	
Dalmanella bellula (James) Meek sp				Ci
Dalmanella crispata (Emmons)				Ci
Dalmanella electra (Billings)	×			
Dalmanella electra major Matthew	×			
Dalmanella electra lævis Matthew	×			
Dalmanella (?) evadne (Billings)	×			
Dalmanella hamburgensis (Walcott)			T	
Dalmanella macleodi (Whitfield)	×			
Dalmanella (?) plicifera (Hall)		×		
Dalmanella pogonipensis (Hall and Whitfield)	×			
Dalmanella stonensis (Safford)			T	
Dalmanella subæquata (Conrad)			T	
Dalmanella subæquata circularis N. H. Winchell			T	
Dalmanella subæquata conradi N. H. Winchell			T	
Dalmanella subæquata gibbosa Billings		×	BR, T	
Dalmanella subæquata perveta (Conrad)			T	
Dalmanella tersus (Sardeson)				Ci

TABLE IV.—*Ordovician Brachiopoda*—Continued.

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Dalmanella testudinaria (Dalman)		×	Bi, BR, T	U, Ci
Dalmanella testudinaria emacerata Hall				U
Dalmanella testudinaria meeki (Miller)				Ci
Dalmanella testudinaria multisecta (James) Meek sp				U
Dinobolus canadensis (Billings)			BR, T	
Dinobolus magnificus (Billings)			BR, T	
Dinobolus (?) parvus Whitfield			T	
Dinorthis deflecta Conrad			T	
Dinorthis fontinalis (White)	×			
Dinorthis iphigenia (Billings)			T	
Dinorthis meedsi Winchell and Schuchert			T	
Dinorthis meedsi germana Winchell and Schuchert			T	
Dinorthis pectinella (Emmons)			T	
Dinorthis pectinella sweeneyi N. H. Winchell			T	
Dinorthis platys (Billings)		×		
Dinorthis porcata (McCoy)			T	Ci
Dinorthis proavita Winchell and Schuchert				Ci
Dinorthis retrorsa (Salter)			T	Ci
Dinorthis subquadrata Hall				Ci
Discina (?) sublamellosa Ulrich				Ci
Eichwaldia subtrigonalis Billings			T	
Elkania ambigua (Walcott)	×			
Glassia romingeri Hall and Clarke			T	
Glossina crassa (Hall)			T	
Glossina cyane (Billings)	×			
Glossina deflecta Winchell and Schuchert			T	Ci
Glossina hurlbuti N. H. Winchell			T	
Glossina trentonensis (Conrad)			T	U
Hebertella battis (Billings)	×			
Hebertella bellarugosa (Conrad)			T	
Hebertella borealis (Billings)		×	BR, T	
Hebertella imperator (Billings)		×		
Hebertella insculpta Hall				Ci
Hebertella lonensis (Walcott)	×			
Hebertella maria (Billings)				Ci
Hebertella occidentalis Hall				Ci
Hebertella occidentalis sinuata Hall				Ci
Heterorthis clytie Hall			T	
Leptæna charlottæ Winchell and Schuchert			T	
*Leptæna rhomboidalis (Wilckens)			T	U, Ci
Leptæna unicostata Meek and Worthen				Ci
Leptella sordida (Billings)	×			
Leptella decipiens (Billings)	×			
Leptobolus grandis Matthew	×			
Leptobolus insignis Hall				U
Leptobolus lepis Hall				U
Leptobolus occidentalis Hall				U
Lingula æqualis Hall			T	
Lingula belli Billings		×		
Lingula beltrami Winchell and Schuchert				Ci
Lingula bisulcata Ulrich				U
Lingula briseis Billings			T	

TABLE IV.—*Ordovician Brachiopoda*—Continued.

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Lingula (?) canadensis Billings			T	Ci
Lingula cincinnatiensis Hall and Whitfield				Ci
Lingula clathrata Winchell and Schuchert			T	
Lingula cobourgensis Billings			T	
Lingula covingtonensis Hall and Whitfield			T	
Lingula curta Conrad			T	U
Lingula (?) dolata Sardeson	×			
Lingula elderi Whitfield			T	Ci
Lingula elongata Hall			T	
Lingula ova Billings			BR	
Lingula forbesi Billings				Ci
Lingula howleyi Matthew	×			
Lingula huronensis Billings		×		
Lingula iole Billings	×			
Lingula iowensis Owen			T	
Lingula iris Billings	×			
Lingula kingstonensis Billings			BR	
Lingula lyelli Billings		×		
Lingula mantelli Billings	×			
Lingula modesta Ulrich			T	U, Ci
Lingula morsii N. H. Winchell		×		
Lingula nympha Billings	×			
Lingula obtusa Hall			T	U
Lingula papillosa Emmons			T	
Lingula perryi Billings		×?		
Lingula philomela Billings			T	Ci
Lingula progne Billings			T	U
†Lingula quebecensis Billings	×		T	Ci
Lingula rectilateralis Emmons			T	
Lingula riciniformis Hall			T	
Lingula riciniformis galenensis Winchell and Schuchert			T	
Lingula vanhorni Miller			T	Ci
Lingula whitfieldi Ulrich				Ci
Lingulasma galenensis Winchell and Schuchert			T	
Lingulasma schucherti Ulrich				Ci
Lingulella (?) cuneata Matthew	×			
†Lingulella irene (Billings)	×			
†Lingulella minuta Hall and Whitfield	×			
Lingulella roberti Matthew	×			
Lingulella selwyni Matthew	×			
†Lingulepis (?) mæra Hall and Whitfield	×			
Lingulobolus affinis Billings	×			
Lingulobolus affinis cuneata Matthew	×			
Lingulops norwoodi (James)			T	
Lingulops whitfieldi Hall				U
†Obolella (?) discoidea Hall and Whitfield	×			
†Obolella (?) ida Billings	×			
Orbiculoidea lamellosa Hall			T	Ci
Orbiculoidea tenuistriata (Ulrich)				U
Orthidium gemmicula (Billings)	×			
Orthis (?) acuminata Billings		×		
Orthis carausii Salter	×			

TABLE IV.—*Ordovician Brachiopoda*—Continued.

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Orthis (?) centrilineata Hall				Ci
Orthis corinna Billings	×			
Orthis costalis Hall		×		
Orthis (?) delicatula Billings	×?			
Orthis (?) desmopleura Meek	×			
Orthis (?) eudocia Billings	×			
Orthis euryone Billings	×			
Orthis hippolyte Billings	×			
Orthis (?) holstoni (Safford) Hall			T	
Orthis (?) leptænoides Emmons			T	
Orthis menapiæ Hicks	×			
Orthis (?) minna Billings	×			
Orthis (?) morrowensis James				Ci
Orthis (?) mycale Billings	×			
Orthis panderiana Hall	×			
Orthis (?) pigra Billings		×		
Orthis (?) porcia Billings		×		
Orthis (?) pumila Ulrich				Ci
Orthis (?) saffordi Hall and Clarke			T	
Orthis (?) sola Billings				Ci
Orthis tricenaria Conrad			T	
Orthis (?) tritonia Billings	×			
Orthorhynchula linneyi (James)				Ci
Parastrophia divergens Hall and Clarke				Ci
Parastrophia hemiplicata Hall			T	
Parastrophia hemiplicata rotunda (Winchell and Schuchert)			T	
Parastrophia obscura (Hall and Whitfield)	×			
Parastrophia scofieldi (Winchell and Schuchert)			T	
Paterula amii Schuchert	×			
Pholidops cincinnatiensis Hall				Ci
Pholidops subtruncata Hall				Ci
Pholidops trentonensis Hall			T	
Pholidops trentonensis minor Winchell and Schuchert			T	
Platystrophia acuminata James				Ci
Platystrophia acutilirata (Conrad)				Ci
*Platystrophia biforata (Schlotheim)		×	BR, T	U, Ci
Platystrophia crassa (James)				Ci
Platystrophia laticostata Meek				Ci
Platystrophia lynx (Eichwald)				Ci
Plectambonites gibbosa Winchell and Schuchert			T	
Plectambonites plicatella (Ulrich)				U
*Plectambonites sericea (Sowerby)			BR, T	U, Ci
Plectorthis æquivalvis Hall				Ci
Plectorthis dichotoma Hall				Ci
Plectorthis ella Hall				Ci
Plectorthis fissicosta Hall				Ci
Plectorthis jamesi Hall				Ci
Plectorthis kankakensis (McChesney)				Ci
*Plectorthis plicatella Hall			T	U, Ci
Plectorthis sectostriata (Ulrich)				Ci
Plectorthis triplicatella (Meek)				Ci

TABLE IV.—*Ordovician Brachiopoda*—Continued.

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Plectorthis whitfieldi (N. H. Winchell)				Ci
Polytœchia apicalis (Whitfield)	×			
Protorhyncha dubia Hall		×		
Rafinesquina alternata (Conrad) Emmons			BR, T	U, Ci
Rafinesquina alternata alternistriata Hall				Ci
Rafinesquina alternata fracta (Meek)				Ci
Rafinesquina alternata loxorhytis (Meek)				Ci
Rafinesquina alternata nasuta (Conrad)				Ci
Rafinesquina (?) atava (Matthew)	×			
* Rafinesquina ceres (Billings)				Ci
Rafinesquina deltoidea (Conrad)			T	U
Rafinesquina fasciata Hall		×		
Rafinesquina imbrex (Pander)				Ci
Rafinesquina incrassata (Hall)		×	BR	
Rafinesquina kingi (Whitfield)				Ci
Rafinesquina lata Whiteaves				Ci
Rafinesquina mesacosta (Shumard)			T?	
Rafinesquina minnesotensis (N. H. Winchell)			T	
Rafinesquina minnesotensis inquassa (Sardeson)			T	
Rafinesquina nitens (Billings)				Ci
Rafinesquina squamula (James)				U, Ci
Rafinesquina tenuilineata (Conrad)			T	
Rafinesquina ulrichi (James)				U
Retzia (?) granulifera (Meek)				Ci
Rhynchonella (?) acutirostris Hall		×		
Rhynchonella (?) anticostiensis Billings				Ci
Rhynchonella (?) corinthia Billings	×			
* Rhynchonella (?) janea Billings				Ci
Rhynchonella (?) neenah Whitfield				Ci
Rhynchonella (?) orientalis Billings		×		
Rhynchonella (?) sordida Hall			T	
Rhynchonella (?) subtrigonalis Hall			T	
Rhynchotrema ainslæi (N. H. Winchell)			T	
Rhynchotrema capax (Conrad)				Ci
Rhynchotrema dentata (Hall)			T	Ci
Rhynchotrema inæquivalvis (Castelnau)			T	
Rhynchotrema inæquivalvis laticostata Winchell and Schuchert			T	
Rhynchotrema ottawaensis (Billings)			T	
Rhynchotrema perlamellosa (Whitfield)				Ci
Scenidium anthonensis Sardeson			T	
Scenidium (?) merope (Billings)			T	Ci
Schizambon (?) dodgii Winchell and Schuchert			T	
Schizambon (?) fissus canadensis Ami				U
Schizambon (?) lockii Winchell and Schuchert				Ci
Schizambon typicalis Walcott	×			
Schizocrania filosa Hall			T	U, Ci
Schizocrania (?) rudis Hall			T	
Schizocrania schucherti Hall and Clarke			T	
Schizotreta conica (Dwight)			T	
Schizotreta minutula Winchell and Schuchert				Ci
Schizotreta ovalis Hall and Clarke			T	

TABLE IV.—*Ordovician Brachiopoda*—Continued.

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Schizotreta pelopea (Billings)			T	Ci
Siphonotreta (?) micula McCoy	×			
Siphonotreta (?) minnesotensis Hall and Clarke			T	
Sphærobolus spissus Billings	×			
Strophomena approximata (James)				Ci
Strophomena (?) arethusa Billings				Ci
Strophomena billingsi Winchell and Schuchert			T	
Strophomena cardinale (Whitfield)				Ci
Strophomena conradi Hall			T	
Strophomena (?) declivis James				Ci
Strophomena emaciata Winchell and Schuchert			T	
Strophomena fluctuosa Billings				U
Strophomena hallii Miller				Ci
Strophomena hecuba Billings				Ci
Strophomena (?) imbecilis Billings	× ?			
Strophomena incurvata (Shepard)			T	
Strophomena lævis Emmons			Bi	
Strophomena (?) minor (Walcott)	×			
Strophomena neglecta (James)				Ci
Strophomena neglecta acuta Winchell and Schuchert				Ci
Strophomena nutans Meek				Ci
Strophomena planoconvexa Hall				Ci
Strophomena planodorsata Winchell and Schuchert				Ci
Strophomena rugosa (Rafinesque) Blainville				Ci
Strophomena rugosa subtenta Hall				Ci
Strophomena scofieldi Winchell and Schuchert			T	
Strophomena septata Winchell and Schuchert			T	
Strophomena sinuata Meek				Ci
Strophomena sulcata (Verneuil)				Ci
Strophomena thalia Billings			T	
Strophomena trentonensis Winchell and Schuchert			T	
Strophomena trilobata (Owen)			T	
Strophomena vetusta James				Ci
Strophomena winchelli Hall			T	
Strophomena wisconsinensis Whitfield				Ci
Syntrophia lateralis (Whitfield)	×			
Trematis crassipuncta Ulrich				Ci
Trematis (?) dyeri Miller				Ci
Trematis fragilis Ulrich			T	
Trematis huronensis Billings			BR	
Trematis millepunctata Hall				U, Ci
Trematis montrealensis Billings			T	
Trematis oblata Ulrich				U, Ci
Trematis ottawaensis Billings			T	Ci
Trematis punctostriata Hall				Ci
Trematis (?) pustulosa Hall				Ci
Trematis quincuncialis Miller and Dyer				Ci
Trematis reticularis Miller				Ci
Trematis terminalis Emmons			T	
Trematis umbonata Ulrich				Ci
Triplecia cuspidata Hall			T	
Triplecia extans (Emmons)			T	

TABLE IV.—*Ordovician Brachiopoda*—Continued.

Species.	Eoordovician.		Mesoordovician.	Neoordovician.
	Calciferous.	Chazy.	Trenton, Black River, Birdseye.	Cincinnati, Utica.
Triplecia nucleus Hall	....	....	T	....
Triplecia (?) radiata Whitfield	×	....	....	....
Triplecia ulrichi Winchell and Schuchert	....	....	....	Ci
Zygospira cincinnatiensis Meek	....	....	....	Ci
Zygospira concentrica Ulrich	....	....	....	Ci
Zygospira deflecta (Hall)	....	....	T	....
Zygospira exigua (Hall)	....	....	T	....
Zygospira kentuckiensis James	....	....	....	Ci
Zygospira modesta Hall	....	....	....	U, Ci
Zygospira nicoletti Winchell and Schuchert	....	....	T	....
Zygospira putilla Hall and Clarke	....	....	....	Ci
Zygospira recurvirostra (Hall)	....	....	T	....
Zygospira saffordi Winchell and Schuchert	....	....	T	....
Number of Ordovician species, 319.				
Number of species in each division	63	26	128	136
Number of species common to the Calciferous and the other divisions	....	1	0	1
Number of species common to the Chazy and the other divisions	1	....	5	2
Number of species common to the Trenton and the other divisions	1	5	....	27
Number of species common to the Cincinnati and the other divisions	1	2	27	....
Species common to the Ordovician and Silurian systems, 5.				
Number of species passing from each division into the Silurian	0	1	3	5

TABLE V.—*Silurian Brachiopoda.*

[A = Anticosti; Ar = Arisaig; Cl = Clinton; Gu = Guelph; MS = Mesosilurian; N = Niagara; NS = Neosilurian; Te = Tentaculite and Coralline; W = Waterlime. Species preceded by an asterisk (*) are found in the Devonian also; by an obelisk (†), in the Ordovician.]

Species.	Eosilurian.	Mesosilurian.		Neosilurian.
	Medina.	Anticosti, Clinton.	Guelph, Arisaig, Niagara.	Tentaculite, Waterlime.
Anastrophia brevirostris (Sowerby) Hall			N	
Anastrophia internascens Hall			N	
Anastrophia interplicata (Hall)			N	
Anoplotheca hemispherica (Sowerby)		Cl		
Anoplotheca planoconvexa (Hall)		Cl		
Anoplotheca plicatula (Hall)		Cl		
Athyris (?) solitaria Billings		A		
Athyris (?) tumidula Billings		A		
Athyris (?) turgida Shaler		A		
Atrypa (?) gibbosa Hall		Cl		
Atrypa (?) lara (Billings)		A		
Atrypa laticorrugata Foerste		Cl		
Atrypa marginalis (Dalman)			N	
Atrypa nodostriata Hall		Cl	N	
Atrypa phoca (Salter)			MS	
*Atrypa reticularis (Linnæus)		Cl, A	N	
Atrypa reticularis niagarensis Nettelroth			N	
Atrypa rugosa Hall			N	
Atrypina clintoni Hall and Clarke		Cl		
Atrypina disparilis Hall			N	
Atrypina intermedia Hall			Ar	
Billingsella (?) laurentina (Billings)		A		
Bilobites acutilobus (Ringueberg)			N	
Bilobites bilobus (Linnæus)			N	
Camarella lenticularis Billings		A		
Camarotœchia (?) acinus Hall			N	
Camarotœchia (?) acinus convexa (Foerste)		Cl		
Camarotœchia æquiradiata Hall		Cl		
Camarotœchia fringilla Billings		A		
Camarotœchia glacialis Billings		A		
Camarotœchia (?) indianensis Hall			N	
Camarotœchia (?) neglecta Hall		Cl	N	
Camarotœchia (?) obtusiplicata Hall			N	
Camarotœchia (?) whitii Hall			N	
Capellinia mira Hall and Clarke			N	
Chonetes cornuta Hall		Cl		
Chonetes nova-scotica Hall			Ar, N	
Chonetes striatella (Dalman)			N ?	
Chonetes tenuistriata Hall			Ar	
Chonetes undulata Hall			N	
Clintonella vagabunda Hall and Clarke		Cl		
Clorinda arcuosa (McChesney)			N	
Clorinda areyi (Hall and Clarke)		Cl		
Clorinda barrandii (Billings)		A		
Clorinda fornicata (Hall)		Cl	N	
Clorinda ventricosa (Hall)			N	
Conchidium biloculare Linnæus			MS	
Conchidium colletti Miller				W
Conchidium crassiradiatum (McChesney)			N	

TABLE V.—*Silurian Brachiopoda*—Continued.

Species.	Eo-silurian.	Mesosilurian.		Neosi-lurian.
	Medina.	Anti-costi, Clinton.	Guelph, Arisaig, Niagara.	Tentac-ulite, Water-lime.
Conchidium crassiplicum Hall and Clarke			N	
Conchidium decussatum (Whiteaves)			N	
Conchidium exponeus Hall and Clarke			N	
Conchidium georgiæ Hall and Clarke		Cl		
Conchidium greenii Hall and Clarke			N	
Conchidium knappi (Hall and Whitfield)			N	
Conchidium laqueatum (Conrad)			N	
Conchidium littoni (Hall)			N	
Conchidium multicostatum (Hall)			N	
Conchidium nysius (Hall and Whitfield)			N	
Conchidium obsoletum Hall and Clarke			N	
Conchidium occidentale Hall			Gu	
Conchidium scoparium Hall and Clarke			Gu	
Conchidium tenuicostatum (Hall and Whitfield)			N	
Conchidium unguiforme (Ulrich)			N	
Crania acadiensis Hall			Ar	
Crania anna Spencer			N	
Crania dentata Ringueberg			N	
Crania dubia Foerste		Cl		
Crania gracilis Ringueberg			N	
Crania setifera Hall			N	
Crania siluriana Hall			N	
Crania spinigera Hall			N	
Craniella (?) clintonensis Foerste		Cl		
Cyclospira (?) sparsiplica Foerste		Cl		
Cyrtia exporrecta (Wahlenberg)			N	
Cyrtia meta Hall		Cl	N	
Cyrtia myrtia Billings		A	N	
Cyrtina pyramidalis (Hall)			N	
Dalmanella arcuaria Hall and Clarke			N	
Dalmanella elegantula (Dalman)		Cl	N	
Dalmanella elegantula parva (Foerste)		Cl		
Dalmanella parva de Verneuil		A		
Delthyris (?) rugicosta (Hall)			Ar	
Delthyris sulcata Hisinger			N	
Dictyonella anticostiensis Billings		A		
Dictyonella concinna Hall			N	
Dictyonella corallifera Hall			N	
Dictyonella gibbosa Hall			N	
Dictyonella reticulata Hall			N	
Dinobolus conradi Hall			N	
Glossina perovata (Hall)		Cl		
Gypidula coppingeri (Etheridge)			MS	
Gypidula globosa (Nettelroth)			N	
Gypidula knotti (Nettelroth)			N	
Gypidula nuclea (Hall and Whitfield)		Cl		
Gypidula roemeri Hall and Clarke			N	
Gypidula uniplicata (Nettelroth)			N	
Hebertella daytonensis (Foerste)		Cl		
Hebertella fausta (Foerste)		Cl		
Hindella prinstana (Billings)		A		
Hindella umbonata (Billings)		A		

TABLE V.—*Silurian Brachiopoda*—Continued.

Species.	Eo-silurian. Medina.	Mesosilurian. Anti-costi, Clinton.	Mesosilurian. Guelph, Arisaig, Niagara.	Neosi-lurian. Tentac-ulite, Water-lime.
Homœospira apriniformis Hall			N	
Homœospira evax Hall			N	
Homœospira sobrina (Beecher and Clarke)			N	
Hyattella congesta (Conrad)		Cl		
Hyatella junia (Billings)		A		
†* Leptæna rhomboidalis (Wilckens)		Cl	N	
Lingula acutirostra Hall		Cl		
Lingula bicarinata Ringueberg			N	
Lingula clintoni Vanuxem		Cl		
Lingula cuneata Conrad	×			
Lingula gibbosa Hall			N	
Lingula ingens Spencer			N	
Lingula insularis Billings		A		
Lingula lamellata Hall			N	
Lingula linguata Hall and Clarke		Cl		
Lingula oblata Hall		Cl		
Lingula subelliptica d'Orbigny		Cl		
Lingula tæniola Hall and Clarke		Cl		
Lingulops granti Hall and Clarke			N	
Meristina maria Hall			N	
Meristina rectirostra Hall			N	
Meristina trisinuata (McChesney)			N	
Mimulus waldronensis (Miller and Dyer)			N	
Monomorella egani Hall and Clarke			N	
Monomorella greenii Hall and Clarke			N	
Monomorella kingi Hall and Clarke			N	
Monomorella newberryi Hall and Whitfield			N	
Monomorella orbicularis Billings			Gu	
Monomorella ortoni Hall and Clarke			N	
Monomorella ovata Whiteaves			Gu	
Monomorella ovata lata Whiteaves			Gu	
Monomorella prisca Billings			Gu	
* Nucleospira elegans Hall			N	
Nucleospira pisiformis Hall			N	
Nucleospira rotundata Whitfield				W
Orbiculoidea numulus Hall and Clarke				W
Orbiculoidea parmulata Hall	×			
Orbiculoidea subplana (Hall)			Ar	
Orbiculoidea vanuxemi (Hall)			Ar	W
Orthis benedicti Miller			N	
Orthis davidsoni de Verneuil		A	N	
Orthis (?) fissiplica Roemer			N	
Orthis flabellites (Hall) Foerste		Cl	N	
Orthis flabellites spania Hall and Clarke			N	
Orthis (?) glypta Hall and Clarke			N	
Orthis (?) missouriensis Shumard			N ?	
Orthis (?) nisis Hall and Whitfield			N	
Orthis (?) punctostriata Hall			N	
Orthis (?) rugiplicata Hall and Whitfield			N	
Orthis (?) ruida Billings		A		
Orthis (?) subnodosa Hall			N	
Orthis (?) tenuidens Hall		Cl		

TABLE V.—*Silurian Brachiopoda*—Continued.

Species.	Eo-silurian.	Mesosilurian.		Neosilurian.
	Medina.	Anticosti, Clinton.	Guelph, Arisaig, Niagara.	Tentaculite, Waterlime.
Orthis (?) trinucleus Hall		Cl		
Orthostrophia (?) fasciata Hall			N	
Orthothetes hydraulicum (Whitfield)				W
Orthothetes interstriata (Hall)				Te
* Orthothetes subplana (Conrad)			N	
Orthothetes tenuis Hall			N	
Orthotropia dolomitica Hall and Clarke			N	
Parastrophia greenii Hall and Clarke			N	
Parastrophia latiplicata Hall and Clarke			N	
Parastrophia multiplicata Hall and Clarke			N	
Parastrophia ops (Billings)		A		
Parastrophia reversa (Billings)		A		
Pentamerella (?) compressa Ringueberg			N	
Pentamerus oblongus Sowerby		Cl	N	
Pentamerus oblongus cylindricus (Hall and Whitfield)			N	
Pentamerus oblongus maquoketa Hall and Clarke			N	
Pentamerus oblongus subrectus Hall and Clarke			N	
Pentamerus ovalis Hall		Cl		
Pentamerus pesovis Whitfield				W
Pholidops ovalis Hall			N	
Pholidops squamiformis Hall			N	
† Platystrophia biforata (Schlotheim)		Cl	N	
Plectambonites glabra Shaler		A		
Plectambonites producta Hall and Clarke			N	
† Plectambonites sericea (Sowerby)		Cl		
Plectambonites transversalis (Wahlenberg)		Cl	N	
Plectambonites transversalis alabamensis Foerste		Cl		
Plectambonites transversalis prolongata Foerste		Cl		
† Rafinesquina ceres (Billings)		A		
Rafinesquina (?) obscura (Hall and Clarke)		Cl		
Reticularia bicostata (Vanuxem)			N	
Reticularia bicostata petila (Hall)			N	
Rhinobolus davidsoni Hall and Clarke			N	
Rhinobolus galtensis (Billings)			Gu	
Rhipidomella circula Hall		Cl		
Rhipidomella hybrida (Sowerby)			N	
Rhipidomella media (Shaler)		A		
Rhipidomella rhynchonelliformis (Shaler)		A		
Rhipidomella subcircula (Simpson)		Cl		
Rhipidomella ubera (Billings)		A		
Rhynchonella (?) argentea Billings		A		
Rhynchonella (?) bellaforma Nettelroth			N	
Rhynchonella (?) bidens Hall		Cl		
Rhynchonella (?) bidentata (Hisinger)			N	
Rhynchonella (?) colletti Miller			N	
Rhynchonella (?) decemplicata Sowerby		Cl		
Rhynchonella (?) emacerata Hall		Cl	Ar	
Rhynchonella (?) eva Billings		A		
Rhynchonella (?) hydraulica Whitfield				W
† Rhynchonella (?) janea Billings		A		
Rhynchonella (?) lævis Simpson		Cl		
Rhynchonella (?) lamellata Hall				Te

TABLE V.—*Silurian Brachiopoda*—Continued.

Species.	Eo-silurian.	Mesosilurian.		Neosilurian.
	Medina.	Anticosti, Clinton.	Guelph, Arisaig, Niagara.	Tentaculite, Waterlime.
Rhynchonella (?) nucula (Sowerby)			N	
Rhynchonella (?) nutrix Billings		A		
Rhynchonella (?) pisa Hall and Whitfield			N	
Rhynchonella (?) plicata Hall	×			
Rhynchonella (?) plicatella (Linnæus)			N	
Rhynchonella (?) pyrrha Billings		A		
Rhynchonella (?) robusta Hall		Cl		
Rhynchonella (?) rugæcosta Nettelroth			N	
Rhynchonella (?) tennesseensis Roemer			N	
Rhynchonella (?) vicina Billings		A		
Rhynchospira (?) acadiæ (Hall)			Ar	
Rhynchospira (?) helena (Nettelroth)			N	
Rhynchospira (?) sinuata Hall			Ar	
Rhynchotreta cuneata americana Hall			N	
Scenidium pyramidale Hall			N	
Schizophoria senecta Hall and Clarke		Cl		
Schizotreta tenuilamellata Hall			N	
Spirifer asperatus Ringueberg			N	
Spirifer crispatus Hall and Clarke			N	
Spirifer crispus (Hisinger)			N	Te
Spirifer crispus simplex Hall			N	
Spirifer dubius Nettelroth			N?	
Spirifer eudorus Hall			N	
Spirifer foggi Nettelroth			N	
Spirifer gibbosus Hall			N	
Spirifer niagarensis (Conrad)			N	
Spirifer niagarensis oligoptychus Roemer			N	
Spirifer nobilis Barrande			N	
Spirifer radiatus Sowerby		Cl	N	
Spirifer rostellum Hall and Whitfield			N	
Spirifer similior Winchell and Marcy			N	
Spirifer subsulcatus Hall			Ar	
Spirifer vanuxemi Hall				Te
Streptis grayi Davidson			N	
Stricklandinia anticostiensis Billings		A		
Stricklandinia billingsana Dawson			Ar	
Stricklandinia brevis Billings		A		
Stricklandinia canadensis Billings		Cl		
Stricklandinia castellana White			N	
Stricklandinia chapmani Hall and Clarke			N	
Stricklandinia davidsoni Billings		A		
Stricklandinia deformis Meek and Worthen			N	
Stricklandinia gaspensis Billings			N	
Stricklandinia lens (Sowerby)			N?	
Stricklandinia lirata Billings		A		
Stricklandinia (?) louisvillensis Nettelroth			N	
Stricklandinia melissa Billings		A		
Stricklandinia multilirata Whitfield			Gu	
Stricklandinia salteri Billings		A		
Stricklandinia triplesiana Foerste		Cl		
Stropheodonta acanthoptera (Whiteaves)			N?	
Stropheodonta corrugata Conrad		Cl		

TABLE V.—*Silurian Brachiopoda*—Continued.

Species.	Eo-silurian.	Mesosilurian.		Neosi-lurian.
	Medina.	Anti-costi, Clinton.	Guelph, Arisaig, Niagara.	Tentac-ulite, Water-lime.
Stropheodonta corrugata pluristriata Foerste		Cl		
Stropheodonta (?) geniculata (Shaler)		A		
Stropheodonta (?) gilpeni (Dawson)			Ar	
Stropheodonta leda (Billings)		A		
Stropheodonta macra (Winchell and Marcy)			N	
Stropheodonta nearpassi Barrett				Te
Stropheodonta prisca Hall		Cl		
Stropheodonta profunda Hall		Cl	N	
Stropheodonta textilis Hall				Te
Stropheodonta (?) ventricosa (Shaler)		A		
Strophomena (?) alterniradiata Shaler		A		
Strophomena (?) antiquata Sowerby		A		
Strophomena (?) arcuata Shaler		A		
Strophomena (?) bipartita Hall				Te
Strophomena (?) doneti Salter			MS	
Strophomena (?) eliptica Conrad			N	
Strophomena (?) julia Billings		A		
Strophomena (?) modesta Conrad		Cl?		
Strophomena (?) orthididea Hall		Cl		
Strophomena philomela Billings		A		
Strophomena (?) reticulata Shaler			N	
Strophomena (?) semiovalis Shaler		A		
Strophomena (?) siluriana Davidson			N	
Strophonella costatula Hall and Clarke			N	
Strophonella (?) patenta Hall		Cl		
Strophonella semiplicata Hall			N	
Strophonella striata Hall			N	
Trematospira camura Hall			N	
Trimerella acuminata Billings			Gu	
Trimerella billingsi Dall			Gu	
Trimerella dalli Davidson and King			Gu	
Trimerella grandis Billings			Gu	
Trimerella ohioensis Meek			N	
Triplecia niagarensis Hall and Clarke			N	
Triplecia ortoni Meek		Cl		
Uncinulus stricklandi (Sowerby)			N	
Whitfieldella billingsana (Meek and Worthen)			N	
Whitfieldella cylindrica Hall		Cl	N	
Whitfieldella hyalo (Billings)			Gu	
Whitfieldella intermedia (Hall)		Cl	N	
Whitfieldella (?) julia (Billings)		A		
Whitfieldella (?) naviformis (Hall)		Cl	N	
Whitfieldell. nitida Hall			N	
Whitfieldella nitida oblata Hall			N	
Whitfieldella (?) nucleolata (Hall)				Te
Whitfieldella oblata (Hall)	×			
Whitfieldella sulcata (Vanuxem)				W
Wilsonia kokomoensis (Miller)				W
* Wilsonia saffordi Hall			N	
Wilsonia saffordi depressa Nettelroth			N	
Wilsonia wilsoni (Sowerby)			N	
Zygospira (?) mica (Billings)		A		

TABLE V.—*Silurian Brachiopoda*—Continued.

Species.	Eo-silurian.	Mesosilurian.		Neosi-lurian.
	Medina.	Anti-costi, Clinton.	Guelph, Arisaig, Niagara.	Tentac-ulite, Water-lime.
Zygospira (?) minima Hall	....	....	N	....
Zygospira (?) paupera Billings	....	A	....	....
Number of Silurian species, 311.				
Number of species in each division	4	116	195	17
Number of species common to the Medina and the other divisions	0	0	0	0
Number of species common to the Clinton and the other divisions	0	....	19	0
Number of species common to the Niagara and the other divisions	0	19	....	2
Number of species common to the Neosilurian and the other divisions	0	0	2	....
Species common to the Silurian and Devonian systems, 5.				
Number of species passing from each division into the Devonian	0	2	5	0

TABLE VI.—*Devonian Brachiopoda.*

[C=Chemung; Co=Corniferous; ED=Eodevonian; G=Genesee; H=Hamilton; Hu=Huron; I=Ithaca; M=Marcellus; MD=Mesodevonian; ND=Neodevonian; P=Portage; S=Schoharie; Tu=Tully. Species preceded by an asterisk (*) are found in the Carboniferous also; by an obelisk (†), in the Silurian.]

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Ambocœlia fimbriata Claypole					P	
Ambocœlia gregaria Hall						C
Ambocœlia præumbona Hall				H		
Ambocœlia spinosa Hall and Clarke				H		
Ambocœlia umbonata (Conrad)			Co	M, H	G	I, C
Amphigenia curta (Meek and Worthen)		×				
Amphigenia elongata (Vanuxem)		×	Co			
Amphigenia elongata subtrigonalis Hall			Co			
Amphigenia elongata undulata Hall			Co			
Anastrophia verneuili (Hall)	×					
Anoplia nucleata Hall		×	Co			
Anoplotheca acutiplicata (Conrad)		×	Co			
Anoplotheca camilla (Hall)		×	Co	M		
Anoplotheca concava (Hall)	×					
Anoplotheca dichotoma (Hall)		×				
Anoplotheca fimbriata (Hall)		×				
Anoplotheca flabellites (Conrad)		×	Co			
Anoplotheca infrequens (Walcott)	ED				ND	
Athyris angelica Hall						C
Athyris angelica occidentalis Whiteaves				H		
Athyris brittsi Miller				MD		
Athyris cora Hall				H		C?
Athyris fultonensis (Swallow)			Co	H		
Athyris minutissima Webster						C
Athyris (?) ottervillensis Miller				MD		
Athyris parvula Whiteaves				H		
Athyris polita Hall						C
Athyris spiriferoides (Eaton)			Co	H		
Atrypa desquamata Sowerby				H		
Atrypa ellipsoidea Nettelroth			Co			
Atrypa hystrix Hall						C
Atrypa hystrix elongata Webster						C
Atrypa hystrix occidentalis Hall				MD		
Atrypa hystrix planosulcata Webster						C
Atrypa missouriensis Miller				MD		
Atrypa pseudomarginalis Hall			S			
†Atrypa reticularis (Linnæus)	×		Co, S	H, Tu		I, C
Atrypa reticularis impressa Hall			S			
Atrypa reticularis nuntia Hall and Whitfield				H		
Atrypa reticularis ventricosa Hall and Whitfield				H		
Atrypa spinosa Hall			Co	H		C
Atrypina imbricata Hall	×					
Barroisella subspatulata (Meek and Worthen)					G	
Beachia suessana Hall		×				
Bilobites varicus (Conrad)	×					
Camarophoria rhomboidalis Hall and Clarke			Co			
Camarospira eucharis Hall			Co			
Camarotœchia barrandi Hall		×				

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Camarotœchia billingsi Hall			Co			
Camarotœchia carica Hall				H		
Camarotœchia carolina Hall			Co			
Camarotœchia congregata (Conrad)				H		
*Camarotœchia contracta Hall					P	C
Camarotœchia contracta saxatilis Hall				H		
Camarotœchia dotis Hall				M, H		
Camarotœchia duplicata Hall						C
Camarotœchia endlichi (Meek). ? Devonian.						
Camarotœchia eximia Hall					P	I, C
Camarotœchia horsfordi Hall				M, H		
Camarotœchia orbicularis Hall						C
Camarotœchia pleiopleura (Conrad)		×				
Camarotœchia prolifica Hall				M, H		
*Camarotœchia sappho Hall				M, H		C
Camarotœchia speciosa Hall		×				
Camarotœchia stephani Hall					P	C
Camarotœchia tethys (Billings)			Co			
Camarotœchia ventricosa Hall	×					
Centronella alveata Hall			Co			
Centronella glansfagea Hall		×	Co			
Centronella glaucia Hall				H		
Centronella impressa Hall				H		
Centronella (?) navicella (Hall)						C
Centronella ovata Hall			Co			
Centronella tumida Billings		×	Co			
Charionella scitula Hall			Co			
Chonetes acutiradiata Hall			Co			
Chonetes antiope Billings		× ?				
Chonetes arcuata Hall			Co			
Chonetes canadensis Billings		× ?				
Chonetes coronata (Conrad)				H		
Chonetes emmetensis A. Winchell				H		
Chonetes filistriata Walcott		ED				
Chonetes hemispherica Hall			Co			
Chonetes koninckiana Norwood and Pratten				MD		
Chonetes lepida Hall				M, H	G, P	I, C
Chonetes lineata (Conrad)			Co	M		
*Chonetes logani aurora Hall				Tu		
Chonetes manitobensis Whiteaves						ND
Chonetes melonica Billings		×				
Chonetes mucronata Hall		×	Co	M, H		
Chonetes punctata Simpson	×					
Chonetes pusilla Hall				H		
Chonetes scitula Hall				M, H	P	I, C
*Chonetes setigera (Hall)				M, H	G	C
Chonetes subquadrata Nettelroth				H		
Chonetes vicina (Castelnau)				H		
Chonetes yandellana Hall			Co			
Chonostrophia complanata Hall		×				
Chonostrophia dawsoni (Billings)		× ?				

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Chonostrophia helderbergiæ Hall	×					
Chonostrophia reversa (Whitfield)			Co			
Christiania subquadrata Hall	×					
Conchidium knighti Nettelroth			Co?			
Conchidium (?) salienense (Swallow)				H?		
Cranæna iowensis (Calvin)				MD		
Cranæna romingeri Hall				H		
Crania agaricina Hall and Clarke	×					
Crania aurora Hall			S			
Crania bella Billings		×?				
Crania centralis Hall					P	
Crania crenistriata Hall			Co	H		
Crania famelica Hall and Whitfield				H		
Crania favincola Hall and Clarke				MD		
Crania granosa Hall and Clarke				H		
Crania greenii Miller			Co			
Crania leoni Hall					P	C
Crania pulchella Hall and Clarke	×					
Crania sheldoni White				H		
Craniella hamiltoniæ Hall				M, H		
Cryptonella (?) circula Walcott. Devonian.						
* Cryptonella (?) eudora Hall						I, C
Cryptonella (?) eximia Hall	×					
Cryptonella iphis Hall			Co			
Cryptonella lens Hall			Co			
Cryptonella ovalis Miller				H		
Cryptonella pinonensis Walcott						ND
Cryptonella planirostra Hall				M, H		
Cryptonella rectirostra Hall				H		
Cyclorhina nobilis Hall				H		
Cyrtia cyrtinaformis Hall and Whitfield						C
Cyrtia norwoodi (Meek)				MD		
Cyrtina affinis Billings		×				
Cyrtina billingsi Meek				H		
Cyrtina biplicata Hall			Co			
Cyrtina crassa Hall			Co			
Cyrtina curvilineata White				H		
Cyrtina dalmani Hall	×					
Cyrtina davidsoni Walcott				MD		ND
Cyrtina hamiltonensis Hall			Co	H	P	I
Cyrtina hamiltonensis recta Hall				H		C
Cyrtina missouriensis (Swallow)				H		
Cyrtina (?) occidentalis (Swallow)				H		
Cyrtina rostrata (Hall)		×	Co			
Cyrtina tiquetra (Hall)				H		
Cyrtina umbonata (Hall)				H		
Cyrtina umbonata alpenensis Hall and Clarke				H		
Dalmanella concinna (Hall)	×					
Dalmanella devonica (Walcott)		ED				
Dalmanella infera (Calvin)						C
Dalmanella lenticularis (Vanuxem)			Co			

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie. Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Dalmanella lepida Hall				H		
Dalmanella perelegans Hall	×	×				
Dalmanella planoconvexa Hall	×	×				
Dalmanella quadrans Hall	×					
Dalmanella subcarinata Hall	×					
Dalmanella superstes Hall and Clarke						C
Dalmanella tenuilineata Hall						C
Delthyris consobrina (d'Orbigny)				H		
Delthyris mesacostalis Hall						I, C
Delthyris perlamellosa (Hall)	×					
Delthyris raricosta Conrad			Co			
Delthyris sculptilis Hall				H		
Dielasma calvini Hall and Whitfield						C
Dignomia alveata Hall				H		
Eatonia coulteri Miller and Gurley		×				
Eatonia eminens Hall	×					
Eatonia medialis (Vanuxem)	×	×				
Eatonia peculiaris (Conrad)	×	×				
Eatonia pumila Hall		×				
Eatonia singularis (Vanuxem)	×					
Eatonia sinuata Hall		×				
Eatonia (?) variabilis Whiteaves				H		
Eatonia whitfieldi Hall		×				
Eunella harmonia Hall			Co			
Eunella lincklæni Hall				M, H		
Eunella simulator Hall				H		
Eunella sullivanti Hall			Co			
Glossina leana (Hall)				H		
Glossina spatiosa (Hall)	×					
Glossina triangulata (Nettelroth)				H		
Gypidula comis (Owen)				MD		
Gypidula galeata (Dalman)	×					
Gypidula læviuscula Hall				MD		
Gypidula lotis (Walcott)						ND
Gypidula munda Calvin				MD		
Gypidula pseudogaleata (Hall)	×					
Gypidula romingeri Hall and Clarke				H		
Gypidula subglobosa (Meek and Worthen)				H		
Hipparionyx proximus Vanuxem		×				
Hypothyris castanea (Meek)				MD		
Hypothyris cuboides (Sowerby)				Tu		
Hypothyris emmonsi (Hall and Whitfield)				MD		
Leiorhynchus dubium Hall				M		
Leiorhynchus globuliforme (Vanuxem)						C
Leiorhynchus hecate Clarke					G	
Leiorhynchus iris Hall						C
Leiorhynchus kelloggi Hall				H		
Leiorhynchus laura Billings				M, H		
Leiorhynchus lesleyi Hall and Clarke						ND
Leiorhynchus limitare (Vanuxem)				M		
Leiorhynchus mesacostale Hall					P	I, C

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie. Corniferous.	Tully, Hamilton. Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Leiorhynchus mysia Hall				M		
Leiorhynchus nevadense Walcott				MD		
Leiorhynchus quadricostatum (Vanuxem)				M	G	
Leiorhynchus robustum Hall and Clarke						C
Leiorhynchus sesquiplicatum A. Winchell				H		
Leiorhynchus sinuatum Hall						C
†* Leptæna rhomboidalis (Wilckens)	×	×	Co	H		C
Leptæna rhomboidalis ventricosa Hall		×				
Leptænisca adnascens Hall and Clarke	×					
Leptænisca concava Hall	×					
Leptænisca tangens Hall	×					
Lindstrœmella aspidium Hall				H		
Lingula albapinensis Walcott						ND
Lingula artemis Billings		× ?				
Lingula centrilineata Hall	×					
Lingula ceryx Hall			S			
Lingula complanata Williams				H		I
Lingula compta Hall and Clarke				H		
Lingula concentrica Conrad			Co ?			
*Lingula cuyahoga Hall						C
Lingula delia Hall				H		
Lingula densa Hall				H		
Lingula desiderata Hall			Co			
Lingula ligea Hall				H	P	
Lingula ligea nevadensis Walcott		ED				
Lingula lonensis Walcott		ED				
Lingula lucretia Billings		× ?				
Lingula maida Hall				H		
Lingula manni Hall			Co			
Lingula minuta Meek				H		
Lingula nuda Hall				H		
Lingula perlata Hall	×					
Lingula punctata Hall				H		I
Lingula rectilatera Hall	×					
Lingula scutella Hall and Clarke						C
Lingula spathata Hall	×					
Lingula spatulata Vanuxem				H	G, P	I
Lingula thedfordensis Whiteaves				H		
Lingula triquetra Clarke					P	
Lingula whitii Walcott		ED				
Lingulella (?) paliformis Hall				H		
Lingulodiscina exilis (Hall)				M		
Lissopleura æquivalvis (Hall)	×					
Martinia athyroides A. Winchell				H		
Martinia glancerasi (White)				H		
Martinia (?) insolita A. Winchell					Hu	
Martinia maia (Billings)			Co			
Martinia meristoides Meek				H		
Martinia sublineata Meek				H		
Martinia subumbona (Hall)				M, H	P	
Megalanteris condoni (McChesney)		×				

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Megalanteris ovalis Hall		×				
Merista elongata Hall	×					
Merista tennesseensis Hall	×					
Merista typa Hall	×					
Meristella arcuata Hall	×					
Meristella barrisi Hall				M, H		
Meristella bella (Hall)	×					
Meristella (?) blancha (Billings)	×					
Meristella clusia (Billings)			Co			
Meristella doris Hall			Co			
Meristella haskinsi Hall				H		
Meristella (?) houghtoni (A. Winchell)					Hu	
Meristella lævis (Vanuxem)	×					
Meristella lata Hall		×				
Meristella lens (A. Winchell)				H		
Meristella lenta Hall		×				
Meristella meeki Hall	×					
Meristella meta Hall				H		
Meristella nasuta (Conrad)			Co			
Meristella princeps Hall	×					
Meristella rostrata Hall				H		
Meristella subquadrata (Hall)	×					
Meristella walcotti Hall and Clarke		×				
Metaplasia disparilis (Hall)			Co			
Metaplasia pyxidata (Hall)		×				
Newberria claypoli Hall				H		
Newberria johannis Hall				MD		
Newberria lævis (Meek)				H		
Newberria missouriensis Hall				H		
Nucleospira concentrica Hall	×					
Nucleospira concinna Hall			Co	H		
†Nucleospira elegans Hall	×					
Nucleospira ventricosa Hall	×					
Orbiculoidea alleghania (Hall)						C
Orbiculoidea ampla Hall		×				
Orbiculoidea conradi (Hall)	×					
Orbiculoidea discus Hall	×					
Orbiculoidea doria (Hall)				H		
Orbiculoidea elmira (Hall)						C
Orbiculoidea humilis (Hall)				M, H		
Orbiculoidea jervensis (Barrett)		×				
Orbiculoidea lodensis (Vanuxem)					G	
Orbiculoidea lodensis media Hall				M, H		C
Orbiculoidea marginalis (Whitfield)				H		
Orbiculoidea minuta Hall				M, H		
Orbiculoidea neglecta (Hall)						C
Orbiculoidea randalli Hall				H		
Orbiculoidea seneca (Hall)				H		
Orbiculoidea tullia (Hall)				Tu		
Oriskania navicella Hall and Clarke		×				
Orthis (?) eryna Hall			Co			

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Orthis (?) tenuistriata Hall					P	
Orthostrophia strophomenoides Hall	×					
Orthothetes anomala (A. Winchell)				H		
Orthothetes bellulus Clarke				M		
Orthothetes chemungensis (Conrad)						C
Orthothetes chemungensis arctostriata Hall				M, H	P	
Orthothetes chemungensis perversus Hall			Co	H		
Orthothetes deformis Hall	×					
Orthothetes deformis sinuata Hall and Clarke	×					
Orthothetes flabellum (Whitfield)			Co			
Orthothetes pandora (Billings)			Co	M		
Orthothetes prava Hall						ND?
?Orthothetes subplana (Conrad)	×					
Orthothetes woolworthana Hall	×					
Parazyga deweyi Hall	×					
Parazyga hirsuta Hall			Co	H		
Pentagonia unisulcata (Conrad)		×	Co	H		
Pentamerella arata (Conrad)			Co			
Pentamerella borealis (Meek)				H		
Pentamerella dubia Hall				H?		
Pentamerella intralineata (A. Winchell)				H		
Pentamerella micula Hall				H?		
Pentamerella obsolescens Hall				H?		
Pentamerella pavillionensis Hall				H		
Pentamerella thusnelda Nettelroth			Co			
Pholidops arenaria Hall		×				
Pholidops areolata Hall			S			
Pholidops bellula Walcott		ED				
Pholidops calceola Hall and Clarke			Co			
Pholidops greenii Miller and Gurley				H		
Pholidops hamiltoniæ Hall				H		
Pholidops lepis Hall and Clarke			Co			
Pholidops oblata Hall				H		
Pholidops ovata Hall	×					
Pholidops patina Hall and Clarke			Co			
Pholidops quadrangularis Walcott		ED				
Pholidops terminalis Hall		×				
Pholidostrophia iowensis (Owen)			Co	H		
Plectorthis (?) aurelia (Billings)		×				
Productella arctirostrata Hall						C
Productella bialveata Hall						C
Productella boydi Hall						C
Productella costatula Hall						C
Productella costatula strigata Hall						C
Productella dumosa Hall				H		
Productella eriensis Nicholson			Co			
Productella exanthemata Hall			Co	H		
Productella hallana Walcott						ND
Productella hirsuta Hall						C
Productella hirsuta rectispina Hall						C
Productella hirsutiforme (Walcott)						ND

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Productella lachrymosa (Conrad)						C
Productella lachrymosa lima (Conrad)						C
* Productella lachrymosa stigmata Hall						C
Productella marquessi Rowley				H		
Productella murchisoniana De Koninck				H		
Productella navicella Hall			Co	H		
Productella onusta Hall						C
Productella papulata Hall				H		
Productella productoides (Murchison)				H		
Productella rarispina Hall						C
Productella semiglobosa Nettelroth			Co			
* Productella speciosa Hall					P	I, C
Productella spinulicosta Hall			Co	M, H		
Productella striatula Hall						C
Productella subalata Hall				MD		
Productella tullia Hall				H		
Pugnax pugnus Martin					P	I
Pugnax pugnus altus (Calvin)						ND
Rensselæria æquiradiata (Conrad)	×					
Rensselæria cayuga Hall and Clarke		×				
Rensselæria cumberlandiæ Hall		×				
Rensselæria elliptica Hall	×					
Rensselæria intermedia Hall		×				
Rensselæria marylandica Hall		×				
Rensselæria mutabilis Hall	×					
Rensselæria ovoides (Eaton)		×				
Rensselæria ovalum Hall and Clarke		×				
Reticularia canandaiguæ (Hall and Clarke)				H		
Reticularia fimbriata (Conrad)		×	Co	M, H		I
Reticularia franklini (Meek)				H		
Reticularia knappiana (Nettelroth)			Co			
Reticularia lævis (Hall)					P	I
Reticularia modesta (Hall)	×	×				
Reticularia nevadensis (Walcott)						ND
Reticularia (?) nympha (Billings)	×					
Reticularia præmatura (Hall)						C
Reticularia subundifera (Meek and Worthen)				H		
Retzia (?) polypleura A. Winchell					P	
Retzia (?) subglobosa Hall			S			
Rhipidomella alsa Hall			S			
Rhipidomella assimilis Hall	×					
Rhipidomella cleobis Hall			Co			
Rhipidomella cumberlandiæ Hall		×				
Rhipidomella (?) cuneata (Owen)				H		
Rhipidomella cyclas Hall				M, H		
Rhipidomella discus Hall	×					
Rhipidomella eminens Hall	×					
Rhipidomella goodwini (Nettelroth)				H		
Rhipidomella idonea Hall				H		
Rhipidomella leucosia Hall				H		
Rhipidomella livia (Billings)			Co			
Rhipidomella lucia Billings		×				

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Rhipidomella (?) mitis (Hall)			S			
Rhipidomella musculosa Hall		×				
Rhipidomella oblata Hall	×					
Rhipidomella oblata emarginata Hall	×					
Rhipidomella peloris Hall			S			
Rhipidomella penelope Hall				H		
Rhipidomella pennsylvanica (Simpson)						C
Rhipidomella semele Hall			Co			
Rhipidomella solitaria Hall				H		
Rhipidomella suborbicularis Hall				H		
*Rhipidomella thiemii (White)						C
Rhipidomella tubulostriata Hall	×					
Rhipidomella vanuxemi Hall			Co	M, H		
Rhynchonella acutiplicata Hall	×					
Rhynchonella allegania Williams						C
Rhynchonella altiplicata Hall	×					
Rhynchonella ambigua Calvin				MD		
Rhynchonella aspasia Billings	×					
Rhynchonella bialveata Hall	×					
Rhynchonella dryope Billings		×				
Rhynchonella eminens Hall	×					
Rhynchonella excellens Billings		×				
Rhynchonella fitchana Hall		×				
Rhynchonella gainesi Nettelroth				H		
Rhynchonella huronensis A. Winchell					Hu	
Rhynchonella huronensis precipua A. Winchell					Hu	
Rhynchonella inæquiplicata Hall			Co			
Rhynchonella inutilis Hall	×					
Rhynchonella louisvillensis Nettelroth			Co			
Rhynchonella mainensis Billings	×					
Rhynchonella medea Billings			Co			
Rhynchonella multistriata Hall		×				
Rhynchonella oblata Hall		×				
Rhynchonella occidens Walcott		ED				
Rhynchonella planoconvexa Hall	×					
Rhynchonella principalis Hall		×				
Rhynchonella ramsayi Hall		×				
Rhynchonella raricosta Whitfield			Co			
Rhynchonella royana Hall			Co			
Rhynchonella rudis Hall	×					
Rhynchonella semiplicata (Conrad)	×					
Rhynchonella septata Hall		×				
Rhynchonella subacuminata Webster						C
Rhynchonella sulcoplicata Hall	×					
Rhynchonella tenuistriata Nettelroth			Co			
Rhynchonella transversa Hall	×					
Rhynchonella warrenensis Swallow		ED				
Rhynchospira electra Billings	×					
Rhynchospira (?) eugenia Billings			Co			
Rhynchospira formosa Hall	×					
Rhynchospira globosa Hall	×					

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Rhynchospira rectirostra Hall		×				
Rhynchotrema formosa (Hall)	×					
Rœmerella grandis Vanuxem				H		
Scenidium insignis Hall	×					
Schizobolus concentricus (Vanuxem)					G	
Schizocrania (?) helderbergia Hall	×					
Schizocrania superincreta Barrett	×					
Schizophoria carinata Hall						C
Schizophoria macfarlanii (Meek)				MD		ND
Schizophoria manitobensis Whiteaves						ND
Schizophoria multistriata Hall	×					
Schizophoria (?) peduncularis Hall	×					
Schizophoria propinqua Hall			Co			
Schizophoria striatula (Schlotheim)				MD		ND
Schizophoria tioga Hall					P	C
Schizophoria tulliensis (Vanuxem)				Tu		
Selenella gracilis Hall and Clarke			Co			
Seminula (?) rogersi Hall and Clarke			Co			
Spirifer acanthopterus (Conrad)				H		
Spirifer acuminatus (Conrad)			Co	H		
Spirifer alæformis de Verneuil			Co			
Spirifer aldrichi Etheridge. Devonian.						
Spirifer amarus Swallow				H		
Spirifer angustus Hall				H	P	
Spirifer annæ Swallow				H		
Spirifer arcticus Haughton. Devonian.						
Spirifer arctisegmentus Hall			Co			
Spirifer arenosus Conrad		×	Co			
Spirifer asper Hall				H		
Spirifer audaculus (Conrad)				M, H		
Spirifer audaculus macronotus Hall				H		
Spirifer belphegor Clarke					G	
Spirifer bidorsalis A. Winchell				H		
Spirifer billingsanus Miller		×				
Spirifer bimesialis Hall						ND
Spirifer byrnesi Nettelroth				H		
Spirifer concinnus Hall	×					
Spirifer consors A. Winchell				H		
Spirifer corticosus Hall				H		
Spirifer (?) costalis Castelnau			Co?			
Spirifer cumberlandiæ Hall		×				
Spirifer cyclopterus Hall	×	×				
Spirifer davisi Nettelroth				H		
Spirifer disjunctus Sowerby						C
Spirifer disjunctus occidentalis Whiteaves						ND
Spirifer disjunctus sulcifer Hall and Clarke						C
Spirifer divaricatus Hall			Co	H		
Spirifer duodenarius Hall			Co			
Spirifer dupliplicatus (Conrad)				H		
Spirifer engelmanni Meek				MD		
Spirifer euruteines Owen				H		

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Spirifer filicostus A. Winchell				H		
Spirifer formosus Hall				H		
Spirifer fornaculus Hall				H		
Spirifer fornax Hall				H		
Spirifer gaspensis Billings		×				
Spirifer granulosus (Conrad)				H		
Spirifer gregarius Hall			Co			
Spirifer grieri Hall			Co			
Spirifer hemicyclus Meek and Worthen		×				
Spirifer hobbsi Nettelroth				H		
Spirifer hungerfordi Hall						C
Spirifer huronensis A. Winchell					P	
Spirifer intermedius Hall		×				
Spirifer inutilis Hall						ND
Spirifer iowensis Owen				MD		
Spirifer kennicotti Meek				MD		
Spirifer macbridii Calvin						ND
Spirifer macconathii Nettelroth				H		
Spirifer macrus Hall			Co			
Spirifer macropleurus (Conrad)	×					
Spirifer macrothyris Hall			Co			
Spirifer manni Hall			Co			
Spirifer marcyi Hall				H		
Spirifer mesastrialis Hall					P	I, C
Spirifer multicostatus Castelnau			Co?			
Spirifer murchisoni Castelnau		×				
Spirifer nictavensis Dawson		×				
Spirifer octocostatus Hall	×					
Spirifer orestes Hall and Whitfield						C
Spirifer paradoxus (Schlotheim)			Co			
Spirifer pennatus (Atwater)				M, H		I
Spirifer pennatus posterus Hall and Clarke						C
Spirifer pennatus tulliensis Williams				Tu		
Spirifer perextensus Meek and Worthen			Co			
Spirifer pertenuis Hall				H		
Spirifer pharovicinus A. Winchell					Hu	
Spirifer pinonensis Meek		ED		MD		ND
Spirifer pluto Clarke					G	
Spirifer rectiplicatus (Conrad)		×?				
Spirifer saffordi Hall	×					
Spirifer segmentus Hall			Co			
Spirifer strigosus Meek. Devonian.						
*Spirifer subattenuatus Hall						C
Spirifer subdecussatus Whiteaves				H		
Spirifer submucronatus Hall		×				
Spirifer substrigosus Webster						C
Spirifer subvaricosus Hall and Whitfield				H?		
Spirifer tenuis Hall				H		
Spirifer tenuistriatus Hall	×					
Spirifer tribulis Hall		×				
Spirifer tullius Hall				H		

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Spirifer urbanus Calvin				H		
Spirifer varicosus Hall			Co			
Spirifer whitneyi Hall						C
Spirifer williamsi Hall and Clarke						C
Spirifer worthenanus Schuchert		×				
Spirifer wortheni Hall				H		
Stringocephalus burtini Defrance				MD		
Strophalosia hystricula Hall						C
Strophalosia muricata Hall						C
Strophalosia radicans (A. Winchell)				H		
Strophalosia rockfordensis Hall						C
Strophalosia truncata (Hall)				M, H	P	I
Stropheodonta alveata Hall			Co			
Stropheodonta arcuata Hall						C
Stropheodonta beckii Hall	×					
Stropheodonta blainvillii (Billings)		ED				
Stropheodonta callawayensis Swallow				H		
Stropheodonta callosa Hall			Co			
Stropheodonta calvini Miller						C
Stropheodonta canace Hall and Whitfield						C
Stropheodonta cincta A. Winchell				H		
Stropheodonta concava Hall			Co	H		
Stropheodonta (?) costata Owen				H		
Stropheodonta crebristriata Hall			Co			
Stropheodonta demissa (Conrad)				MD		ND
Stropheodonta demissa imitata A. Winchell				H		
Stropheodonta erratica A. Winchell				H		
Stropheodonta fieldeni Etheridge		ED				
Stropheodonta galatea (Billings)		ED				
Stropheodonta hemispherica Hall			Co			
Stropheodonta inæquiradiata Hall			Co			
Stropheodonta inæquistriata (Conrad)			Co	M, H		
Stropheodonta indenta (Conrad)	×					
Stropheodonta interstrialis (Phillips)				MD		
Stropheodonta interstrialis (Vanuxem)						I
Stropheodonta iowensis Owen						ND?
Stropheodonta irene (Billings)			Co			
Stropheodonta junia Hall				H		
Stropheodonta kemperi Swallow				H		
Stropheodonta lincklæni Hall		×				
Stropheodonta macrostriata (Walcott)		ED				
Stropheodonta magnifica Hall		×				
Stropheodonta magniventra Hall		×				
Stropheodonta mucronata (Conrad)					P	I
Stropheodonta navalis Swallow				H		
Stropheodonta navalis boonensis Swallow				H		
Stropheodonta parva Owen				H		
Stropheodonta parva Hall			Co			
Stropheodonta patersoni Hall		×	Co			
Stropheodonta perplana (Conrad)		×	Co	H		I, C
Stropheodonta perplana nervosa Hall						I

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Stropheodonta perplana tulliensis Williams				Tu		
Stropheodonta planulata Hall	×					
Stropheodonta plicata Hall				H		
Stropheodonta tullia (Billings)			Co			
Stropheodonta variabilis Calvin						C
Stropheodonta varistriata (Conrad)	×					
Stropheodonta varistriata arata Hall	×					
Stropheodonta vascularia Hall		×				
Strophomena (?) elongata Conrad	×					
Strophomena (?) gibbosa Conrad			Co			
Strophonella ampla Hall			Co			
Strophonella cælata Hall						C
Strophonella cavumbona Hall	×					
Strophonella (?) conradi Hall	×					
Strophonella crassa Rowley				H		
Strophonella geniculata (Hall)	×					
Strophonella headleyana Hall	×					
Strophonella leavenworthana Hall	×					
Strophonella punctulifera (Conrad)	×					
Strophonella (?) radiata (Vanuxem)	×					
Strophonella reversa Hall						C
Strophonella schohariensis Castelnau			Co?			
Terebratula elia Hall				MD		
Terebratula jucunda Hall			Co			
Terebratula ontario Hall				H		
Terebratula traversensis A. Winchell				H		
Trematospira costata Hall	×					
Trematospira dubia (Billings)	×					
Trematospira equistriata Hall and Clarke	×					
Trematospira gibbosa Hall				H		
Trematospira hippolyte (Billings)	×					
Trematospira (?) liniuscula A. Winchell				H		
Trematospira maria (Billings)	×					
Trematospira multistriata Hall	×	×				
Trematospira perforata Hall	×					
Trematospira simplex Hall	×					
Trematospira tennesseensis Hall and Clarke	×					
Trigeria gaudryi Œhlert		×				
Trigeria (?) lepida Hall				H		
Trigeria (?) portlandica (Billings)	×					
Tropidoleptus carinatus (Conrad)				M, H		
Tropidoleptus occidens Hall				H		
Uncinulus abruptus (Hall)	×					
Uncinulus campbellanus (Hall)	×					
Uncinulus mutabilis Hall	×					
Uncinulus nobilis (Hall)	×					
Uncinulus nucleolata (Hall)	×					
Uncinulus pyramidatus (Hall)	×					
Uncinulus vellicata Hall	×					
Vitulina pustulosa Hall				H		
Whitfieldella (?) bisulcata (Vanuxem)	×					

TABLE VI.—*Devonian Brachiopoda*—Continued.

Species.	Eodevonian.		Mesodevonian.		Neodevonian.	
	Lower Helderberg.	Oriskany.	Schoharie, Corniferous.	Tully, Hamilton, Marcellus.	Portage, Huron, Genesee.	Chemung, Ithaca.
Whitfieldella (?) harpalyce (Billings)	×	....	....	....	....	....
Zygospira (?) subconcava Meek and Worthen	×	....	....	....	....	....
Number of Devonian species, 663.						
Number of species in each division	129	104	128	238	41	117
Number of species common to the Lower Helderberg and the other divisions	....	8	2	2	1	2
Number of species common to the Oriskany and the other divisions	8	....	15	7	0	3
Number of species common to the Corniferous and the other divisions	2	15	....	27	2	7
Number of species common to the Hamilton and the other divisions	2	7	27	....	12	22
Number of species common to the Genesee-Portage and the other divisions	1	1	4	12	....	17
Number of species common to the Chemung and the other divisions	2	4	7	24	17	....
Species common to the Devonian and Carboniferous systems, 11.						
Number of species passing from each division into the Carboniferous	1	1	1	4	3	10

TABLE VII.—*Carboniferous and Permian Brachiopoda.*

[B=Burlington; EC=Eocarboniferous; K=Keokuk; Ka=Kaskaskia; SL=St. Louis. Species preceded by an obelisk (†) are found in the Devonian also.]

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinderhook.	Keokuk, Burlington.	Kaskaskia, St. Louis.	Coal Measures.	Permian.
Acambona osagensis (Swallow)	×				
Acambona prima White		B			
Ambocœlia minuta White	×				
Ambocœlia planoconvexa (Shumard)				×	×
Athyris biloba (A. Winchell)	×				
Athyris (?) corpulenta (A. Winchell)	×				
Athyris densa Hall and Clarke			SL		
Athyris hannibalensis (Swallow)	×				
Athyris incrassata Hall		B			
Athyris intervarica McChesney		B			
Athyris (?) jacksoni (Swallow)				×	
Athyris lamellosa (L'Eveille)	×	K			
Athyris missouriensis (A. Winchell)	×				
Athyris monticola (White)	EC				
Athyris ohioensis (A. Winchell)	×				
Athyris papillioniformis McChesney			Ka		
Athyris (?) perinflata McChesney		K			
Athyris prouti (Swallow)	×				
Athyris ultravarica McChesney		K			
Aulacorhynchus millipunctata (Meek and Worthen)				×	
Beecheria davidsoni Hall and Clarke				×	
Camarophorella lenticularis (White and Whitfield)		B			
Camarophoria (?) bisulcata Shumard				×	
Camarophoria caput-testudinis (White)		B			
Camarophoria explanata (McChesney)			Ka		
Camarophoria occidentalis Miller		B			
Camarophoria ringens (Swallow)		K			
Camarophoria subcuneata Hall			SL		
Camarophoria subtrigona Meek and Worthen		K			
Camarophoria thera Walcott		EC			
Camarophoria (?) wortheni (Hall)			SL		
†Camarotœchia contracta Hall	×				
Camarotœchia sagerana (A. Winchell)	×				
†Camarotœchia sappho Hall	×				
Centronella (?) allii A. Winchell	×				
Centronella (?) crassicardinalis Whitfield			SL		
Centronella (?) flora A. Winchell	×				
Chonetes geniculata White	×				
Chonetes glabra Geinitz				×	
Chonetes granulifera Owen				×	×
Chonetes illinoiensis Worthen		B			
Chonetes logani Norwood and Pratten	×	B			
†Chonetes logani aurora Hall		B			
Chonetes loganensis Hall and Whitfield	×				
Chonetes mesolobus Norwood and Pratten				×	
Chonetes michiganensis Stevens				×	
Chonetes multicosta A. Winchell	×	B			
Chonetes ornata Shumard	×				

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Chonetes parva Shumard				×	
Chonetes permiana Shumard				×	
Chonetes planumbona Meek and Worthen		K			
Chonetes platynotus White				×	
Chonetes pulchella A. Winchell	×				
†Chonetes setigera (Hall)	×				
Chonetes shumardiana de Koninck		K			
Chonetes tumida Herrick	×				
Chonetes variolata d'Orbigny				×	
Chonetes verneuiliana Norwood and Pratten				×	
Chonetes verneuiliana utahensis Meek				×	
Chonopectus fischeri (Norwood and Pratten)	×	B			
Cleiothyris clintonensis (Swallow)			Ka		
Cleiothyris crassicardinalis (White)	×				
Cleiothyris hirsuta (Hall)			SL, Ka		
Cleiothyris missouriensis (Swallow)				×	
Cleiothyris obmaxima (McChesney)		K			
Cleiothyris obvia (McChesney)			Ka		
Cleiothyris orbicularis (McChesney)				×	
Cleiothyris reflexa (Swallow)			SL		
Cleiothyris roissyi (L'Eveille)		K	SL, Ka		
Cleiothyris squamosa (Worthen)			SL		
Crania chesterensis Miller and Gurley			Ka		Ka
Crania lævis Keyes	×				
Crania modesta White and St. John				×	
Crania (?) permiana Shumard				×	
Crania reposita White		B			
Crania rowleyi Gurley	×				
Cryptacanthia compacta White and St. John				×	
†Cryptonella (?) eudora Hall	×				
Cryptonella (?) inconstans (Herrick)	×				
Cryptonella subelliptica Hall and Clarke	×				
Cryptonella alta Hall	×				
Cyrtina acutirostris (Shumard)	×				
Cyrtina burlingtonensis (Rowley)		B			
Cyrtina lachrymosa Hall and Clarke	×				
Cyrtina neogenes Hall and Clarke		B			
Cyrtina triplicata Simpson	×				
Derbya affinis Hall and Clarke				×	
Derbya bennetti Hall and Clarke				×	
Derbya biloba Hall				×	
Derbya broadheadi Hall and Clarke				×	
Derbya (?) costatula Hall and Clarke			Ka		
Derbya crassa (Meek and Hayden)				×	×
Derbya cymbula Hall and Clarke				×	
Derbya kaskaskiensis (McChesney)			Ka		
Derbya keokuk Hall	×	K			
Derbya pratteni (McChesney)				×	
Derbya robusta (Hall)				×	
Derbya ruginosa Hall and Clarke		K			

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carboniferous.	Neo-carboniferous.
	Kinderhook.	Keokuk, Burlington.	Kaskaskia, St. Louis.	Coal Measures.	Permian.
Dielasma bovidens (Morton)				×	
Dielasma burlingtonensis White	×				
Dielasma formosa Hall			SL		
Dielasma gorbyi Miller		K			
Dielasma obovata Hall and Clarke				× ?	
Dielasma occidentalis (Miller)	×				
Dielasma (?) rowleyi (Worthen)		B			
Dielasma sacculus (Martin)				×	
Dielasma shumardana Miller			Ka		
Dielasma turgida (Hall)			Ka		
Enteletes hemiplicata Hall				×	×
Eumetria (?) altirostris (White)	×				
Eumetria marcyi (Shumard)			SL, Ka		
Eumetria marcyi costata Hall			Ka		
Eumetria woosteri (White)				× ?	
Glossina flabellula Hall and Clarke	×				
Glossina nebraskensis (Meek)				×	
Glossina sedaliensis (Miller)	×				
Glossina waverlyensis (Herrick)	×				
Harttina anna (Hartt)				×	
Hustedia (?) meekana (Shumard)				×	
Hustedia mormoni (Marcou)				×	
Hustedia (?) papillata (Shumard)				×	
Hustedia (?) triangularis (Miller)	×				
Leiorhynchus boonense (Shumard)		B			
Leiorhynchus newberryi Hall	×				
†Leptæna rhomboidalis (Wilckens)	×				
Lingula atra Herrick	×				
Lingula carbonaria Shumard				×	
Lingula crawfordsvillensis Gurley		K			
†Lingula cuyahoga Hall	×				
Lingula gannensis Herrick	×				
Lingula gorbyi Miller	×				
Lingula halli White		B			
Lingula indianensis Miller and Gurley		K			
Lingula meeki Herrick	×				
Lingula melie Hall	×				
Lingula membranacea A. Winchell	×				
Lingula mytiloides Sowerby				×	
Lingula paracletus Hall and Clarke	×				
Lingula parrishi Miller				×	
Lingula tighti Herrick				×	
Lingula umbonata Cox				×	
Lingula varsoviense Worthen			SL		
Lingulodiscina (?) connata Walcott		EC			
Lingulodiscina newberryi Hall	×				
Lingulodiscina pleurites (Meek)	×				
Martinia glabra (Martin)				×	
Martinia glabra contracta Meek and Worthen			Ka		
Martinia lævigata (Swallow)		K			

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Meekella occidentalis (Newberry)				×	
Meekella (?) occidentalis (Swallow)				×	
Meekella pyramidalis (Newberry)				×	
Meekella striatocostata (Cox)				×	×
Moristella (?) incerta Simpson	×				
Nucleospira barrisi White	×				
Orbiculoidea (?) capax (White)	×				
Orbiculoidea capuliformis (McChesney)				×	
Orbiculoidea convexa (Shumard)				×	
Orbiculoidea gallaheri (A. Winchell)	×				
Orbiculoidea hertzeri Hall and Clarke	×				
Orbiculoidea keokuk (Gurley)		K			
Orbiculoidea illinoiensis (Miller and Gurley)				×	
Orbiculoidea magnifica Herrick	×				
Orbiculoidea manhattenensis (Meek and Hayden)				×	
Orbiculoidea missouriensis (Shumard)				×	
Orbiculoidea (?) munda (Miller and Gurley)				×	
Orbiculoidea nitida (Phillips)				×	
Orbiculoidea patellaris (A. Winchell)	×				
Orbiculoidea saffordi (A. Winchell)	EC				
Orbiculoidea sampsoni (Miller)	×				
Orbiculoidea subtrigonalis (McChesney)				×	
Orbiculoidea tenuilineata (Meek and Hayden)				×	
Orbiculoidea utahensis (Meek)				×	
Orbiculoidea varsoviensis (Worthen)		K			
Orthis (?) flava A. Winchell	×				
Orthothetes crenistrius (Phillips)		EC			
Orthothetes desideratus Hall and Clarke	×				
Orthothetes inæqualis (Hall)	×				
Orthothetes inflatus (White and Whitfield)	×				
Orthothetes lens (White)	×				
Orthothetes umbraculum Authors		EC		×	
Proboscidella (?) clava (Norwood and Pratten)				×	
Productella arcuata Hall	×				
Productella concentrica (Hall)	×				
†Productella lachrymosa stigmata Hall	×				
Productella pyxidata Hall	×				
Productella shumardana Hall	×				
†Productella speciosa Hall	×				
Productus alternatus Norwood and Pratten		K			
Productus altonensis Norwood and Pratten			SL		
Productus auriculatus Swallow				×	
Productus bisinuatus Hall			SL		
Productus blairi Miller	×				
Productus boliviensis d'Orbigny				×	
Productus boonensis Swallow				×	
Productus boonensis elevata Swallow				×	
Productus buchianus de Koninck				×	
Productus burlingtonensis Hall		B			
Productus carbonarius de Koninck. Carboniferous.					

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Productus confragosus Conrad				×	
Productus cooperensis Swallow	×				
Productus cora d'Orbigny				×	
Productus cora mogoyoni Marcou				×	
Productus coræformis Swallow			SL		
Productus costatoides Swallow				×	
Productus costatus de Koninck				×	×
Productus curtirostratus A. Winchell	×				
Productus delawari Marcou		EC			
Productus depressus Swallow		K			
Productus dolorosus A. Winchell	×				
Productus duplicostatus A. Winchell	×				
Productus fasciculatus McChesney			Ka		
Productus fentonensis Swallow		K			
Productus fimbriatus Sowerby			SL?	×?	
Productus flexistrius McCoy			Ka		
Productus giganteus (Martin)			EC		
Productus gracilis A. Winchell	×				
Productus gradatus Swallow		K			
Productus granulosus Phillips		K			
Productus hepar Morton				×	
Productus hildrethanus Norwood and Pratten				×	
Productus indianensis Hall			SL		
Productus inflatus McChesney				×	
Productus ivesi Newberry				×	
Productus lævicostus White	×				
Productus lasallensis Worthen				×	
Productus latissimus Sowerby				×?	
Productus leuchtenbergensis de Koninck				×?	
Productus longispinus Sowerby?				×	
Productus longus Meek. Carboniferous.					
Productus magnicostatus Swallow				×	
Productus magnus Meek and Worthen		K			
Productus margaritaceus Phillips				×	
Productus marginicinctus Prout			SL		
Productus mesialis Hall		K			
Productus mesolobus Phillips. Carboniferous.					
Productus mexicanus Shumard				×	
Productus morbillianus A. Winchell		B			
Productus multistriatus Meek. Carboniferous.					
Productus muricatus Norwood and Pratten				×	
Productus nanus Meek and Worthen				×	
Productus nebrascensis Owen				×	×
Productus nevadensis Meek				×	
Productus newberryi Hall	×				
Productus newberryi annosus Herrick	×				
Productus nodocostatus Herrick	×				
Productus nodosus Newberry				×	
Productus norwoodi Swallow				×	
Productus occidentalis Newberry				×	

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Productus ovatus Hall			SL		
Productus parvulus A. Winchell	×				
Productus parvus Meek and Worthen			Ka		
Productus pertenuis Meek				×	
Productus phillipsi Norwood and Pratten. Carboniferous.					
Productus pileolus Shumard				×	
Productus pocillum Morton				×	
Productus popii Shumard				×	
Productus punctatus (Martin)				×	
Productus pustulosus Phillips				×	
Productus raricostatus Herrick	×				
Productus rushvillensis Herrick	×				
Productus scabriculus (Martin)			EC	×	
Productus scitulus Meek and Worthen			SL		
Productus semireticulatus (Martin)		K	SL	×	×
Productus semireticulatus kansasensis Swallow				×	
Productus semistriatus Meek				×	
Productus subhorridus Meek. Carboniferous.					
Productus swallovi Beecher			Ka		
Productus symmetricus McChesney				×	
Productus tenuicostatus Hall			SL		
Productus undiferus de Koninck				×	
Productus viminalis White		B			
Productus wortheni Hall		K			
Productus weyprechti Toula				×	
Ptychospira sexplicata White and Whitfield	×				
Pugnax dawsonianus (Davidson)				×	
Pugnax globulina (Davidson)				×	
Pugnax grosvenori Hall			SL		
Pugnax mutatus Hall		K	SL		
Pugnax ottumwa (White)			SL		
Pugnax pugnus missouriensis (Shumard)	×				
Pugnax rockymontanus (Marcou)				×	
Pugnax striatocostatus (Meek and Worthen)	×				
Pugnax swallovanus (Shumard)				×	
Pugnax utah (Marcou)				×	
Reticularia cooperensis (Swallow)	×				
Reticularia guadalupensis (Shumard)				×	
Reticularia perplexa (McChesney)				×	
Reticularia perplexa striatolineata (Swallow)				×	
Reticularia pseudolineata (Hall)		B, K			
Reticularia setigera (Hall)			Ka		
Reticularia (?) temeraria (Miller)		B			
Reticularia tenuispinata (Herrick)	×				
Reticularia translata (Swallow)			Ka		
Retzia (?) circularis Miller	×				
Retzia (?) plicata Miller	×				
Retzia (?) popeana Swallow	×				
Rhipidomella burlingtonensis Hall		B			
Rhipidomella clarkensis (Swallow)		K			

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Rhipidomella dalyana (Miller)		B			
Rhipidomella dubia Hall			SL		
Rhipidomella michelini (L'Eveille)	×				
Rhipidomella missouriensis (Swallow)	×				
Rhipidomella nevadensis (Meek). Carboniferous.					
Rhipidomella occasus Hall	×				
Rhipidomella oweni Hall and Clarke	×				
Rhipidomella pecosi (Marcou)				×	
Rhipidomella subelliptica (White and Whitfield)	×				
?Rhipidomella thiemii (White)	×				
Rhipidomella vanuxemi pulchella Herrick	×				
Rhynchonella acadiensis Davidson				×	
Rhynchonella algeri McChesney				×	
Rhynchonella arctirostrata Swallow			SL		
Rhynchonella barquensis A. Winchell	×				
Rhynchonella camarifera A. Winchell	×				
Rhynchonella carbonaria McChesney				×	
Rhynchonella cooperensis Shumard	×				
Rhynchonella eurekensis Walcott			EC		
Rhynchonella evangelina Hartt				×	
Rhynchonella guadalupe Shumard				×	
Rhynchonella heteropsis A. Winchell	×				
Rhynchonella hubbardi A. Winchell	×				
Rhynchonella ida Hartt				×	
Rhynchonella illinoisensis Worthen				×	
Rhynchonella indentata Shumard				×	
Rhynchonella macra Hall			SL		
Rhynchonella medialis Simpson	×				
Rhynchonella metallica White				×	
Rhynchonella micropleura A. Winchell	×				
Rhynchonella obsolescens Hall	×				
Rhynchonella opposita White and Whitfield	×				
Rhynchonella perrostellata Swallow			SL		
Rhynchonella persinuata A. Winchell	×				
Rhynchonella pleurodon (Phillips)				×	
Rhynchonella ricinula Hall			SL		
Rhynchonella striata Simpson	×				
Rhynchonella subcircularis A. Winchell	×				
Rhynchonella tetraptyx A. Winchell	×				
Rhynchonella texana Shumard				×	
Rhynchonella tuta Miller		B			
Rhynchonella unica A. Winchell	×				
Rhynchonella whitii A. Winchell	×				
Rhynchopora pustulosa (White)	×				
Rhynchospira (?) ashlandensis Herrick	×				
Rhynchospira scansa Hall and Clarke	×				
Romingerina julia (A. Winchell)	×				
Schizophoria resupinata (Martin)		EC			
Schizophoria resupinoides (Cox)				×	
Schizophoria swallovi Hall		B			

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Seminula argentea (Shepard)				×	×
Seminula caput-serpentis (Swallow)				×	
Seminula charitonensis (Swallow)				×	
Seminula claytoni (Hall and Whitfield)	×				
Seminula dawsoni Hall and Clarke				×	
Seminula formosa (Swallow)		K			
Seminula hawni (Swallow)				×	
Seminula maconensis (Swallow)				×	
Seminula parva (Swallow)		K			
Seminula persinuata (Meek). Carboniferous.					
Seminula (?) plattensis (Swallow)				×	
Seminula singletonii (Swallow)				×	
Seminula subquadrata (Hall)			Ka		
Seminula trinuclea Hall			SL		
Seminula wasatchensis (White)				×	
Spirifer acuticostatus de Koninck				×	
Spirifer agelaius Meek		EC			
Spirifer albapinensis Hall and Whitfield	×				
Spirifer annectans Walcott		EC			
Spirifer biplicatus Hall	×				
Spirifer boonensis Swallow				×	
Spirifer cameratus Morton				×	
Spirifer cameratus percrassus Swallow				×	
Spirifer centronatus A. Winchell	×				
Spirifer clavatulus McChesney		B			
Spirifer deltoideus Herrick	×				
Spirifer desideratus Walcott		EC			
Spirifer duplicostus Phillips. Carboniferous.					
Spirifer fastigatus Morton. Carboniferous.					
Spirifer (?) fimbriatus Morton				×	
Spirifer forbesi Norwood and Pratten		B			
Spirifer fultonensis Worthen				×	
Spirifer grimesi Hall	×	B			
Spirifer imbrex Hall		B			
Spirifer incertus Hall		B			
Spirifer increbescens Hall			Ka		
Spirifer increbescens americanus Swallow			Ka		
Spirifer increbescens transversalis Hall			Ka		
Spirifer kelloggi Swallow		K			
Spirifer keokuk Hall		K			
Spirifer keokuk shelbyensis Swallow			SL		
Spirifer lateralis Hall			SL		
Spirifer latior Swallow	×				
Spirifer leidyi Norwood and Pratten			SL		
Spirifer leidyi chesterensis Swallow			Ka		
Spirifer leidyi merimacensis Swallow			SL		
Spirifer littoni Swallow			SL		
Spirifer logani Hall		K			
Spirifer marcoui Waagen				×	
Spirifer marionensis Shumard	×				

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carboniferous.	Neo-carboniferous.
	Kinderhook.	Keokuk, Burlington.	Kaskaskia, St. Louis.	Coal Measures.	Permian.
Spirifer meeki Swallow		B			
Spirifer mexicanus Shumard				×	
Spirifer missouriensis Swallow	×				
Spirifer mortonanus Miller		K			
Spirifer mundulus Rowley		B			
Spirifer mysticensis Meek		EC			
Spirifer neglectus Hall		K			
Spirifer newberryi Hall	×				
Spirifer novamexicanus Miller		B			
Spirifer oregonensis Shumard				×	
Spirifer osagensis Swallow	×				
Spirifer ovalis Phillips. Carboniferous.					
Spirifer peculiaris Shumard	×				
Spirifer rockymontanus Marcou				×	
Spirifer rostellatus Hall		K			
Spirifer rostratus Morton				×	
Spirifer scobina Meek. Carboniferous.					
Spirifer sillanus A. Winchell	×				
Spirifer striatiformis Meek	×				
Spirifer striatus (Martin)	×	B			
Spirifer subæqualis Hall			SL		
†Spirifer subattenuatus Hall	×				
Spirifer subcardiformis Hall			SL		
Spirifer suborbicularis Hall		K			
Spirifer subrotundatus Hall	×				
Spirifer sulciferus Shumard				×	
Spirifer taneyensis Swallow	×				
Spirifer tenuicostatus Hall		K	SL		
Spirifer tenuimarginatus Hall		K			
Spirifer texanus Meek				×	
Spirifer trigonalis Martin			EC		
Spirifer vernonensis Swallow	×				
Spirifer vernonensis ozarkensis Swallow	×				
Spirifer waverlyensis A. Winchell	×				
Spirifer winchelli Herrick	×				
Spiriferina aciculifera Rowley	×				
Spiriferina billingsi Shumard				×	
Spiriferina binacuta A. Winchell		B			
Spiriferina clarksvillensis A. Winchell	×				
Spiriferina cristata (Schlotheim)				×	
Spiriferina depressa Herrick	×				
Spiriferina gonionota Meek				×	
Spiriferina norwoodana (Hall)			SL		
Spiriferina octoplicata (Sowerby)				×	
Spiriferina pulchra Meek				×	
Spiriferina solidirostris White	×				
Spiriferina spinosa (Norwood and Pratten)			Ka		
Spiriferina subelliptica (McChesney)		K			
Spiriferina subtexta White		B			
Spiriferina transversa (McChesney)			Ka		

TABLE VII.—*Carboniferous and Permian Brachiopoda*—Continued.

Species.	Eocarboniferous.			Meso-carbon-iferous.	Neo-carbon-iferous.
	Kinder-hook.	Keo-kuk, Bur-lington.	Kaskas-kia, St. Louis.	Coal Meas-ures.	Per-mian.
Streptorhynchus (?) multistriata Meek and Hayden				×	
Streptorhynchus ulrichi Hall and Clarke			Ka		
Stricklandinia (?) subquadrata Herrick				×	
Strophalosia beecheri Rowley	×				
Strophalosia cymbula Hall and Clarke		K			
Strophalosia (?) guadalupensis (Shumard)				×	
Strophalosia keokuk Beecher		K			
Strophalosia nummulina A. Winchell	×				
Strophalosia scintilla Beecher	×				
Strophalosia spondyliformis (White and St. John)				×	
Strophomena (?) nassula Conrad. Carboniferous.					
Syringothyris angulata Simpson	×				
Syringothyris carteri (Hall)	×	B			
Syringothyris extenuata (Hall)	×				
Syringothyris gigas (Troost). Lower Carboniferous.					
Syringothyris herricki Schuchert	×				
Syringothyris missouri Hall and Clarke	×				
Syringothyris (?) plena (Hall)		B			
Syringothyris randalli Simpson	×				
Syringothyris texta (Hall)	×	K			
Terebratula bisacula McChesney			Ka		
Terebratula brevilobata Swallow			SL		
Terebratula inornata McChesney		K	SL	×	
Terebratula lapillus Morton				×	
Terebratula mexicana Hall				×?	
Terebratula perinflata Shumard				×	
Terebratula subretziaforma McChesney			Ka		
Terebratula swallovana Miller			Ka		
Terebratula utah Hall and Whitfield	×				
Torynifer criticus Hall and Clarke			SL		
Number of Carboniferous species, 478.					
Number of species in each division	156	93	74	158	9
Number of species common to the Kinderhook and the other divisions		9	0	0	0
Number of species common to the Burlington-Keokuk and the other divisions	9		5	4	1
Number of species common to the St. Louis-Kaskaskia and the other divisions	0	5		5	1
Number of species common to the Coal Measures and the other divisions	0	4	5		9
Number of species common to the Permian and the other divisions	0	1	1	9	
No species pass from the Carboniferous into the Mesozoic.					

TABLE VIII.—*Mesozoic Brachiopoda.*

Species.	Triassic.	Jurassic.	Lower Cretaceous.	Upper Cretaceous.
Cistella beecheri Clark				×
Cistella plicatilis Clark				×
Discina (?) pileolus Whiteaves			×	
Discina (?) semipolita Whiteaves				× ?
Discina (?) vancouverensis Whiteaves				× ?
Kingena leonensis (Conrad)			×	
Kingena wacoensis (Roemer)			×	
Lingula brevirostris Meek and Hayden		×		
Lingula nitida Meek and Hayden				×
Lingula shumardi Cragin			×	
Lingula subspatulata Hall and Meek				×
Rhynchonella æquiplicata Gabb	×			
Rhynchonella gnathophora Meek		×		
Rhynchonella halli Gabb	×			
Rhynchonella lacunosa (Schlotheim)		×		
Rhynchonella lacunosa arolica Oppel		×		
Rhynchonella lingulata Gabb	×			
Rhynchonella maudensis Whiteaves				× ?
Rhynchonella myrina Hall and Whitfield		×		
Rhynchonella plicatilis (Sowerby)				× ?
Rhynchonella schucherti Stanton				×
Rhynchonella tayloriana Lea. Habana, Cuba		× ?		
Rhynchonella whitneyi Gabb				×
Spiriferina (?) alia Hall and Whitfield	×			
Spiriferina borealis Whiteaves	×			
Spiriferina homfrayi (Gabb)	×			
Spiriferina obtusa (Gabb)	×			
Terebratella californica Stanton				×
Terebratella (?) dubitanda (Cooper)				× ?
Terebratella (?) imbricata (Cooper)				× ?
Terebratella obesa Gabb				×
Terebratella plicata (Say)				×
Terebratella vanuxemi Lyell and Forbes				×
Terebratula augusta Hall and Whitfield	×	×		
Terebratula dorenbergi Felix. Mexico		×		
Terebratula harlani Morton				×
Terebratula helena Whitfield				×
Terebratula humboltensis Gabb	×			
Terebratula liardensis Whiteaves	×			
Terebratula poeyana Lea. Habana, Cuba		× ?		
Terebratula repellini d'Orbigny. Mexico		×		
Terebratula robusta Whiteaves		× ?		
Terebratula semisimplex White	×			
Terebratula cfr. zieteni Loriol. Mexico		×		
Terebratulina atlantica (Morton)				×
Terebratulina filosa Conrad				× ?
Terebratulina floridana (Morton)				×
Terebratulina guadalupæ (Roemer)				×
Waldheimia (?) catorcensis Aguilera. Mexico		×		
Number of Mesozoic species, 49.				
Number of species in each system	11	13	4	22

TABLE IX.—*Cenozoic and Recent Brachiopoda.*

Species.	CENOZOIC. Eocene.	CENOZOIC. Neocene.	RECENT. North and Central American Atlantic.	RECENT. North and Central American Pacific.
Discinisca lugubris (Conrad)		×		
Discinisca multilineata (Conrad)		×		
Hemithyris psittacea (Chemnitz)		×		
Rhynchonella wilmingtonensis (Lyell and Sowerby)	×			
Terebratula canipes Ravenel	×			
Terebratula carneoidea Guppy. Trinidad	×			
Terebratula demissirostra Conrad	×			
Terebratula lecta Guppy. Trinidad	×			
Terebratula nitens (Conrad)		×		
Terebratula trinitatensis Guppy. Trinidad	×			
Terebratulina gracilis (Schlotheim)	×			
Terebratulina lachryma (Morton)	×			
Terebratulina tejonensis Stanton	×			
Waldheimia kennedyi Dall		×		
Number of species in each division	9	5		
Atretia gnomon Jeffrys			×	
Cistella cistellula (Wood)			×	
Dallina floridana (Pourtales)			×	
Discinisca atlantica (King)			×	
Discinisca cumingi (Broderip)				×
Frieleia halli Dall				×
Glottidia albida (Hinds)			×	×
Glottidia antillarum (Reeve)				×
Glottidia audebarti (Broderip)				×
Glottidia palmeri Dall				×
Hemithyris craneana Dall				×
Hemithyris psittacea (Chemnitz)		×	×	×
Kraussina pisum (Lamarck)				×
Lacqueus californicus (Koch)				×
Lacqueus jeffreysi Dall				×
Lacqueus vancouverensis Davidson				×
Liothyrina bartletti (Dall)			×	
Liothyrina clarkeana Dall			×	
Macandrevia americanum Dall				×
Macandrevia craniella Dall				×
Macandrevia cranium (Müller)			×	
Macandrevia diamantina Dall			×	×
Magasella aleutica Dall				×
Magasella labradorensis (Sowerby)			×	
Magasella radiata Dall			×	×
Platidia anomioides (Phillippi)				×
Terebratalia obsoleta Dall				×
Terebratalia occidentalis Dall				×
Terebratalia transversa (Sowerby)				×
Terebratella frielii Davidson			×	
Terebratella pulvinata (Gould)				×
Terebratella spitzbergensis Davidson			×	
Terebratulina caput-serpentis (Linné)				×
Terebratulina küensis Dall and Pillsbry				×
Terebratulina murrayi Davidson			×	
Terebratulina septentrionalis Couthouy			×	
Number of species in each ocean			15	24

TABLE X.—*South American fossil Brachiopoda.*

[J=Jurassic. Species preceded by an asterisk (*) are found in North America also.]

Species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Carboniferous.	Jurassic, Triassic.	Cretaceous.	Tertiary.
* Ambocœlia planoconvexa (Shumard)					×			
* Amphigenia elongata (Vanuxem)				×				
Anabia paraia Clarke			×					
* Anoplotheca flabellites (Conrad)				×				
* Camarotœchia dotis Hall				×				
Centronella (?) arcii A. Ulrich				×				
Centronella (?) silvetii A. Ulrich				×				
Chonetes amazonica Derby					×			
Chonetes (?) arcii A. Ulrich				×				
Chonetes comstockii Rathbun				×				
Chonetes curuaensis Rathbun				×				
Chonetes falklandica (Morris and Sharpe)				×				
Chonetes freitassii Rathbun				×				
* Chonetes glabra Geinitz					×			
* Chonetes granulifera Owen					×			
Chonetes herbert-smithi Rathbun				×				
Chonetes onettiana Rathbun				×				
Chonetes rucki A. Ulrich				×				
Chonetes stübeli A. Ulrich				×				
* Chonetes variolata d'Orbigny					×			
* Chonostrophia complanata Hall?				×				
* Cleiothyris roissyi (L'Eville)					×			
Clitambonites adscendens (Pander?)		×						
Cyrtina (?) curupira Rathbun				×				
Dalmanella (?) nettoana (Rathbun)				×				
Derbya correanus (Derby)					×			
Dielasma hochstetteri (Toula)					×			
Dielasma itaitubensis (Derby)					×			
Enteletes andii (d'Orbigny)					×			
Enteletes gaudryi (d'Orbigny)					×			
Glossina dubia (d'Orbigny)		×						
* Glossina trentonensis (Conrad?)		×						
Harttina coutinhoana (Derby)					×			
* Hustedia mormoni (Marcou)					×			
Leptæna (?) stelzneri Kayser		×						
Lingula coheni A. Ulrich				×				
Lingula ererensis Rathbun				×				
Lingula gracana Rathbun				×				
Lingula metensis Terquem						J		
Lingula munsteri d'Orbigny		×						
Lingula plagemanni Möricke						J		
Lingula rodriguezii Rathbun				×				
* Lingula spatulata Vanuxem				×				
Lingula stautoniana Rathbun				×				
Lingula submarginata d'Orbigny		×						
Lingula truncata Sowerby							×	
Meristella riskowyi A. Ulrich				×				
Notothyris (?) smithii Derby				×				
Orbiculoidea baini Morris and Sharpe				×				
* Orbiculoidea lodensis (Vanuxem)				×				

TABLE X.—*South American fossil Brachiopoda*—Continued.

Species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Carboniferous.	Jurassic, Triassic.	Cretaceous.	Tertiary.
Orthis buchi d'Orbigny					×			
Orthis calligramma (Davidson) Kayser		×						
Orthis concinna Morris and Sharpe				×				
Orthis disparilis Kayser		×						
Orthis humboldti d'Orbigny			×					
Orthis (?) laticostata d'Orbigny				×				
Orthis lenticularis Wahlenberg ?	×							
Orthis obtusa Pander		×						
Orthis (?) pectinata d'Orbigny				×				
Orthis saltensis Kayser	×							
Orthis (?) sulivanti Morris and Sharpe				×				
Orthis (?) tenuis Morris and Sharpe				×				
Orthis vespertilio Sowerby		×						
Orthothetes agassizi (Rathbun)				×				
Orthothetes tapajotensis (Derby)					×			
Orthotichia morganiana (Derby)					×			
* Plectambonites sericea (Sowerby)		×						
Productella mæcuruensis Rathbun				×				
Productus batesianus Derby					×			
* Productus boliviensis d'Orbigny					×			
Productus capacii d'Orbigny					×			
Productus chandlessii Derby					×			
Productus clarkianus Derby					×			
* Productus cora d'Orbigny					×			
* Productus costatus (Sowerby) de Koninck					×			
Productus humboldti d'Orbigny					×			
* Productus longispinus Sowerby ?					×			
Productus papilio Gabb					×			
Productus peruvianus d'Orbigny					×			
Productus reticulatus Gabb					×			
Productus rhomianus Derby					×			
* Productus semireticulatus (Martin)					×			
Productus villiersi d'Orbigny					×			
Productus wallacianus Derby					×			
* Reticularia perplexa (McChesney)					×			
Retzia (?) jamesiana Rathbun				×				
Rhipidomella hartti (Rathbun)				×				
Rhipidomella inca (d'Orbigny)				×				
Rhipidomella penniana Derby					×			
Rhynchonella ænigma (d'Orbigny)						J		
Rhynchonella anduin Gottsche						J		
Rhynchonella antisiensis (d'Orbigny)				×				
Rhynchonella antonii Gabb							× ?	
Rhynchonella belemnitica Quenstedt						J		
Rhynchonella caracolensis Gottsche						J		
Rhynchonella ererensis Rathbun				×				
Rhynchonella manflasensis Möricke						J		
Rhynchonella pipira Derby					×			
* Rhynchonella pleurodon (Phillips)					×			
Rhynchonella plicatissima Quenstedt						J		
Rhynchonella subtetræda (Conrad)							× ?	

TABLE X.—*South American fossil Brachiopoda*—Continued.

Species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Carboniferous.	Jurassic, Triassic.	Cretaceous.	Tertiary.
Rhynchonella tetræda (Sowerby)						J		
Rhynchonella triplicata Quenstedt						J		
Scaphiocœlia boliviensis Whitfield				×				
Schizophoria cora (d'Orbigny)					×			
*Seminula argentea (Shepard)					×			
Seminula titicacensis (Gabb)					×			
Spirifer antarcticus Morris and Sharpe				×				
Spirifer buarquianus Rathbun				×				
Spirifer boliviensis d'Orbigny				×				
Spirifer chuquiscus Ulrich				×				
Spirifer condor d'Orbigny					×			
*Spirifer duodenarius Hall				×				
Spirifer elizæ Rathbun				×				
Spirifer hartti Rathbun				×				
Spirifer hawkinsi Morris and Sharpe				×				
Spirifer mæcuruensis Rathbun				×				
*Spirifer murchisoni Castelnau				×				
Spirifer orbignii Morris and Sharpe				×				
Spirifer pedroanus Rathbun				×				
Spirifer pentlandi d'Orbigny					×			
Spirifer quichuus d'Orbigny				×				
*Spirifer rockymontanus Marcou					×			
Spirifer valenteanus Rathbun				×				
Spirifer vogeli von Ammon				×				
*Spiriferina cristata (Schlotheim)					×			
Spiriferina cfr. münsteri Davidson						J		
Spiriferina rostrata Schlotheim						J		
*Spiriferina spinosa (Norwood and Pratten)					×			
Spirigerella derbyi Waagen					×			
Streptorhynchus hallianus Derby					×			
Strophalosia cornelliana Derby					×			
*Stropheodonta perplana (Conrad)				×				
Strophomena (?) talacastrensis Kayser		×						
Terebratula bicanaliculata Schlotheim						J		
Terebratula chilensis d'Orbigny								×
Terebratula copiapensis Möricke						J		
Terebratula derbyana Rathbun				×				
Terebratula domeykana Bayle and Coquand						J		
Terebratula emarginata Sowerby						J		
Terebratula ficoides Bayle and Coquand						J		
Terebratula gottschii Steinman						J		
Terebratula hohmanni Möricke						J		
Terebratula ignaciana d'Orbigny						J		
Terebratula lacunosa Schlotheim						J		
Terebratula meridionalis Conrad							×	
Terebratula patagonica Sowerby								×
Terebratula perforata Piette						J		
Terebratula perovalis Sowerby						J		
Terebratula punctata Sowerby						J		
Terebratula raimondiana Gabb							×?	
Terebratula subexcavata Conrad							×	

TABLE X.—*South American fossil Brachiopoda*—Continued.

Species.	Cambrian.	Ordovician.	Silurian.	Devonian.	Carboniferous.	Jurassic, Triassic.	Cretaceous.	Tertiary.
Terebratula subovoides Roemer	......	......	......	......	......	J	......	......
Terebratula subnumismalis Davidson	......	......	......	......	......	J	......	......
Trigeria (?) margarida (Derby)	......	......	......	×	......	......	......	......
Trigeria (?) wardiana (Rathbun)	......	......	......	×	......	......	......	......
Tropidoleptus carinatus (Conrad)	......	......	......	×	......	......	......	......
Vitulina pustulosa Hall	......	......	......	×	......	......	......	......
Number of South American species, 159.								
Number of species in each system	2	12	2	61	47	26	6	2
Number of species common to South and North America, 28.								

CHAPTER II.

BRACHIOPOD TERMINOLOGY APPLIED TO FOSSIL FORMS.

Adductor muscles.—In the Protremata and Telotremata these muscles have their ventral insertion one on either side of the central axis, between the diductors. In passing to the dorsal valve they divide into four, and produce in that shell the two pairs of principal scars known as the anterior and posterior adductors. By contraction these muscles close the shell. In the Neotremata they are the essential muscles, so far as scars in the fossil shells are concerned, the anterior adductors closing the valves, while the posterior pair serves to open the valves. In the Atremata there is a simple pair of adductors placed near the anterior extremity of the visceral area.

Anterior region.—That portion of the shell in front of the transverse axis and opposite the pedicle opening.

Apex.—The place of initial shell growth. It may be the most posterior portion of the valve or may be situated near the transverse axis.

Brachidium (Hall and Clarke).—The calcareous brachial supports of the Spiriferacea and Terebratulacea.

Cardinal area.—A more or less well-developed triangular area on each side of the delthyrium, distinctly set off from the general surface of the shell. It is best developed on the ventral valve of articulate brachiopods, but is also present on the dorsal valve, and generally in a rudimentary condition in many inarticulate species. See *Deltidium.*

Cardinal extremities.—The terminations of the hinge line.

Cardinal process.—A variously modified apophysis, situated posteriorly at the center of the hinge of the dorsal valve in articulate brachiopods. To it are attached the diductor muscles, which by their contraction serve to open the valves anteriorly.

Cardinal slopes.—The inclined surfaces extending from the umbonal slopes to the hinge margins.

Chilidium (Beecher).—A plate, in appearance similar to the deltidium, covering the exterior portion of the cardinal process in many Protremata. Its development does not begin until early neanic or later growth, and is probably secreted by the dorsal mantle lobe.

Crura.—Processes on the dorsal hinge plate of the Telotremata and some Protremata, to which are attached the fleshy brachia and brachidia. These usually form the inner walls of the dental sockets, and may be supported by septal plates.

Cruralium (Hall and Clarke).—The dorsal equivalent of the ventral spondylium, being formed by the convergence or union of the crural plates in the Pentameracea.

Delthyrium (Hall and Clarke).—The triangular aperture transecting medially the cardinal area, or the posterior surface from the apex to the posterior margin of the ventral valve, through some portion of which the pedicle passes. It has also been termed the *fissure* or *foramen.* The delthyrium may or may not be closed by a deltidium or deltidial plates.

Deltidium.—A plate of one piece which grows over the delthyrium of many Protremata and some Neotremata. In the early larval stage of Thecidium this plate begins as a secretion from the dorsal side of the body segment, and becomes anchylosed to the ventral valve in the phylembronic stage, subsequent additions being secreted by the body wall and pedicle. The convex or concave central portion of the ventral cardinal area in some Atremata is not homologous with the deltidium. It is but a part of the area, and does not have its origin in the prodeltidium, as in Thecidium.

Deltidial plates.—Two plates growing medially from the walls of the delthyrium after neanic growth. These usually unite medially, and close the delthyrium more or less completely. They are restricted to the Telotremata, and are secreted by extensions of the ventral mantle lobe. Hall and Clarke introduced the terms *deltarium* and *deltaria* for the same plates, and for the coalesced condition of the deltaria, Bronn's *pseudodeltidium.*

Dental plates.—Vertical plates supporting the teeth of the ventral valve.

Dental sockets.—Excavations in the dorsal cardinal margin in which the teeth of the ventral valve articulate. The inner wall of the socket is elevated and forms the base of the crural plate.

Diductor muscles.—In the Protremata and Telotremata the principal pair of diductor muscles has the larger end attached to the ventral valve near the anterior edge of the visceral area, while the other end has its insertion on the anterior portion of the cardinal process. There is another pair of small accessory diductor muscles, but these are seldom shown in fossil shells. By contraction these muscles open the valves.

Dorsal valve.—Usually the smaller and imperforate valve and the one to which the brachia are always attached. *Brachial, hæmal, socket,* and *entering* valves are other terms more rarely employed.

Ephebic (Hyatt, emend. Bather and Buckman).—Designating the mature shell.

Foramen.—A small circular passage through the deltidium or deltidial plates, either below or at the apex of the ventral valve. Sometimes the foramen encroaches by abrasion upon the umbo of the ventral valve.

Genital markings.—Radial markings or pits within the posterior portion of the visceral space, indicating the position and extent of the genitalia.

Gerontic (Hyatt, emend. Bather and Buckman).—Designating old age. It is indicated in the ontogeny of many species of brachiopods by extreme thickness of the valves, obesity, or by numerous, crowded growth lines near the anterior margin, a condition which sometimes produces truncation and absence of striæ at the margin.

Hinge line.—The line along which articulation takes place.

Jugum (Hall and Clarke).—The transverse band and its accessory processes uniting the spiralia. When this band is medially incomplete the parts are termed *jugal processes.*

Lateral areas.—That portion of the shell on each side of the ventral axis.

Listrium (Hall and Clarke).—In some Neotremata a plate closing the progressive track of the pedicle opening or pedicle cleft, posterior to the apex of the ventral valve.

Longitudinal axis.—A median line through the shell from the beak to the opposite margin.

Loop.—The calcareous brachial supports of the Terebratulacea. It is usually composed of descending and ascending lamellæ, united by a transverse band.

Median septum.—An internal vertical plate commonly developed along the vertical axis and between the muscles of the ventral valve. Sometimes there is also a dorsal median septum. Lateral septa are rarely developed.

Neanic (Hyatt, emend. Bather and Buckman).—Designating youthfulness, or the stage in which specific characters begin to develop.

Nepionic (Hyatt).—Designating the smooth-shell stage succeeding the protegulum.

Pallial sinuses.—Two convergent or divergent primary sinuses of the circulatory system, traversing the mantle and originating in the posterior medial region. They usually have numerous secondary branches, and both often leave impressions in the shell.

Pedicle.—The flexible muscular organ of the ventral valve by means of which brachiopods may be attached to extraneous objects.

Pedicle muscles.—In the Protremata and Telotremata one pair originates on the ventral valve at points just outside and behind the diductors and another on the dorsal valve behind the posterior adductors, while the opposite ends of both are attached to the pedicle. Besides these, there is an unpaired muscle lying at the base of the pedicle, attaching it closely to the ventral valve.

Platform.—See *Spondylium.*

Posterior region.—That portion of the shell back of the transverse axis and toward the beak, or apex.

Primary lamellæ.—The primary descending bands of the spiralia, the posterior ends being attached to the crura.

Prodeltidium (Hall and Clarke restricted).—The third shell plate developed in the earlier embryonic growth of species of Atremata, Neotremata, and Protremata, and subsequently becoming more or less firmly attached to either the dorsal (Atremata) or ventral valve.

Protegulum (Beecher).—The initial shell of brachiopods. It is smooth and of microscopic size, in outline being semicircular or arcuate, and without cardinal areas.

Protractor muscles.—In the Lingulacea one pair has the ventral ends fastened at the anterior extremity of the visceral area, extending backward and inserted near the lateral margin of the dorsal valve, outside the rotators. A second pair originates just behind the adductors of the ventral valve, and is inserted posterior to the first pair. These muscles draw the dorsal valve forward. They are apparently present in the Obolidæ and Trimerellidæ, but their position is different.

Pseudodeltidium.—Properly this term applies only to the united condition of the deltidid plates in the Protremata and Telotremata. It is provisionally applied to the concave or convex medial portion of the cardinal areas in Atremata and Protremata.

Retractor muscles.—In the Atremata these extend from the outer lateral margins of the visceral area in the ventral valve to its anterior extremity in the dorsal valve, and serve to readjust the dorsal shell.

Rotator muscles.—In Lingulacea these are situated posteriorly just in advance of the umbonal muscle, two on one side and one on the other. By their contraction the dorsal valve turns alternately first in one direction and then in the other.

Septal plates.—Plates supporting the crural processes, also known as *crural plates.*

Spondylium.—A plate in the Pentameracea, formed by the union of converging dental plates, to the upper surface of which are attached the adductor, diductor, and pedicle muscles. The spondylium may rest upon the ventral valve or may be supported by a median septum. This plate is rarely present in the Telotremata, but more commonly in the Atremata, where it is known as the *platform.* There is sometimes developed in the dorsal valve a plate similar in appearance to the spondylium, but different in origin, and known as the *cruralium.*

Spiralia (Beecher).—The calcareous spiral brachial supports in the Spiriferacea. A connecting jugum may be present or absent.

Syrinx.—A tubular structure developed in the delthyrium of some Spiriferacea, opening ventrally and partially inclosing the pedicle.

Teeth.—Two processes of the ventral valve of articulate brachiopods, serving for articulation.

Transverse axis.—A line through the shell from right to left, midway between the beak and anterior margin.

Umbo.—The elevated or prominent portion of the valve anterior to the apex.

Umbonal muscle.—A single muscle situated in the umbonal region of most Atremata. By its contraction the valves are opened anteriorly. In Obolus this muscle divides toward the ventral valve.

Umbonal slopes.—The inclined surfaces about the umbo and opposite the cardinal slopes.

Ventral valve.—The valve situated on the ventral side of the animal, and having in youth or maturity a delthyrium or pedicle opening through which the pedicle is protruded, except in Iphidea, Obolella, Lingula, etc., where the pedicle protrudes between the valves. When the shell is cemented to foreign bodies it is always by the ventral valve. It is usually the larger and deeper of the two valves. *Pedicle*, *larger*, *dental*, *neural*, and *receiving* valves are synonymous terms.

CHAPTER III.

BIOLOGIC DEVELOPMENT OF THE BRACHIOPODA.

ORDINAL DEVELOPMENT.

ATREMATA.

This order, which began in the Lower Cambrian, is represented by 199 species, or over 10 per cent of American Paleozoic brachiopods. Its greatest representation, both in species and genera, was during the Cambrian and Ordovician eras. A very marked decline set in during the Silurian and Devonian, with almost extinction in the Carboniferous, where only Lingula and its subgenus Glossina occur.

The terminal families Trimerellidæ and Lingulidæ contain species which attain the greatest individual growth. Lingulidæ has the longest phylogenetic history. It is the last important and most specialized family of the Atremata, and manifests the greatest persistency and specific differentiation. Lingula, the essential genus of the family, lived at least from the Ordovician system through all succeeding time, and is represented in modern seas. During this enormous period the only change observable is that in the ancient forms the viscera occupied a little more and the brachia somewhat less space.

In the more primitive types of Atremata, Obolacea, the shell is usually much thicker and less chitinous than in the higher or derived families, Lingulacea. The shell is thickest in the Trimerellidæ and thinnest in the Lingulidæ. From their mode of occurrence in rocks it seems probable that Paterinidæ, Obolidæ, and Trimerellidæ (=Obolacea) never lived in the mud or sand of the sea bottom, as did Lingulidæ, Lingulasmatidæ, and probably Lingulellidæ (=Lingulacea).[1] The oboloids in all probability had short pedicles, while the linguloids have very long pedicles. The long, flexible, tubular pedicle of Lingula, associated with the buried habit of the animal, apparently explains

[1]Since all the species of Obolacea are known only as fossils, it may seem hazardous to ascribe to them a mode of living different from that of Lingula. These shells had short peduncles, are round or oval, sometimes very gibbous, always comparatively thick shelled, and not decidedly phosphatic. The writer has never observed any species of this superfamily in situ transverse to sedimentation, or in other words "on edge." In the Lingulacea the peduncle is very long, and the shells are elongate quadrangular, triangular, spatulate, or acuminate, and, as a rule, are decidedly thin and phosphatic. Recent Lingulas all live partially buried in the sea bottom, and not infrequently fossil species are found in situ, on edge, with their apices downward. Lingulops and Lingulasma also have been observed situated on edge. The round, thick shells of Obolacea are strongly contrasted with the elongate thin shells of Lingulacea. These peculiarities are in all probability due to mechanical causes. The Linguloids, with their long, powerful, and flexible peduncles, are buried in the sediments, while the posteriorly pointed shell is an adaptation to the same end, caused by the frequent peduncular pulling on that part of the valves.

the cause for the thinness of the shell and the long, narrow, attenuated form of its valves.

The ontogeny of Obolella and Lingula shows that one branch developed directly from the Paterinidæ to Obolidæ and Trimerellidæ, while another branch began in the Obolidæ. The derived branch continued to diverge by changing the thick round shells of the radical stock into thin spatulate or elongate subquadrate valves, first in the Lingulellidæ and culminating in the Lingulidæ. The latter family then gave rise to Lingulasmatidæ, which, in accordance with the law of morphologic equivalents, developed some of the internal diagnostic characters of the terminal family of the first phylum in the platform of the Trimerellidæ.

Hall and Clarke refer the genera of Lingulasmatidæ to Trimerellidæ, and thus the latter family, as understood by them, embraces two stocks having widely separated origins. This is peculiar, since they clearly understand the independent origin of these stocks, as will be seen by the following quotation, but more particularly by their diagram.[1]

> There is no single feature in the entire group of the edentulous brachiopods so striking as the great platforms in Trimerella and its allies, and it is rarely that so beautiful and well established an illustration of the attainment of such a remarkable resultant along two distinct lines of development can be presented.

The writer holds that a natural family can have but one stock, a stock can have but one origin.

Nonfunctional articular processes are developed in this order in a number of genera and at various times. Such are slightly developed in Trimerella and Monomorella, and more strongly in Tomasina, Barroisella, and Spondylobolus. In the Neotremata, articulation is also approached in Trematobolus, and in Crania a false hinge is sometimes developed in Ordovician species. A cardinal process so characteristic of the Protremata and Telotremata is faintly developed in Neobolus, Lakmina, and Trimerella of the Atremata.

NEOTREMATA.

The order Neotremata begins in the Lower Cambrian, and is represented by 156 species, or over 8 per cent of the brachiopods of the American Paleozoic. It has considerably fewer species than the Atremata, and exhibits a lack of specific differentiation, such as form and surface ornamentation. This probably is largely due to the fact that the pedicle is very short, or even obsolete, in this order, and that the pedicle foramen is subcentral, producing in the Trematidæ and Craniidæ more or less of a parasitic growth, while in the families Discinidæ and Acrotretidæ the great majority of species are circular or oval, with more or less cone-shaped shells.

As in the Atremata, great tenacity of life is also manifested in this order, since its two essential families, Discinidæ and Craniidæ, have representatives throughout all time since the Ordovician system.

[1] Palæontology of New York, Vol. VIII, Part I, 1892, p. 165.

Greatest representation in both genera and species was during the Ordovician, after which generic differentiation was practically restricted to the Discinidæ and Craniidæ. Crania persisted throughout the post-Ordovician, and for longevity equals the atrematous genus Lingula.

The percentage of widely dispersed species is about the same as in the Atremata, and likewise is greatest in those families with the longest phylogenetic history, as Acrotretidæ, Discinidæ, and Craniidæ.

Development was along two lines. In one a broad fissure (the most primitive condition of the pedicle opening in this order) is retained as a mature character (Trematidæ). Later geologically, and at the maturity of the individual in derived forms, the fissure is gradually closed posteriorly, leaving a long, narrow slit, at one end of which the pedicle emerges (Discinidæ). The other line (Acrotretacea) probably developed and inherited holoperipheral growth in the ventral valve, very rapidly producing a small subcentral circular foramen, since this feature is already well developed in the Lower Cambrian Acrotretidæ, and in advance of the greatest development of the Discinidæ. It is probably this second branch that gave origin to the degraded family Craniidæ. The protegulum in the dorsal valve of Acrotretacea is probably always marginal, whereas in the Discinacea it is always more or less central.

It is remarkable that Crania, so unlike other living brachiopods and occurring abundantly in the seas of to-day, has never been completely studied developmentally or ontogenetically. The taxonomic position of the Craniidæ is therefore not actually determined, and Hall and Clarke incline to follow Waagen in regarding the Craniacea as equivalent in rank to the Atremata and Neotremata. These authors write:[1]

> It is nevertheless to be observed that no trace of a former pedicle-slit incision or perforation is found on mature or immature shells, and it would be difficult to comprehend in what manner such an essential modification of the shell could be wholly concealed by later growth. Were the pedicle marginal in primitive growth stages, and subsequently atrophied, the obliteration of the marginal opening by later resorption and growth would be a readily intelligible process. There is, hence, in this default of evidence, a good reason to doubt the close affinities of Crania and Pholidops to the Diacaulia [= Neotremata]. Present knowledge would seem to indicate that they were primarily of the type of the Mesocaulia [= Atremata], and that their resemblance to the Diacaulia is wholly of secondary growth. Waagen's term for this group, Gastropegmata (or Craniacea), may therefore prove to be equivalent to each of these other two divisions.

Brachiopod embryology demands a pedicle in the early stages of Crania. The ventral valve carries the pedicle, and it is always this valve which is attached by cementation or otherwise. The writer has observed in Yale University Museum a specimen of *Pholidops ovata* with a cicatrix of attachment, around which point growth is holoperipheral, as in all Neotremata. Specimens of Pholidops are sometimes preserved with both valves in position and delicately attached to Bryozoa,

[1] Palæontology of New York, Vol. VIII, Part II, 1895, p. 325.

from the Falls of the Ohio. These are believed to be actual and not chance attachments. In Crania cementation occurs very early and is complete, causing all obliteration of the protegulum and subsequent stages of growth in the ventral shell. That cementation does obliterate nearly all the younger characters is also shown in the remarkable genera Richthofenia and Ostrea. On the interior of Pholidops and Crania the four large muscular scars, which are more those of the Neotremata than of the Atremata, are arranged medially, in the center of which, probably, was the pedicle opening. Some proof of this is seen in the excavated, posteriorly terminating muscular pit of *Crania ignabergensis*, which, if carried through the valve, will make the pedicle opening subcentral and surrounded by shell deposit. If an Acrotreta, Linnarssonia, or Conotreta became cemented, there would result practically a Crania. In no atrematous brachiopod is there the slightest indication of cementation, but where shell fixation does occur it is always (excepting in Zugmeyeria and Thecocyrtella) in such as have the pedicle very early surrounded by shell matter, as in the Strophomenidæ and Productidæ. For these reasons the characters of Craniacea seem more in accord with the Neotremata than with the Atremata. The characters of Craniacea are certainly not of ordinal importance, and possibly not even of superfamily value.

In the development of its pedicle foramen the family Siphonotretidæ is unlike any other of this order. During neanic growth the pedicle opening was posterior to the protegulum, but later it gradually moves anteriorly through the shell by resorption, producing a narrow slit similar in appearance to that of the Discinidæ. A pedicle foramen of the same nature is also developed in Eichwaldia and Dictyonella of the Protremata. As yet no explanation has been given as to the causes producing this aberrant development. The writer suggests that since these animals had delicate peduncles, with the shell elongate oval and sometimes cone-shaped in form, they probably stood nearly upright on their pedicles in early growth. Shell accretion being more rapid anteriorly, with the ventral side of the animal the larger and heavier, a tendency was initiated for the shell to lean against the ventral side of the peduncle. This pressure would produce resorption of the ventral shell anterior to the pedicle, and eventually, this tendency becoming hereditary, the ventral valve would lie nearly flat, with the pedicle emerging at a great angle subcentrally.

PROTREMATA.

This order is represented by 738 species, or nearly 40 per cent of American Paleozoic brachiopods, and is eminently characteristic of the post-Cambrian Paleozoic systems. Like the Atremata and Neotremata, it is represented in the Lower Cambrian. It was not, however, until Ordovician times that the Protremata attained very rapid evolution. In the Cambrian there are but 4 genera and 22 species, while in the Ordovician there are 20 genera and 173 species, a specific increase of more than seven and one-half times the number in the Cambrian. Greatest generic differentiation occurred during the Silurian, where 30 genera appear. Then began a steady decline, with extinction in the Carboniferous of North America. In the Triassic of Europe this order is sparingly represented by small species, and is there essentially restricted to the family Thecidiidæ, which continues to have living representatives in the Mediterranean Sea.

The widely distributed species gradually increase in percentage from 14 in the Cambrian to 36 in the Carboniferous, and are most marked in the family Productidæ. This family is one of the last of the order to originate.

The largest of all brachiopods occur in this order, in the families Pentameridæ and Productidæ, exceeding the Spiriferidæ of the Telotremata. In the former family greatest size is attained in the Silurian during the acme of the order, and in the Productidæ in the Carboniferous system. *Productus giganteus* of the Lower Carboniferous is the giant of all brachiopods, attaining a diameter of nearly 1 foot. In both these families the earliest species are small, but certain groups gradually attain larger and larger size with geologic time. Upon the appearance of the giants, vitality of the families, as exemplified in specific differentiation and robustness of individuals, is at its highest. After this these families rapidly decline, and the species dwarf far more rapidly than they developed to the climax.

In the Protremata, as in the two previous orders, greatest specific differentiation does not occur in the radical families, but in those of later development. The Kutorginidæ, Clitambonitidæ, and Billingsellidæ are the radical and, geologically, the oldest families of the Protremata. These are best but sparingly developed in the Cambrian, whereas the younger families, Pentameridæ, Strophomenidæ, Productidæ, and Orthidæ, contain over 95 per cent of the species and nearly 90 per cent of the genera. Orthidæ and Strophomenidæ, beginning in the Cambrian, are best developed in the Ordovician and Silurian systems, respectively; while Productidæ, originating in the Silurian, attained a climax in the Carboniferous. The latter family was one of the last of the Protremata to originate and has the shortest geologic history and least generic differentiation, yet many of its species have greater geographic dispersion.

The Protremata are clearly divisible into two phyla, Strophomenacea and Pentameracea. The former superfamily has the greater number of species, and is characterized by the nondevelopment of a spondylium or cruralium. The Pentameracea has, in addition to the deltidium, an internal spoon-shaped plate, or spondylium, serving for the attachment of muscles, and a discrete or united cruralium. The superfamily Strophomenacea in North America has 608 species, and represents the most primitive phylum, since it is far better developed in the Cambrian than is the Pentameracea, and has almost without exception a straight cardinal area. The Pentameracea has 127 species, and its earliest forms also have straight hinge-lines in the 16 species of the families Clitambonitidæ and Syntrophiidæ; but the rostrate family Pentameridæ, which attained maximum development in the Silurian, has 87 species. The Strophomenacea has living species, while the Pentameracea disappeared with the Permian. The cause for the rapid extinction of the latter is probably due to the high degree of specialization expressed by the spondylium.

Two well-marked types of shell form are developed in this order. By far the most prominent is the group which includes the long-hinge families Kutorginidæ, Clitambonitidæ, Billingsellidæ, Strophomenidæ, Productidæ, Thecidiidæ, and Orthidæ. The other group, represented by Pentameridæ, is largely rostrate in form, but occasionally also develops a straight hinge line. This, however, is never so prominent as in the former group. In the Telotremata the general form is rostrate, but very notable exceptions are present in the families Spiriferidæ and Terebratellidæ, and occasionally in the Rhynchonellidæ and Athyridæ. The form of the shell, however, has no great taxonomic value, and can not be accorded more than generic rank. The predominating type of shell form within an order probably has phyletic value, since the oldest protrematous shells are long-hinged, while the telotrematous shells are usually rostrate. Nevertheless, as indicated above, in the derived forms of both orders there are notable exceptions, and these changes are probably always induced by shortening or lengthening of the peduncles. Since Orthorhynchula has a well-developed cardinal area, it is not in itself "evidence of the first significance as indicating the source from which the extensive group of the Rhynchonellas originated."[1] The oldest rhynchonelloids are rostrate shells (*Protorhyncha? minor* and *P.? ambigua* of the Lower Cambrian), and the ontogeny of several species of Rhynchonella and of Zygospira has not revealed a long-hinged stage with cardinal areas. There is, therefore, no conclusive proof for the deduction of Hall and Clarke, "that some of the Rhynchonellidæ, early in their [geologic] history, occasionally retain a well-defined cardinal area, and that, in default of other evidence, the presence of this character may be regarded as indicative of the common origin of Orthis, the Strophomenidæ, and the Rhynchonellas."[2]

In this order far more than in any other is found the closure of the pedicle passage and atrophy of the pedicle, together with peculiar special adaptations which entirely or partially replace the functions of the pedicle. In the family Productidæ the ventral shell develops more or less abundant tubular spines, either along the cardinal line or over the entire valve. These are always most abundant in, or are

[1] Palæontology of New York, Vol. VIII, Part II, 1895, p. 336.
[2] Ibid., p. 342. For further remarks bearing on this subject, see pages 93–95 on the significance of the prodeltidium.

restricted to, the posterior region. The functions of the spines are to hold the animal to its place of habitation, for there is no apparent pedicle opening in these shells when mature. In others of the same family the ventral apex is cemented to extraneous objects (Strophalosia), and in still others the spines clasp the object of support when small (*Strophalosia goldfussi* and Etheridgina). In the Strophomenidæ the older species all seem to have functional pedicles throughout life, but in the Devonian, forms occur in which the apex is cemented to foreign objects (Leptænisca). Some of the Middle and Upper Devonian Stropheodontas show no trace of a pedicle opening when adult. In the Carboniferous cementation is far more common, and occurs in Derbya and Streptorhynchus; and when taken in connection with Strophalosia, Chonostrophia, Aulosteges, and Richthofenia, it is seen that nearly all the contemporaneous species of this order have developed other methods for fixation than the normal one. In Richthofenia calcareous cementation is complete, and the modifications resulting therefrom have so changed the shell that the lower or fixed valve is very suggestive of a cyathophylloid coral, not only in form but even in shell structure.

The chief cause for atrophy of the pedicle lies not only in the fact that this organ, in all long-hinged brachiopods, is short, but more particularly in the fact that throughout this order, and in the Acrotretacea of the Neotremata, the young shells always have the pedicle completely surrounded by shell, and thus to a great extent limit its growth. Even among the Orthidæ, where the species geologically older often have thick pedicles, which is indicated by the large open delthyrium, they gradually diminish in size throughout the Paleozoic. In the Strophomenidæ the pedicle is never a thick organ, and shortly after this family gives rise to the Productidæ, in Chonetes, the first appearance of cementation takes place. This mode of attachment constantly increases in the different phyla to the end of the family histories. In the Productidæ the early inheritance of a weak pedicle soon leads to its complete loss by the additional fixation developed. This additional fixation has its first appearance in the cardinal spines of Chonetes, which are periodically developed by mantle extensions. The degeneracy of the pedicle, once well established, is inherited at earlier and earlier periods by acceleration. The spines become more numerous, and are finally developed over the entire ventral valve. In the dorsal valve, the spines are never so long as in the ventral valve, and often are not developed at all, but are replaced by numerous concentric overlapping lamellæ. As the spines begin to develop more numerously and longer, the ventral valve attains more convexity, with a strongly incurved beak and the complete loss of a pedicle opening. Productus, therefore, does not stand erect on the cardinal areas, as in Chonetes; but lies on the ventral shell, anchored by the numerous spines. The spines are of the same nature as the shells, and never flexible. When they came in contact with hard objects during their growth, they followed along or clasped the object of support.

The slender shell-incased pedicle of the Strophomenacea probably leads to the growth of long, straight hinges for additional support, further weakening the pedicle and necessitating accessory fixation in four of its families, and finally occasioning in many species complete loss of this organ at the maturity of the individual. With the exception of the Thecidiidæ, the order Protremata has become nearly extinct since the Jurassic era.

TELOTREMATA.

This order, though but 2 Cambrian and 20 Ordovician forms are known, is represented by 766 species, or about 41 per cent of all American Paleozoic brachiopods. It is as well developed specifically as the Protremata, and exhibits a far greater variety of structures. Telotremata was probably the last order to originate, and has the greatest number and variety of living species. Its highest development is in the Devonian, where 369 species in 50 genera occur, while 109 species are known from the Silurian, a growth more than five times greater than that of the Ordovician system. Here, too, as in the Protremata, considerable time was consumed in establishing a few primitive characters, and these are no sooner obtained than an almost sudden development of great specific and generic differentiation takes place.

It is highly probable that no telotrematous Paleozoic genus continued to live through half the geologic time that Lingula and Crania did. Rhynchonella, a primitive genus of this order, is often said to have continued since the Ordovician, and Terebratula since the Devonian, era. This is now very doubtful, since Hall and Clarke have demonstrated that in all of the Paleozoic forms of these genera where it has been possible to examine their interiors none belong to Rhynchonella or Terebratula. In this catalogue both genera are recognized as occurring in the Paleozoic, but this is due to the fact that the internal structure of those species is not known.

Telotremata has three distinct types of brachial supports, which readily serve to differentiate 3 superfamilies. The simplest, Rhynchonellacea, has but crura, and is represented in the American Paleozoic by 14 genera and 202 species, of which 66 are widely distributed. The superfamily Terebratulacea, having more or less simple V or W shaped brachial supports, is present with 19 genera and 78 species, of which 23 are widely distributed. In the structurally more complex superfamily Spiriferacea, having spiral brachial supports, there are 41 genera and 466 species, and of these 161 become widely distributed. This again confirms the previously noted fact that the groups latest developed have the greatest generic and specific differentiation. In Spiriferacea this likewise occurred in the family Athyridæ.

If the percentage of widely distributed species within a superfamily is a criterion of its vitality, it will be seen that the Rynchonellacea begin in the Ordovician with 50 per cent and decline to 23 per cent in the Carboniferous. The Spiriferacea, also beginning in the Ordovician, have 50 per cent of their species widely distributed, becoming reduced to 20 per cent in the Carboniferous. On the other hand, the Terebratulacea were not widely dispersed in the Silurian, whereas in the Devonian their distribution reached nearly 30, increasing to 34 per cent in the Carboniferous. Since no statistics of the European Mesozoic and Cenozoic species of this nature are available, the writer can not determine whether or not the Rhynchonellacea continue to decline with such rapidity. It is known, however, that this superfamily has declined considerably in the Cenozoic and late Mesozoic. After the Triassic the Spiriferacea are essentially represented by Spiriferina, yet it too died out with the Jurassic, while the Terebratulacea, which manifested progressively greater vitality during the Paleozoic, are believed to have continued so nearly throughout the Mesozoic into late Cretaceous time. Since then, however, they have also declined.

In the ontogeny of Dielasma and Zygospira—loop-bearing and spire-bearing genera respectively—Dr. Beecher and the writer have shown that the Terebratulacea may not have been the last superfamily to develop, as was formerly supposed, and that it may have given rise, during early Ordovician times, to the spire-bearing superfamily Spiriferacea. The Terebratulacea probably originated in the Rhynchonellacea, though no loop-bearing species are known until the spire-bearing forms are well advanced, or until early in the Devonian system. While some of the largest species of Terebratulacea are found in the Devonian of America and Europe, yet throughout the Paleozoic this superfamily is not a conspicuous one. In the Jurassic and Cretaceous systems of Europe, however, great specific differentiation and abundant individual development took place. There is but 1 species of this superfamily in the American Silurian, while the Devonian has 50 species in 15 genera, an increase fifty times greater than that of the Silurian. In the Carboniferous a sharp decline set in, and the superfamily is reduced to 30 species and 8 genera.

These facts suggest that either the superfamily Terebratulacea did not originate in American seas or—which seems less probable—that diminutive species occur whose interior characters have escaped detection. Further, since the earliest American primitive genera, Rensselæria and Trigeria of the Lower Devonian, have very large species, neither these nor Centronella can be the earliest adult representatives of this superfamily. When quite young, Zygospira, also, has a "centronella-like loop," and it is possible that the primitive Terebratulacea had their origin before the earliest appearance of Zygospira, or during the earliest part of the middle Ordovician era.

The great majority of telotrematous genera are rostrate in form, but at different times and in separate phyla straight cardinal areas are more or less well developed. In America, the oldest members of this order (*Protorhyncha? minor* and *P.? ambigua*, members of the family Rhynchonellidæ) occur in the Lower Cambrian. In these species, and in the great majority of this family, there is no cardinal area; but occasionally this character is present, the earliest conspicuous example being the Ordovician genus Orthorhynchula. Among the Paleozoic Terebratulacea cardinal areas are seldom developed. A conspicuous exception, however, occurs in Tropidoleptus. But in the Mesozoic and Ceneozoic, in the family Terebratellidæ, cardinal areas are very often present, and in living forms are accompanied by a short pedicle. It is, moreover, in the Spiriferacea, the youngest superfamily of the Telotremata to originate, that the greatest development of cardinal areas takes place. The oldest genera of the Spiriferacea are all rostrate, as in the Ordovician Zygospira, Catazyga, and Cyclospira. In the Silurian the Spiriferidæ tend to develop rapidly long, straight, and wide cardinal areas, attaining greatest development in the Devonian and early Carboniferous. This excessive development of cardinal areas is no doubt due to the shortening and decline of the pedicle, since in the Triassic system forms occur in which cementation is complete (Zugmeyeria and Thecocyrtella). Cardinal areas are also developed in other families of the Spiriferacea, but in no case can such be traced to Ordovician long-hinged ancestors.

In this order, more than in the Protremata, internal specialization of the brachia has progressed from a simple to a highly complex condition. In the Protremata, in its latest developed superfamily, Pentameracea, crura are also present, of the same phase of development attained by the Rhynchonellacea, the most primitive superfamily of the Telotremata. In this order, however, there are, with but few exceptions, no internal special structures, as spondylia. The specialization in the Telotremata is expressed in the progressive complication of the calcareous brachial supports. In the most primitive species of the Rhynchonellacea no crura are present (Protorhyncha), but in all later forms these appendages are well developed, and finally in the Trias and Jura attain very great length in Rhynchonellina. In the next more complicated superfamily, Terebratulacea, the crura in the primitive members have united anteriorly, thus forming the simple unchanging loop of Centronella and Rensselæria, which is also known to occur in the very young of some species of the highest superfamily, the Spiriferacea. The geological history of the loop has shown that the brachia have been constantly changing, causing more or less complete resorption of the hard parts and adaptation to later requirements. The progressive development of the loop is also repeated ontogenetically and more or less fully in living terebratuloids.

In Zygospira, the oldest known genus of the suborder Spiriferacea, the primitive loop of Centronella is reproduced in the earliest phase in the development of its brachidium. This is partially resorbed and changed in form, and to it is then added laterally the two spirals and medially the simple or, in the higher forms, the complex processes, or jugum. The volutions of the spirals in the oldest genera geologically are very few, but subsequently they become more numerous, and attain their maximum in the long-hinged Devonian and Carboniferous spirifers, where 35 volutions have been observed, with 24 in Atrypa.

The form of the paired spirals varies but little except under the necessity of conforming to the interior cavity of the valves. Their inclination and direction is a feature of much significance when considered with reference to the development of the entire shell. It is the loop, or to employ a term more appropriate in view of the homologies of the spire-bearing and loop-bearing shells, the *jugum*, however, which is subject to the most frequent variations in form, and which serves as the generic index. When the spirals are directed outward toward the lateral margins of the valves, the jugum seems to be much more variable than in shells where the spirals are introverted or take some intermediate position. In the latter there is a much greater variation in the position of the loop upon the primary lamellæ than occurs in the former.[1]

GENERAL DEVELOPMENT.

In the preceding pages it is shown that the four types of pedicle openings which serve as the prime characters in distinguishing the four orders, Atremata, Neotremata, Protremata, and Telotremata, are present in the oldest division of the Cambrian, the Olenellus zone. From the pre-Cambrian sedimentary rocks, or Algonkian system, practically no fossils are known, though there is evidence in them that life existed. The fact that the Olenellus zone has a varied marine fauna alone indicates that the sea during Algonkian times must have swarmed with living things. When the enormous time represented by the great thickness of North American pre-Cambrian sediments is considered, or that of Bohemia, it is evident that ample time elapsed for life to attain the degree of complexity manifested in the basal Cambrian zone. Kayser says that this pre-Cambrian time was "probably so long that the beginning of the Cambrian period may be considered as comparatively a recent event."[2] Van Hise, in writing on the same subject, says:[3]

If geological history were to be divided into three approximately equal divisions, these divisions would not improbably be the time of the Archean, the time of the clastic series between the Archean and the Cambrian, and the time of Cambrian and post-Cambrian. In this connection it is well to recall that many years ago Logan suggested that the thickness of the Laurentian and Huronian may surpass that of all succeeding formations, and that the appearance of the so-called Primordial fauna may be considered as a comparatively modern event.

In the Lower Cambrian there are not many species of brachiopods, nor is the specific differentiation in any order very varied, indicating

[1] Hall and Clarke, Palæontology of New York, Vol. VIII, Part II, 1895, p. 343.
[2] Text-Book of Comparative Geology, 1893, p. 13.
[3] Sixteenth Ann. Rept. U. S. Geol. Survey, Part I, 1896, p. 760.

either that evolution in pre-Cambrian eras was much slower than subsequently or that the class had its origin late in the Algonkian. Cambrian brachiopods usually differ fundamentally from one another, and do not appear to have been persistent, as but 4 of the 22 genera pass into the Ordovician. Differentiation also appears to have been slow during the Lower and Middle Cambrian, but toward the close of this system species begin to be more numerous and varied. In Middle Ordovician times all the orders and superfamilies are well established except Terebratulacea. The zenith of the class was attained in the Silurian and Devonian eras, but decline began during late Devonian, and steadily continued to the close of the Paleozoic. But 7 of the Carboniferous genera are known to have survived the break between the Paleozoic and Mesozoic. During the latter time the spire-bearing brachiopods pass out of existence, while the great Paleozoic superfamily Strophomenacea is represented by a few small species of the Thecidiidæ, which continue to be represented up to the present time. After the Cretaceous system the orders Atremata, Neotremata, and Protremata are represented only by Lingula, Discina, Discinisca, Crania, and Thecidium. The Terebratulidæ may have had their inception below the middle of the Ordovician, but are not a pronounced Paleozoic group. However, in the Jurassic and Cretaceous systems the rocks abound with the shells of this family, and from that time on they are the chief representatives of the class. Lingula and Crania are present in the Ordovician, and, as far as can be determined, have persisted to the present time.

Of the 49 families and subfamilies constituting the class, 43 became differentiated in the Paleozoic, and of these 30 disappeared with it, while but 13 continued from the Paleozoic into the Mesozoic. Of Paleozoic families, 6 are represented by living species, viz, Lingulidæ, Discinidæ, Craniidæ, Thecidiidæ, Rhynchonellidæ, and Terebratulidæ.

Of the 327 genera now in use, 227 had their origin in Paleozoic seas, or nearly 70 per cent of the entire class, and of this great number but 8 are positively known to pass into the Mesozoic, viz, Lingula, Orbiculoidea, Crania, Rhynchonella, Spiriferina, Athyris, Terebratula, and Hemiptychina. Besides these, Streptorhynchus, Cyrtina, Retzia, Martinia, and Martiniopsis, are mentioned as occurring in the Triassic, but these species probably in great part belong to other genera.

The Atremata, which contains the oldest and the simplest forms structurally, is represented by 29 genera, while the Neotremata and Protremata have 30 and 89, respectively. Telotremata is the last order to appear, and has by far the greatest number of genera, 179.

The chronogenetic history of brachiopods shows that the four orders begin with smooth shells, and that subsequently various kinds of surface ornamentation are developed or disappear with varying degrees of rapidity. The ontogeny of strongly plicated and lamellose shells, wherever observed, begins with smooth shells. All new surface characters are first introduced during adolescent growth or senility, and these by the law of acceleration appear earlier and earlier in later species. In the Lower Cambrian there are species of Billingsella with a few broad undulations in the shell, but in the Middle Cambrian the plications are pronounced and cover half or more than half the anterior portion of the valves, while in the Upper Cambrian these folds appear upon the umbones. In the oldest rostrate pentameroids the shells are either smooth or have a few folds (Camarella), which become more distinct in Parastrophia, and culminate in numerous sharp plications in Anastrophia. The rhynchonelloids, beginning in Protorthis of the Lower Cambrian as smooth shells, gradually become more and more plicated in the Silurian and Devonian, yet in the Triassic many species again appear nearly smooth.

STRUCTURAL CHARACTERS.

THE PROTEGULUM.

The order Atremata is the radical brachiopodous stock, which early in its history gave origin more or less directly to the other three orders of brachiopods. Beecher has observed:[1]

> That all brachiopods, so far as studied by the writer, have a common form of embryonic shell, which may be termed the protegulum. The protegulum is semicircular or semielliptical in outline, with a straight or arcuate hinge line, and no hinge area. A slight posterior gaping is produced by the ventral valve being usually more convex than the brachial. The modifications noted are apparently due to accelerated growth, by which characters primarily nealogic [=neanic] become so advanced in the development of the individual as to be impressed finally upon the embryonic shell. This feature is well shown in the development of Orbiculoidea and Discinisca.
>
> As the protegulum has been observed in about 40 genera, representing nearly all the leading families of the class, its general presence may be safely assumed. [In structure it is corneous and imperforate and varies in size from 0.05 to 0.60mm. The] prototype preserving throughout its development the main features of the protegulum, and showing no separate or distinct stages of growth [is found in the Lower Cambrian genus Paterina]. The resemblance of this form to the protegulum of other brachiopods is very marked and significant, as it represents a mature type having only the common embryonal features of other genera.

Since the above was written Mr. C. D. Walcott has shown that the type species of Paterina has a well-developed cardinal area, and that it is synonymous with Iphidea.[2] The latter, however, is generally assumed to have an apical pedicle opening as in the Acrotretidæ. This is now known not to be the case. The supposed perforation is but a slight depression or short groove in the apex of the ventral valve, and does not pass through the shell. Iphidea is therefore in harmony with Paterina, since both have more or less well-developed cardinal areas. The theoretical Paterina or prototype of the protegulum is therefore

[1] Am. Jour. Sci., April, 1891, 3d series, Vol. XLI, pp. 344–346.
[2] Proc. U. S. Nat. Mus., Vol, XIX, 1897, pp. 707–713.

not yet known. It is evident, however, from the material Mr. Walcott possesses, that Iphidea-like forms will be discovered in which the cardinal area is undeveloped and in harmony with the protegulum. It is in this sense that the terms Paterina and paterina stage are used throughout this work.

THE PRODELTIDIUM.

The term prodeltidium is applied by Hall and Clarke to the third shell plate originating on the dorsal side of the body wall in the cephalula stage of *Thecidium mediterraneum*, the only living species of Protremata. This plate, however, is not restricted to that order, but has been observed by authors as also occurring in the Atremata and Neotremata. The term prodeltidium is here applied to this embryonic plate wherever it occurs unmodified.

Beecher has shown that the prodeltidium in the Protremata is the first cause for the development of the deltidium so characteristic of this order. That this plate is also present in the Neotremata is apparent from the description of a brachiopod larva of Discina (= Discinisca) given by Fritz Mueller. These larvæ were captured in abundance off Desterro or Santa Cathrina, Brazil, but Mueller was not so successful as Kovalevsky and others in securing the earlier larval stages of other genera developing in the brood pouch, and therefore nothing is known as to the place of origin of the prodeltidium in Neotremata. Since, however, the prodeltidium is also present in young Lingula of the order Atremata, where it is wholly attached to the interior of the dorsal shell, it appears safe to assume that this plate invariably develops on the dorsal side of the thoracic segment of embryonic brachiopods, and later becomes attached either to the dorsal (Atremata) or ventral valve (Neotremata and Protremata), except where, as in the Telotremata, it does not occur.

Before taking up the phylogenetic significance of the prodeltidium, it will be advisable to state what is known of this plate in the Atremata and Neotremata. Since it was first discovered by Fritz Mueller in the Neotremata, where also it is best developed, and subsequently was homologized by Brooks with a similar plate in Glottidia, it will here be given first consideration. Mueller writes:[1]

> Mit ihrem Hinterrande dem ausgebuchteten Hinterrande des Bauchshale anliegend, gewahrt man zwischen den Schalen eine *querovale Platte*, 0.06 mm. lang, 0.11 breit, mit dunklerem, oft braunröthlich gefärbtem, ringförmigen Rande. Sie haftet an der Bauchschale, deren Bewegungen sie folgt, und steht mit der Rückenschale nur durch Muskeln in Verbindung.

There is, then, in this Discinisca, a transversely oval plate somewhat loosely attached to the ventral shell near its posterior margin, the movements of which it follows. Mueller adds:[2]

> Die querovale Platte tritt unter des bis zum Vorderrande der Rückenschale vorgeschobenen Bauchschale vor, beginnt sich nach hinten zu verlangeren und ein faseriges Ansehen zu zeigen (Stiel?); sie folgt, nach wie vor, den Bewegungen der Bauchschale.

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[1] Archiv Anat., Physiol., 1860, p. 74.
[2] Ibid., p. 78.

Since in this stage of Discinisca there is no pedicle present, Mueller apparently was disposed to regard the prodeltidium as the equivalent of the pedicle. That this is an erroneous interpretation seems certain, for in his second paper he states: [1]

Die bis dahin zwischen den Schalen verborgene querovale Platte (der Stiel) tritt hervor, indem sie sich wie es scheint, um dem ausgebuchten Hinterrande des Bauchschale vollständig herumdreht und so ihr vorderer Rand zum hinteren wird.

In Glottidia the pedicle does not appear until sometime after the prodeltidium is developed, and it seems reasonable to assume from the description of Mueller that, on the development of the pedicle, the prodeltidium is pushed and turned backward, and between this and the notched ventral margin the pedicle passes. The pedicle opening at this stage is therefore surrounded by shell matter, anteriorly by the protegulum and posteriorly by the prodeltidium, characters duplicated in Thecidium. In the latter genus the prodeltidium develops into the deltidium, whereas, according to Mueller, this plate subsequently disappears in Discinisca. Brooks, also, is not disposed to accept Mueller's interpretation of this plate as the pedicle, since he writes: [2]

If it is the same [the transversely oval plate of Discinisca and the dorsal semicircular plate of Glottidia], Mueller is certainly in error in his suggestion that it is the peduncle, for there is no connection between the two structures.

In *Glottidia pyramidata*, Brooks has shown that the prodeltidium is also present, yet here it does not become attached to the ventral shell, but is firmly fastened to the dorsal valve, and this apparently was consummated in the paternia stage. Brooks writes:

I was not able to learn anything of the significance of the semicircular plate shown in figures 1 and 3. It is found only in the dorsal valve, and is either a mark upon its inner surface or a plate between the body and the valve. According to Fritz Mueller, the Brachiopod larva studied by him possessed a similar structure. * * * The embryo of Lingula is so small and thin that if this were a separate plate, it would be rather difficult to prove without seeing it move, or find it bent outward. In the absence of such evidence, we seem warranted in concluding that it is a similar structure to the movable plates of Mueller's larva, although, in Lingula at least, it is in connection with the dorsal, not the ventral valve.

No one has yet mentioned the presence of the prodeltidium in living Telotremata, and it may prove to be absent in this order, as it is not developed in the three species carefully studied by Morse, Kovalevesky, and Shipley.

Recapitulation.—The prodeltidium is present in Atremata, Neotremata, and Protremata. In the embryonic brachiopods developing this plate it is first found on the dorsal side of the body wall, and later is anchylosed to the ventral shell in Protremata (Thecidium). In the Neotremata, the earliest embryonic stages of which are not known, it is found completely developed and loosely attached to the ventral shell, anterior to the posterior margin. It subsequently turns backward to

[1] Archiv für Naturgesch., 1861, p. 54.

[2] Chesapeake Zoological Laboratory, session of 1878; Johns Hopkins University, 1879.

the posterior margin of the same valve, and the pedicle is believed to emerge between the plate and the valve (Discinisca). The prodeltidium is therefore alike in final position in the Neotremata and Protremata. In the Atremata this plate is either attached by its entire surface or by the posterior margin only to the dorsal shell, as in Glottidia, where the earliest embryonic stages are also unknown. The prodeltidium is likewise dorsal in the cephalula stage of Thecidium (Protremata), but subsequently is attached to the ventral shell, yet in reality remains dorsal to the animal. In Glottidia (Atremata) this plate remains attached to the dorsal valve, and in nowise affects the pedicle opening, as in the Neotremáta and Protremata. In the Telotremata the prodeltidium has not been observed, nor has any fossil species in this order shown the least trace of a deltidium, and wherever the delthyrium is closed it is always by plates growing medially from its walls, secreted by the mantle and never by the peduncle. Therefore, when the prodeltidium remains stationary or with the dorsal valve, it is not known that this plate affects the original pedicle opening (Atremata and Telotremata), but when subsequently attached to the ventral valve and partly surrounds the pedicle with shell matter, it completely modifies the primitive pedicle opening by restricting it to the ventral shell (Neotremata and Protremata). In the derived or later-appearing families of the Neotremata and Protremata the effects of foraminal modification initiated by the prodeltidium may be wholly lost, as in Craniidæ and Orthiidæ.

SIGNIFICANCE OF THE PRODELTIDIUM.

The deltidium is the chief character of ordinal importance in the Protremata, and since this plate is attached to the ventral valve, yet originates in the dorsal prodeltidium, it seems reasonable to assume that if similar developmental conditions are found in other orders such orders would possess closer phylogenetic relationship than those having differing conditions. It has been shown that the prodeltidium is also attached to the ventral valve in the Neotremata, and so far both orders show relationship in their earliest embryonic growth. Beecher has shown that the protegulum or initial shell of the Protremata is discinoid in form and more like that of the Neotremata than that of the Atremata or Telotremata. He writes:[1]

> Discinisca shows a subcircular ventral protegulum with a pedicle notch, and the evidence of any hinge in the dorsal protegulum is very slight. The discinoid character appearing in the second and third nepionic stage of the Paleozoic Orbiculoidea has become so accelerated in Neozoic and recent Discinisca as to produce a discinoid protegulum.
>
> The strophomenoid shells usually retain a normal protegulum in the dorsal valve, but from the acceleration of the discinoid stage in the ventral valve the protegulum, has an abbreviate hinge and arcuate hinge line. (P. 346.)
>
> The nepionic stage of *Leptæna rhomboidalis* is represented by a shell without radii, having a comparatively large pedicle opening in the ventral valve and a large deltidium. The hinge is not well defined and the shell is discinoid in form. * * *

[1] Am. Jour. Sci., 3d series, Vol. XLI, 1891, p. 346; Vol. XLIV, 1892, pp. 150-151.

The external characters as expressed by both valves are manifestly nearer to Kutorgina than to any telotremate genus. * * * It should be noted, however, that the young of Chonetes, Productus, Stropheodonta, Orthothetes, Leptæna, Plectambonites, and Strophomena, all have little or no indication of a straight hinge line, and that the extension of this member takes place during later nealogic and ephebolic growth. (Pp. 150–151.)

By far the greatest number of Neotremata occurring in the Lower Cambrian are species of the family Acrotretidæ. To the writer it has always seemed strange to suppose that this family has been derived through the Trematidæ, but the above interpretation of the prodeltidium in Discinisca indicates that the turning of this plate posterior to the pedicle at once led to holoperipheral growth in some of these early forms. In some species of the Acrotretidæ there is a true deltidium. In Acrothele the cardinal area is flat, without any trace of a deltidium, whereas in Acrotreta and Conotreta, which have high cardinal areas, there is a narrow concave depression bisecting it. These deltidia, whether convex or concave, are in all probability initiated by the prodeltidium, as in the Protremata. In the family Trematidæ there appears to be nothing homologous with the deltidium, since the plates situated in the apex of the wide triangular fissure of Schizocrania and Lingulodiscina seem to be formed anterior to the pedicle and subsequent to its movement posteriorly with growth, and not posterior to the pedicle, as in the Acrotretidæ. These plates in the Trematidæ should probably be homologized with the listrium of the Discinidæ.

The complete harmony of the muscular system in the Protremata and Telotremata is no evidence in itself that the latter were derived from the former. The occurrence at the base of the Cambrian of very primitive species of the four brachiopod orders is proof that divergence took place very early in the history of the class, and while there is little knowledge of the muscles in either Iphidea, Kutorgina, or Protorhyncha (*P. ? minor and P. ? ambigua*), the earliest genera of Atremata, Protremata, and Telotremata, respectively, there is some evidence for supposing them to be as in the type embryo stage of living species. The high degree of specialization attained by Lingula (Atremata), as exemplified by the burrowing habit, long peduncle, and absence of valve articulation, is the cause for their complex muscular system, while the development of a functional hinge in the Protremata and Telotremata has led to the retention of very primitive conditions or to the simplification and harmony of the muscles throughout these two orders.

The presence of a terminal intestinal opening in the living species of the Atremata and Neotremata and its general absence in those of the Protremata and Telotremata is no longer held to have phylogenetic significance, as many of the Paleozoic species of the two latter orders afford good evidence of such having been present in the median line as in living Crania.[1]

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[1] See p. 113.

The known protegula, or initial shells, of the Neotremata and Protremata have been shown to be harmonious, and to differ from the normal unmodified protegula of the Atremata and Telotremata. The paterina stage in the two last-named orders is followed by the "obolella stage" in the highest families of the Atremata (Lingulellidæ and Lingulidæ), and probably throughout the Telotremata, since it has been observed in a number of Ordovician and Silurian Rhynchonellacea, Spiriferacea, and recent Terebratulinas.[1] In the Neotremata and Protremata the paterina stage is not followed by the obolella stage, but usually by holoperipheral growth, except where the pedicle slit remains for a time wholly uninclosed by shell matter.[2]

In tabulated form the above-presented facts appear thus:

Table of fundamental brachiopod characters ordinally arranged.

Character.	Atremata.	Telotremata.	Neotremata.	Protremata.
1. Prodeltidium in type embryo.	With dorsal valve.	Absent	With ventral valve.	With ventral valve.
2. Prodeltidium affecting pedicle opening.	None	None	Modified in primitive forms.	Modified throughout.
3. Deltidium present	None	None	Present in primitive forms.	Present throughout.
4. Protegulum	Present	Present	Present	Present.
5. Obolella stage	Present	Present	Absent	Absent.
6. Anus	Present	In many early geologic species.	Present	Present in pentameroids.
7. Chemical nature of shell.	Phosphatic and calcareous.	Calcareous	Phosphatic and calcareous.	Calcareous.
8. Cardinal area	Present, but usually small.	Not generally present.	Present in primitive forms only.	Generally present.
9. Similarity of valves.	Very much alike	Unlike.	Very unlike.	Unlike.
10. Articulation	Often present, not functional.	Functional	Rarely present, not functional.	Functional.
11. Nature and function of pedicle	Affixing and burrowing.	Generally present, affixing; shell rarely cemented.	Generally present, affixing; cementation complete.	Affixing or obsolete; cementation or anchoring spines present.
12. Brachia, with or without internal skeleton.	Without	With or without	Without.	With or without.

It now appears evident that the two great divisions of brachiopods heretofore based on the presence or absence of functional articulation have no phylogenetic significance, and as they "do not appear to have a primary developmental basis in nature, * * * they fail to express the true relationships of the various groups included in them."[3]

[1] See papers by Beecher and Clarke, Brooks, Morse, Beecher and Schuchert, and Winchell and Schuchert.

[2] See Am. Jour. Sci., 3d series, Vol. XLIV, 1891, pp. 150-151.

[3] Beecher, Am. Jour. Sci., 3d series, Vol. XLI, 1891, p. 353; also see Vol. XLIV, 1892.

Articulation was developed along two independent lines, and therefore the terms Lyopomata and Arthropomata have no phylogenetic significance. The presence or absence of articulating processes was at one time considered a fixed line, on either side of which all brachiopods could be arranged, but now articulation is known to be nearly functional in several lyopomatous genera, as in Spondylobolus, Trimerella, Monomorella, Tomasina, Barroisella, of the Atremata, and in Trematobolus of the Neotremata. Among the Arthropomata, articulation is hardly functional in Kutorgina, Schizopholis, Eichwaldia, and Dictyonella. However, it appears probable that two superorders exist, each having two orders. Atremata and Telotremata are the more primitive groups, and agree in the following fundamental characters: Prodeltidium attached to the dorsal valve or absent; pedicle opening primarily unmodified, and generally closed later by calcareous plates secreted by the ventral mantle extensions; presence of a functional pedicle throughout the life of the individual (except in Thecospira, Thecocyr-

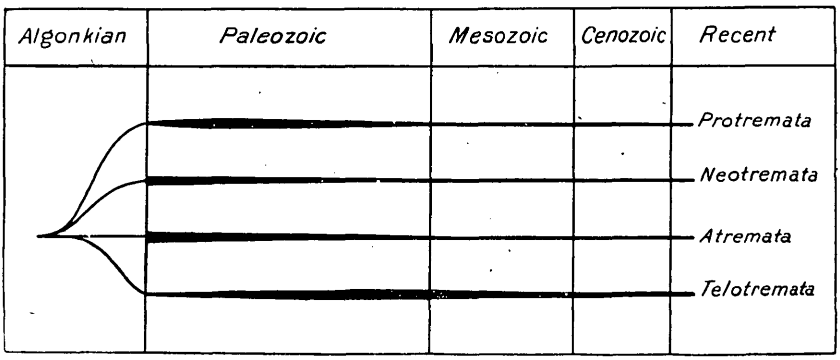

FIG. 1.—Diagram giving the geological distribution of brachiopod orders.

tella, and Bittnerula); general presence of the "obolella stage" in the ontogeny of atremate and telotremate species, and the development of complicated calcareous brachial supports in the derived order. The Neotremata and Protremata agree in having the prodeltidium attached to the ventral valve with complete nepionic modification of the pedicle opening; delthyrium often closed by a single plate secreted by the pedicle and never by mantle extensions; the pedicle is very often lost before maturity is attained, along with the development of new anchoring adaptations; absence of the "obolella stage" and complicated calcarious brachial supports.

Owen's superorders Lyopomata and Arthropomata have no basis in nature, and should be dropped. It is to be hoped that students will determine the complete embryology of Lingula, Discinisca, Crania, Rhynchonella, and Terebratulina, for until more of the ontogeny of some species of these genera is known, no satisfactory relationship which the orders bear to one another can be established. However, it appears probable that Atremata and Telotremata have superordinal relationship differing from that of the Neotremata and Protremata. If the characters above pointed out are of superordinal value, it will be convenient to refer to these divisions as *Homocaulia* and *Idiocaulia*, respectively.[1]

DEVELOPMENT OF CARDINAL AREAS AND ARTICULATION.

The earliest suggestion of cardinal areas occurs in Iphidea of the Atremata and in the Acrotretidæ of the Neotremata. In none of these forms, however, is there a true cardinal area comparable with those of the Protremata and Telotremata, since it is not bisected by a delthyrium, nor are deltidial plates developed. A convex pseudodeltidium is often present, but this feature is not homologous with the deltidium of the higher forms. It is due to holoperipheral growth and interference by the pedicle. In the dorsal valves of primitive genera in both the Atremata and Neotremata growth is hemiperipheral, but in the ventral valve of Iphidea, the most primitive known genus of Atremata, and in the Acrotretidæ of the Neotremata, growth is holoperipheral.

The ontogeny of many species of Protremata shows that this order had its origin in some atrematous paterina-like genus. This must have occurred in pre-Cambrian times, since in the Lower Cambrian there are several species of Billingsella, a highly developed protrematous genus when compared with the theoretical Paterina. *Kutorgina cingulata* Walcott, also of the Lower Cambrian, is a more primitive species than any Billingsella, and it gives evidence as to the course of evolution from the inarticulate paterina-like ancestor to this rudimentary, articulate, long-hinged genus. *K. cingulata* in connection with the Indian genus Schizopholis Waagen shows that the opening between the widely gaping valves of Paterina, which was entirely occupied by the pedicle, was partially closed by a gradual thickening of the lateral walls, and there was slowly developed a primitive, ventral, cardinal area. This area and the articulating processes in *K. cingulata* are very rudimentary, and are situated at the lateral extremity of the cardinal area; thus this species still retains a very large open delthyrium, much as in the theoretical Paterina. In Schizopholis this wide fissure is reduced to a narrow triangular delthyrium by the development of a true cardinal area, and the articulating processes are now no longer at the lateral extremities, as in Kutorgina, but are situated more medially. Naturally, in the older Cambrian, complete articulation did not obtain, as in post-Cambrian times. Some of the oldest protrematous species, such as *K. cingulata*, *Billingsella whitfieldi*, and possibly others, also retain considerable phosphatic material in their shells, but in later and more highly specialized species the shell is decidedly calcareous.

Some of the species of Iphidea have the ventral posterior region

[1] Ὁμος (homos), ἴδιος (idios), and καυλός (kaulos) = stem or pedicle common to both valves and pedicle restricted to one valve, respectively. These characters may be retained throughout life or restricted to the nepionic and neanic stages of growth.

more drawn out beyond the dorsal posterior margin than others. If this rostrate condition were carried a little farther and the pseudodeltidium resorbed, there would practically result a telotremate shell duplicated by the neanic condition of many rostrate Telotremata. The articulation would at first be nearly obsolete and situated extremely lateral, as in the Protremata, but as the cardinal area became greater the teeth would attain a more medial position. While there are no known genera to fill in the gap between the theoretical Paterina and Protorhyncha (*P. minor and P. ambigua*), yet the hiatus between the Atremata and Telotremata is not greater than between theoretical Paterina and Kutorgina, or between the Atremata and Protremata.

DEVELOPMENT AND SIGNIFICANCE OF THE DELTIDIUM.

The most characteristic mature feature of ordinal importance which distinguishes Protremata from the other three orders is found in the plate that more or less completely covers the delthyrium. However, in two of the families of this order, Pentameridæ and Orthidæ, this plate is generally wanting in the mature individual, since here it usually develops only during early growth, and later is lost by abrasion or hidden beneath the incurved beak. Again, in the Acrotretidæ of the Neotremata, and in Iphidea of the Atremata, a deltidium-like plate is also often developed, but as these shells are strongly phosphatic it is not difficult to distinguish the ordinal position of any shells with a true deltidium. In *Lacazella mediterranea*, the only living species of Protremata, this plate has its origin in the cephalula stage along with the rudiments of the dorsal and ventral valves, when the embryo is yet free and swimming about by the aid of cilia. The dorsal shell and the prodeltidium appear first, and are secreted by the rudimentary dorsal mantle and the dorsal surface of the body, which subsequently becomes the pedicle. The ventral shell appears last, and is then widely separated from the dorsal valve. Between the two valves is the thick and short pedicle, on the dorsal surface of which still remains the third plate, or prodeltidium. Subsequently the latter is anchylosed to the posterior margin of the ventral valve. The prodeltidium is also known in the Atremata and Neotremata, yet in the Telotremata this embryonic third plate does not exist, but a covering to the delthyrium is developed sometime after the animal has become attached. In its origin this covering is wholly different from the deltidium of the Protremata, which has its beginning in the prodeltidium and grows down from the shell apex over the delthyrium, while the deltidial plates of Telotremata grow out medially from the walls of the delthyrium. The deltidial plates are secreted by extensions of the ventral mantle, and at no period of development has the pedicle any share in their formation. It is not always easy to distinguish mature protrematous and telotrematous shells on the basis of these characters alone, but the young of both orders are easily classified by the covered or open delthyria, respectively. In some of the Telotremata, toward maturity the deltidial plates anchylose medially posterior to the pedicle, or they may surround the pedicle, thus resembling the deltidium, but, since their origin is quite different, they are termed "pseudodeltidia." Such pseudodeltidia in Cyrtia, Cyrtina, and some spirifers resemble the deltidium of Clitambonites. Even the median line of anchylosis is often obliterated by the continuous secretion of the completely united prolongations of the ventral mantle lobe. In the Pentameridæ the deltidium is generally absent, as in the Orthidæ, but in Pentamerus and Conchidium it is often retained as a thin, fragile, concave plate. This reversal in form from the generally prevalent, convex, or flat deltidium may be due to the rostrate and arched ventral umbones so common in these genera. In the aberrant rostrate genus Dictyonella, which has an arched ventral umbone, a concave plate is also present, between which and the shell the pedicle passes and emerges upon the umbone, as in the Siphonotretidæ. It is not certainly known that this plate in Dictyonella is a deltidium, but its form and position in the rostral cavity are very suggestive of that organ in Pentamerus and Conchidium. The peculiar umbonal pedicle opening in Dictyonella also finds its equivalent in Leptæna.

THE CHILIDIUM.

The chilidium is a convex plate often covering the cardinal process of the dorsal valve in the Protremata. It is particularly well developed in the families Clitambonitidæ and Strophomenidæ, and is not to be confounded with the deltidium, since it first makes its appearance not earlier than neanic growth, and apparently is a secretion of the dorsal mantle lobe. The origin of the chilidium and of the deltidium is therefore wholly different, and both have very dissimilar phyletic significance.

ORIGIN AND FUNCTION OF THE SPONDYLIUM.

The spondylium is an internal ventral plate traversing the posterior portion of the animal. The upper surface of this plate is usually transversely marked by striæ, which, in the Pentameracea have three distinct curvatures in passing over it.

Since their position and the area occupied agree with the muscular scars of this valve in *Orthis*, they are here regarded as homologous with the adductors, diductors, and adjustors of that genus. In *Lingulasma*, *Lingulops* and the trimerellids the muscular scars are not found in front nor underneath, but *on* the "platform" of those genera. The platform, therefore, is homologous with the spondylium of *Clitambonites* and *Pentamerus*. * * * The portion of the valve immediately beneath the spondylium, and occasionally the sides of the septum, are strongly marked by the genital sinuses. Since there is no space posterior to these markings for the attachment of the muscles, this clearly indicates that they were situated on the upper surface of the spondylium.[1]

[1] Winchell and Schuchert, Final Rept. Minn. Geol. Survey, Vol. III, Part I, June, 1893, p. 378.

The spondylium is developed as the "platform" in Lingulasmatidæ and Trimerellidæ of the Atremata; as a "spondylium" in Pentameracea of the Protremata, and in Cyrtina, Camerospira, Merista, and Dicamara, of the Telotremata. In the Atremata and Telotremata, spondylia-bearing species are not numerous, but the individuals are usually abundant, often of large size, and generally are of short geologic duration.

The development of the spondylium or its morphologic equivalent probably had its origin in an excessive deposit of testaceous matter about the bases of the powerful adductors, diductors, and pedicle muscles. Growth of the individual necessitates the progressive anterior movement of the muscles, and when these are large there is but little or no space left between or outside of them for the viscera and genitalia, which are therefore crowded farther and farther anteriorly. This condition naturally produces constant pressure of the genitalia against the anterior base of the forming spondylium, and since pressure causes resorption or diverts testaceous deposition, it follows that these organs will gradually produce cavities for their relief beneath this plate. In the older species of the Trimerellidæ and in all of the Lingulasmatidæ displacement of the genitalia does not appear to have been excessive, as the platforms are but slightly excavated. However, in the terminal genus Trimerella the genitalia chambers are very deep, and these are present in both valves. Throughout the Pentameracea the spondylium is a thin, freely terminating or medially supported plate, and never solid as in the older species of the Trimerellidæ. It is likewise thin and excavated in the order Telotremata.

Hall and Clarke advance quite a different explanation as to the origin of the spondylium. They write:[1]

The *spondylium* is an area of muscular implantation. In its early or incipient condition it is evident that it originates from the convergence and coalescence of the dental lamellæ, and forms a receptacle for the proximal portion of the pedicle, and for the capsular or pedicle muscles. * * * Considering this structure in its incipent condition, where, as in *Orthis*, it is represented only by the convergent dental plates which usually unite with, or rest upon the bottom of the valve, and inclose only the base of the pedicle and its muscles, it will be evident that the plate is actually but a modification of the original pedicle-sheath. It is evidently the inner moiety of this sheath surrounding the pedicle, which has become involved or inclosed by the growth of the pedicle-valve, and further modified by the development of articulating processes where it comes in contact with the brachial valve It therefore follows, as a natural inference, that wherever the spondylium is pres. ent, whether in the incipient condition or in the more advanced stage of development in which it supports all the muscles of the valve, it is, or, at some period of growth, has been accompanied by the *external* portion of the sheath, which is termed the deltidium. Thus the spondylium appears to be but the complement of the deltidium, or the original plate formed upon the body of the embryo, and that portion of the adult shell to which the term deltidium has been applied, is the other part of the original or primitive deltidial plate or pedicle-sheath.

[1] Palæontology of New York, Vol. VIII, Part II, 1895, p. 332.

The writer also previously entertained this view, but when it became known that spondylia are developed where no dental lamellæ exist, as in the Lingulasmatidæ and Trimerellidæ of the Atremata; that spondylia are never present in the Neotremata, where a pedicle-sheath is sometimes well developed, as in the Acrotretidæ; and finally, that a spondylium is even present where no deltidium ever existed, as in the two first-mentioned families, and in Cyrtina, Camerospira, Merista, and Dicamara of the Telotremata, such an explanation became untenable. The fact that solid or excavated spondylia exist in three orders, two of which never developed a pedicle-sheath (Atremata and Telotremata), and one had no dental lamellæ (Atremata), is good evidence that the prodeltidium primarily had nothing to do with the development of spondylia. Further, no spondylia are developed in the Cambrian until long after the deltidium was well established, and therefore the spondylium can not be "but a modification of the original pedicle-sheath." However, it is very probable that when the dental lamellæ in the Protremata became sufficiently wide to join the ventral shell, crowding all the muscles of this valve into a small area, these took advantage of the inner sides of the dental lamellæ for insertion, and thus a continuous layer of testaceous matter was deposited within the rostral cavity. With growth, the muscles move forward and press against the genitalia, which causes resorption or nondeposition for their relief. No spondylia appear before the Upper Cambrian, and here also are the first completely developed dental lamellæ. The so-called Lower Cambrian camarellas have no completely developed dental lamellæ, and are related to the rhynchonelloid genus Protorhyncha, and to *Protorthis billingsi*, which also has no spondylium.[1] Therefore, the further conclusion of Hall and Clarke can not be accepted, that, "where the teeth are wholly without dental lamellæ, or where such lamellæ do not extend to the bottom of the valve, it seems necessary to regard them as instances of degeneracy or resorption of the primitive spondylium."[2]

It seems clear to the writer that since the "shoe-lifter" plate, or spondylium, in Merista and Dicamara is for muscular insertion, this plate in the ventral valve of these genera is the morphic equivalent of the spondylium in the Pentameracea, and that the dorsal muscular plate in Dicamara is the equivalent of the cruralium, and can not "be interpreted as an entirely different structure from the spondylium."[3] It is true that the spondylia of these genera are not exactly like those of the Pentameracea, but since this plate in the Atremata is not formed by the union of dental lamellæ, as these do not exist in this order, there is no reason for rejecting the terminology for these plates in Merista and Dicamara.

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[1] *Camarella minor* and *C. antiqua* are more closely related to Protorhyncha than to any other genus. Of *Orthis billingsi*, the type of Protorthis, very good casts of specimens in the Cornell University Museum are in the National Museum, which show that this genus also has no spondylium, and that its characters are those of Billingsella.

[2] Hall and Clarke, ibid., p. 333.

[3] Ibid., p. 335.

CRURA AND CRURALIUM.

Calcareous processes for the support of the brachia are also developed in the Protremata, in the superfamily Pentameracea, but never to the same degree attained by the Spiriferacea or Terebratulacea of the Telotremata. In the Protremata these supports are first developed in the Syntrophiidæ, and attain their greatest length in the Pentameridæ. Since the two parts often unite medially, forming a plate for muscular insertion either resting upon the valve or supported by a septum, this has been termed a cruralium by Hall and Clarke, to distinguish it from the spondylium of the ventral valve. When the parts remain separate, and are therefore not for muscular insertion, they are homologous with and the equivalent of the crura in the Rhynchonellidæ. The crura of the Pentameracea and Rhynchonellacea arise independently, and are therefore morphologic equivalents.

MORPHOLOGIC EQUIVALENTS.

Because of the presence of similar or identical morphological structures in different groups of mature brachiopods, it is unsafe, on the basis of these alone, to suppose such to have close relationship. The spondylium has been shown to originate independently in three orders: Atremata, Protremata, and Telotremata. Identical mature loops have resulted in different ways in two stocks of the same family, one boreal (Dallinæ) and the other austral (Magellaninæ). Flat and more or less wide cardinal areas develop independently of one another in Protremata and Telotremata (Spiriferacea). Cementation of valves takes place at different and widely separated geologic epochs in Neotremata, Protremata, and Telotremata, and shell plications arise from smooth stocks in Pentameracea, Rhynchonellacea, Spiriferacea, and Terebratulacea. Natural phylogenies can only be established upon ontogenies checked by chronogenesis or geologic succession.

SUMMARY.

In North America there are 1,859 Paleozoic, 49 Mesozoic, and 14 Cenozoic species of fossil Brachiopoda. There are 116 species in the Cambrian, 319 in the Ordovician, 311 in the Silurian, 663 in the Devonian, and 478 in the Carboniferous.

The remarkable scarcity of post-Paleozoic species in America is supposed to be due not so much to the general decline of the class as to great orographic movements during the close of the Paleozoic, which produced complete barriers against the introduction of species from other areas.

Specific differentiation was most rapid in the Ordovician, having exceeded the Cambrian representation more than three times.

Thirty per cent of all American Paleozoic species had wide geographic distribution, which is most pronounced in the Devonian and

Carboniferous systems. One hundred and twenty-one American species are also found on other continents.

Widely dispersed species are least common in the most primitive order, Atremata, and greatest in the highest orders, Protremata and Telotremata. The difference, however, is but 7 per cent.

The order Atremata is represented by 199 species, or over 10 per cent of the American Paleozoic representation. In the Neotremata it is 156, or over 8 per cent. The Protremata have 738 species, or nearly 40 per cent; and the Telotremata 766 species, or about 41 per cent.

The order Atremata is best developed in species and genera in the Cambrian and Ordovician systems; the Neotremata in the Ordovician; the Protremata in the Ordovician, Silurian, and Devonian; and the Telotremata in the Devonian. The climax of differentiation is therefore chronologically related to phylogenetic or sequential origin.

Since the four orders of Brachiopoda are present in the Lower Cambrian, ordinal differentiation must have taken place in pre-Cambrian times. The two more primitive orders, Atremata and Neotremata, have in Lingula and Crania, respectively, genera with longest life histories. This probably is due not so much to their primitive structures as to their modes of living.

The last order to originate, Telotremata, has the greatest number of generic and superfamily characters, and probably also of species.

The last superfamily to appear, Spiriferacea, manifests most rapid evolution and is the second one to die out, being preceded by the Pentameracea. These two superfamilies are the most highly specialized in the orders to which they belong, and their great specialization may be the cause of their early disappearance.

The trunk families of later origin throughout the class manifest the greatest specific and generic differentiation and the widest specific dispersion, and have species of the largest size and often of longer geologic persistence.

The oldest or most primitive families nearly always have short geologic duration (except Rhynchonellidæ) and the least generic and specific differentiation, and commonly the individuals are of small size.

The largest of all brachiopods occur in the families Pentameridæ, Productidæ, and Spiriferidæ, at a time when the class was at the height of differentiation.

Large specific size is probably often gradually attained in genetic lines, and is due to favorable food conditions. The gigantic brachiopods always occur in the later-developed trunk families, and just before their decline in differentiation.

But 8 genera are known to pass from the Paleozoic to the Mesozoic. There are in all 327 brachiopod genera, 227 of which are Paleozoic. The Atremata have 29 genera, the Neotremata 30, the Protremata 89, and the Telotremata 179.

All brachiopods begin with smooth shells and protegula.

The prodeltidium, or third embryonic shell plate, is known in the Atremata, Neotremata, and Protremata. In the Atremata this becomes attached to the dorsal valve, while in the Telotremata it is apparently not developed at all. In the Protremata it becomes attached to the ventral valve, as in Neotremata. In the two last-named orders it modifies the pedicle opening. For this and other ontogentic and morphologic characters, Owen's terms Lyopomata and Arthropomata are abandoned. The Atremata and Telotremata are provisionally arranged under the superordinal term *Homocaulia*, and the Neotremata and Protremata under *Idiocaulia.*

Morphologic equivalents, or similar structural features, are developed independently, as follows: A spondylium in Obolacea, Lingulacea, Pentameracea, and rarely in Spiriferacea; crural processes in Pentameracea and Rhynchonellacea; functional articulation in Protremata and Telotremata; straight, more or less long, cardinal areas from rostrate forms in Rhynchonellacea, Spiriferacea, and Terebratulacea; rostrate shells from long cardinal areas in Pentameracea, and loss of pedicle and ventral shell cementation in Craniacea, Strophomenacea, and Spiriferacea.

CHAPTER IV.

MORPHOLOGY OF THE BRACHIA.

By Charles E. Beecher.[1]

The diagnostic value of the brachidium, or calcareous arm supports, of brachiopods has long been recognized, and forms one of the chief characters for generic and family subdivision among the Terebratulacea and Spiriferacea. This character fails in all other brachiopods, which have simply fleshy arms, unsupported by calcareous skeletons. There is, however, generally the most obvious analogy and intimate relationship between the arms themselves and the brachidium, so that whenever either structure can be ascertained it furnishes important data aiding in the determination of the systematic position of any genus within a family or order.

The growth of the arms, or lophophore, in recent genera may be divided into distinct stages, which often have a direct correlation with other important features of the shell. In many cases it is also possible to infer the form and arrangement of the brachia in fossil genera from markings on the interior of the valves and from the calcareous arm supports, and thus to obtain the chronogenetic as well as the morphogenetic history of these organs.

The most detailed accounts of arm development are given by Brooks[5] for Glottidia, by Morse[11] for Terebratulina, and by Kovalevski[10] for Cistella and Thecidea. These results, combined with original observations by the writer[1,2] and occasional descriptions of arm structure by Davidson[7] and other authors, are sufficient to include and properly interpret all the leading varieties of structure.

As shown by Brooks,[5] the tentacles, or cirri, in Glottidia originate on the dorsal side of the oral disk. They grow in pairs, one on each side of a central lobe. New tentacles are added between the first pair formed and the median lobe. Thus the cirri farthest removed from the median lobe are the oldest. Tentacles are added rapidly until the first arc is extended to a semicircle, and then progressively the whole disk becomes surrounded by a circle of these organs. The further introduction of cirri can only take place by the enlargement of the oral disk or through the deformation of the circle by lobes, loops, or extensions. In Glottidia, Lingula, Discinisca, Crania, and Rhynchonella the two points of tentacular increase, originally together and on

[1] The references to the literature will be found at the end of this chapter.

opposite sides of a median lobe, or tentacle, gradually separate, and the further multiplication of tentacles results in strap-shaped extensions on each side, which finally assume a coiled form, due to the limited space in which they grow. Therefore the arms in adult individuals of these genera have a single cirrated edge, extending from their free extremities to the sides of the oral disk, and, continuing posteriorly, unite on the ventral side of the disk behind the mouth. Each cirrated edge in the adult lophophore apparently has two approximate rows of alternating cirri (Hancock[9]), but as they were originally a single row in early stages, this appearance is evidently the result of a crowding of the cirri or a crumpling of the edge.

Kovalevski[10] has shown that in Cistella the tentacles also originate in pairs on each side of the dorso-median line, without a central tentacle or lobe. The same mode of increase has been shown by the writer[2] to be present in Magellania and Terebratalia. In young stages of Cistella, Terebratulina, Magellania, and other terebratuloid genera, as well as in Thecidea, after the circlet of tentacles is complete the two points at which new ones are added do not separate, but remain close together throughout the life of the animal. In this case the cirrated margin is lengthened by means of lobation and looping, and often by the final growth of a single, median, coiled arm, cirrated on both margins. Gwynia illustrates the completed circle of tentacles about the mouth. Adult Cistella shows an advance in having the anterior margin of the lophophore introverted, making it bilobed. Megathyris is slightly more complicated by two additional lobes. This simple method of increase is further elaborated in the Thecidiidæ. In the higher genera, especially among the Terebratulidæ, the maximum is reached by means of a median, unpaired, coiled arm, as in Magellania and Terebratulina.

The development of the different types and varieties of arm structure is presented in the accompanying figures (figs. 2–6), which are necessarily somewhat diagrammatic in order to show the features clearly, but the essential structure can readily be verified from consultation of the works cited or from a study of actual specimens. In the case of fossil forms, such as Dielasma, the Atrypidæ, and Athyridæ, the brachial supports have sufficient analogy with the arm structures of Terebratulina and Rhynchonella to warrant their interpretation as given. Also the spiral impressions on the valves of Davidsonia, and those occasionally present in Leptæna and Productus, clearly point to the possession of coiled arms by these genera.

CLASSIFICATION OF BRACHIAL STRUCTURES.

From what has already been shown it is seen that the various types of lophophores admit of a simple classification into stages and groups. It is proposed to give to these distinctive names, which may be used with facility in making comparisons and correlations. They may be found useful, also, in designating the kind of brachial complexity attained in any genus the arm structure of which can be determined, thus helping to fix its place in a genetic scale. It should be emphasized, however, that the form and complexity of the cirrated margin of the lophophore can have a taxonomic value only within comparatively narrow limits. This at once becomes evident when the arms of Lingula, Discinisca, Crania, Rhynchonella, and all the Spiriferacea are considered. Each has spiral arms, which were probably developed through similar changes of form, and yet each is genetically distinct, as shown by all the other leading characters. But when this classification of arm structures is applied within a family or genus, or even when made the basis of comparison among some closely related families, it is sometimes possible to reach very satisfactory conclusions relating to the systematic position of various forms.

LEIOLOPHUS STAGE.

It is hardly necessary to direct attention to the embryonic brachial structure before the growth of any of the tentacles, or cirri, on the edge of the lophophore, while the animal is in the typembryonic stage. For the sake of designating all the stages, this may be called the *leiolophus* stage, though it has no special significance beyond indicating the beginning of the lophophore.

TAXOLOPHUS STAGE.

The first stage in which a true brachial structure is manifest is an early larval form, often the protegulum stage, when the tentacular portion of the lophophore is a simple arc, or crescent. This may be called the *taxolophus*. The tentacles are few in number, and increase takes place on each side of the median line, dorsally, in front of the mouth. In figs. 2*a*, *e*, 3*a*, *f*, 5*a* this character is clearly shown. The tentacles at the ends of the arc are the oldest, and new ones are being formed in the middle portion. In Thecidea, Cistella, and Magellania the tentacles of the taxolophus are centripetal, due to the edge of the lophophore being near the margin of the shell; while in Terebratulina, Discinisca, and Lingula they are centrifugal, due to the smaller and central lophophore.

So far as known, there is no adult living form which has the taxolophian brachial structure. It may have been present in adult Iphidea of the Cambrian.

TROCHOLOPHUS STAGE.

By the continual addition of new cirri and the pushing back of the old ones, the fringed margin of the lophophore passes from a crescentic to a circular form, thus making a complete ring about the mouth. This may be termed the *trocholophus* stage. It appears in the late larval and early adolescent stages of Thecidea (fig. 2*b*), Cistella (fig. 2*f*), Magellania and Terebratalia (fig. 3*b*), Terebratulina (fig. 3*g*), Glottidia (fig. 5*b*), and Discinisca, and, like the former stages, is undoubtedly common to all brachiopods, except, perhaps, Iphidea.

Gwynia is an adult living representative of this stage, and never develops any higher type of brachial structure. Dyscolia also belongs here, since it has a discoid lophophore surrounded by a marginal fringe of tentacles (Fischer and Œhlert[8]). It is possibly a little more advanced than Gwynia, as it has a slight median anterior notch, suggesting the beginning of the bilobed structure of the next higher type. The absence of septum, hinge-plate, and dental plates are other primitive characters belonging to Dyscolia.

SCHIZOLOPHUS STAGE.

After the completion of the trocholophus stage in all brachiopods, except such simple forms as Gwynia and Discolia, no further increase in the cirrated edge of the lophophore can occur without some deformation of the circle. This is first accomplished by an introversion of the anterior median edge, thus dividing the lophophore into two lobes, and suggesting the name *schizolophus* for this type. (See figs. 2c, g, 3c, h, 5c.)

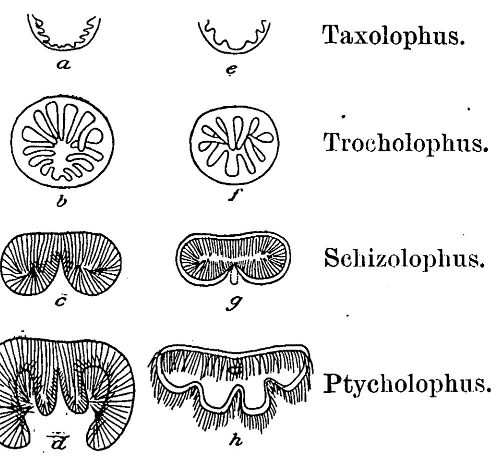

FIG. 2.—Stages of growth of the lophophore in Thecidea, Cistella, and Megathyris. *a, b, c, d*, stages in the growth of the lophophore in *Thecidea (Lacazella) mediterranea*, enl. (*a–c* after Kovalevski, *d*, after Lacaze-Duthiers). *e, f*, early stages of lophophore of *Cistella neapolitana*, enl. (after Kovalevski). *g*, adult lophophore of Cistella (*C. cistellula*), enl. (after Davidson). *h*, labial appendages of *Megathyris decollata*, enl. (after Davidson).

Several brachiopods retain the schizolophian brachia as an adult character. Of these, Cistella is perhaps the best example, as it agrees exactly with an early stage of arm structure among the Terebratellidæ, which has been called the cistelliform stage (fig. 3c). Terebratulina (fig. 3h), Glottidia (fig. 5c), and other higher forms, also have corresponding schizolophian stages, but are without the median septum. *Lacazella mediterranea* presents a similar larval structure, and in *L. barretti* it is retained to maturity. The fossil genera Davidsonella and Thecidella of the Thecidiidæ, and Zellania of the Terebratellidæ, never developed beyond the schizolophus stage, and they must therefore be considered as quite primitive genera in their respective families.

From this point the further development and complication of arm structure proceeds in three distinct diverging lines, producing the three characteristic types of brachia of all the higher brachiopods, as exemplified in Thecidea, Terebratulina, and Rhynchonella.

PTYCHOLOPHUS STAGE.

The simplest of the types of brachia just cited is developed out of the schizolophus by the additional lobation, or looping, of the primary lobes, making a structure which may be called the *ptycholophus*. Megathyris and *Lacazella mediterranea* both have 4 lobes (fig. 2*d*, *h*); *Thecidea radiata* has 6; *T. vermicularis* and *Eudesella mayale*, 8; *E. digitata*, 10; Pterophloios and Oldhamina, about 20. Lobation in some (Thecidea) is produced by the forking or branching of the median septum; in others (Pterophloios) the septum remains simple while the lateral borders of the lophophore are lobed.

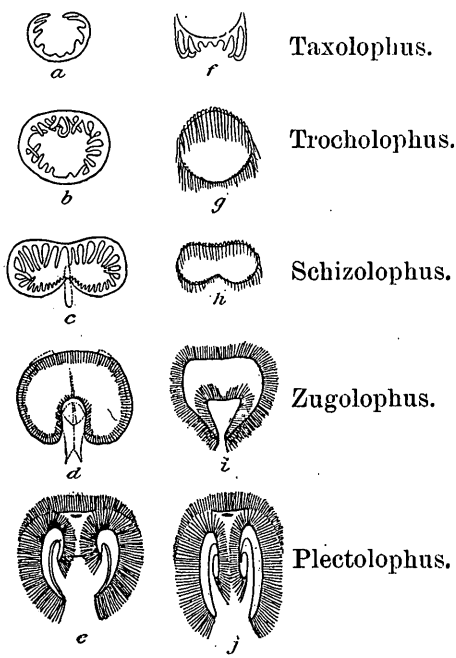

FIG. 3.—Stages of growth of the lophophore in the Terebratellidæ and Terebratulidæ. *a*, *b*, *c*, *d*, *e*, five stages in the development of the lophophore in the Terebratellidæ. *a–d*, *Terebratalia obsoleta*, enl. (after Beecher[2]). *e*, *Magellania kerguelenensis*, nat. size (after Davidson[7]). *f*, *g*, *h*, *i*, *j*, development of lophophore in the Terebratulidæ. *f–i*, early stages in *Terebratulina septentrionalis*, enl. (after Morse[11]). *j*, adult *Terebratulina cancellata* (after Davidson[7]).

ZUGOLOPHUS AND PLECTOLOPHUS STAGES.

All the higher Terebratulacea reach the final growth of the lophophore through an intermediate stage which from its form may be called the *Zugolophus*—fig. 3*d*, *i*. Eucalathis and Platidia (?Tropidoleptus) are apparently adult representatives of this stage, while Kraussina and probably Bouchardia are slightly more advanced by the growth of a short median, coiled arm, and lead to the next highest, or plectolophus, stage, in which there is a well-developed spiral arm with a fringe of cirri on each edge—fig. 3*e*, *j*.

A long loop pointed in front like Rensselæria and Centronella could not have supported a median arm, as the pallial cavity is thus fully occupied, and the development of the brachidium in the Terebratellidæ shows that the central space between the branches of the loop is to accommodate such an organ. The same is doubtless true of Dielasma, which first has a Centronella-like loop, and through the subsequent resorption of the anterior portion the ascending branches are formed and space allowed for the median arm—fig. 4*a–d*. In a spire-bearing genus like Zygospira this is more obvious, for here the transverse process or jugum is clearly the result of the growth and resorption of the centronelliform loop to admit the spiralia.

FIG. 4.—Metamorphoses of the brachidium in *Dielasma turgida*, enl. (after Beecher and Schuchert).

The calcareous loop in Terebratulina and Liothyrina is only a posterior basal support, and does not repeat the outline of the cirrated margin of the lophophore, exclusive of the arm. Therefore it is impossible in these and closely allied genera to infer the stage of development of the lophophore from the loop alone. Dyscolia is an excellent example, since the loop is the same as in Terebratulina; but the lophophores are quite distinct in each, the former being of the trocholophus type and the latter belonging to the plectolophus.

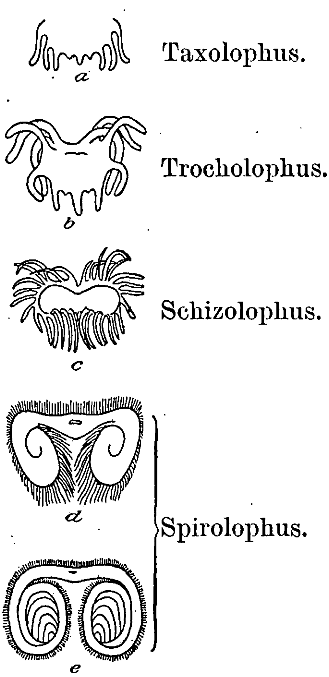

FIG. 5.—Early stages of lophophore of Glottidia and adult brachia in Lingula and Hemithyris. *a*, *b*, *c*, early stages of lophophore of *Glottidia audebarti*, enl. (after Brooks). *d*, adult brachia in Lingula (after Woodward). *e*, adult brachia in *Hemithyris psittacea* (after Hancock).

SPIROLOPHUS STAGE.

The last type to be noticed is the one in which there are two separate coiled arms, each with a row of cirri on one edge only—fig. 5*d*, *e*. It embraces the greater part of the families of brachiopods in the orders Telotremata and Protremata, and includes all the living species in the orders Atremata and Neotremata.

In the early stages of development of the spiral lophophore there is an agreement with the early stages of the families already noticed, and the taxolophus, trocholophus, and schizolophus stages may be determined—fig. 5*a*, *b*, *c*. The separation and growth of the spiral arms seem to be due to the widening or expansion of the median lobe or tentacle, on each side of which is the formative tissue for new cirri. This is very apparent in the young Discinisca described by Muller,[12] and the Glottidia described by Brooks.[5]

The brachidium in Zygospira passes through a series of changes which have been described in detail elsewhere.[4] These metamorphoses are of great assistance in understanding the development and comparative morphology of this feature in other groups of the Spiriferacea. The earliest stage observed (fig. 6*a*) has the form of a simple terebratuloid loop, which, from its resemblance to Centronella, was called the centronelliform stage. Since approximately this form of brachidium is also characteristic of the young of recent terebraluloids, it may be taken in Zygospira as indicative of the trocholophus stage of brachial development. With this as a starting point for comparison, the further correlation of the succeeding stages is very simple.

The first resorption of the end of the loop in Zygospira produced a schizolophus condition, and further resorption carried the brachidium to a stage closely resembling Dielasma (fig. 6*b*). The dielasmatiform stage has already been explained as due to the requirements of space for the growth of the coiled brachia. Next, the initial calcification of the spiral arms resulted in the extension of the descending branches beyond the jugum (fig. 6*c*), and, lastly, complete calcification manifests the spirolophus structure and produced the characteristic brachidium of the Spiriferacea.

The Atrypidæ and the Athyridæ seem to stand to each other in the same relation as the Terebratellidæ and Terebratulidæ. In the first the descending branches are widely separated and follow the edges of the valves; in the second the descending branches are close together. This difference in the Spiriferacea produces the converging cones of the Atrypidæ (fig. 6*d*) and the diverging cones of the Athyridæ, Spiriferidæ, Retziidæ (fig. 6*e*), etc.

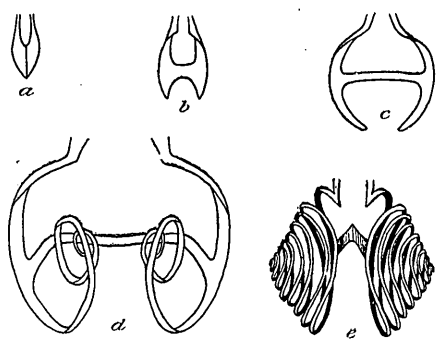

FIG. 6.—Metamorphoses of brachidium of Zygospira and adult brachidium of Rhynchospira. *a, b, c, d*, metamorphoses of brachidium of *Zygospira recurvirostra*, enl. (after Beecher and Schuchert). *e*, Brachidium of *Rhynchospira evax* (after Beecher and Clarke).

It seems doubtful whether the fleshy portions of the brachia in the Meristellidæ and Athyridæ possessed additional characters expressing the complexity and elaboration reached by the jugal processes, even when the lamellæ were duplicated, as in Koninckina and Kayseria.

From the above descriptions and illustrations it appears that the mode of growth of the cirrated lophophore, or brachia, is alike in the larval stages of all brachiopods. They first develop tentacles in pairs on each side of the median line in front of the mouth (taxolophus stage). New tentacles are continually added at the same points, until, by pushing back the older ones, they form a complete circle about the mouth (trocholophus stage), later becoming introverted in front (schizolophus stage). From this common and simple structure all the higher types of brachial complication are developed through one of two methods: (1) The growing points of the lophophore, or points at which new tentacles are formed, remain in juxtaposition; or (2) they separate. Complexity in the first is produced (*a*) by lobation, as in

Megathyris, Eudesella, Pterophloios, Thecidea, etc. (ptycholophus type), and (*b*) by looping (zugolophus) and the growth of a median, unpaired coiled arm (plectolophus), as in Magellania, Terebratulina, etc.; in the second (*c*) by the growth of two, separate, coiled extensions or arms, one on each side of the median line (spirolophus), as in Lingula, Crania, Discinisca, Rhynchonella, Leptæna, Davidsonia, Spirifer, Athyris, Atrypa, etc.

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CHAPTER V.

CLASSIFICATION OF THE BRACHIOPODA.

HISTORICAL.

Fabius Columna, in 1616, and Martin Lister, in 1678, were the first to describe brachiopods, calling them *Conchæ anomiæ*. Grundler, in 1774, was, however, the first to give a good illustration of a brachiopod in *Terebratulina caput-serpentis*. In 1818 Lamarck recognized 5 genera, including the operculate coral Calceola. Other genera were added by Sowerby, Dalman, and Defrance, from 1820 to 1830, and in the early forties about 1,500 species had been defined. In 1849 King recognized 49 genera in 16 families, and Bronn, in 1862, knew nearly 2,000 species and 51 genera. At present there are probably no fewer than 6,000 species known in 321 genera, grouped in 31 families, 9 superfamiles, 4 orders, and 2 superorders.

Since 1858 the class Brachiopoda has been divided by nearly all systematists into two orders, based on the presence or absence of articulating processes. These two divisions were recognized by Deshayes as early as 1835, but not until twenty-three years later were the names Lyopomata and Arthropomata given to them by Owen. These terms have been generally adopted by authors, though some prefer Inarticulata and Articulata of Huxley, or Bronn's Ecardines and Testicardines. Bronn, in 1862, and King, in 1873, while retaining these divisions, considered the presence or absence of an anal opening more important than articulation, and accordingly proposed the terms Pleuropygia and Apygia, and Trententerata and Clistenterata, respectively. In many Paleozoic genera of Clistenterata it has been shown that an anal opening was also present, and therefore the absence or presence of this organ is not of superordinal value. Beecher writes:[1]

> The dorsal beaks of Amphigenia, Athyris, Cleiothyris, Atrypa, and Rhynchonella are usually notched or perforate. The perforation comes from the union of the crural plates above the floor of the beak leaving a passage through to the apex. A similar opening occurs between the cardinal processes in Strophomena, Stropheodonta, and allied genera, and the chilidium may also be furrowed, as in *Leptæna rhomboidalis*. This character is evidently in no way connected with the pedicle opening, but points to the existence, in the early articulate genera, of an anal opening dorsal to the axial line, as in the recent Crania. This dorsal foramen was described and figured by King

[1] Am. Jour. Sci., 3d series, Vol. XLIV, 1892, p. 147. See also King, A Monograph of the Permian Fossils of England, 1850; and Œhlert, Fischer's Manuel de Conchyliologie, Appendice, 1887.

in 1850, Hall in 1860, and by several authors since, and has commonly been termed a visceral foramen. Œhlert suggests that it was probably occupied by the terminal portion of the intestine. The persistence of the foramen seems to indicate an anal opening.

Hall and Clarke state:[1]

> It has become evident, from a study of the hinge plate, that the so-called visceral foramen which perforates it, and which is often present in Athyris, Rensselæria, Cryptonella, etc., is a remnant of this aperture, the remainder of the median opening having become filled by a testaceous secretion. There is every reason to believe that the visceral foramen was actually traversed by the lower alimentary canal, and if this were true, then the deep and narrow median chamber bounded by the crural plates must also have inclosed the terminal portion of the intestine.

In 1834 Von Buch also divided the class into two sections, founded on the mode of attachment. The first section contained all brachiopods fixed by a pedicle to foreign bodies, while the second was restricted to those forms in which there is no pedicle at maturity, the entire lower or ventral valve being cemented to other objects, as in Crania. The first section was again divided into three groups, on the basis of the pedicle: (*a*) Pedicle emerging from between the valves, as in Lingula; (*b*) ventral valve perforated for the protrusion of the pedicle; and (*c*) uncemented shells without a pedicle opening. The third group, however, is identical with *b*, since Leptæna, Productus, and Strophomena, genera referred to section *c*, do possess a pedicle opening. While this classification lacks a complete understanding of the features in question, it is remarkable that Von Buch nearly sixty years ago, and Deslongchamps twenty-eight years later, recognized some of the principles upon which the classification of the Brachiopoda is now established, viz, the nature of the pedicle opening.

Up to 1846 the general external features of brachiopods served the majority of authors as the essential basis for generic differentiation. In that year, however, King pointed out that more fundamental and constant characters exist in the interior of the shell, a fact which soon came to be generally recognized, mainly through the voluminous writings of Thomas Davidson.

In 1848 Gray, probably stimulated by King's paper, divided the Brachiopoda into two subclasses, Ancylopoda and Helictopoda. These divisions rest entirely on the basis of the structure and the presence or absence of calcareous supports. The Ancylopoda are distinguished in having the "oral arms recurved and affixed to fixed appendages on the disk of the ventral [dorsal] valve," while in Helictopoda "they are regularly spirally twisted when at rest." The brachia, however, in all recent species, are recurved and more or less spirally enrolled, except in some gerontic forms of loop-bearing genera, as Cistella and Gwynia. Therefore Helictopoda, as far as the brachial structure is concerned, will also include the Ancylopoda. In fact, to the former Gray referred only the terebratuloids, if Thecidia is

[1] Palæontology of New York, Vol. VIII, Part II, 1895, p. 334.

excluded, while the Ancylopoda contained all other brachiopods, both articulate and inarticulate forms. These subclasses are further divided, on the basis of the brachia, into four orders: Ancylobrachia, Cryptobrachia, Sclerobrachia, and Sarcicobrachia. Of these the first only has value as a superfamily, since it includes the "loop-bearing" genera, or Terebratulacea. The other orders have so heterogeneous an assemblage of forms as to be of no permanent value.

Beyond the introduction of new families, no further attempt was made by writers to divide the Brachiopoda into other orders than Lyopomata and Arthropomata until 1883, when Waagen published his great work on the fossils of this class from the Salt Range group of India. He found it "absolutely necessary" to further divide the Lyopomata and Arthropomata into seven suborders. The basis for these suborders has no underlying principle of general application, yet the majority of the divisions are of permanent value, for each contains an assemblage of characters not to be found in any of the others. Waagen's genealogy of the Arthropomata, with Orthis as the prototype, falls at once to the ground, since the comprehensive studies of the genus Orthis by Hall and Clarke have shown that it is questionable "whether any of these primordial forms can be included under Orthis according to the strict definition of the term or even under any of the subdivisions"[1] proposed by them. There are, however, a few species in the Upper Cambrian which seem to agree with such dalmanellas as *O. subæquata*, but these originated long after many undoubted Protremata and Telotremata had lived in the Lower and Middle Cambrian. Lingula, on the other hand, was usually regarded as the prototype of all brachiopods, but this is also impossible, since a number of inarticulate genera flourished for ages before Lingula was developed.

PRINCIPLES OF CLASSIFICATION.

No classification can be natural and permanent unless based on the history of the class (chronogenesis) and the ontogeny of the individual. However, as long as the structure of the early Paleozoic genera of Brachiopoda remained practically unknown and the ontogeny untouched, nothing of a permanent nature could be attempted. In the recent volumes by Hall and Clarke many of these early genera are clearly defined, so that their structures and geologic sequence are now far more accurately known. The ontogenetic study of Paleozoic species was initiated in 1891 by Beecher and Clarke, and was continued by Beecher and Schuchert. These results, combined with those derived from the development of some recent species, and published by Kovalevsky, Morse, Shipley, Brooks, Beecher, and others, confirm the conclusions reached through chronogenesis. Moreover, the application by Beecher of the law of morphogenesis, as defined by Hyatt, and the

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[1] Palæontology of New York, Vol. VIII, Part I, 1892, p. 218.

recognition and establishment of certain primary characters have resulted in the discovery of a fundamental structure of general application for the classification of these organisms. It has for its basis the nature of the pedicle opening and the stages of shell growth. On these characters Beecher has divided the class into four orders—the Atremata, Neotremata, Protremata, and Telotremata.[1]

Hall and Clarke[2] reject Beecher's ordinal terms Atremata and Neotremata for the subordinal names Mesokaulia and Daikaulia of Waagen, on the ground of priority, and because the latter terms are "an admirable expression of the significance of the pedicle passage." If some of Waagen's subordinal terms are elevated to ordinal rank and amended by Hall and Clarke, then these terms are no longer Waagen's, but should be credited to Hall and Clarke. Such being the case, the law of priority demands the retention of Beecher's terms, as they do not conflict with those of Waagen but with the secondary definition and rank accorded them by Hall and Clarke.

On the other hand, Dall claims[3] that "names of higher rank than genera are not subject to the rule of strict priority, on account of the mutability of their limits." Again, if Waagen's subordinal terms (and there are seven of them) are to be elevated to ordinal rank—i. e., if the characters upon which they are established are ordinal characters—then all should be elevated alike in rank. Besides the two mentioned above, Hall and Clarke accept also Gasteropegmata and Helicopegmata. The latter, however, they retain as suborders, and would do likewise with Kampylopegmata if Gray's term Ancylobrachia of earlier date did not cover the same group of brachiopods; while Gasteropegmata, having certainly no greater value than a superfamily, is elevated to an order. Again, they accept Beecher's Protremata, when Waagen's suborder Aphaneropegmata could as well be raised to ordinal rank and adapted so as to include the former, since Waagen based the latter upon families having the diagnostic character of the Protremata, namely, the well-developed deltidium. However, a far more important reason why Waagen's terms should not be elevated to ordinal rank and made to displace Beecher's names is that the latter clearly understood the value of the different ordinal characters and defined them excellently, which definitions are accepted by Hall and Clarke. He pointed out the most primitive shelled condition in the protegulum, and found this first shell-growth stage in all the important families in the class. He observed that not the mere pedicle slit of the Daikaulia is the ordinal character for Neotremata, but the way in which growth proceeds to form this derived pedicle slit from the open pedicle notch of primitive forms. He was the first to interpret the true morphologic

[1] Development of the Brachipoda, Part I, Am. Jour. Sci., 3d series, Vol. XLI, 1891; Part II, ibid., Vol. XLIV, 1892.

[2] Palæontology of New York, Vol. VIII, Part II, summary, 1895.

[3] Trans. Wagner Free Institute of Science, Phila., Vol. III, Part III, 1895, p. 565, Rule XII.

meaning of the deltidium and deltidial plates, and subsequently, from the works of others, chiefly Kovalevsky, was able to demonstrate the great morphologic significance of the deltidium. Without any injustice to the monumental work of Waagen—and there is no more careful work on the Brachiopoda—it can safely be asked, Were Waagen's suborders based on a fundamental morphologic character of general importance throughout or on ontogeny? Mesokaulia and Daikaulia are the only two of the seven suborders having, as now understood, the required ordinal characters, and these divisions were established by Waagen on the form, general expression, and the position of the pedicle, and not on the morphologic development of the pedicle opening. Four of the other five suborders are based on superfamily and the fifth on family characters. Five of Waagen's seven suborders, therefore, are here retained as superfamilies, and practically in the sense of their author.

Since orders are established on the nature of the pedicle opening, persistent internal characters of the shell are, as a rule, used for superfamily purposes. Such are the absence or presence of a spondylium (Strophomenacea and Pentameracea, respectively); the absence or presence of calcareous brachial supports, and their nature (crura only in the Rhynchonellacea, loop in the Terebratulacea, and spirals in the Spiriferacea).

Families within the superfamilies are based upon a combination of external and internal generic characters common to many genera, or even to one genus. Such characters are: Outer form; nature and position of muscles (Obolidæ, Lingulidæ, etc.); internal plates (Trimerellidæ, Lingulasmatidæ, Pentameridæ); peculiarities of the cardinal process (Orthidæ, Strophomenidæ); imperfection or perfection or persistent peculiarities of ordinal and superfamily characters (Orthidæ, Trematidæ, Discinidæ, Siphonotretidæ, etc.); simplicity or complexity of the jugum (Hindellinæ, Diplospirinæ, etc.); and occasionally the nature of the shell structure (Rhynchospirinæ). When families are large it is not rare to find groups of genera having a common origin which have characters in common but not differentiated sufficiently to introduce new characters of family importance. In such cases it is advisable to divide the family into subfamilies, which facilitates systematic review and discussion. Such is the case in the large families Strophomenidæ, Terebratulidæ, Terebratellidæ, Spiriferidæ, and Athyridæ.

No division, however, has any value unless the group contains forms of but one phylum. A phylum, or line of descent, can not originate twice. It happens, however, that the same or nearly the same combination of mature characters is developed along different phyla. When this occurs the ontogeny will show it. It is therefore not correct to group these different stocks as belonging to one family. For instance, the Trimerellidæ and Lingulasmatidæ have family structures in common and were referred to the same family. Ontogeny and chronogenesis, however, show that the former family originated directly in the Obolidæ, while the latter was not evolved from the linguloid phylum until the Obolidæ had given origin to the Lingulellidæ and the Lingulidæ. Again, the family Terebratellidæ, probably during early Mesozoic times, divided, one stock drifting into boreal and another into austral regions. These two stocks agree in the earliest shelled condition and at maturity, but between these two stages of growth the austral group (Magellaninæ) passes through a series of loop metamorphoses different from that through which the boreal group (Dallinæ) passes. Therefore it is unnatural to include both in one subfamily, as was formerly done.

It was by the application of the above-mentioned principles that the writer, in 1893, arranged all brachiopod genera under the four orders instituted by Beecher. Since then this subject has received considerable attention, and the many Cambrian brachiopods brought together by Walcott have been examined as to their generic structures. These studies have led to some changes in the classification which follows, the most important being that the order Telotremata could not have originated in the Pentameriidæ, since no Pentameracea are known in the Cambrian until long after that order had representation. The divisions Lyopomata and Arthropomata, introduced by Deshayes and Owen, have been abandoned for reasons given in previous pages.

CLASSIFICATION AND SYNONYMY.[1]

Class BRACHIOPODA Cuvier, 1802; Duméril, 1

Spirobranchiophora Gray, 1821; Palliobranchiata Blainville, 1824; Branchiopoda Risso, 1826 (not Latreille); Brachiopodidæ Broderip, 1839; Branchionopoda Agassiz, 1847; Brachionocephala Bronn, 1862; Spirobranchia Bronn, 1862; Branchionobranchia Paetel, 1875.

Bivalved Molluscoidea with inequivalved, equilateral shells attached to extraneous objects by a posterior prolongation of the body, or pedicle, (1) throughout, (2) during a portion of life, or (3) cemented ventrally. Valves ventral and dorsal. In composition, phosphatic or calcareous, or both. Animal consisting of two pallial membranes intimately related to the shell. Within the mantle cavity at the sides of the mouth are inserted the two, more or less long, oral, usually spirally enrolled, cirrated brachia, which are variously modified, and are supported in the two terminal superfamilies by an internal calcareous skeleton, or brachidium, attached to the dorsal valve. Anus present or absent. Central nervous system consisting of an œsophageal ring, with weakly

[1] All names in small type and indented are synonyms of the term in larger type immediately preceding.

developed brain and infraœsophageal ganglionic swellings. Blood-vascular system probably present, with the sinuses developed into vascular dilatations at the back of the stomach and elsewhere. Sexes separate. Exclusively inhabitants of the sea. The class is present in the Lower Cambrian, attained maximum development in the Silurian and Devonian, and is represented by about 140 living species. During this time, probably upward of 6,000 fossil and recent species have been developed, and these are distributed in 328 genera, grouped in 31 families, 10 superfamilies, and 4 orders.

Order **ATREMATA** Beecher, 1891.[1]

Mesokaulia, or Lingulacea (partim) Waagen, 1885.

Inarticulate Brachiopoda with the pedicle emerging freely between the two valves, the opening being more or less shared by both. Growth taking place mainly around the anterior and lateral margins, never inclosing or surrounding the pedicle. Aperture unmodified. Prodeltidium attached to dorsal valve.

Superfamily **OBOLACEA** Schuchert, 1896.[2]

Rounded or semicircular and more or less lens-shaped, thick-shelled, primitive Atremata, fixed by a short pedicle throughout life to extraneous objects.

1.[3] Family PATERINIDÆ Schuchert, 1893 (emend.).[4]

Obolacea with the dorsal valve semicircular and the ventral subcircular in outline. Posterior region more or less closed by cardinal areas.

Iphidea Billings, 1872.
Paterina Beecher, 1891.

Volborthia von Möller, 1873.

2. Family OBOLIDÆ King, 1846.

Obolinæ Gill, 1871.

Thick-shelled Obolacea of nearly circular or ovoid outline, biconvex, usually smooth, with rudimentary cardinal areas traversed by shallow

[1] Since in this classification no superordinal terms are for the present adopted, it will be well to give here all such terms used by authors and others which are of lower rank and not readily referred as synonyms to their proper places:

Ancylobrachia, Ancylopoda, Helictopoda, Sarcicobrachia Gray, 1848; Lyopomata and Arthropomata Owen, 1858; Pleuropygia, Sarcicobranchiona, Sclerobranchiona Bronn, 1862; Articulata and Inarticulata Huxley, 1864; Clistenterata and Tretenterata King, 1873.

[2] Text book of Paleontology, by Zittel and Eastman, 1896, p. 305. Also see page 78 of this bulletin.

[3] The numbers and letters before a family or subfamily term indicate the phyletic relations which these have to one another within a superfamily. The phylogeny of the families, however, is more clearly represented in the diagram on Pl. I, facing p. 134.

[4] Recent discoveries have shown that Iphidea has no pedicle opening, and should include forms referred to Paterina. Therefore this family is of doubtful value, and is provisionally retained for the reception of genera more primitive in structure than those of the Obolidæ.

pedicle grooves. Muscular scars distinct, consisting of two pairs of adductors and three of sliders, or adjustors.

Obolella Billings, 1861.
  Dicellomus Hall, 1871.
Elkania Ford, 1886.
  Billingsia Ford, 1886.
Neobolus Waagen, 1885.
Botsfordia Matthew, 1893.
?Spondylobolus McCoy, 1852.
Obolus Eichwald, 1829.
  Ungula Pander, 1830.
  Ungulites Bronn, 1848.
  Aulontreta Kutorga, 1848.
  Euobolus Mickwitz, 1896.
Acritis Volborth, 1869.
Schmidtia Volborth, 1869 (not Bals-Criv., 1863).
Thysanotos Mickwitz, 1896.
Leptembolon Mickwitz, 1896.

3. Family TRIMERELLIDÆ Davidson and King, 1874.

Large, thick-shelled, inequivalved Obolacea, with the ventral cardinal area usually very prominent, triangular, and transversely striated. Adjustors and anterior adductor muscles elevated upon solid or deeply excavated platforms, or spondylia.

?Lakmina Œhlert, 1887.
  Davidsonella Waagen, 1885 (not Munier-Chalmas, 1880).
Lingulobolus Matthew, 1896.
Sphærobolus Matthew, 1896.
Dinobolus Hall, 1871.
  Conradia Hall, MS., 1862.
  Obolellina Billings, 1871.
  Ungulites Quenstedt, 1871 (not Bronn, 1848).
Monomorella Billings, 1871.
Trimerella Billings, 1862.
  Gotlandia Dall, 1870.
Rhinobolus Hall, 1874.

Superfamily **LINGULACEA** Waagen, 1885 (restricted).[1]

Elongate, thin-shelled, burrowing, derived Atremata, with a more or less long, worm-like, tubular, flexible pedicle.

1. Family LINGULELLIDÆ Schuchert, 1893.

Spatulate, inequivalved Lingulacea, structurally intermediate between the Obolidæ and Lingulidæ.

Lingulella Salter, 1866.
Lingulepis Hall, 1863.
Leptobolus Hall, 1871.
?Paterula Barrande, 1879.
  Cyclus Barrande, 1879.
?Mickwitzia Schmidt, 1888.

[1] Waagen's term Mesokaulia, or Lingulacea, is based upon the families Obolidæ, Trimerellidæ, and Lingulidæ. Since this term has value, and to avoid proposing another, Lingulacea is here restricted to the latter family and two others recently proposed. Waagen in using this term gave a dual series; the second one is here adopted to conform in euphony with other superfamily terms.

2. Family LINGULIDÆ Gray, 1840.

Lingulidæ Gill, 1871.

Attenuate, subquadrate or spatulate, almost equivalved Lingulacea, derived through Lingulellidæ, with a more or less long, tubular, flexible pedicle. Muscles highly differentiated and consisting of six pairs, two of adductors, and four of sliders, or adjustors.

Lingula Bruguière, 1792.
 Pharetra Bolton, 1798.
 Lingularius Duméril, 1806.
Glossina Phillips, 1848.
Dignomia Hall, 1871.
Glottidia Dall, 1870.
Barroisella Hall and Clarke, 1892.
Tomasina Hall and Clarke, 1892.

3. Family LINGULASMATIDÆ Winchell and Schuchert, 1893.

Platform-bearing Lingulacea derived through Lingulidæ.

Lingulops Hall, 1871.
Lingulasma Ulrich, 1889.
 Lingulelasma Miller, 1889.

Order **TELOTREMATA** Beecher, 1891.

Sclerobrachia Gray, 1848; Kampylopegmata (partim) Waagen, 1883; Pegmatobranchiata (partim) Neumayr, 1883.

Articulate Brachiopoda, with the pedicle opening shared by both valves in nepionic and early neanic stages, usually confined to one valve in later stages, and becoming more or less modified by deltidial plates in ephebic stages. Brachia supported by calcareous crura, loops, or spiralia. Prodeltidium absent.

Superfamily **RHYNCHONELLACEA** Schuchert, 1896.[1]

Rostracea Schuchert, 1893; Ancistropegmata (partim) Zittel, 1895.

Rostrate, primitive Telotremata, with or without crura.

1. Family PROTORHYNCHIDÆ Schuchert, 1896.[1]

Primitive Rhynchonellacea, without deltidial plates or crura.

Protorhyncha Hall and Clarke, 1893.

2. Family RHYNCHONELLIDÆ Gray, 1848.

Hypothyridæ (partim) King, 1850; Rhynchonellinæ Gill, 1871; Waagen, 1883.

Rhynchonellacea with more or less long crura.

[1] Text-book of Paleontology, by Zittel and Eastman, 1896, p. 323.

Orthorhynchula Hall and Clarke, 1893.
Rhynchotrema Hall, 1860.
Stenochisma Conrad, 1839; Hall, 1867.
Rhynchotreta Hall, 1879.
Camarotœchia Hall and Clarke, 1893.
Plethorhynchus Hall and Clarke, 1893.
Leiorhynchus Hall, 1860.
Wilsonia Kayser, 1871.
Uncinulina Bayle, 1878.
Uncinulus Bayle, 1878.
Hypothyris King, 1846 (not Phillips, 1841).
Pugnax Hall and Clarke, 1893.
Eatonia Hall, 1857.
Cyclorhina Hall and Clarke, 1893.
Rhychopora King, 1856.
Rhynchoporina Œhlert, 1887.
Terebratuloidea Waagen, 1883.
Rhynchonella Fisher de Waldheim, 1809.
Oxyrhynchus Llhwyd, 1699 (not Aristotle).
Rhyngonella Bronn, 1849.
Bicornes Quenstedt, 1851.
Rhynchonellopsis Bose, 1894.
Halorella Bittner, 1890.
Austriella Bittner, 1890.
Norella Bittner, 1890.
Peregrinella Œhlert, 1887.
Rhynchonellina Gemmelaro, 1871.
Dimerella Zittel, 1870.
Acanthothyris d'Orbigny, 1850.
Hemithyris d'Orbigny, 1847.
Frieleia Dall, 1895.
Cryptopora Jeffreys, 1869.
Atretia Jeffreys, 1876.
Neatretia Œhlert, 1891.

Superfamily TEREBRATULACEA Waagen, 1883 (restricted).[1]

Ancylopoda, Cryptobrachia, and Ancylobrachia (partim) Gray, 1848; Kampylopegmata Waagen, 1883; Ancylopegmata Zittel, 1895.

Derived Telotremata with the brachia supported by calcareous, primitive, or metamorphosed loops.

Section A. *TEREBRATULA*.

Terebratulacea with the loops unsupported by a median dorsal septum at any stage of growth. Brachial cirri directed outward in larval stages.

1. Family CENTRONELLIDÆ Hall and Clarke, 1895.[2]

Centronellinæ Waagen, 1882; Beecher, 1893; Rensselæridæ Hall and Clarke, 1895.

Terebratulas with the loop developing direct and composed of two descending lamellæ, uniting in the median line and forming a broad, arched plate.

[1] Terebratulacea Waagen is used here in preference to Ancylobrachia Gray, in violation of the law of priority, for the sake of euphony.

[2] Since Beecher's "Revision of the families of loop-bearing Brachiopoda" (Trans. Conn. Acad., Vol. IX, 1893), it has been shown by Beecher and Schuchert (Proc. Biol. Soc. Washington, Vol. VIII, 1893) that the loop in the family Terebratulidæ, as limited in the former paper, does in part pass through a short series of metamorphoses. This necessitates the removal of Centronellinæ from the family Terebratulidæ, since its loops remain essentially without change throughout growth.

Rensselæria Hall, 1859.
Beachia Hall and Clarke, 1893.
Newberria Hall, 1891.
Rensselandia Hall, 1867.
Oriskania Hall and Clarke, 1893.
Trigeria (Bayle, 1875?) Hall and Clarke, 1893.
?Scaphiocœlia Whitfield, 1891.
Centronella Billings, 1859.
Cryptonella Hall, 1863 (not 1861 and 1867).
Chascothyris Holzapfel, 1895.
Selenella Hall and Clarke, 1893.
Romingerina Hall and Clarke, 1893.
Juvavella Bittner, 1888.
Juvavellina Bittner, 1896.
Nucleatula (Zugmayer) Bittner, 1890.
Dinarella Bittner, 1892.
?Lissopleura Whitfield, 1896.

2. Family TEREBRATULIDÆ Gray, 1840.

Terebratulas developing originally a Centronella-like loop, and thence by a short series of metamorphoses resulting at maturity in a free loop of varying form.

Subfamily STRINGOCEPHALINÆ Dall, 1870.

Stringocephalidæ King, 1850; Davidson, 1853.

Terebratulidæ with a "long loop, following the margin of the dorsal valve, not recurved in front. Probably no median coiled arm" (Beecher).[1]

Stringocephalus Defrance, 1827.

2a. Subfamily MEGALANTERINÆ Waagen, 1882.

Terebratulidæ with a long loop having ascending branches.

Megalanteris Œhlert, 1887.
Meganteris Suess, 1855.
?Cryptacanthia White and St. John, 1868.
Cryptonella Hall (1861?), 1867.
Harttina Hall and Clarke, 1893.

2a[a]. Subfamily TEREBRATULINÆ Dall, 1870.

Terebratulidæ with a short loop. "A median unpaired coiled arm exists in recent genera" (Beecher).

Eunella Hall and Clarke, 1893.
Cranæna Hall and Clarke, 1893.
Dielasma King, 1859.
Epithyris King, 1850 (not Phillips, 1841).
Seminula McCoy, 1855 (not 1844).
Dielasmina Waagen, 1882.
Notothyris Waagen, 1882.
Zugmeyeria Waagen, 1882.
Dictyothyris Douvillé, 1880.
Glossothyris Douvillé, 1880.
Pygope Link, 1830.

[1] The ontogenetic history of Stringocephalus is not known. Its mature loop, however, is so different from that of the Centronellidæ that it appears probable that this appendage passed through a short series of changes, and therefore the reference of this subfamily to the Terebratulidæ.

Beecheria Hall and Clarke, 1893.
Hemiptychina Waagen, 1882.
Rhætina Waagen, 1882.
Terebratula Klein, 1753.
- Terebratula Llhwyd, 1699.
- Sacculus Llhwyd, 1699.
- Lampas Meuschen, 1787.
- Terebratularius Duméril, 1806.
- Nucleata Quenstedt, 1871.
- Musculus Quenstedt, 1871 (not Klein, 1753).
- Diphyites Schroter, 1799.
- Pugites de Hann, 1833.
- Antinomia Catullo, 1850.

Propygope Bittner, 1890.
Liothyrina Œhlert, 1887.
- Epithyris Deslongchamps, 1862 (not King, 1848).
- Gryphus Megerle, 1811 (not Brisson, 1760).
- Liothyris Douvillé, 1880 (not Conrad, 1875).

Terebratulina d'Orbigny, 1847.
? Disculina Deslongchamps, 1884.

2a[b]. Subfamily DISCOLIINÆ Beecher, 1893.

Discoliidæ Fischer and Œhlert, 1892.

Terebratulidæ with the "loop short and continuous with the cirrated edge of the lophophore. No coiled median arm" (Beecher).

Discolia Fischer and Œhlert, 1890.
Eucalathis Fischer and Œhlert, 1890.
? Agulhasia King, 1871.

Section B. *TEREBRATELLA*.

Terebratulacea with the loop supported by a median dorsal septum throughout life, or only in the younger stages. Brachial cirri directed inward during larval stages. This section has two phyla having a common origin now geographically separated in two provinces, one austral, the other boreal.

1. Family TEREBRATELLIDÆ King, 1850 (emend Beecher, 1893).

Waldheimidæ Douvillé, 1880; Waldheimiinæ Waagen, 1882.

Terebratulacea with the "loop in the higher genera composed of two primary and two secondary lamellæ, passing through a series of distinct metamorphoses while attached to a dorsal septum" (Beecher).

1. Subfamily TROPIDOLEPTIINÆ Schuchert, 1896.[1]

Terebratellidæ with the loop consisting of two slender descending branches, uniting with a high, vertical septum. Apparently the ancestral stock for the Terebratellidæ.

Tropidoleptus Hall, 1859.

[1] Text-book of Paleontology, by Zittel and Eastman, 1896, p. 330.

1a. Subfamily MEGATHYRINÆ Dall, 1870 (emend Beecher, 1893).

Argiopidæ King, 1850; Megathyridæ Œhlert, 1887; Argiopidæ Davidson, 1884; Argiopinæ Davidson, 1887.

Terebratellidæ in which the "loop is composed of descending branches only, passing in the highest genus through stages correlative with Gwynia, Cistella, and Megathyris. The lower genera do not complete the series" (Beecher). The original stock for the two following subfamilies:

Megathyris d'Orbigny, 1847.
  Argiope Deslongchamps, 1842 (not Savigny and Audouin, 1827).
Zellania Moore, 1854.
Gwynia King, 1859.
Cistella Gray, 1850.

1a[a]. Subfamily DALLINÆ Beecher, 1893.[1]

Platidiinæ Dall, 1870.

Terebratellidæ with the "loop composed of descending and ascending lamellæ, passing in the highest genera through metamorphoses comparable to the adult structure of Platidia, Ismenia, Mühlfeldtia, Terebratalia, and Dallina. The lower genera, therefore, do not progress to the final stages" (Beecher). Recent genera restricted to boreal seas.

Dallina Beecher, 1893.
Macandrevia King, 1859.
Terebratalia Beecher, 1893.
Lacqueus Dall, 1870.
  Frenula Dall, 1871.
Frenulina Dall, 1895.
Mühlfeldtia Bayle, 1880.
  Megerlia King, 1850 (not Robineau Desvoidy, 1830).
Platidia Costa, 1852.
  Morrisia Davidson, 1852.
Ismenia King, 1850 (not Dall, 1871).
Kingena Davidson, 1852.
  Kingia Schoenbach, 1867.
Trigonosemus Koenig, 1825.
  Fissurirostra d'Orbigny, 1847.
  Fissirostra d'Orbigny, 1847.
  Delthyridea King, 1850.
Lyra Cumberland, 1816.
  Terebrirostra d'Orbigny, 1847.
Eudesia King, 1850.
  Orthotoma Quenstedt, 1871.
  Trigonella Quenstedt, 1871.
  Flabellothyris Deslongchamps, 1884.
Zeilleria Bayle, 1878.
Fimbriothyris Deslongchamps, 1884.
Microthyris Deslongchamps, 1884.
  Ornithella Deslongchamps, 1884.
Aulacothyris Douvillé, 1880.
Camerothyris Bittner, 1890.
Epicyrta Deslongchamps, 1884.
Cincta Quenstedt, 1871.
Antiptychina Zittel, 1883.
Plesiothyris Douvillé, 1880.
?Hynniphoria Suess, 1858.
?Cruratula Bittner, 1890.
?Orthoidea Friren, 1875.

[1] Since many of the fossil genera here referred to this family have not been studied in the light of Beecher's and Œhlert's recent researches, it is not known that all belong to this boreal stock.

1a^b. Subfamily MAGELLANINÆ Beecher, 1893.

Waldheimidæ (partim) Douvillé, 1880; Terebratellinæ and Magasinæ Davidson, 1887; Magasidæ (partim) d'Orbigny, 1847; King, 1850; Rhynchoridæ (partim) King, 1850; Mühlfeldtinæ Œhlert, 1887; Kraussininæ Dall, 1870; Kraussidæ Davidson, 1870.

Terebratellidæ with the "loop composed of descending and ascending branches, passing in the higher genera through metamorphoses comparable to the adult structure of Bouchardia, Magas, Magasella, Terebratella, and Magellania. The lower genera become adult before reaching the terminal stages" (Beecher). Recent genera are restricted to austral seas.

Magellania Bayle, 1880.
- Waldheimia King, 1850 (not Brulle, 1846).
- Neothyris Douvillé, 1880.

Terebratella d'Orbigny 1847.
- Delthyris Menke, 1830 (not Dalman, 1828).
- Ismenia King, 1850 (not Dall, 1870).
- Waltonia Davidson, 1850.

Magasella Dall, 1870.

Rhynchorina Œhlert, 1887.

Magas Sowerby, 1816.

Megerlina Deslongchamps, 1884.

Bouchardia Davidson, 1849.
- Pachyrhynchus King, 1850.

Kraussina Davidson, 1859.
- Kraussia Davidson, 1852 (not Dana, 1852).

Cœnothyris Douvillé, 1880.

Mannia Dewalque, 1874.

? Rhynchora Dalman, 1828.

Superfamily SPIRIFERACEA Waagen, 1883.

Helicopegmata Waagen, 1883.

Telotremata with the adult brachia supported by calcareous spiral lamellæ or spiralia.

1. Family ATRYPIDÆ Gill, 1871.

Atrypidæ Dall, 1877.

Spiriferacea with the crura directly continuous with the primary lamellæ, which diverge widely and have the spiral cones between them. Jugum simple, complete or incomplete.

1a. Subfamily ZYGOSPIRINÆ Waagen, 1883.

Anazygidæ Davidson, 1884; Zygospiridæ Hall and Clarke, 1895.

Atrypidæ with a simple jugum either posteriorly or anteriorly directed. Spiralia with their apices toward the median dorsal region.

Zygospira Hall, 1862.
- Stenocisma Hall, 1864 (not Conrad, 1839; Hall, 1867).
- Anazyga Davidson, 1882.
- Orthonomæa Hall, 1858.
- Hallina Winchell and Schuchert, 1892.
- Protozyga Hall and Clarke, 1893.

Catazyga Hall and Clarke, 1893.

Atrypina Hall and Clarke, 1893.

Glassia Davidson, 1882.

? Clintonella Hall and Clarke, 1893.

Subfamily DAYINÆ Waagen, 1883.

Atrypidæ with the jugum drawn out posteriorly into a simple short process. Spiralia laterally directed.

Dayia Davidson, 1882.

1a[a]. Subfamily ATRYPINÆ Waagen, 1883.

Atrypidæ with the jugum situated extremely posterior, complete in young stages, but at maturity discontinuous. Spiralia dorso-medially directed.

Atrypa Dalman, 1828.
  Cleiothyris Phillips, 1841 (not King, 1830).
  Spirigerina d'Orbigny, 1874.
Gruenewaldtia Tschernyschew, 1885.
?Karpinskya Tschernyschew, 1885.

2. Family SPIRIFERIDÆ King, 1846 (emend Davidson).

Martiniinæ and Reticulariinæ Waagen, 1883; Spiriferinidæ Davidson, 1884.

Spiriferacea with the crura directly continuous with the bases of the primary lamellæ, which are situated between the laterally directed spiralia. Jugum simple, complete or incomplete.

2a. Subfamily SUESSIINÆ Waagen, 1883.

Spiriferidæ with the jugum continuous and more or less V-shaped. Shell structure punctate.

Cyrtina Davidson, 1858.
Theocyrtella Bittner, 1892.
  Cyrtotheca Bittner, 1890 (not Salter).
Spiriferina d'Orbigny, 1847.
Suessia Deslongchamps, 1854.

Subfamily UNCITINÆ Waagen, 1883.

Spiriferidæ (?) with the jugum as in Suessiinæ. Just within the posterior margin of the dorsal valve are pouch-like plates. Deltidial plates united, deeply concave. Subfamily anomalous.

Uncites Defrance, 1825.
?Uncinella Waagen, 1883.

2b. Subfamily TRIGONOTRETINÆ Schuchert, 1893.

Delthyrinæ (partim) Waagen, 1883.

Spiriferidæ with the jugum at maturity discontinuous, represented by two short jugal processes, one attached to each primary lamella.

?Cyclospira Hall and Clarke, 1893.
Spirifer Sowerby, 1815.
  Choristites Fisher de Waldheim, 1825.
  Trigonotreta Koenig, 1825; Meek and Hayden, 1864.
  Spiriferus Blainville, 1827.
  Spirifera J. de C. Sowerby, 1835.
  Brachythyris McCoy, 1844.
  Fusella McCoy, 1844.
  Hysterolithus Quenstedt, 1871.
Cyrtia Dalman, 1828.
Syringothyris Winchell, 1863.
  Spirifer Meek and Hayden, 1864.
Delthyris Dalman, 1828.
Martinia McCoy, 1844.
Martiniopsis Waagen, 1883.
Mentzelia Quenstedt, 1871.
Ambocœlia Hall, 1860.
Reticularia McCoy, 1844.
Verneuilia Hall and Clarke, 1893.
?Metaplasia Hall and Clarke, 1893.

3. Family ATHYRIDÆ Phillips, 1841.

Nucleospiridæ Davidson, 1882; Koninckinidæ Davidson, 1853.

Spiriferacea with the bases of the primary lamellæ situated between the spiralia, and sharply recurved dorsally at their junction with the crura. Spiralia more or less laterally directed. Jugum complete, V-shaped, with the apex drawn out into a simple, bifurcated, or otherwise modified process.

3a. Subfamily RHYNCHOSPIRINÆ Schuchert, 1894.

Retziinæ Waagen, 1883; Retziidæ and Rhynchospiridæ Hall and Clarke, 1895.

Athyridæ with the single process of the jugum commonly recurved, but sometimes bifurcated. Shell structure distinctly punctate.

Homœospira Hall and Clarke, 1893.
Rhynchospira Hall, 1859.
Ptychospira Hall and Clarke, 1893.
Eumetria Hall, 1864.
Trematospira Hall, 1857.
Parazyga Hall and Clarke, 1893.
Acambona White, 1862.
Hustedia Hall and Clarke, 1893.
Retzia King, 1850.
  Trigeria Bayle, 1878.

3a. Subfamily HINDELLINÆ Schuchert, 1894.

Cœlospiridæ and Nucleospiridæ Hall and Clarke, 1895.

Athyridæ in which the jugum has a single process which may be simple, or it articulates in a ventral septal socket, and sometimes (rarely) is sharply recurved terminally. Shell structure impunctate.

Hindella Davidson, 1882.
Whitfieldella Hall and Clarke, 1893.
  Meristina Davidson, 1882 (not Hall, 1867).
Nucleospira Hall, 1858.
Hyattella Hall and Clarke, 1893.
Anoplotheca Sandberger, 1856.
  Bifida Davidson, 1882.
Cœlospira Hall, 1863.
  Leptocœlia Hall, 1857, 1859.
Vitulina Hall, 1860.
?Anabia Clarke, 1893.

3b. Subfamily ATHYRINÆ Waagen, 1883.

Athyridæ in which the single process of the jugum bifurcates. The branches may or may not terminate between the first and second volutions of the spiralia.

Meristina Hall, 1867.
  Athyris Davidson, 1853 (not McCoy, 1844).
  Whitfieldia Davidson, 1882.
Glassina Hall and Clarke, 1893.
Athyris McCoy, 1844.
  Spirigera d'Orbigny, 1847.
  Euthyris Quenstedt, 1871.
Actinoconchus McCoy, 1844.
Torynifer Hall and Clarke, 1895.
Cleiothyris King, 1840 (not Phillips, 1841).
Seminula McCoy, 1844.
Spirigerella Waagen, 1883.
Anomactinella Bittner, 1890.
Pomatospirella Bittner, 1892.
Amphitomella Bittner, 1890.
Tetractinella Bittner, 1890.
  Plicigera Bittner, 1890.
Pentactinella Bittner, 1890.

3c. Subfamily DIPLOSPIRINÆ Schuchert, 1894.

Athyridæ (partim) Hall and Clarke, 1895.

Athyridæ with the jugal bifurcations very long, lying between the volutions of the spiralia, and continuing with these to their outer ends. Sometimes there is an additional jugal process which articulates with the ventral valve, or recurves and joins the jugum.

Kayseria Davidson, 1882.
Diplospirella Bittner, 1890.
Euractinella Bittner, 1890.
Pexidella Bittner, 1890.
Anisactinella Bittner, 1890.
? Didymospira Salomon.

3bb. Subfamily KONINKININÆ Waagen, 1883.

Koninckinidæ Davidson, 1853; Amphiclininæ Waagen, 1883; Diplospidæ and Diplospiridæ Munier-Chalmas, 1880.

Athyridæ with jugum and spiralia essentially as in Diplospiridæ. The spiralia in Koninckininæ, however, are not laterally directed as in the former group, but point ventrally, this being due to the concave form of the dorsal shell.

Koninckina Suess, 1853.
Amphiclina Laube, 1865.
Koninckella M.-Chalmas, 1880.
Koninckodonta Bittner, 1893.
? Thecospira Zugmeyer, 1880.
? Amphiclinodonta Bittner, 1890.

3ba. Subfamily MERISTELLINÆ Waagen, 1883.

Meristellidæ Hall and Clarke, 1895.

Athyridæ in which the jugal bifurcations do not enter the spiralia, but recurve and join near their origin.

Meristella Hall, 1860.
Charionella Billings, 1861.
? Pentagonia Cozzens, 1846.
Goniocœlia Hall, 1861.
Dicamara Hall and Clarke, 1893.
Merista Suess, 1851.
Camarium Hall, 1859.
Dioristella Bittner, 1890.
? Camarospira Hall and Clarke, 1893.

Order **NEOTREMATA** Beecher, 1891.

Circular or oval, more or less cone-shaped, inarticulate Brachiopoda, with the pedicle opening restricted throughout life to the ventral valve. Pedicle aperture modified by a deltidium or listrium. Prodeltidium attached to the ventral valve.

Superfamily **ACROTRETACEA** Schuchert, 1896.[1]

Daikaulia (partim) Waagen, 1885; Diacaulia Hall and Clarke, 1895.

Neotremata with phosphatic shells and a more or less well-developed pseudodeltidium. Dorsal protegulum marginal.

[1] Text-book of Paleontology, by Zittel and Eastman, 1896, p. 308.

1. Family ACROTRETIDÆ Schuchert, 1893.

Acrotretacea with the pedicle opening posterior to the protegulum.

Acrothele Linnarsson, 1876.
Linnarssonia Walcott, 1885.
Discinopsis (Matthew) Hall and Clarke, 1892.
Acrotreta Kutorga, 1848.
Conotreta Walcott, 1889.
? Mesotreta Kutorga, 1848.
? Orbicella d'Orbigny, 1849.
Keyserlingia Pander, 1861.
? Helmersenia Pander, 1861.

2. Family SIPHONOTRETIDÆ Kutorga, 1848.

Acrotretacea with the pedicle opening passing by resorption anteriorly through the protegulum and the umbo of the shell.

Yorkia Walcott, 1897.
Trematobolus Matthew, 1893.
Siphonotreta de Verneuil, 1845.
Protosiphon Matthew, 1897
Schizambon Walcott, 1884.
Schizambonia Œhlert, 1887.

Superfamily **DISCINACEA** Waagen, 1885.

Daikaulia (partim) Waagen, 1885; Diacaulia (partim) Hall and Clarke, 1895.

Neotremata with phosphatic shells, a listrium, but with no deltidium. Dorsal protegulum usually subcentral.

1. Family TREMATIDÆ Schuchert, 1893.

Primitive Discinacea, in which the posterior margin of the ventral valve has a triangular pedicle notch throughout life. A listrium is usually present.

Discinolepis Waagen, 1885.
Trematis Sharpe, 1847.
Orbicella Hall and Whitfield, 1875 (not d'Orbigny, 1849).
Schizocrania Hall and Whitfield, 1875.
Schizobolus Ulrich, 1886.
Lingulodiscina Whitfield, 1890.
Œhlertella Hall and Clarke, 1890.
? Monobolina Salter, 1865.

2. Family DISCINIDÆ Gray, 1840.

Orbiculidæ McCoy, 1844.

Derived Discinacea with an open pedicle notch in early life in the posterior margin of the ventral valve, which is closed posteriorly during neanic growth, leaving a more or less long, narrow slit partially closed by the listrium.

Orbiculoidea d'Orbigny, 1847.
Schizotreta Kutorga, 1848.
Lindstrœmella Hall and Clarke, 1890.
Rœmerella Hall and Clarke, 1890.
Discina Lamarck, 1819.
Orbicula Sowerby, 1830 (not Cuvier, 1798).
Discinisca Dall, 1871.

Superfamily **CRANIACEA** Waagen, 1885.[1]

Gasteropegmata Waagen, 1885.

Cemented, calcareous Neotremata without pedicle or anal openings at maturity.

Family CRANIIDÆ King, 1846.

Orbiculæ Deshayes, 1830; Craniadæ Gray, 1840.

Craniacea with the pedicle functional probably only during nepionic growth.

Crania Retzius, 1781.
- Nummulus Stoeboeus, 1732.
- Ostracites Beuth, 1776.
- Criopus Poli, 1791.
- Criopoderma Poli, 1795.
- Orbicula Cuvier, 1798 (not Sowerby, 1830).
- Orbicularius Duméril, 1806.
- Craniolites Schlotheim, 1820.
- Discina Turton, 1832 (not Lamarck, 1819).
- Criopododerma Agassiz, 1846.
- Choniopora Schauroth, 1854.

Craniella Œhlert, 1888.

Cardinocrania Waagen, 1885.

Ancistrocrania Dall, 1877.
- Cranopsis Dall, 1871 (not A. Adams).

Craniscus Dall, 1871.
- Siphonaria Quenstedt, 1851 (not Sowerby).

Pholidops Hall, 1860.
- Craniops Hall, 1859.

Pseudocrania McCoy, 1851.
- Palæocrania Quenstedt, 1871.

Order **PROTREMATA** Beecher, 1891.

Derived, articulate Brachiopoda, with the pedicle opening restricted to the ventral valve throughout life or during early growth. Prodeltidium originating on the dorsal side of the body wall in the cephalula stage, and later anchylosed to the ventral shell, thus initiating the development of a deltidium. Pedicle aperture modified by the deltidium. Brachia unsupported by a calcareous skeleton except in the Pentameracea where there are crura.

Superfamily **STROPHOMENACEA** Schuchert, 1896.[2]

Lineicardines (partim) and Denticardines (partim) Bronn, 1862; Aphaneropegmata (partim), Productacea, Coralliopsida, and Kampylopegmata (partim) Waagen, 1883; Eleutherobranchiata (partim) Neumayr, 1883; Cryptobrachia (partim) Gray, 1848; Thecacea Schuchert, 1893.

Primitive Protremata without spondylia and cruralia.

Family KUTORGINIDÆ Schuchert, 1893.

Primitive Strophomenacea with incipient cardinal areas, great delthyrial opening, and very rudimentary articulating processes and deltidium.

Kutorgina Billings, 1861 (emend Walcott).

?Schizopholis Waagen, 1885.

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[1]The writer believes that when the young growth stages of Crania are studied it will be shown that the Craniacea have the superfamily characters of Acrotretacea rather than those of Discinacea.

[2]Text-book of Paleontology, by Zittel and Eastman, 1896, p. 312.

? Family EICHWALDIIDÆ Schuchert, 1893.[1]

Primitive or aberrant, rostrate Strophomenacea, with narrow lateral grooves and ridges for articulation. Delthyrium closed by a concave plate (?deltidium). Pedicle emerging through the ventral umbone and moving with growth anteriorly by resorption through the shell, as in Siphonotretidæ.

Eichwaldia Billings, 1858.

Dictyonella Hall, 1867.

1. Family BILLINGSELLIDÆ Schuchert, 1893.

Strophomenacea with well-developed cardinal areas and deltidium. Cardinal process obsolete or very rudimentary. Articulation fairly well developed.

Billingsella Hall and Clarke, 1892.

Protorthis Hall and Clarke, 1892.

2. Family STROPHOMENIDÆ King, 1846.

Strophomenacea with well-developed cardinal areas, deltidium, chilidium, cardinal and articulating processes.

2a. Subfamily RAFINESQUININÆ Schuchert, 1893.

Leptænacea Braun, 1840; Orthisidæ (partim) d'Orbigny, 1847; Davidsonidæ King, 1850; Davidsoninæ Gill, 1871; Strophomeninæ (partim) Gill, 1871; Waagen, 1884; Cadomellinæ Munier-Chalmas, 1887; Leptænidæ Hall and Clarke, 1895.

Strophomenoids with ventral valve convex and dorsal concave, except in Strophonella. The relative form of the valves is the reverse of the Orthothetinæ.

Rafinesquina Hall and Clarke, 1892.

Leptæna Dalman, 1828.

Leptagonia McCoy, 1844.

Strophomena Meek, 1873 (not Blainville, 1825).

Plectambonites Œhlert, 1887 (not Pander, 1830).

Stropheodonta Hall, 1852.

Brachyprion Shaler, 1865.

Douvillina Œhlert, 1887.

Leptostrophia Hall and Clarke, 1892.

Pholidostrophia Hall and Clarke, 1892.

Strophonella Hall, 1879.

Amphistrophia Hall and Clarke, 1892.

Cadomella M.-Chalmas, 1887.

Leptella Hall and Clarke, 1892.

Plectambonites Pander, 1830.

Leptæna Davidson, 1853; Œhlert, 1877 (not Dalman, 1828).

Leptænisca Beecher, 1890.

Christiania Hall and Clarke, 1892.

Davidsonia Bouchard, 1847.

[1]In 1893 the writer referred this family with doubt to the Rhynchonellacea. The absence of crural plates in Eichwaldia forbids that disposition. If the concave plate closing the umbonal pedicle passage is a deltidium, there can be no doubt that this family belongs to the Protremata. Students should search for the very young of Eichwaldia or Dictyonella, since it is through ontogeny alone that the true systematic position of this family will be determined.

2b. Subfamily ORTHOTHETINÆ Waagen, 1884.

Strophomeninæ (partim) Waagen, 1884.

Strophomenoids with the ventral valve convex during early growth, becoming subsequently concave.

? Orthidium Hall and Clarke, 1892.
Strophomena Blainville, 1825.
Hemipronites Meek, 1872 (not Pander, 1830).
Orthothetes Fischer de Waldheim, 1837.
Orthis King, 1850 (not Dalman, 1828).
Hipparionyx Vanuxem, 1842.
Streptorhynchus King, 1850.
Derbya Waagen, 1884.
Kayserella Hall and Clarke, 1892.
Meekella White and St. John, 1870.
Triplecia Hall, 1859.
Dicraniscus Meek, 1872.
Mimulus Barrande, 1879.
Streptis Davidson, 1881.

3. Family THECIDIIDÆ Gray, 1840.

Cemented Strophomenacea in which the interior of the shell is impressed with variously indented brachial furrows.

3a. Subfamily LYTTONIINÆ Waagen, 1883.

Thecidiidæ with the brachial markings common to both valves.

Lyttonia Waagen, 1883.
Leptodus Kayser, 1882.
Oldhamina Waagen, 1883.

3b. Subfamily THECIDIINÆ Dall, 1870.

Thecidiidæ with the brachial markings restricted to the dorsal valve.

Thecidia Defrance, 1822.
Thecidium Sowerby, 1824.
Lacazella M.-Chalmas, 1880.
Thecidiopsis M.-Chalmas, 1887.
Thecidella M.-Chalmas, 1887.
Eudesella M.-Chalmas, 1880.
Pterophloios Gümbel, 1861.
Bactrynium Emmerich, 1855.
(In error. Not Bactrillium Herr.)
Davidsonella M.-Chalmas, 1880.

2aa. Family PRODUCTIDÆ Gray, 1840.

Productina Giebel, 1846.

Strophomenacea with hollow anchoring spines.

2aaa. Subfamily CHONETINÆ Waagen, 1884.

Chonetidæ Bronn, 1862; Hall and Clarke, 1895.

Productidæ with the anchoring spines restricted to the ventral cardinal margin.

Chonetes Fischer de Waldheim, 1837.
Leptæna McCoy, 1844 (not Dalman, 1828).
Anoplia Hall and Clarke, 1892.
Chonetella Waagen, 1884.
Chonostrophia Hall and Clarke, 1892.
Chonetina Krotow, 1888.
Chonetella Krotow, 1884 (not Waagen, 1884).

2a[ab]. Subfamily PRODUCTINÆ Waagen, 1884.

Productidæ with the anchoring spines more or less abundant over the ventral valve and sometimes also over the dorsal valve.

Daviesiella Waagen, 1884.
Productella Hall, 1867.
Productus Sowerby, 1812.
- Pyxis Chemnitz, 1784.
- Producta G. B. Sowerby, 1825.
- Arbusculites Murray, 1831.
- Protonia Linck, 1830 (not Rafinesque).
- Marginifera Waagen, 1884.

Proboscidella Œhlert, 1887.
Etheridgina Œhlert, 1887.
Chonopectus Hall and Clarke, 1892.
Strophalosia King, 1844.
- Orthothrix Geinitz, 1847.
- Leptænalosia King, 1845.

Aulosteges von Helmersen, 1847.
?Aulacorhynchus Dittmar, 1871.
- Isogramma Meek and Worthen, 1873.

2a[ac]. Family RICHTHOFENIDÆ Waagen, 1885.

Strophomenacea probably derived through the Productidæ, and remarkably modified by ventral cementation. The form of the shell is that of cyathophylloid corals with an operculiform dorsal valve. Shell structure cystose.

Richthofenia Kayser, 1881.

1a. Family ORTHIDÆ Woodward, 1852.

Orthisidæ (partim) d'Orbigny, 1847; Orthinæ and Enteletinæ Waagen, 1884.

Strophomenacea usually with large open delthyria; deltidium only developed in younger growth stages.

Orthis Dalman, 1828.
- Orthambonites Pander, 1830.

{ Plectorthis Hall and Clarke, 1892.
{ Hebertella Hall and Clarke, 1892.

{ Schizophoria King, 1850.
{ Orthotichia Hall, 1892.
{ Enteletes Fischer de Waldheim, 1830.
- Syntrielasma Meek, 1865.

Platystrophia King, 1850.
Orthotropia Hall and Clarke, 1895.

{ Dinorthis Hall and Clarke, 1892.
- Plæsiomys Hall and Clarke, 1892.

{ Orthostrophia Hall, 1883.

{ Dalmanella Hall and Clarke, 1892.
{ Heterorthis Hall and Clarke, 1892.
{ Bilobites Linné, 1775.
- Dicœlosia King, 1850.

Rhipidomella Œhlert, 1890.
- Rhipidomys Œhlert, 1887 (not Wagner).

Superfamily PENTAMERACEA Schuchert, 1896.[1]

Trullacea Schuchert, 1893; Ancistropegmata (partim) Zittel, 1895; Aphaneropegmata (partim) and Productacea (partim) Waagen, 1883; Eleutherobranchiata (partim) Neumayr, 1883.

Derived Protremata with spondylia to which are attached the adductor, diductor, and ventral pedicle muscles. Commonly cruralia are present.

1. Family CLITAMBONITIDÆ Winchell and Schuchert, 1893.

Orthisidæ (partim) d'Orbigny, 1849; Orthisinæ Waagen, 1884.

Primitive Pentameracea with long, straight cardinal areas and a well-developed deltidium. No cruralium.

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[1] Text-book of Paleontology, by Zittel and Eastman, 1896, p. 320.

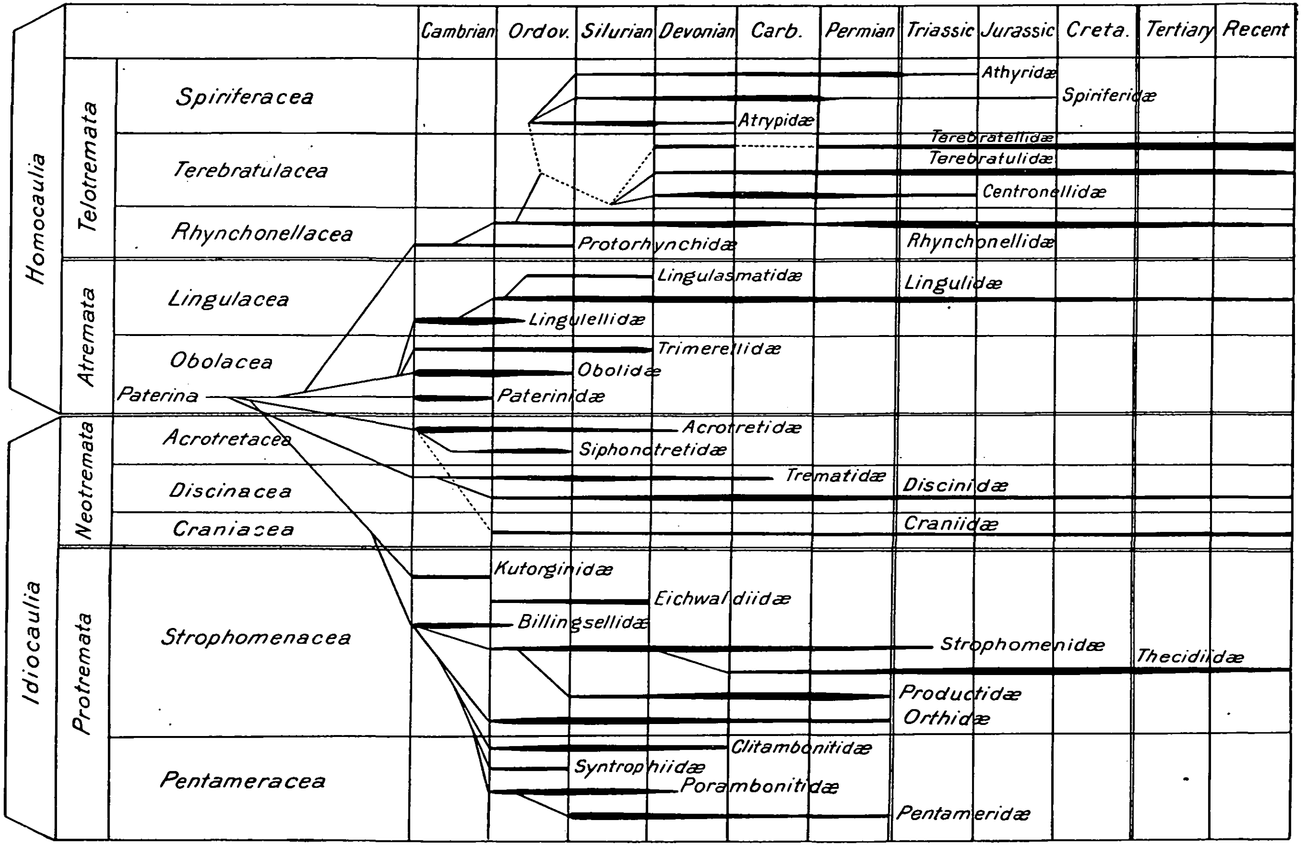

DIAGRAM ILLUSTRATING GEOLOGIC DISTRIBUTION OF FAMILIES.

Clitambonites Pander, 1830.
Pronites Pander, 1830.
Gonambonites Pander, 1830.
Orthisina d'Orbigny, 1847.
Polytœchia Hall and Clarke, 1892.
Hemipronites Pander, 1830.
Scenidium Hall, 1860.
Mystrophora Kayser, 1871.

2. Family SYNTROPHIIDÆ Schuchert, 1896.[1]

Stricklandiniidæ (partim) Hall and Clarke, 1895.

Primitive Pentameracea with long, straight cardinal areas, deltidia, and cruralia.

Syntrophia Hall and Clarke, 1892–93.

2a. Family PORAMBONITIDÆ Davidson, 1853.[2]

Porambonitinæ Gill, 1871; Porambonitidæ (partim) Nœtling, 1883; Camarellidæ (partim) Hall and Clarke, 1895.

Pentameracea intermediate in structure between the Syntrophiidæ and Pentameridæ, in that the deltidium and the straight cardinal areas of the former family tend to obsolescence, particularly the deltidium. The Porambonitidæ approach the latter family in tending to develop a rostrate shell. Cruralium present.

Camarella Billings, 1859 (emend Hall and Clarke, 1893).
Parastrophia Hall and Clarke, 1893.
Anastrophia Hall, 1867.
Brachymerus Shaler, 1865 (not Dejean, 1834).
Branconia Gagel, 1890.
Porambonites Pander, 1830.
Priambonites Agassiz, 1847.
Isorhynchus King, 1850.
Nœtlingia Hall and Clarke, 1893.
?Lycophoria Lahusen, 1885.

2b. Family PENTAMERIDÆ McCoy, 1844.

Hypothyridæ (partim) King, 1850; Pentameridæ Hall, 1867; Camerophoriinæ Waagen, 1883; Pentamerinæ Gill, 1871; Waagen, 1883; Porambonitidæ (partim) Noetling, 1883; Stenochismatinæ and Conchidiinæ Œhlert, 1887; Camarellidæ (partim), Stricklandiniidæ (partim), and Amphigenidæ Hall and Clarke, 1895.

Rostrate Pentameracea rarely with straight cardinal areas. Deltidium commonly absent, but sometimes present as a concave plate, being the reverse of the ordinary form of the deltidium and due to the incurved beaks. Cruralium present.

Stricklandinia Billings, 1863.
Stricklandia Billings, 1859.
Pentamerus Sowerby, 1813.
Pentastère Blainville, 1824.
Capellinia Hall and Clarke, 1893.
Pentamerella Hall, 1867.
Gypidula Hall, 1867.
Sieberella Œhlert, 1887.
Camarophorella Hall and Clarke, 1893.
Amphigenia Hall, 1867.
Conchidium Linné, 1753.
Antirhynchonella Quenstedt, 1871.
Zdimir Barrande, 1879.
Gypidia Dalman, 1828.
Clorinda Barrande, 1879.
Barrandella Hall and Clarke, 1893.
Enantiosphen Widborne (Holzapfel), 1893.
Camarophoria King, 1846.
Stenochisma Dall, 1877; Œhlert, 1887 (not Conrad, 1839).

[1] Text book of Paleontology, by Zittel and Eastman, 1896, p. 320.

[2] Since Hall and Clarke's family Camarellidæ (1895), after removing Camarophoria and Camarophorella, is based upon the same family characters as those of the Porambonitidæ (1853), as Porambonites is now interpreted, Davidson's family is retained on the ground of priority.

Synopsis of the divisions of Brachiopoda higher than genera.

Superorders.	*Orders.*	*Superfamilies.*	*Families.*	
Pedicle common to both valves throughout life or only in youthful growth. (Homocaulia.)	Pedicle opening common to both valves throughout life. No deltidial plates. Inarticulate. (Atremata.)	Shells rounded. Pedicle short. Animal not burrowing. (Obolacea.)	Valves semicircular; pedicle opening more or less large	= Paterinidæ.
			Valves rounded, posteriorly acuminate; pedicle opening small	= Obolidæ.
			Valves round or oval, thick, with solid or excavated platforms	= Trimerellidæ.
		Shells elongate. Pedicle long. Animal burrowing. (Lingulacea.)	Shells thin, elongate, with oboloid interiors	= Lingulellidæ.
			Shells thin, elongate, with muscular system highly specialized	= Lingulidæ.
			Shells elongate, with solid platforms	= Lingulasmatidæ.
	Pedicle opening common to both valves only in youthful growth. Deltidial plates usually present. (Telotremata.)	Brachia supported by crura. (Rostracea.)	Shells primitive. No deltidial plates; articulation rudimentary	= Protorhynchidæ.
			Articulation and deltidial plates well developed	= Rhynchonellidæ.
		Brachia supported by loops. (Terebratulacea.)	Loops free, developing direct; no metamorphoses	= Centronellidæ.
			Loops free, developing indirect	= Terebratulidæ.
			Loops attached to a median septum; developing indirect	= Terebratellidæ.
		Brachia supported by spiralia. (Spiriferacea.)	Crura directly continuous with bases of primary lamellæ between which are the spiralia	= Atrypidæ.
			Crura directly continuous with bases of primary lamellæ which are between the spiralia	= Spiriferidæ.
			Bases of primary lamellæ between the spiralia, and sharply recurving dorsally at their junction with the crura	= Athyridæ.

Synopsis of the divisions of Brachiopoda higher than genera—Continued.

Superorders.	*Orders.*	*Superfamilies.*	*Families.*	
Pedicle restricted to ventral valve throughout life or only in youthful growth. (Idiocaulia.)	Pedicle restricted to ventral valve throughout life. Inarticulate. (Neotremata.)	Pedicle aperture modified by a deltidium. (Acrotretacea.)	Pedicle opening small, circular, posterior to protegulum	= Acrotretidæ.
			Pedicle fissure narrow, elongate, anterior to protegulum	= Siphonotretidæ.
		Pedicle slit modified by a listrium. (Discinacea.)	Pedicle fissure marginal, open posteriorly	= Trematidæ.
			Pedicle fissure narrow, elongate, closed posteriorly	= Discinidæ.
		Pedicle suppressed. (Craniacea.)	Shells partially or completely cemented to foreign bodies	= Craniidæ.
	Pedicle restricted to ventral valve throughout or a portion of life. Articulate. (Protremata.)	Shells without spondylia and cruralia. (Strophomenacea.)	Pedicle opening large; deltidium and articulation incipient. No crural process	= Kutorginidæ.
			Rostrate, aberrant Strophomenacea	= Eichwaldiidæ.
			Cardinal areas and deltidium well developed. No cardinal process	= Billingsellidæ.
			Cardinal areas, deltidium, chilidium, and cardinal process well developed	= Strophomenidæ.
			Strophomenidæ with impressed brachial furrows	= Thecidiidæ.
			Valves more or less covered with hollow, anchoring spines	= Productidæ.
			Cone-shaped productoids completely modified by cementation	= Richthofenidæ.
			Delthyrium usually large, open; deltidium developed only in early growth	= Orthidæ.
		Shells with spondylia and cruralia. (Pentameracea.)	Large, straight cardinal areas with prominent deltidium. No cruralia	= Clitambonitidæ.
			Straight cardinal areas, prominent deltidium, and short cruralia	= Syntrophiidæ.
			Shells intermediate in structure between Syntrophiidæ and Pentameriæ	= Porambonitidæ.
			Shells rostrate, commonly without deltidium. Cruralia well developed	= Pentameridæ.

CHAPTER VI.

INDEX AND BIBLIOGRAPHY OF AMERICAN FOSSIL BRACHIOPODA.

ACAMBONA White. Genotype A. prima White.

Acambona White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 27, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 119;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 797.

Acambona osagensis (Swallow). Chouteau (L. Carb.).

Retzia osagensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 653.

Acambona? osagensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 120, pl. 51, figs. 38, 39.

Retzia? osagensis Keyes, Geol. Survey Missouri, V, 1895, p. 94.

Loc. Cooper and Benton counties, Missouri.

Acambona prima White. Burlington (L. Carb.).

Acambona prima White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 27, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 119, pl. 51, figs. 40, 41.

Eumetria prima Miller, North American Geol. and Pal., 1889, p. 346.

Loc. Burlington, Iowa.

Obs. It is probable that this species is identical with A. osagensis.

ACROTHELE Linnarsson. Genotype A. coriacea Linnarsson.

Acrothele Linnarsson, Bihang till Kgl. Svenska Vetens.-Akad. Handl., III, 1876, p. 20.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 107.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 98, 167;—Eleventh Ann. Rep. N. Y. State Geologist, 1892, p. 249.

Acrothele bellula Walcott. Middle Cambrian.

Acrothele bellula Walcott, Proc. U. S. National Mus., XIX, 1897, p. 716, pl. 60, figs. 4–4e.

Loc. Cowans Creek, Cherokee County, Alabama.

Acrothele decipiens Walcott. Lower Cambrian.

Acrothele decipiens Walcott, Proc. U. S. National Mus., XIX, 1897, p. 716, pl. 60, fig. 2.

Loc. Near Stoner's, York County, Pennsylvania.

Acrothele (?) dichotoma Walcott. Lower Cambrian.

Acrothele? dichtoma Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 14, pl. 9, fig. 11;—Bull. U. S. Geol. Survey, 30, 1886, p. 107.

Loc. Eureka district, Nevada.

Acrothele matthewi (Hartt). Middle Cambrian.

Lingula matthewi Hartt, Dawson's Acadian Geology, 2d ed., 1868, p. 644, fig. 221;—Ibidem, 3d ed., 1874, p. 644, fig. 221.

Acrothele matthewi Matthew, Trans. Royal Soc. Canada, III, 1886, p. 39, pl. 5, fig. 15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 99, pl. 3, fig. 29.—Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 128, pl. 5, figs. 6, 7, 8.

Loc. Portland, New Brunswick; Manuels Brook, Conception Bay, Newfoundland.

Acrothele matthewi costata Matthew. ?Middle Cambrian.

Acrothele matthewi var. costata Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 128, pl. 5, fig. 9.

Loc. Hanford Brook, New Brunswick.

Acrothele matthewi lata Matthew. Middle Cambrian.

Acrothele matthewi var. lata Matthew, Trans. Royal Soc. Canada, III, 1886, p. 41, pl. 5, fig. 17.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 3, figs. 26-28.

Loc. Portland, New Brunswick.

Acrothele matthewi prima Matthew. Middle Cambrian.

Acrothele matthewi var. prima Matthew, Trans. Royal Soc. Canada, III, 1886, p. 41, pl. 5, fig. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 3, fig. 25.

Loc. Hanford Brook, New Brunswick.

Acrothele subsidua (White). Lower and Middle Cambrian.

Acrotreta? subsidua White, Wheeler's Geogr. Geol. Expl. and Surv. west 100 Merid., Prelim. Rep., 1874, p. 6;—Ibidem, Final Rep., IV, 1875, p. 34, pl. 1, fig. 3.

Acrothele subsidua White, Proc. U. S. National Mus., III, 1880, p. 47.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 108, pl. 9, fig. 4;—Tenth. Ann. Rep. U. S. Geol. Survey, 1891, p. 608, pl. 70, fig. 1.—Beecher, American Jour. Sci., XLI, 1891, p. 357, pl. 17, fig. 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 100, pl. 3, figs. 30, 31.

Loc. Antelope Spring, Utah; Pioche, Nevada.

ACROTRETA Kutorga. Genotype A. subconica Kutorga.

Acrotreta Kutorga, Verhand. Kais. Min. Gessel. zu St. Petersburg, 1848, p. 275.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 101, 166;—Eleventh Ann. Rep. N. Y. State Geologist, 1892, p. 250.

Acrotreta attenuata Meek=A. gemma.

Acrotreta baileyi Matthew. Middle and Upper Cambrian.

Acrotreta baileyi Matthew, Trans. Royal Soc. Canada, III, 1886, p. 36, pl. 5, fig. 13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 102, pl. 3, figs. 32-34.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 43, pl. 12, fig. 7d.

Loc. Hanford Brook and Long Reach, New Brunswick.

Acrotreta gemma Billings. Lower to Upper Cambrian.

Acrotreta gemma Billings, Pal. Fossils, I, 1865, p. 216, fig. 201.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 17, pl. 1, fig. 1; pl. 9, fig. 9;—Bull. U. S. Geol. Survey, 30, 1886, p. 98, pl. 8, fig. 1;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 608, pl. 67, fig. 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 102, figs. 55-57.—Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 126.

Acrotreta subconica Meek, Hayden's Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 463.

Acrotreta attenuata Meek, Ibidem, 1873, p. 463.

Acrotreta pyxidicula White, Wheeler's Geogr. Geol. Expl. and Survey west 100 Merid., Prelim. Rep., 1874, p. 9;—Ibidem, Final Rep., IV, 1875, p. 53, pl. 3, fig. 3.

Loc. Near Portland Creek, Newfoundland; Eureka and White Pine mining districts, Nevada.

Acrotreta gemma depressa Walcott. Middle Cambrian.

Acrotreta gemma var. depressa Walcott, Proc. U. S. National Mus., XI, 1888, p. 441.

Loc. Mount Stephen, British Columbia.

Acrotreta gemmula Matthew. Middle Cambrian.

Acrotreta gemmula Matthew, Trans. Royal Soc. Canada, X, 1894, p. 87, pl. 16, fig. 2;—Trans. N. Y. Acad. Sci., XIV, 1895, p. 126, pl. 5, fig. 5.

Loc. St. Martins, New Brunswick.

Acrotreta gulielmi Matthew=Discinopsis gulielmi.

Acrotreta microscopica (Shumard). Middle Cambrian.

Discina microscopica Shumard, American Jour. Sci., XXXII, 2d ser., 1861, p. 221.

Loc. Occurs abundantly in Burnett and Llano counties, Texas.

Acrotreta pyxidicula White=Acrotreta gemma.

Acrotreta subconica Meek (non Kutorga)=Acrotreta gemma.

Acrotreta (?) subsidua White=Acrothele subsidua.

Ægilops Hall. A genus of pelecypods.

AMBOCŒLIA Hall. Genotype Orthis umbonata Conrad.

Ambocœlia Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 71, figs. 1-3; p. 72, figs. 4-6.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., 172, 1864, p. 20.—Hall, Pal. New York, IV, 1867, p. 258—Davidson, Suppl. British Sil. Brach., Palæontographical Soc., 1882, p. 131.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 85.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 54;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 761.

Ambocœlia fimbriata Claypole. Portage (Dev.).

Ambocœlia fimbriata Claypole, Proc. American Phil. Soc., XXI, 1883, p. 232.

Loc. Perry County, Pennsylvania.

Ambocœlia gemmula McChesney=Ambocœlia planoconvexa.

Ambocœlia gregaria Hall. Chemung (Dev.).

Orthis unguiculus Hall (non Phillips), Geol. New York; Rep. Fourth Dist., 1843, p. 267, fig. 5.

Ambocœlia gregaria Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 81;—Fifteenth Rep. Ibidem, 1862, p. 186.—Williams, Bull. U. S. Geol. Survey, 3, 1884, p. 11.

Ambocœlia umbonata var. gregaria Hall, Pal. New York, IV, 1867, p. 261, pl. 44, figs. 19-25.

Loc. New York; Pennsylvania, and Virginia.

Obs. See Martinia subumbona.

Ambocœlia minuta White. Kinderhook (L. Carb.).

Ambocœlia (Spirifer?) minuta White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 26.

Loc. Hamburg, Illinois, and Hannibal, Missouri.

Ambocœlia planoconvexa (Shumard). Upper Carboniferous.

Spirifer planoconvexa Shumard, Geol. Rep. Missouri, 1855, p. 202.—Geinitz, Carbon u. Dyas in Nebraska, 1866, p. 42, pl. 3, figs. 10-18.

Ambocœlia gemmula McChesney, New Pal. Fossils, 1860, p. 41;—Ibidem, 1865, pl. 1, fig. 3.

Spirifer (Martinia) planoconvexa Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., 172, Pt. I, 1864, p. 20, figs. a-e.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 184, pl. 4, fig. 4; pl. 8, fig. 2.

Martinia planoconvexa McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 34, pl. 1, fig. 3.

Amphigenia elongata (Vanuxem)—Continued.

Stricklandinia elongata Billings, Geol. Canada, 1863, p. 371, fig. 390.

Amphigenia elongata Hall, Pal. New York, IV, 1867, p. 383, pl. 58A, figs. 21-24; pl. 59, figs. 1-11.—Billings, Canadian Nat. Geol., n. ser., VII., 1874, p. 240.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 34.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 253, pl. 73, figs. 16-20; pl. 74, figs. 1-9; pl. 76, fig. 9.

Loc. New York; Michigan; Cayuga, Ontario; Rio Maecuru and Rio Curua, Brazil.

Amphigenia elongata subtrigonalis Hall. Up. Helderberg (Dev.).

Meganteris subtrigonalis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 123.

Amphigenia elongata var. subtrigonalis Hall, Pal. New York, IV, 1867, p. 384.

Loc. Erie County, New York.

Amphigenia elongata undulata Hall. Up. Helderberg (Dev.).

Amphigenia elongata var. undulata Hall, Pal. New York, IV, 1867, p. 384, pl. 58A, figs. 25-27.

Loc. Mackinac, Michigan.

AMPHISTROPHIA Hall and Clarke. Genotype Strophonella striata Hall.

Amphistrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 283.

Obs. Proposed as a subgenus of Strophonella.

ANABAIA Clarke. Genotype A. paraia Clarke.

Anabaia Clarke, Pal. New York, VIII, Pt. II, 1893, p. 141.—Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 805.

Anabaia paraia Clarke. Silurian.

Anabaia paraia Clarke, Pal. New York, VIII, Pt. II, 1893, p. 141, figs. 124-127.

Loc. Rio Trombetas, Province of Para, Brazil.

ANASTROPHIA Hall. Genotype Pentamerus verneuili Hall.

Brachymerus Shaler (non Dej., 1834), Bull. Mus. Comp. Zool., 4, 1865, p. 69.

Anastrophia Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 163;—Pal. New York, IV, 1867, p. 374.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 47.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 839.

Anastrophia brevirostris (Sowerby?) Hall. Niagara (Sil.).

Terebratula brevirostris Sowerby, Murchison's Sil. System, 1839, p. 631, pl. 13, fig. 15.

Atrypa brevirostris? Hall, Pal. New York, II, 1852, p. 278, pl. 58, fig. 1.

Pentamerus brevirostris Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Rhynchonella brevirostris Billings, Geol. Canada, 1863, p. 315, fig. 324.

Loc. Lockport, New York.

Obs. Compare with Anastrophia interplicata. If a pentameroid, this species is probably identical with Anastrophia interplicata Hall.

Anastrophia hemiplicata W. and S.=Parastrophia hemiplicata.

Anastrophia internascens Hall. Niagara (Sil.).

Anastrophia verneuili Hall (non Hall, 1859), Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., Doc. ed., 1876, pl. 26, figs. 41-49.

Anastrophia internascens Hall, Ibidem, 1879, p. 168, pl. 26, figs. 41-49;—Eleventh Rep. State Geol. Indiana, 1882, p. 311, pl. 26, figs. 41-49.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 47, pl. 32, figs. 17-20.—Beecher and Clarke, Mem. N. Y. State Mus., 1, 1889, p. 32, pl. 3, figs. 14-16.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224, pl. 63, fig. 30.

Loc. Waldron, Indiana; Louisville, Kentucky; Milwaukee, Wisconsin.

Anastrophia interplicata (Hall). Niagara (Sil.).

Atrypa interplicata Hall, Pal. New York, II, 1852, p. 275, pl. 57, fig. 2.

Pentamerus interplicatus Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Anastrophia interplicata Miller, American Pal. Fossils, 1877, p. 104.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224.

Loc. Lockport, New York; Louisville, Kentucky; Wisconsin.

Obs. See A. brevirostris.

Anastrophia reversa Miller=Parastrophia reversa.

Anastrophia scofieldi W. and S.=Parastrophia scofieldi.

Anastrophia verneuili Hall, 1876 (non 1859)=Anastrophia internascens.

Anastrophia verneuili (Hall). Lower Helderberg (Dev.).

Atrypa lacunosa Vanuxem (non Sowerby), Geol. N. Y.; Rep. Third Dist., 1842, p. 117, fig. 3, and p. 119.

Pentamerus verneuili Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 104, figs. 1, 2;—Pal. New York, III, 1859, p. 260, pl. 48, fig. 1.—Billings, Geol. Canada, 1863, p. 957, fig. 453.

Anastrophia verneuili Miller, N. American Geol. Pal., 1889, p. 334.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 224, pl. 63, figs. 31-38; pl. 84, figs. 43, 44.

Loc. Eastern New York; Perry County, Tennessee; Petermann Fiord, Greenland.

Anazyga recurvirostra Davidson=Zygospira recurvirostris.

ANOPLIA Hall and Clarke. Genotype Leptæna nucleata Hall.

Anoplia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 309;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 293.

Anoplia nucleata Hall. Oriskany and Corniferous (Dev.).

Leptæna nucleata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 47.

Leptæna? nucleata Hall, Pal. New York, III, 1859, p. 419, pl. 94, fig. 1.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 393, pl. 8, fig. 8.

Anoplia nucleata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 309, pl. 15A, figs. 17, 18; pl. 20, figs. 14-17.

Loc. Albany County, New York; Alexander County, Illinois; Cayuga, Ontario.

Obs. It is probable that Productella nucleata Nicholson is a synonym of this species.

ANOPLOTHECA Sandberger (emend Hall and Clarke). Genotype Productus lamellosus Sandberger=Terebratula venusta Schnur.

Anoplotheca F. Sandberger, Sitzb. d. k. k. Akad. d. Wissens., math.-naturw. Classe, XVI, 1853, p. 5; XVIII, p. 102.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 129, figs. 113-121.

Leptocœlia Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 108;—Twelfth Rep., Ibidem, 1859, p. 32, figs. 1, 2, 4;—Pal. New York, III, 1859, p. 447.—Billings, Canadian Jour., VI, 1861, p. 351.—Hall, American Jour. Sci., XXXVI, 1863, p. 14.—Rominger, American Jour. Sci., XXXV, 1863, p. 84.—Hall, Pal. New York, IV, 1867, p. 365.—Dall, American Jour. Conch., VII, 1871, p. 60.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 151.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136.

Cœlospira Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 59;—Trans. Albany Institute, IV, 1863, p. 146;—Pal. New York, IV, 1867, p. 328.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 134, figs. 122, 123.

Bifida Davidson, Supplement to British Dev. Brach., Palæontographical Soc., 1882, p. 27.

Anoplotheca, Cœlospira, and Leptocœlia Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, pp. 801-803.

ANOPLOTHECA Sandberger (emend Hall)—Continued.

Obs. Hall and Clarke have shown that Anoplotheca and Bifida are synonymous terms and that Cœlospira is also structurally identical. The latter name, however, they retain as a subgenus of Anoplotheca. While the brachydium is not yet fully known in Leptocœlia, all its other characters are the same as those of Cœlospira. Under these circumstances it appears best, for the present at least, to refer all American species of Leptocœlia and Cœlospira to Anoplotheca.

Anoplotheca acutiplicata (Conrad). Corniferous (Dev.).

Atrypa acutiplicata Conrad, Fifth Ann. Rep. N. Y. Geol. Survey, 1841, p. 54.—Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 17.

Leptocœlia acutiplicata Hall, Pal. New York, IV, 1867, p. 365, pl. 67, figs. 30-39.

Cœlospira acutiplicata Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 136, pl. 53, figs. 32-39.

Loc. Waterville, Cassville, East Victor, etc., New York.

Anoplotheca camilla (Hall). Oriskany and Up. Helderberg (Dev.).

Cœlospira concava Hall (non Hall 1863), Pal. New York, IV, 1867, p. 329.

Cœlospira camilla Hall, Ibidem, 1867, pl. 52, figs. 13-19;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 168.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 53, figs. 24-31.

Loc. Caledonia, New York; county of Haldimand, Ontario.

Anoplotheca concava (Hall). Lower Helderberg (Dev.).

Leptocœlia concava Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 107;—Pal. New York, III, 1859, p. 245, pl. 38, figs. 1-7.—Billings, Canadian Jour., VI, 1861, p. 352, fig. 127;—Geology Canada, 1863, p. 369, fig. 383; p. 957, fig. 451.

Cœlospira concava Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 60;—Trans. Albany Institute, IV, 1863, p. 146.—Meek, American Jour. Sci., 2d ser., XL, 1865, p. 33.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 134, figs. 122, 123; pl. 53, figs. 20-23.

Loc. Albany and Schoharie counties, New York; Kennedy Channel, Arctic region.

Anoplotheca dichotoma (Hall). Oriskany (Dev.).

Leptocœlia dichotoma Hall, Pal. New York, III, 1859, p. 452, pl. 103B, figs. 3.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 137.

Loc. Cumberland, Maryland.

Obs. Possibly the young of Anoplotheca flabellites.

Anoplotheca fimbriata (Hall). Oriskany (Dev.).

Leptocœlia fimbriata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 33, fig. 3;—Pal. New York, III, 1859, p. 450, pl. 103B, fig. 2.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 137, pl. 53, figs. 47-52, 54, 55.

Loc. Cumberland, Maryland.

Anoplotheca flabellites (Conrad). Oriskany and Corniferous (Dev.).

Atrypa flabellites Conrad, Fifth Ann. Rep. N. Y. Geol. Survey, 1841, p. 55.

Atrypa palmata Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. 10, fig. 5.

Orthis palmata Sharpe and Salter, Trans. Geol. Soc. London, 2d ser., VII, 1856, p. 207, pl. 26, figs. 7-10.

Leptocœlia propria Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 108.

Leptocœlia flabellites Hall, Twelfth Rep. Ibidem, 1859, p. 33, figs. 1, 2, 4;—Pal. New York, III, 1859, p. 449, pl. 103B, fig. 1; pl. 106, fig. 1.—Billings, Canadian Jour., VI, 1861, p. 351, fig. 126;—Geology Canada, 1863, p. 369, fig. 382.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 397, pl. 8, fig. 3.—Billings, Pal. Fossils, II, 1874, p. 42, pl. 3, figs. 5, 6.—Steinmann, American Naturalist, XXV, 1891, p. 856.—A. Ulrich, N. Jahrb. f. Mineral., Beilageband,

Anoplotheca flabellites (Conrad)—Continued.

VIII, 1892, p. 60, pl. 4, figs. 9, 10–13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 137, pl. 53, figs. 40–46, 53.—Von Ammon, Zeits. Gesells. für Erdk., Berlin, XXVIII, 1893, p. 363, fig. 7.

Orthis aymara Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 68, pl. 4, fig. 14.

Orthis palmata Sharpe and Salter, Trans. Geol. Soc. London, 2d ser., VII, 1856, p. 207, pl. 26, figs. 7–10.

Loc. Schoharie, etc., New York; county of Haldimand, Ontario; Gaspé; Cumberland, Maryland; Union County, Illinois; Bolivia; Tanquarassu, Matto Grosso, Brazil; Falkland Islands; South Africa.

Anoplotheca hemispherica (Sowerby). Clinton (Sil.).

Atrypa hemispherica Sowerby, Murchison's Silurian System, 1839, p. 639, pl. 20, fig. 7.—Hall, Pal. New York, II, 1852, p. 74, pl. 23, fig. 10.—Billings, Geology Canada, 1863, p. 318, fig. 337.

Atrypa hemispherica? Hall, Geology, N. Y.; Rep. Fourth Dist., 1843, p. 73, fig. 4.

Leptocœlia hemispherica Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 152, pl. 32, figs. 21–23, 36–39.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 325, pl. 6, figs. 18, 19.

Atrypa flabella Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 68.

Cœlospira? hemispherica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 82, figs. 1–4 (? pl. 52, fig. 16).

Loc. England; Rochester, Sodus, and Walcott, New York; Louisville, Kentucky; Cumberland Gap, Tennessee; Ringgold, Georgia; Collinsville, Alabama; Arisaig, Nova Scotia (Ami); Anticosti.

Anoplotheca infrequens (Walcott). Lower and Upper Devonian.

Trematospira infrequens Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 151, pl. 4, fig. 3.

Loc. Lone Mountain, Nevada.

Obs. The exterior is like that of A. flabellites.

Anoplotheca planoconvexa (Hall). Clinton (Sil.).

Atrypa planoconvexa Hall, Pal. New York, II, 1852, p. 75, pl. 23, fig. 11.—Billings, Geology Canada, 1863, p. 318, fig. 336.

Leptocœlia planoconvexa Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.—Nicholson and Hinde, Canadian Jour., n. ser., XIV, 1874, p. 144.

Cœlospira ?planoconvexa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 52, fig. 15; pl. 53, figs. 11–16.

Loc. Flamborough Head, Ontario; Niagara of Wisconsin (Whitfield).

Anoplotheca plicatula (Hall). Clinton (Sil.).

Atrypa plicatula Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 71, fig. 4;—Pal. New York, II, 1852, p. 74, pl. 23, fig. 9.

Leptocœlia? plicatula Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Rhynchonella plicata Miller, N. American Geol. Pal., 1889, p. 369.

Cœlospira? plicatula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 136, pl. 52, figs. 12–14; pl. 82, fig. 5.

Loc. Reynales Basin, New York; Niagara of Wisconsin (Whitfield).

ATHYRIS McCoy (emend Hall and Clarke).

Genotype Terebratula concentrica von Buch.

Athyris McCoy, Carb. Fossils Ireland, 1844, pp. 128, 146.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 73.—Billings, Canadian Jour., V, 1860,

ATHYRIS McCoy (emend Hall and Clarke)—Continued.

p. 273;—Ibidem, VI, 1861, p. 138;—Pal. Fossils, I, 1862, p. 144.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, pp. 152, 258;—Pal. New York, IV, 1867, p. 282.—Billings, American Jour. Sci., XLIV, 1867, p. 48.—Herrick, Bull. Denison Univ., IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 87.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 83, fig. 57 on p. 86;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 777.

Spirigera d'Orbigny, Paris Acad. Sci., Comptes Rendus, XXV, 1847, p. 268.

Euthyris Quenstedt, Petrefactenkunde Deutschlands, 1871, p. 442.

Athyris americana Swallow=Cleiothyris roissyi.

Athyris angelica Hall. Chemung (Dev.).

Athyris angelica Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 99;—Fifteenth Rep. Ibidem, 1862, pl. 3, figs. 10–13, 24;—Pal. New York, IV, 1867, p. 292, pl. 47, figs. 9–20.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 148.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 45, figs. 26–30.

Loc. Phillipsburg, Rockville, etc., New York; Meadville, Pennsylvania; Eureka district, Nevada.

Athyris angelica occidentalis Whiteaves. Hamilton (Dev.).

Athyris angelica occidentalis Whiteaves, Cont. Canadian Pal., I, 1891, p. 227, pl. 32, fig. 3.

Loc. Athabasca River, Canada.

Athyris ashlandensis Herrick=A. lamellosa.

Athyris biloba (A. Winchell). Kinderhook (L. Carb.).

Spirigera biloba A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 118.

Loc. Rockford, Indiana.

Obs. This species is not well established and is based upon a single ventral valve.

Athyris blancha Billings=Meristella blancha.

Athyris borealis Billings=Catazyga erratica.

Athyris brittsi Miller. Middle Devonian.

Athyris brittsi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 314, pl. 9, figs. 16–18.

Loc. Near Otterville, Missouri.

Obs. Probably the same as A. spiriferoides.

Athyris caputserpentis Swallow=Seminula caputserpentis.

Athyris charitonensis Swallow=Seminula charitonensis.

Athyris chloe Billings=Parazyga hirsuta.

Athyris clara Billings=Meristella nasuta.

Athyris claytoni Swallow=Seminula claytoni.

Athyris clintonensis Swallow=Cleiothyris clintonensis.

Athyris clusia Billings=Meristella clusia.

Athyris concentrica Billings (non von Buch)=A. spiriferoides.

Athyris congesta Conrad=Hyatella congesta.

Athyris cora Hall. Hamilton and Chemung ? (Dev.).

Athyris cora Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 94;—Fifteenth Rep. Ibidem, 1862, pl. 3, figs. 15, 16;—Pal. New York, IV, 1867, p. 291, pl. 47, figs. 1–7.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 90, pl. 45, figs. 6–10.

Loc. Delphi, New York.

Athyris (?) corpulènta (A. Winchell). Kinderhook (L. Carb.).
Spirigera corpulenta A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 6.
Loc. Burlington, Iowa.

Athyris crassicardinalis White=Cleiothyris crassicardinalis.

Athyris crassirostra Billings=Whitfieldella cylindrica.

Athyris cylindrica Billings=Whitfieldella cylindrica.

Athyris densa Hall and Clarke. St. Louis (L. Carb.).
Athyris densa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 364, pl. 46, figs. 6-12.
Loc. Washington County, Indiana; Colesburg, Kentucky.
Obs. Compare with Centronella (?) crassicardinalis.

Athyris differentis McChesney=Seminula argentea.

Athyris eborea A. Winchell=A. vittata.

Athyris euzona Swallow=Seminula formosa.

Athyris(?) formosa Swallow=Seminula formosa.

Athyris fultonensis (Swallow). Corniferous and Hamilton (Dev.).
Spirigera fultonensis Swallow, Trans. St. Louis Acad. Sci., I, July or August, 1860, p. 650.
Spirigera minima Swallow, Ibidem, 1860, p. 649.
Athyris vittata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 89;—Pal. New York, IV, 1867, p. 289, pl. 46, figs. 1-4.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 502, pl. 4, figs. 8, 9;—Tenth Rep. State Geol. Indiana, 1881, p. 134, pl. 4, figs. 8, 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 87, pl. 16, figs. 25-32.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 228.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, figs. 62, 63; pl. 45, figs. 1-5.—Keyes, Geol. Survey Missouri, V, 1895, p. 90, pl. 41, fig. 1.
Spirigera eborea A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.
Loc. Callaway County, Missouri; Iowa City and New Buffalo, Iowa; Falls of Ohio; Alpena, Michigan; Lake Winnipegosis, Manitoba.
Obs. Specimens of S. fultonensis Swallow and S. eborea Winchell in the writer's collection prove to be the same as A. vittata Hall.

Athyris hannibalensis (Swallow). Chouteau (L. Carb.).
Spirigera hannibalensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 649.
Athyris hannibalensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 46, figs. 13-15.—Keyes, Geol. Survey Missouri, V, 1895, p. 90, pl. 40, fig. 9.
Loc. Clarksville, Hannibal, etc., Missouri; Sciotoville, Ohio.
Obs. Meek was inclined to regard this species the same as A. lamellosa. It is, however, distinct. See A. missouriensis.

Athyris harpalyce Billings=Whitfieldella harpalyce.

Athyris hawni Swallow=Seminula hawni.

Athyris headi Billings=Catazyga headi.

Athyris headi anticostiensis Billings=Catazyga erratica.

Athyris headi borealis Billings=Catazyga erratica.

Athyris hirsuta Hall=Cleiothyris hirsuta.

Athyris incrassata Hall. Burlington (L. Carb.).
Athyris incrassata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 600, pl. 12, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 46, fig. 21; pl. 83, fig. 39.
Athyris incrassatus Keyes, Geol. Survey Missouri, V, 1895, p. 91, pl. 41, fig. 10.
Loc. Burlington, Iowa; Quincy, Illinois; Hannibal, Missouri.

Athyris intermedia Nicholson=Whitfieldella intermedia.

Athyris intervarica McChesney. Burlington (L. Carb.).

Athyris intervarica McChesney, Descriptions New Pal. Foss., 1861, p. 78.

Loc. Burlington, Iowa.

Obs. May be the same as A. lamellosa L'Eveillé.

Athyris (?) **jacksoni** (Swallow). Upper Coal Measures.

Spirigera jacksoni Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 651.

Loc. Cass County, Missouri.

Athyris julia Billings=Whitfieldella julia.

Athyris junia Billings=Hyattella junia.

Athyris lamellosa (L'Eveillé). Waverly-Keokuk (L. Carb.).

Spirifer lamellosus L'Eveillé, Mém. Soc. Géol. de France, II, 1835, p. 39, figs. 21–23.

Athyris lamellosa Meek, Pal. Ohio, II, 1875, p. 283, pl. 14, fig. 6.—Herrick, Bull Denison Univ., III, 1888, p. 49, pl. 2, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 90, pl. 46, figs. 16–20.

Athyris ashlandensis Herrick, Bull. Denison Univ., IV, 1888, p. 24, pl. 3, fig. 6;—Geol. Ohio, VII, 1895, pl. 23, fig. 10.

Loc. Europe; Sciotoville, and Licking County, Ohio; Lebanon, Kentucky; Crawfordsville, Indiana; New Mexico.

Obs. See A. intervarica McChesney.

Athyris lara Billings=Atrypa lara.

Athyris maconensis Swallow=Seminula maconensis.

Athyris maia Billings=Martinia maia.

Athyris minima Swallow=A. fultonensis.

Athyris minutissima Webster. Chemung (Dev.).

Athyris minutissima Webster, American Nat., XXII, 1888, p. 1015.

Loc. Near Rockford, Iowa.

Athyris missouriensis Swallow=Cleiothyris missouriensis.

Athyris missouriensis (A. Winchell). Chouteau (L. Carb.).

Spirigera missouriensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.

Loc. Louisiana, Missouri; Medina County, Ohio.

Obs. Should be compared with A. hannibalensis.

Athyris monticola (White). Lower Carboniferous.

Spirigera monticola White, Wheeler's Geogr. Geol. Expl. and Survey west 100 Merid., Prel. Rep., 1874, p. 16;—Final Rep. Ibidem, IV, 1875, p. 91, pl. 5, fig. 11.

Loc. Mountain Spring, Nevada.

Athyris naviformis Billings=Whitfieldella naviformis.

Athyris nitida Billings=Whitfieldella nitida.

Athyris obmaxima McChesney=Cleiothyris obmaxima.

Athyris obvia McChesney=Cleiothyris obvia.

Athyris ohioensis (A. Winchell). Waverly (L. Carb.).

Spirigera ohioensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 118.

Athyris ohioensis Herrick, Bull. Denison Univ., III, 1888, p. 49, pl. 2, fig. 1.

Loc. Akron and Sciotoville, Ohio.

Athyris orbicularis McChesney=Cleiothyris orbicularis.

Athyris (?) **ottervillensis** Miller. Middle Devonian.

Athyris ottervillensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 314, pl. 9, figs. 14, 15.

Loc. Near Otterville, Missouri.

Athyris papilioniformis McChesney. Kaskaskia (L. Carb.).

Athyris spiriferoides McChesney (non Eaton, 1831), Descriptions New Pal. Foss., 1860, p. 46.

Athyris? papilioniformis McChesney, Ibidem, 1865, pl. 6, fig. 4;—Trans. Chicago Acad. Sci., I, 1868, p. 33, pl. 6, fig. 4.

Loc. Fountain Bluff, Illinois.

Athyris parvirostris Meek and Worthen=Cleiothyris roissyi.

Athyris parvula Whiteaves. Hamilton (Dev.).

Athyris parvula Whiteaves, Cont. Canadian Pal., I, 1891, p. 228, pl. 32, figs. 4, 5.

Loc. Athabasca River, Canada.

Athyris pectinifera? Swallow (non Sowerby)=Cleiothyris roissyi.

Athyris (?) **perinflata** McChesney. Keokuk (L. Carb.).

Athyris perinflata McChesney, Descriptions New Pal. Foss., 1861, p. 81.

Loc. Nauvoo, Illinois.

Athyris persinuata Meek=Seminula persinuata.

Athyris planosulcata American authors (non Phillips)=Cleiothyris roissyi.

Athyris plattensis Swallow=Seminula plattensis.

Athyris polita Hall. Chemung (Dev.).

Atrypa polita Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, Tables of Organic Remains, 65, fig. 5.

Athyris ? polita Hall, Pal. New York, IV, 1867, p. 293, pl. 47, figs. 21–33.

Athyris polita Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 46, figs. 1-5

Loc. Jasper, Randolph, and Albion, New York.

Athyris prinstana Billings=Hindella prinstana.

Athyris prouti (Swallow). Chouteau (L. Carb.).

Spirigera prouti Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 649.

Athyris prouti Keyes, Geol. Survey Missouri, V, 1895, p. 91.

Loc. St. Louis County, etc., Missouri.

Athyris reflexa Swallow=Cleiothyris reflexa.

Athyris roissyi=Cleiothyris roissyi.

Athyris singletoni Swallow=Seminula singletoni.

Athyris (?) **solitaria** Billings. Anticosti (Sil.).

Athyris solitaria Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 48.

Loc. Anticosti.

Athyris spiriferoides McChesney (non Eaton)=A. papilioniformis.

Athyris spiriferoides (Eaton). Corniferous and Hamilton (Dev.).

Terebratula spiriferoides Eaton, American Jour. Sci., XXI, 1831, p. 137;—Geological Text-book, 1832, p. 46.

Atrypa concentrica Conrad (non von Buch), Ann. Rep. Geol. Survey New York, 1838, p. 111.—Hall, Geol. New York; Rep. Fourth Dist, 1843, p. 198, fig. 5.

Spirifera spiriferoides Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 153, figs. 1, 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, fig. 667.

Athyris spiriferoides Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 1-4;—Fifteenth Rep. Ibidem, 1862, p. 180, figs. 1-4;—Pal. New York, IV, 1867, p. 285, pl. 46, figs. 5-31.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 89, figs. 60, 61; pl. 45, figs. 11-27.

Athyris spiriferoides (Eaton)— Continued.

Athyris concentrica Billings, Canadian Jour., VI, 1861, p. 145, figs. 54-57;—Geol. Canada, 1863, p. 373, fig. 399; p. 385, fig. 421.

Loc. New York; Pennsylvania; Maryland; Virginia; Cayuga and Widder, Canada.

Athyris squamosa Worthen=Cleiothyris squamosa.

Athyris sublamellosa Hall=Cleiothyris roissyi.

Athyris subquadrata Hall=Seminula subquadrata.

Athyris subtilita Hall=Seminula argentea.

Athyris trinucleus Hall=Seminula trinucleus.

Athyris trisinuatus McChesney=Meristina trisinuata.

Athyris tumida Roemer=Meristina tumida.

Athyris (?) **tumidula** Billings. Anticosti (Sil.).

Athyris tumidula Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 47.

Loc. Anticosti.

Obs. Probably a species of Whitfieldella.

Athyris (?) **turgida** Shaler. Anticosti (Sil.).

Athyris turgida Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 69.—Miller, N. American Geol. Pal., 1889, p. 335.

Loc. Anticosti.

Athyris ultravarica McChesney. Keokuk (L. Carb.).

Athyris ultravarica McChesney, Descriptions New Pal. Fossils, 1861, p. 79.

Loc. Keokuk, Iowa.

Athyris umbonata Billings=Hindella umbonata.

Athyris unisulcata Billings=Pentagonia unisulcata.

Athyris vittata Hall=A. fultonensis.

ATRYPA Dalman. Genotype Anomia reticularis Linnæus.

Atrypa Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, p. 102.—Billings, Canadian Nat. Geol., I, 1856, p. 134;—Canadian Jour., VI, 1861, p. 264.—Whitfield, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 141, pl. 1.—Hall, Pal. New York, IV, 1867, p. 312.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 88.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 163;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 818.

Atrypa æquiradiata Conrad=Rensselæria æquiradiata.

Atrypa acutiplicata Conrad=Anoplotheca acutiplicata.

Atrypa acutirostrum Hall=Rhynchonella acutirostris.

Atrypa affinis Vanuxem=A. reticularis.

Atrypa altilis Hall=Camarotœchia plena.

Atrypa ambigua Hall=Camarella ambigua.

Atrypa aprinis Hall=Homœospira apriniformis.

Atrypa arata Conrad=Pentamerella arata.

Atrypa aspera American authors=A. spinosa.

Atrypa aspera occidentalis Hall=A. hystrix occidentalis.

Atrypa bidens Hall=Rhynchonella bidens.

Atrypa bidentata Hall=Rhynchonella bidentata.

Atrypa bisulcata Hall (non Vanuxem)=Cyclospira bisulcata.

Atrypa bisulcata Vanuxem (non Hall)=Whitfieldella bisulcata.

Atrypa brevirostris Hall=Anastrophia brevirostris.

Atrypa hystrix Hall. Chemung (Dev.).

Atrypa hystrix Hall, Geology N. Y.; Rep. Fourth Dist., 1843, p. 271, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 829, fig. 681.—Hall, Pal. New York, IV, 1867, p. 326, pl. 53A, figs. 15-17.—Whitfield, Geol. Wisconsin, IV, 1882, p. 333, pl. 26, fig. 5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, fig. 23.

Loc. Steuben County, New York; Pennsylvania; Rockford, Iowa; Milwaukee, Wisconsin.

Obs. See A. spinosa.

Atrypa hystrix elongata Webster. Chemung (Dev.).

Atrypa hystrix var. elongata Webster, American Nat., XXII, 1888, p. 1104.

Loc. Near Rockford, Iowa.

Atrypa hystrix occidentalis Hall. Middle Devonian.

Atrypa aspera var. occidentalis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 515, pl. 6, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, figs. 18-20.

Atrypa aspera Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 403, pl. 13, fig. 7.

Loc. Independence, Davenport, etc., Iowa; Rock Island, Illinois.

Obs. This variety is probably more closely related to A. hystrix than to A. aspera.

Atrypa hystrix planosulcata Webster. Chemung (Dev.).

Atrypa hystrix var. planosulcata Webster, American Nat., XXII, 1888, p. 1104.

Loc. Near Rockford, Iowa.

Atrypa imbricata Hall (non Sowerby)=A. nodostriata.

Atrypa impressa Hall=A. reticularis impressa.

Atrypa impressa Shaler (non Hall)=A. reticularis.

Atrypa increbescens Hall=Rhynchotrema inæquivalvis.

Atrypa intermedia Hall=Whitfieldella intermedia.

Atrypa interplicata Hall=Anastrophia interplicata.

Atrypa lævis Vanuxem=Meristella lævis.

Atrypa lacunosa Vanuxem=Anastrophia verneuili.

Atrypa lamellata Hall=Rhynchonella lamellata.

Atrypa(?) lara (Billings). Anticosti (Sil.).

Athyris lara Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 47.

Atrypa lara Davidson, Suppl. British Sil. Brach., Palæontographical Soc., 1882, p. 121.

Loc. Anticosti.

Obs. Said to have a true Atrypa loop and spires. The exterior is smooth. Probably the type of a new genus.

Atrypa laticorrugata Foerste. Clinton (Sil.).

Atrypa lati-corrugata Foerste, Geol. Ohio, VII, 1895, p. 591, pl. 57A, fig. 16.

Loc. Dayton, Ohio.

Atrypa laticostata Hall (non Phillips)=Camarotœchia contracta.

Atrypa lentiformis Vanuxem=A. reticularis.

Atrypa limitaris Hall=Leiorhynchus limitare.

Atrypa (?) lingulata Nicollet. Lower Carboniferous.

Atrypa lingulata Nicollet, Rep. Hydrog. Basin Up. Miss. River, 1843, p. 167.

"Subfusiform; valves nearly equally convex; inferior valve with a longitudinal sinus; base projecting in the middle, the margin of the projection truncated. St. Louis, and also the bluff beneath Rockwell, Illinois."

Atrypa phoca (Salter). Silurian.

Rhynchonella phoca Salter, Sutherland's Jour. Voyage Baffins Bay, etc., II, 1852, p. ccxxvi, pl. 5, figs. 1-3.

Atrypa phoca Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 576.

Loc. Cape Riley, Cornwallis, Seal Islands, Bessels Bay, lat. 81° 6′, and Dobbins Bay, lat. 79° 41′, Arctic America.

Atrypa planoconvexa Hall=Anoplotheca planoconvexa.

Atrypa pleiopleura Conrad=Camarotœchia pleiopleura.

Atrypa plena Hall=Camarotœchia plena.

Atrypa plicata Hall=Rhynchonella plicata.

Atrypa plicatella Hall=Rhynchonella plicatella.

Atrypa plicatula Hall=Anoplotheca plicatula.

Atrypa plicifera Hall=Camarotœchia plena.

Atrypa polita Hall=Athyris polita.

Atrypa prisca Vanuxem=A. reticularis.

Atrypa pseudomarginalis Hall. Up. Helderberg (Dev.).

Atrypa pseudomarginalis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Fifteenth Rep. Ibidem, 1862, p. 189;—Pal. New York, IV, 1867, p. 327, pl. 53, figs. 1, 2.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 55, figs. 26, 27.

Loc. Schoharie, New York.

Atrypa quadricostata Hall, 1843=Leiorhynchus quadricostatum.

Atrypa quadricostata Hall, 1852=Hyattella congesta.

Atrypa rectiplicata Conrad=Spirifer rectiplicatus.

Atrypa recurvirostris Hall=Zygospira recurvirostris.

Atrypa reticularis (Linnæus). Silurian and Devonian.

Anomia reticularis Linné, Systema Naturæ, ed. xii, I, 1767, p. 1132.

Atrypa chemungensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 182, fig. 4.

Hipparionyx consimilaris Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 132, fig. 2.

Atrypa affinis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 88, fig. 12.—Hall, Ibidem, Rep. Fourth Dist, 1843, p. 88, fig. 12.

Atrypa prisca Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 139, fig. 5.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 175, fig. 5; p. 198, fig. 4.—Owen, Geol. Expl. Iowa, Wisconsin, Illinois, 1844, pl. 12, figs. 2, 10.—Billings, Canadian Nat. Geol., I, 1856, p. 474, pl. 7, fig. 11.

Atrypa lentiformis Vanuxem, Geol. New York; Rep Third Dist., 1842, p. 163, fig. 3; p. 164.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 215, fig. 3.

Strophomena ithacensis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 174, fig. 2. (On the authority of Professor Williams.)

Atrypa tribulis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 271, fig. 3.

Terebratula prisca Castelnau, Essai Syst., Sil. l'Amérique Septentrionale, 1843, p. 40, pl. 13, fig. 8.

Terebratula reticularis Hall, American Jour. Sci., 2d ser., XX, 1849, p. 227.—Yandell and Shumard, Cont. Geol. Kentucky, 1847, p. 10.

Atrypa reticularis Hall, Pal. New York, II, 1852, p. 72, pl. 23, fig. 8; p. 270, pl. 55, fig. 5.—Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 10.—Hall, Geol. Survey Iowa, II, 1858, p. 515;—Pal. New York, III, 1859, p. 253, pl. 42, fig. 1.—Roemer, Sil. Fauna west. Tennessee, 1860, p. 69, pl. 5, fig. 9.—Billings, Canadian Jour., VI, 1861, p. 264, figs. 84-87;—Geol. Canada, 1863, p. 318,

Atrypa sordida Hall=Rhynchonella sordida.

Atrypa spinosa Hall. Corniferous-Chemung (Dev.).

Atrypa spinosa Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 200, figs. 1, 2.—Whitfield, Geol. Wisconsin, IV, 1882, p. 333, pl. 26, figs. 7, 8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 55, figs. 21, 22.

Atrypa dumosa Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 271, fig. 1.

Atrypa aspera Hall (non Schlotheim), Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 168.—Rogers, Geol. Pennsylvania, II, 1858, Pt. II, p. 828, fig. 671.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 96, pl. 13, fig. 12.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 88, pl. 14, figs. 1-11.

Atrypa aspera vel aspera Hall, Pal. New York, IV, 1867, p. 322, pl. 53A, figs. 1-14, 18, 24, 25.

Atrypa aspera? Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 348, pl. 1, fig. 2.

Atrypa reticularis var. aspera Whiteaves, Cont. Canadian Pal., I, 1891, pp. 229, 289.

Loc. New York; Pennsylvania; Maryland; Virginia; Kentucky; Ohio; Illinois; Iowa; Wisconsin; Ontario; Lockhart and Athabasca rivers, etc., Northwest Territory, Canada.

Obs. The Corniferous limestone specimens of A. spinosa are not always easily distinguished from A. reticularis. The fewer plications of the former, however, will usually distinguish it from the latter species. This tendency to fewer plications is more marked in the Hamilton formation and attains its climax in the Chemung, where the species is known as A. hystrix.

Atrypa subtrigonalis Hall=Rhynchonella subtrigonalis.

Atrypa sulcata Vanuxem=Whitfieldella sulcata.

Atrypa tenuilineata Hall=Dalmanella tenuilineata.

Atrypa tribulis Hall=A. reticularis.

Atrypa unguiformis Hall=Hipparionyx proximus.

Atrypa unisulcata Conrad=Pentagonia unisulcata.

ATRYPINA Hall and Clarke. Genotype Leptocœlia imbricata Hall.

Atrypina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 161, fig. 152;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 815.

Atrypina clintoni Hall and Clarke. Clinton (Sil.).

Atrypina clintoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 162, pl. 53, figs. 7, 17-19; pl. 83, fig. 6.

Loc. Orleans County, New York.

Atrypina disparilis (Hall). Niagara (Sil.).

Atrypa disparilis Hall, Pal. New York, II, 1852, p. 277, pl. 57, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 53, figs. 1-4.

Leptocœlia disparilis Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 77.

Trematospira? disparilis Hall, Sixteenth Rep., Ibidem, 1863, p. 60;—Trans. Albany Institute, IV, 1863, p. 146.

Cœlospira disparilis Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 162, pl. 25, figs. 39-43;—Eleventh Rep. State Geol. Indiana, 1882, p. 363, pl. 25, figs. 39-43.—Beecher and Clarke, Mem. New York State Mus. Nat. Hist., I, 1889, p. 64, pl. 5, figs. 17-23.

Loc. Wolcott, New York; Waldron, Indiana.

Obs. Davidson in 1882 regarded this species the same as Atrypa barrandei of Europe.

Atrypina imbricata Hall. Lower Helderberg (Dev.).

Leptocœlia imbricata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 108;—Pal. New York, III, 1859, p. 246, pl. 38, figs. 8-13.—Billings, Geol. Canada, 1863, p. 957, fig. 452.

Trematospira imbricata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 60;—Trans. Albany Institute, IV, 1863, p. 146.—Keyes, Geol. Survey Missouri, V, 1895, p. 96.

Trematospira ? imbricata Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 381, pl. 7, fig. 2.

Atrypina imbricata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 53, figs. 5, 6, 8-10.

Loc. Albany and Schoharie counties, New York; Perry County, Missouri.

Atrypina intermedia (Hall). Arisaig (Sil.).

Leptocœlia intermedia Hall, Canadian Nat. Geol., V, 1860, p. 147, fig. 5.—Dawson, Acadian Geology, 3d ed., 1878, p. 598, fig. 202.

Loc. Arisaig, Nova Scotia.

Avicula desquamata Hall=Obolella crassa.

AULACORHYNCHUS Dittmar. Genotype A. pachti Dittmar.

Aulacorhynchus Dittmar, Verhand. Kais. Mineral. Gessel. St. Petersburg, 2d ser., VII, 1871, p. 1, pl. 1, figs. 1-13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 311;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 904.

Isogramma Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 568.

Aulacorhynchus millipunctatum (Meek and Worthen). Up. Coal Meas.

Chonetes ? ? millipunctata Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 35;—Geol. Survey Illinois, V, 1873, p. 566, pl. 25, fig. 3.

Isogramma millipunctata Meek and Worthen, Ibidem, 1873, p. 568.

Aulacorhynchus millipunctatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 312, pl. 83, figs. 14, 15.

Chonetes millipunctatus Keyes, Geol. Survey Missouri, V, p. 54.

Loc. Marion County, Illinois; Kansas City, Missouri.

Aulosteges guadalupensis Shumard=Strophalosia guadalupensis.

Aulosteges spondyliformis White and St. John=Strophalosia spondyliformis.

Barrandella Hall and Clarke=Clorinda.

BARROISELLA Hall and Clarke. Genotype Lingula subspatulata Meek and Worthen (non Hall and Meek).

Barroisella Hall and Clarke, Pal. New York, Extract, VIII, Pt. I, 1890, p. 62;—Pal. New York, VIII, Pt. I, 1892, pp. 62, 64;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 230.

Barroisella subspatulata (Meek and Worthen). Black Slate (Dev.).

Lingula subspatulata Meek and Worthen (non Hall and Meek), Geol. Survey Illinois, III, 1868, p. 437, pl. 13, fig. 1.

Lingula subspatulata ? A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 248.

Barroisella subspatulata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 63, pl. 2, figs. 14-16 and p. 164.

Loc. Jonesboro, Illinois; Louisville and Lebanon, Kentucky; Rockford, Indiana.

BEACHIA Hall and Clarke. Genotype Meganteris suessana Hall.

Beachia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 260;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 850.

Beachia suessana Hall. Oriskany (Dev.).

Meganteris suessana Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 100.

Rensselæria suessana Hall, Pal. New York, III, 1859, p. 459, pl. 107, figs. 1-15.

Beachia suessana Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 260, pl. 77, figs. 1-11.

Loc. Cumberland, Maryland; near Rondout, New York.

BEECHERIA Hall and Clarke. Genotype B. davidsoni Hall and Clarke.

Beecheria Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 300;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 866.

Beecheria davidsoni Hall and Clarke. Upper Carboniferous.

Beecheria davidsoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 300, fig. 224, pl. 79, figs. 33-36.

Loc. Windsor, Nova Scotia.

BILLINGSELLA Hall and Clarke.

Genotype Orthis pepina Hall=O. coloradoensis Shumard.

Billingsella and Protorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 230, 231;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 273.

Obs. Protorthis was founded on Orthis billingsi Hartt, a species rarely found in good preservation. The diagnostic character was supposed to be the presence of a rudimentary spondylium and the absence of a deltidium. In the National Museum collection, however, there are two artificial casts of the ventral valve made from Hartt's original specimens and other material collected by Mr. Walcott, showing O. billingsi to be without a spondylium. The rostral plate is the deltidium distorted by pressure to which these shells have been subjected. The only character of generic importance is that the geologically older species of Billingsella have a more rudimentary or nearly obsolete cardinal process than the type species. This difference, however, hardly justifies the retention of Protorthis.

Billingsella alberta (Walcott). Middle Cambrian.

Orthisina alberta Walcott, Proc. U. S. National Mus., XI, 1888, p. 442.

Loc. Mount Stephan, British Columbia.

Billingsella billingsi (Hartt). Middle Cambrian.

Orthis billingsi Hartt, Dawson's Acadian Geology, 2d ed., 1868, p. 644, fig. 223.—Walcott, Bull. U. S. Geol. Survey, 10, 1884, p. 17, pl. 1, fig. 1.—Matthew, Trans. Royal Soc. Canada, III, 1886, p. 43.

Orthis? billingsi Matthew, Ibidem, VIII, 1891, p. 131.

Protorthis billingsi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 219, 232, pl. 7A, figs. 14-20.

Loc. St. John, New Brunswick.

Billingsella coloradoensis (Shumard). Upper Cambrian.

Orthis coloradoensis Shumard, Trans. St. Louis Acad. Sci., I, 1860, p. 627.

Orthis pepina Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 134, pl. 6, figs. 23-27;—Trans. Albany Institute, V, 1867, p. 113.—Whitfield, Geol. Wisconsin, IV, 1882, p. 170, pl. 1, figs. 4, 5.

Orthis? (Orthisina?) pepina Hall, Second Ann. Rep. New York State Geologist, 1883, pl. 37, figs. 16-19.

Billingsella pepina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230, pl. 7, figs. 16-19; pl. 7A, figs. 7-9.

Orthis (Billingsella) pepina Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 96.

Loc. Burnett County, Texas; Lake Pepin, Minnesota; St. Croix River and Berlin, Wisconsin.

Billingsella festinata (Billings). Lower Cambrian.

Orthisina festinata Billings, Pal. Fossils, I, 1861, p. 10, figs. 11, 12;—Geol. Vermont, II, 1861, p. 949, figs. 350-352;—American Jour. Sci., 2d ser., XXXIII, 1862, p. 105;—Geology Canada, 1863, p. 284, fig. 289.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 120, pl. 7, fig. 7;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 7.

Billingsella festinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230.

Loc. Swanton, Vermont; York, Pennsylvania.

Billingsella (?) grandæva (Billings). Calciferous (Ord.).

Orthisina grandæva Billings, Canadian Nat. Geol., IV, 1859, p. 349, fig. 1;—Geology Canada, 1863, p. 113, fig. 21.

Billingsella? grandæva Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 231.

Loc. Mingan Island, Gulf of St. Lawrence.

Billingsella latourensis (Matthew). Middle Cambrian.

Kutorgina latourensis Matthew, Trans. Royal Soc. Canada, III, 1886, p. 42, pl. 5, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 93, 95, 233, pl. 4, figs. 18-20.

Loc. Portland, New Brunswick.

Billingsella (?) laurentina (Billings). Anticosti (Sil.).

Orthis laurentina Billings, Geol. Survey Canada; Rep. for 1856, 1857, p. 297;—Pal. Fossils, I, 1862, p. 138, fig. 115.

Billingsella? laurentina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 231, 238, pl. 7A, figs. 1-6.

Loc. Anticosti.

Billingsella orientalis (Whitfield). Lower Cambrian.

Orthisina orientalis Whitfield, Bull. American Mus. Nat. Hist., I, 1884, p. 144, pl. 14, fig. 6.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 120, pl. 7, fig. 6;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 8.

Billingsella orientalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230.

Loc. Georgia and Swanton, Vermont.

Billingsella (?) primordialis (Whitfield). Calciferous (Ord.).

Streptorhynchus? primordiale Whitfield, Bull. American Mus. Nat. Hist., I, 1886, p. 301, pl. 24, fig. 7.

Billingsella? primordiale Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 231.

Loc. Fort Cassin, Vermont.

Billingsella quacoensis (Matthew). Middle Cambrian.

Orthis quacoensis Matthew, Trans. Royal Soc. Canada, III, 1886, p. 43, pl. 5, fig. 20.

Orthis? quacoensis Matthew, Ibidem, VIII, 1891, p. 131.

Protorthis quacoensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 232, pl. 7A, fig. 21.

Loc. Portland and St. Martins, New Brunswick.

Billingsella transversa (Walcott). Lower Cambrian.

Orthisina? transversa Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 121, pl. 7, fig. 5;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 9.

Billingsella transversa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 230.

Loc. Georgia, Vermont.

Billingsella whitfieldi (Walcott). Lower Cambrian.

Kutorgina whitfieldi Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 18, pl. 9, fig. 4.

Loc. Eureka district, Nevada.

Billingsia Ford (non de Koninck, 1876)=Elkania.

BILOBITES Linnæus. Genotype Anomia biloba Linnæus.

Bilobites Linnæus, Systema Naturæ, ed. Muller, VI, 1775, p. 325.—Hall, Bull. Geol. Soc. America, I, 1889, p. 21.—Beecher, American Jour. Sci., 3d ser., XLII, 1891, p. 51.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 204, 223;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 269.

Dicœlosia King, Mon. Permian Fossils England, Pal. Soc., 1850, p. 106.

Bilobites acutilobus (Ringueberg). Niagara (Sil.).

Orthis acutiloba Ringueberg, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 134, pl. 7, fig. 5.

Bilobites acutilobus Beecher, American Jour. Sci., 3d ser., XLII, 1891, p. 52, pl. 1, fig. 1.

Loc. Lockport, New York.

Bilobites bilobus (Linnæus). Niagara (Sil.).

Anomia biloba Linnæus, Systema Naturæ, ed. XII, 1767, p. 1154.

Delthyris sinuatus Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 105, fig. 8.

Spirifer bilobus Hall, American Jour. Sci., 2d ser., XX, 1849, p. 228;—Pal. New York, IV, 1852, p. 260, pl. 54, fig. 1.

Orthis biloba Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 85;—Eleventh Rep. State Geol. Indiana, 1882, p. 286, pl. 27, fig. 16.

Bilobites bilobus Beecher, American Jour. Sci., 3d ser., XLII, 1891, p. 52, pl. 1, fig. 28.

Bilobites biloba Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 204, 205, 223, pl. 5B, figs. 11–14.

Loc. Lockport, New York; Waldron, Indiana; Wisconsin.

Bilobites varicus (Conrad). Lower Helderberg (Dev.).

Delthyris bilobata Conrad (not Orthis bilobata Sowerby), Second Ann. Rep. New York Geol. Survey, 1838, pp. 112, 118.

Delthyris varica Conrad, Jour Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 262, pl. 14, fig. 20.

Orthis varica Hall, Pal. New York, III, 1859, p. 179, pl. 24, fig. 1.

Orthis (Dicœlosia) varica Hall, Second Ann. Rep. New York State Geol., 1883, pl. 35, figs. 38–42.

Bilobites varicus Beecher, American Jour. Sci., 3d ser., XLII, 1891, p. 52, pl. 1, figs. 3–27.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 204, 223, pl. 5B, figs. 15–19.

Loc. Albany and Schoharie counties, New York; Decatur County, Tennessee; St. Blandine, New Brunswick.

BOTSFORDIA Matthew. Genotype Obolus pulcher Matthew.

Obolus (Botsfordia) Matthew, Trans. Royal Soc. Canada, VIII, 1891, p. 148; X, p. 90.

Botsfordia pulchra Matthew. Middle Cambrian.

Obolus pulcher Matthew, Canadian Record of Science, III, 1889, p. 306;—Trans. Royal Soc. Canada, VII, 1890, p. 151, pl. 8, figs. 1, 2.

Obolus (Botsfordia) pulcher Matthew, Trans. Royal Soc. of Canada, VIII, 1891, p. 148.

Obolus? pulcher Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 81, 183, pl. 4K, fig. 22.

Obolus (Botsfordia) pulchra Matthew, Trans. Royal Soc. Canada, X, 1894, p. 90, pl. 16, fig. 3.

Botsfordia pulchra Matthew, Trans. New York Acad. Sci., XIV, 1895, p. 115, pl. 3.

Loc. Canton Island, New Brunswick.

Brachymerus Shaler (non Dejean, 1834)=Anastrophia.

Brachymerus reversus Shaler=Parastrophia reversa.

Brachyprion Shaler=Stropheodonta.

Brachyprion geniculatum Shaler=Stropheodonta geniculata.

Brachyprion leda Shaler=Rafinesquina leda.

Brachyprion ventricosum Shaler=Stropheodonta ventricosa.

CAMARELLA Billings. Genotype C. volborthi Billings.

Camarella Billings, Canadian Nat. Geol., IV, 1859, p. 301;—Ibidem, VI, 1861, p. 316.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 122.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 48.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 219;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 838.

Camarella ambigua (Hall). Trenton (Ord.).

Atrypa ambigua Hall, Pal. New York, I, 1847, p. 143, pl. 33, figs. 8, 9.
Triplesia? ambigua Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 65.
Camarella ambigua Miller, American Pal. Foss., 1879, p. 107.
Loc. Middleville, New York.

Camarella antiquata Billings=Protorhyncha antiquata.

Camarella bisulcata Emmons=Cyclospira bisulcata.

Camarella bernensis Sardeson=Parastrophia hemiplicata.

Camarella breviplicata Billings. Calciferous (Ord.).

Camarella breviplicata Billings, Pal. Fossils, I, 1865, p. 304, fig. 295.
Loc. Stanbridge, Quebec, Canada.

Camarella calcifera Billings=Syntrophia calcifera.

Camarella circularis Miller=Parastrophia hemiplicata.

Camarella(?) costata Billings. Calciferous (Ord.).

Camarella? costata Billings, Pal. Fossils, I, 1865, p. 305, fig. 296.
Loc. Stanbridge, Quebec, Canada.

Camarella hemiplicata Billings=Parastrophia hemiplicata.

Camarella lenticularis Billings. Anticosti (Sil.).

Camarella lenticularis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 45.
Loc. Anticosti.

Camarella longirostris Billings. Chazy (Ord.).

Camarella longirostra Billings, Canadian Nat. Geol., IV, 1859, p. 302; p. 445, fig. 23;—Geol. Canada, 1863, p. 127, fig. 53.
Loc. Mingen Islands, Gulf of St. Lawrence.

Camarella minor Walcott=Protorhyncha minor.

Camarella ops Billings=Parastrophia ops.

Camarella owatonnensis Sardeson=Cyclospira bisulcata.

Camarella panderi Billings. Black River (Ord.).

Camarella panderi Billings, Canadian Nat. Geol., IV, 1859, p. 302;—Geol. Canada, 1863, p. 143, fig. 78.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 220, pl. 62, figs. 19–23.
Loc. Pauquettes Rapids, Canada; Curdsville, Kentucky.

Camarella parva Billings. Calciferous (Ord.).

Camarella parva Billings, Pal. Fossils, I, 1865, p. 219.
Camarella parva? Matthew, Trans. Royal Soc. Canada, XI, 1893, p. 103, pl. 7, fig. 9.
Loc. Table Head and Portland Creek, Newfoundland; near St. John, New Brunswick.

Camarella polita Billings. Calciferous (Ord.).
Camarella polita Billings, Pal. Fossils, I, 1865, p. 305, fig. 297 on p. 304.
Loc. Stanbridge, Quebec, Canada.

Camarella reversa Billings=Anastrophia reversa.

Camarella varians Billings. Calciferous-Chazy (Ord.).
Camarella varians Billings, Canadian Nat. Geol., IV, 1859, p. 445, fig. 24;—Geol. Canada, 1863, p. 127, fig. 52;—Pal. Fossils, I, 1865, p. 220.
Loc. Mingan Islands, Gulf of St. Lawrence; Table Head and Portland Creek, Newfoundland; Chazy, New York.

Camarella volborthi Billings. Black River (Ord.).
Camarella volborthi Billings, Canadian Nat. Geol., IV, 1859, p. 301;—Geol. Canada, 1863, p. 143, fig. 77.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 220, pl. 62, figs. 11–18; pl. 84, fig. 42.
Loc. Pauquettes Rapids, Ontario, Canada.

Camarium Hall=Merista.

Camarium elongatum Hall=Merista typus.

Camarium meeki Hall=Meristella meeki.

Camarium princeps Hall=Meristella princeps.

Camarium typus Hall=Merista typus.

CAMAROPHORELLA Hall and Clarke.
Genotype Pentamerus lenticularis White and Whitfield.
Camarophorella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 215;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 838.

Camarophorella lenticularis (White and Whitfield).
Burlington (L. Carb.).
Pentamerus lenticularis White and Whitfield, Jour. Boston Soc. Nat. Hist., VIII, 1862, p. 295.
Camarophorella lenticularis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 215, pl. 62, figs. 46–48.
Loc. Burlington, Iowa.

CAMAROPHORIA King. Genotype Terebratula schlotheimi von Buch.
Camarophoria King, Ann. Mag. Nat. Hist., XVIII, 1846, p. 89;—Mon. Permian Foss. England, Pal. Soc., 1850, p. 113.—Hall, Pal. New York, IV, 1867, p. 435.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 212;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 837.
Stenochisma Œhlert (non Conrad), Fischer's Manuel Conchyliologie, 1887, p. 1309.

Camarophoria(?) bisulcata Shumard. Upper Carboniferous.
Camarophoria(?) bisulcata Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 296, pl. 11, fig. 2.
Loc. Guadalupe Mountains of New Mexico and Texas.

Camarophoria caput-testudinis (White). Burlington (L. Carb.).
Rhynchonella caput-testudinis White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 23.
Camarophoria caput-testudinis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 215.
Loc. Burlington, Iowa.
Obs. Probably identical with C. ringens Swallow.

Camarophoria eucharis Hall=Camarospira eucharis.

Camarophoria explanata (McChesney). Kaskaskia (L. Carb.).
Rhynchonella explanata McChesney, Descriptions New Pal. Foss., 1860, p. 50;—Trans. Chicago Acad. Sci., I, 1868, p. 30, pl. 6, fig. 7.

Camarophoria(?) wortheni (Hall). Warsaw (L. Carb.).

Rhynchonella wortheni Hall, Trans. Albany Institute, IV, 1858, p. 11.

Camarophoria? wortheni Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 54, pl. 6, figs. 35-39.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 334, pl. 29, figs. 35-39.

Camarophoria wortheni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214.

Loc. Alton, Illinois.

CAMAROSPIRA Hall and Clarke.

Genotype Camarophoria eucharis Hall.

Camarospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 82;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 776.

Camarospira eucharis Hall. Corniferous (Dev.).

Camarophoria eucharis Hall, Pal. New York, IV, 1867, p. 368, pl. 57, figs. 40-45.

Camarospira eucharis Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 82, pl. 50, figs. 46-52.

Loc. Ontario, Canada; Cass County, Indiana.

CAMAROTŒCHIA Hall and Clarke.

Genotype Atrypa congregata Conrad.

Camarotœchia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 189;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 826.

Camarotœchia(?) acinus Hall. Niagara (Sil.).

Rhynchonella acinus Hall, Trans. Albany Institute, IV, 1863, p. 215;—Twenty-eighth Rep. New York State Mus. Nat. Hist, 1879, p. 163, pl. 26, figs. 7-11;—Eleventh Rep. State Geol. Indiana, 1882, p. 306, pl. 26, figs. 7-11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 73, pl. 26, figs. 6, 13, 14, and pl. 32, figs. 13-16.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 35, pl. 4, figs. 9-11.

Camarotœchia? acinus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Waldron, Indiana; Louisville, Kentucky.

Camarotœchia(?) acinus convexa (Foerste). Clinton (Sil.).

Rhynchonella acinus var. convexa Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 318, pl. 6, fig. 13;—Geol. Ohio, VII, 1895, p. 593, pl. 31, fig. 13.

Loc. Hanover, Indiana.

Camarotœchia æquiradiata Hall. Clinton (Sil.).

Atrypa equiradiata Hall, Pal. New York, II, 1852, p. 70, pl. 23, fig. 5.

Rhynchospira? equiradiata Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 77.

Rhynchonella æquiradiata Miller, N. American Geol. Pal., 1889, p. 367.

Camarotœchia æquiradiata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Protorhyncha æquiradiata Hall and Clarke, Ibidem, 1895, pl. 56, figs. 7-9.

Loc. Oneida County, New York; Arisaig, Nova Scotia.

Camarotœchia (Plethorhyncha) barrandei Hall. Oriskany (Dev.).

Rhynchonella barrandi Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 82, figs. 1-3; p. 84, fig. 4;—Pal. New York, III, 1859, p. 442, pl. 103, figs. 3-8.

Plethorhyncha barrandi Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 191.

Loc. Albany and Schoharie counties, New York.

Camarotœchia billingsi Hall. Corniferous (Dev.).

Rhynchonella thalia Billings (non d'Orbigny, 1847), Canadian Jour., V, 1860, p. 272, figs. 23-25;—Geol. Canada, 1863, p. 370, fig. 386.

Rhynchonella (Stenocisma) billingsi Hall, Pal. New York, IV, 1867, p. 336, pl. 54, figs. 9-13.

Camarotœchia billingsi Hall—Continued.
Camarotœchia billingsi Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 192, pl. 57, fig. 3.
Loc. New York; Columbus, Ohio; Ontario.

Camarotœchia carica Hall. Hamilton (Dev.).
Rhynchonella (Stenocisma) carica Hall, Pal. New York, IV, 1867, p. 344, pl. 54A, figs. 21-23.
Camarotœchia carica Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 192.
Loc. Hamilton, Madison County, New York.

Camarotœchia carolina Hall. Corniferous (Dev.).
Rhynchonella (Stenocisma) carolina Hall, Pal. New York, IV, 1867, p. 337, pl. 34, figs. 14-19.
Rhynchonella carolina Meek, Pal. Ohio, I, 1873, p. 196, pl. 18, fig. 8.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 75, pl. 13, figs. 1-3, 34, 35.
Camarotœchia carolina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 4-6.
Loc. Columbus and Sandusky, Ohio; Falls of Ohio.

Camarotœchia congregata (Conrad). Hamilton (Dev.).
Atrypa congregata Conrad, Fifth Ann. Rep. New York Geol. Survey, 1841, p. 55.
Rhynchonella (Stenocisma) congregata Hall, Pal. New York, IV, 1867, p. 341, pl. 54, figs. 44-59.
Camarotœchia congregata Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 15-27.
Loc. Fultonham, Summit, Onondaga, and Tinkers Falls, New York.

Camarotœchia contracta Hall. Portage-Waverly (Dev.-L. Carb.).
Atrypa contracta Hall, Geol. New York; Rep. Fourth Dist., 1843, tab. 66, figs. 2, 3.
Atrypa laticostata Hall (non Phillips), Ibidem, 1843, tab. 66, fig. 1.
Rhynchonella (Stenocisma) contracta Hall, Pal. New York, IV, 1867, p. 351, pl. 55, figs. 26-39.
Rhynchonella contracta Herrick, Bull. Denison Univ., III, 1887, p. 39, pl. 10, fig. 9;—Ibidem, IV, 1888, p. 23, pl. 11, fig. 21.
Camarotœchia contracta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 28-32, 49.
Loc. New York; Meadville and Bradford, Pennsylvania; Licking County, Ohio.

Camarotœchia contracta saxatilis (Hall). Hamilton (Dev.).
Rhynchonella (Stenocisma) saxatilis Hall, Pal. New York, IV, 1867, p. 417, pl. 54A, figs. 44-51.
Loc. Rockford, Iowa.

Camarotœchia dotis Hall. Marcellus and Hamilton (Dev.).
Rhynchonella (Stenocisma) dotis Hall, Pal. New York, IV, 1867, p. 344, pl. 54A, figs. 11-20.—Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 246, pl. 8, figs. 10, 12;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 33.
Camarotœchia dotis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 40, 41.
Loc. Geneseo and York, New York; Columbus, Ohio; Rio Maecuru and Rio Curua and Erere, Brazil.

Camarotœchia(?) duplicata Hall. Chemung (Dev.).
Atrypa duplicata Hall, Geol. New York; Rep. Fourth Dist., 1843, tab. 67, fig. 2.
Rhynchonella (Stenocisma) duplicata Hall, Pal. New York, IV, 1867, p. 350, pl. 55, figs. 17-25.

Camarotœchia (?) duplicata Hall—Continued.

Rhynchonella duplicata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 155, pl. 14, fig. 8.

Camarotœchia (?) duplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 36–39.

Loc. New York; Eureka district, Nevada.

Camarotœchia (Plethorhyncha) endlichi (Meek). ?Devonian.

Rhynchonella endlichi Meek, Bull. U. S. Geol. Survey Terr., 2d ser., 1, 1875, p. 46.—White, Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 133, pl. 36, fig. 2; pl. 33, fig. 4.

Loc. East of Animas River, Colorado.

Obs. This type of Rhynchonella occurs in eastern North America only in the Lower Devonian. It therefore seems probable that Meek's provisional reference to the Devonian is nearer correct than White's to the Lower Carboniferous.

Camarotœchia eximia Hall. Portage-Chemung (Dev.).

Atrypa eximia Hall, Geol. New York; Rep. Fourth Dist., 1843, tab. 66, fig. 4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 829, fig. 682.

Rhynchonella (Stenocisma) eximia Hall, Pal. New York, IV, 1867, p. 348, pl. 55, figs. 1–8.—Kindle, Bull. American Pal., 6, 1896, p. 36.

Camarotœchia eximia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 44, 45.

Loc. Ithaca, New York; Pennsylvania.

Camarotœchia fringilla (Billings). Anticosti (Sil.).

Rhynchonella fringilla Billings, Pal. Fossils, I, 1862, p. 141, fig. 118.

Camarotœchia fringilla Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190, pl. 56, figs. 28–30.

Loc. Anticosti.

Camarotœchia glacialis (Billings). Anticosti (Sil.).

Rhynchonella glacialis Billings, Pal. Fossils, I, 1862, p. 143, fig. 120.

Camarotœchia glacialis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 190.

Loc. Anticosti.

Camarotœchia horsfordi Hall. Marcellus and Hamilton (Dev.).

Rhynchonella horsfordi Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 87.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 152, pl. 14, fig. 3; pl. 15, fig. 6.

Rhynchonella (Stenocisma) horsfordi Hall, Pal. New York, IV, 1867, p. 339, pl. 54, figs. 24–32.

Camarotœchia horsfordi, Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 7–9.

Loc. Moscow, York, Geneseo, and Avon, New York; Eureka district, Nevada.

Camarotœchia(?) indianensis (Hall). Niagara (Sil.).

Rhynchonella indianensis Hall, Trans. Albany Institute, IV, 1863, p. 215;—Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 163, pl. 26, figs. 12–22;—Eleventh Rep. State Geol. Indiana, 1882, p. 306, pl. 26, figs. 12–22; pl. 27, figs. 4–6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 76, pl. 33, figs. 18–20.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 42, pl. 3, figs. 17–28.

Loc. Waldron, Indiana; Louisville, Kentucky.

Camarotœchia marshallensis (A. Winchell). Marshall (L. Carb.).

Rhynchonella marshallensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.—Herrick, Bull. Denison Univ, III, 1888, p. 40; IV, p. 23;—Geol. Ohio, VII, 1895, pl. 23, fig. 14.

Camarotœchia (Plethorhyncha) pleiopleura (Conrad)—Continued.

Plethorhyncha pliopleura Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 191.

Loc. Albany and Schoharie counties, New York; Indian Cove, Gaspé.

Camarotœchia prolifica Hall. Marcellus and Hamilton (Dev.).

Rhynchonella (Stenocisma) prolifica Hall, Pal. New York, IV, 1867, p. 343, pl. 54A, figs. 1–10.

Rhynchonella prolifica Tschernyschew, Mém. du Comité Géol. St. Petersburg, III, 1887, p. 89, pl. 14, fig. 6.

Camarotœchia prolifica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 42, 43.

Loc. Fultonham and Cooperstown, New York; Russia.

Camarotœchia sageriana (A. Winchell). Marshall (L. Carb.).

Rhynchonella sageriana A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407;—Ibidem, 1865, p. 122.—Herrick, Bull. Denison Univ., III, 1888, p. 39.

Camarotœchia sageriana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192.

Loc. Marshall, Michigan; Weymouth, Ashland, Sciotoville, and Newark, Ohio; Hickman County, Tennessee.

Camarotœchia sappho Hall. Marcellus-Waverly (Dev.-L. Carb.).

Rhynchonella sappho Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 87.—Herrick, Bull. Denison Univ., III, 1888, p. 40, pl. 5, fig. 1; pl. 7, fig. 25;—Geol. Ohio, VII, 1895, pl. 21, fig. 1.

Rhynchonella (Stenocisma) sappho Hall, Pal. New York, IV, 1867, p. 340, pl. 54, figs. 33–43; var. pl. 55, figs. 47–52.

Camarotœchia sappho Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 10–14.

Loc. Leroy, Geneseo, and York, New York; Licking County, Ohio.

Camarotœchia (Plethorhyncha) speciosa (Hall). Oriskany (Dev.).

Rhynchonella speciosa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 81;—Pal. New York, III, 1859, p. 444, pl. 103A, figs. 1–6.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 394, pl. 8, fig. 9.

Rhynchotrema speciosa Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 411.

Plethorhyncha speciosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 191, pl. 58, figs. 29–37.

Loc. Cumberland, Maryland; Jackson County, Illinois.

Camarotœchia stephani Hall. Portage and Chemung (Dev.).

Rhynchonella (Stenocisma) stephani Hall, Pal. New York, IV, 1867, p. 349, pl. 55, figs. 9–16.

Camarotœchia stephani Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192;—Ibidem, 1895, pl. 57, figs. 33–35.

Loc. Ithaca and Phillipsburg, New York; Bradford, Pennsylvania.

Camarotœchia tethys (Billings). Corniferous (Dev.).

Rhynchonella? tethys Billings, Canadian Jour., V, 1860, p. 270, figs. 20–22.

Rhynchonella tethys Billings, Geol. Canada, 1863, p. 370, fig. 387.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 152.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 83, pl. 13, figs. 25–33; pl. 31, figs. 22–25.

Rhynchonella (Stenocisma) tethys Hall, Pal. New York, IV, 1867, p. 335, pl. 54, figs. 1–8.

Camarotœchia tethys Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 192, pl. 57, figs. 1, 2.

Loc. County of Haldimand, Ontario; Stafford and Williamsville, New York; Columbus, Ohio; Falls of Ohio; Eureka district, Nevada.

Catazyga headi (Billings)—Continued.

Catazyga headi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 158, fig. 151; pl. 54, figs. 24–26, 30.

Loc. St. Lawrence River, opposite Three Rivers; near St. Nicholas, St. Croix, and Becancour River, Quebec, Canada; Waynesville, etc., Ohio; Richmond and Versailles, Indiana. According to Mr. Ami, also in the Utica slate at Ottawa, Canada.

Catazyga uphami (Winchell and Schuchert). Trenton (Ord.).

Zygospira uphami Winchell and Schuchert, American Geol., IX, 1892, p. 291;—Minnesota Geol. Survey, III, p. 468, pl. 34, figs. 45–48.

Loc. Near Spring Valley and Wykoff, Minnesota.

CENTRONELLA Billings. Genotype Rhynchonella glansfagea Hall.

Centronella Billings, Canadian Nat. Geol., IV, 1859, p. 131, figs. 1–5;—Canadian Jour., VI, 1861, p. 271.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 45, figs. 13–17;—American Jour. Sci., 2d ser., XXXV, 1863, p. 396.—Billings, Ibidem, XXXVI, 1863, p. 237.—Hall, Trans. Albany Institute, IV, 1863, pp. 134, 148.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 122.—Hall, Pal. New York, IV, 1867, p. 399.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 265;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 853.

Centronella(?) allei A. Winchell. Waverly (L. Carb.).

Centronella allii A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 123.

Cryptonella? allei Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290.

Loc. Burlington, Iowa; Hamburg, Illinois; Summit County, Ohio.

Centronella alveata Hall. Onondaga (Dev.).

Rhynchonella? alveata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 124.

Centronella hecate Billings, Canadian Jour., VI, (May) 1861, p. 272, fig. 99;—Geol. Canada, 1863, p. 374, fig. 403.—Hall, Pal. New York, IV, 1867, p. 420, pl. 61A, figs. 27–29.—Ibidem, VIII, Pt. II, 1895, pl. 79, fig. 15.

Centronella alveata Hall, Pal. New York, IV, 1867, p. 401, pl. 61A, figs. 22–24.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 268, pl. 79, figs. 22–24.

Loc. New York; Cayuga, Ontario.

Obs. See C. impressa Hall.

Centronella anna Hartt=Harttina anna.

Centronella(?) arcei A. Ulrich. Devonian.

Centronella? arcei Ulrich, N. Yahrb. f. Mineral., Beilageband, VIII, 1892, p. 53, pl. 5, figs. 5–9.

Loc. Icla, and near Pulquina, Bolivia.

Centronella billingsiana Meek and Worthen=Whitfieldella billingsiana.

Centronella(??) crassicardinalis Whitfield. Warsaw (L. Carb.).

Centronella crassicardinalis Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 55, pl. 6, figs. 50–52.—Hall, Twelfth Rep. State Geol. Indiana, XXIX, 1883, figs. 50–52.

Loc. Spergen Hill, Indiana.

Obs. This species is not well established and is based upon a single ventral valve. Compare with Athyris densa.

Centronella(?) flora A. Winchell. Waverly (L. Carb.).

Centronella? flora A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 254.

Loc. Sciotoville, Ohio.

Centronella glansfagea Hall. Oriskany-Corniferous (Dev.).

Rhynchonella glansfagea Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 125, figs. 1-6.

Centronella glansfagea Billings, Canadian Nat. Geol., IV, 1859, p. 132, figs. 1-5;—Canadian Jour., VI, 1861, p. 271, fig. 97;—Geol. Canada, 1863, p. 374, fig. 405.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, pp. 45-47;—Pal. New York, IV, 1867, p. 399, pl. 61A, figs. 1-21, 25, 26.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 153, pl. 31, figs. 14-17.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 268, fig. 180; 180; pl. 79, figs. 1-14, 17, 21.

Loc. Albany and Schoharie counties, New York; Cayuga, Ontario; Falls of Ohio; Michigan.

Obs. In the American Museum of Natural History this species is labeled Atrypa naviculoides Conrad. The writer has not been able to find this description. It may be one of Conrad's manuscript names.

Centronella glaucia Hall. Hamilton (Dev.).

Centronella glaucia Hall, Pal. New York, IV, 1867, p. 403, pl. 61A, figs. 39, 40.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 269.

Loc. Schoharie, New York.

Centronella hecate Billings=C. alveata.

Centronella impressa Hall. Hamilton (Dev.).

Centronella impressa Hall, Fourteenth Rep. New York State Cab. Nat. Hist., (July or August) 1861, p. 102;—Fifteenth Rep., Ibidem, 1862, pl. 3, figs. 1-5.—Billings, Canadian Nat. Geol., VII, 1862, p. 392.—Hall, Pal. New York, IV, 1867, p. 402, pl. 61A, figs. 30-38.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 269, pl. 79, figs. 16, 18-20.

Loc. Bellona, York, Pavilion, and Hamburg, New York.

Obs. Billings says this species is the same as C. hecate (=C. alveata).

Centronella julia A. Winchell=Romingerina julia.

Centronella margarida Derby=Trigeria margarida.

Centronella (?) navicella Hall. Chemung (Dev.).

Terebratula navicella Hall, Pal. New York, IV, 1867, p. 391, pl. 60, figs. 38-44.

Centronella (?) navicella Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 79, figs. 40-42.

Loc. Rockford, Iowa.

Centronella ovata Hall. Upper Helderberg (Dev.).

Centronella ovata Hall, Pal. New York, IV, 1867, p. 419, pl. 61A, figs. 47-49.

Loc. Cayuga, Ontario.

Centronella(?) silvetii A. Ulrich. Devonian.

Centronella silvetii A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 51, pl. 4, figs. 15a-15d.

Loc. Chahuarani, Bolivia.

Centronella tumida Billings. Oriskany and Corniferous (Dev.).

Centronella tumida Billings, Canadian Jour., VI, 1861, p. 272, fig. 98;—Geol. Canada, 1863, p. 374, fig. 404.

Loc. Cayuga and Port Colbourne, Ontario.

CHARIONELLA Billings. Genotype Atrypa scitula Hall.

Charionella Billings, Canadian Jour., VI, 1861, pp. 148, 274, figs. 101, 102.—Hall, Sixteenth Rep. New York State Cab. Nat Hist., 1863, p. 40;—American Jour. Sci., n. ser., XXXV, 1863, p. 396.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78;—Thirteenth Rep. New York State Geologist, 1895, p. 775.

Charionella circe Billings=C. scitula.
Charionella doris Billings=Meristella doris.
Charionella hyale Billings=Whitfieldella hyale.
Charionella rostrata Billings=Meristella rostrata.

Charionella scitula Hall. Corniferous (Dev.).

Atrypa scitula Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 171, fig. 1.
Athyris? scitula Billings, Canadian Jour., V, 1860, p. 278, figs. 35-38.
Charionella circe Billings, Ibidem, VI, 1861, p. 273, fig. 100;—Geol. Canada, 1863, p. 374, fig. 400.
Meristella scitula Hall, Pal. New York, IV, 1867, p. 302, pl. 47, figs. 34-38.
Meristella circe Miller, N. American Geol. Pal., 1889, p. 354.
Charionella scitula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78, pl. 42, figs. 17-19.
Loc. Williamsville and Clarence Hollow, New York; Columbus, Ohio (Whitfield); county of Haldimand, Ontario.

CHONETES Fischer de Waldheim. Genotype Orthis striatella Dalman.

Chonetes Fischer de Waldheim, Oryctographie du Gouvernement de Moscow, Pt. II, 1837, p. 134.—Hall, Pal. New York, II, 1852, p. 64.—Billings, Canadian Jour., VI, 1861, p. 349.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. Knowl., 172, 1864, p. 22.—Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 242;—Pal. New York, IV, 1867, p. 115.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 122.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1886, p. 66.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 303;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 292.

Chonetes acutiradiatus Hall. Corniferous (Dev.).

Strophomena acutiradiata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 171, fig. 3.
Chonetes acutiradiata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 117;—Pal. New York, IV, 1867, p. 120, pl. 20, fig. 5;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 8.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 66, pl. 18, figs. 18-20.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 8.
Loc. Williamsville, Stafford, etc., New York; Columbus, Ohio; Falls of Ohio.

Chonetes amazonicus Derby. Upper Carboniferous.

Chonetes amazonica Derby, Bull. Cornell Univ., I, 1874, p. 41, pl. 6, figs. 3, 12, 19; pl. 9, figs. 8, 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15B, fig. 13.
Loc. Itaituba, Brazil.

Chonetes antiope Billings. Lower Devonian.

Chonetes anitope Billings, Pal. Fossils, II, 1874, p. 19.
Loc. Mount Jolli and Percé, Nova Scotia.

Chonetes arcei A. Ulrich. Middle Devonian.

Chonetes arcei A. Ulrich, N. Jahrb. f. Mineral., Beilageband VIII, 1892, p. 77, pl. 4, figs. 35, 36.
Loc. Chahuarani, Icla, and Tarabuco, Bolivia.

Chonetes arcuatus Hall. Corniferous (Dev.).

Chonetes arcuata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 116;—Pal. New York, IV, 1867, p. 119, pl. 20, fig. 7;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 15, 35, 36.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 15, 35, 36.
Loc. Williamsville, Clarence Hollow, etc., New York; Columbus, Ohio.

Chonetes armata Norwood and Pratten (non Bouchard)=C. pusilus.

Chonetes canadensis Billings. Lower Devonian.

Chonetes canadensis Billings, Pal. Fossils, II, 1874, p. 17, fig. 7.

Loc. Percé, Nova Scotia.

Chonetes complanata Hall=Chonostrophia complanata.

Chonetes comstockei Rathbun. Middle Devonian.

Chonetes comstockii Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 250, pl. 9, figs. 5, 14, 18, 19, 31;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 18.

Loc. Province of Para, Brazil.

Chonetes cornutus (Hall). Clinton (Sil.).

Strophomena cornuta Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 73, fig. 3.

Chonetes cornuta de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 200, pl. 20, fig. 3.—Hall, Pal. New York, II, 1852, p. 64, pl. 21, fig. 10;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 1.

Loc. Wayne County, New York.

Chonetes coronatus (Conrad). Hamilton (Dev.).

Strophomena carinata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 13.

Strophomena syrtalis Conrad, Ibidem, 1842, p. 253, pl. 14, fig. 1.

Chonetes littoni Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 25, pl. 2, fig. 4.

Chonetes maclurea Norwood and Pratten, Ibidem, 1854, p. 28, pl. 2, fig. 8.

Chonetes tuomyi Norwood and Pratten, Ibidem, 1854, p. 28, pl. 2, fig. 9.

Chonetes martini Norwood and Pratten, Ibidem, 1854, p. 29, pl. 2, fig. 10.

Chonetes coronata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 146, figs. 1, 2;—Pal. New York, IV, 1867, p. 133, pl. 21, figs. 9-12.—Whitfield, Geol. Wisconsin, IV, 1882, p. 327, pl. 25, fig. 16.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 10, 11, 24, 26, 33, 39, 41, 43.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 10, 11, 24, 26, 33, 39, 41, 43.

Loc. New York; Pennsylvania; near Arkona, Ontario; Bakeoven, Illinois; Milwaukee, Wisconsin.

Obs. In the Illinois State collection there are specimens of C. maclurea and C. littoni which are not specifically distinct from C. coronatus Conrad. In the American Museum of Natural History the writer has seen specimens of C. tuomyi and C. martini labeled as varieties of C. coronatus.

Chonetes curuaensis Rathbun. Middle Devonian.

Chonetes curuaensis Rathbun, Proc. Boston Soc. Nat. Sci., XX, 1879, p. 21.

Loc. Province of Para, Brazil.

Chonetes dawsoni Billings=Chonostrophia dawsoni.

Chonetes deflecta Hall=C. vicinus.

Chonetes emmetensis A. Winchell. Hamilton (Dev.).

Chonetes emmetensis A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 92.

Loc. Grand Traverse Region, Michigan.

Chonetes falklandicus Morris and Sharpe. Lower Devonian.

Chonetes falklandica Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 274, pl. 10, fig. 4.—De Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 204, pl. 20, fig. 4.—Von Ammon, Zeits. d. Gessels. für Erdk., Berlin, XXVIII, 1893, p. 360, fig. 5.

Loc. Falkland Islands; Taquarassu, Matto Grosso, Brazil.

Chonetes filistriatus Walcott. Lower Devonian.

Chonetes filistriata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 127, pl. 13, fig. 15.

Loc. Eureka district, Nevada.

Chonetes fischeri Hall=Chonopectus fischeri.

Chonetes flemingi Norwood and Pratten=C. variolatus.

Chonetes freitassii Rathbun. Middle Devonian.

Chonetes species Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 253.

Chonetes freitassii Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 18.

Loc. Province of Para, Brazil.

Chonetes geinitziana Waagen, and Miller=C. glaber.

Chonetes geniculatus White. Kinderhook (L. Carb.).

Chonetes geniculata White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 116;—Proc. American Phil. Soc., XI, 1870, p. 250.

Chonetes geniculatus Keyes, Geol. Survey Missouri, V, 1895, p. 53, pl. 38, fig. 3.

Loc. Hamburg, Illinois; Clarksville, Missouri; Rockford, Indiana; Rockville, Ohio.

Obs. Compare with C. ornatus Shumard.

Chonetes gibbosa Hall=C. vicinus.

Chonetes glabra Hall (non Geinitz)=C. lineatus.

Chonetes glaber Geinitz. Upper Carboniferous.

Chonetes glabra Geinitz, Carbon u. Dyas in Nebraska, 1866, p. 60, pl. 4, figs. 15-18.—Toula, Sitzb. der Kais. Akad. der Wissensch., Wien, LIX, 1869, p. 10.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 171, pl. 4, fig. 10; pl. 8, fig. 8.—Derby, Bull. Cornell Univ., 1, 1874, p. 43, pl. 8, figs. 11, 14, 15, 19;—Bull. Mus. Comp. Zool., III, 1876, p. 280.

Chonetes geinitziana Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 621.

Chonetes lævis Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 229, pl. 12, fig. 3;—Geol. Survey Missouri, V, 1895, p. 55, pl. 37, fig. 5.

Chonetes geinitzianus Miller, N. American Geol. Pal., 1889, p. 339.

Loc. Nebraska City, Nebraska; Kansas; Iowa; Illinois; Bomjardim and Itaituba, Brazil; Yampopata and Cochabamba, Bolivia.

Chonetes granulifer Owen. Upper Carboniferous.

Chonetes granulifera Owen, Geol. Rep. Iowa, Wisconsin, Minnesota, 1852, p. 583, pl. 5, fig. 12.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 24.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 170, pl. 4, fig. 9; pl. 6, fig. 10; pl. 8, fig. 7.—White, Wheeler's Geogr. Geol. Survey west 100 Merid., 1875, p. 122, pl. 9, fig. 8.—Keyes, Geol. Survey Missouri, V, 1895, p. 56.

Chonetes smithii Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 24, pl. 2, fig. 2.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 570, pl. 25, fig. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15B, fig. 12.

Chonetes mucronata Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1858, p. 262;—Pal. Upper Missouri, Smithsonian Cont. to Knowl., 172, 1864, p. 22, pl. 1, fig. 5.—Geinitz, Carbon u. Dyas in Nebraska, 1866, p. 58, pl. 4, figs. 12-14.—Toula, Sitzungsb. der Kais. Akad. der Wissensch., Wein, LIX, 1869, p. 10.

Chonetes granuliferus Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 357, pl. 17, fig. 15.

Loc. Mouth of Keg Creek, Iowa; Illinois; Kansas; Missouri; Alabama; Kanab Canyon, Arizona; Cochabamba, Bolivia.

Chonetes hemisphericus Hall. Upper Helderberg (Dev.).

Chonetes hemispherica Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 116, figs. 1-3.—Billings, Canadian Jour., VI, 1861, p. 349, figs. 121-123; Geol. Canada, 1863, p. 368, fig. 380.—Hall, Pal. New York, IV, 1867, p. 118, pl. 20, fig. 6.—Nicholson, Pal. Prov. Ontario, 1873, p. 75.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 123.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 14.

Loc. Schoharie, etc., New York; Eureka district, Nevada; Ontario, Canada.

Chonetes herbert-smithi Rathbun. Middle Devonian.

Chonetes herbert-smithi (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 251, pl. 10, figs. 39-42, 44-47;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 20.

Loc. Province of Para, Brazil.

Chonetes illinoisensis Worthen. Burlington (L. Carb.).

Chonetes logani Hall (non N. and P.), Geol. Survey Iowa, I, Pt. II, 1858, p. 598, pl. 12, figs. 1, 2.

Chonetes illinoiensis Worthen, Trans. St. Louis Acad. Sci., I, 1860, p. 571.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 5;—Ibidem, 1865, p. 116.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 505, pl. 15, fig. 8.—Herrick, Bull. Denison Univ., III, 1888, p. 35, pl. 3, fig. 21.

Loc. Burlington, Iowa; Jersey County, Illinois; Rockford, Indiana; Licking County, Ohio.

Chonetes iowensis Owen=Pholidostrophia iowensis.

Chonetes koninckianus Norwood and Pratten. Middle Devonian.

Chonetes koninckiana Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 30, pl. 2, fig. 11.

Loc. Jonesboro, Union County, Illinois.

Chonetes lævis Keyes=C. glaber Geinitz.

Chonetes laticosta Hall=C. mucronatus.

Chonetes lepidus Hall. Marcellus-Chemung (Dev.).

Chonetes lepida Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 148;—Pal. New York, IV, 1867, p. 142, pl. 22, figs. 12, 13.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, pp. 24, 32.

Loc. Cayuga Lake, etc., New York; Meadville, Pennsylvania.

Chonetes lineatus (Conrad). Corniferous (Dev.).

Strophomea lineata Conrad, Third Ann. Rep. Geol. Survey New York, 1839, p. 64.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 139, fig. 6 (should be 5a).—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 175, fig. 8.

Chonetes glabra Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 117, figs. 1-8.

Chonetes lineata Hall, Pal. New York, IV, 1867, p. 121, pl. 20, fig. 3;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 34.

Loc. Cayuga Lake, etc., New York.

Chonetes littoni Norwood and Pratten=C. coronatus.

Chonetes logani Hall (non Nor. and Prat.)=C. illinoisensis.

Chonetes logani Norwood and Pratten. Kinderhook-Burlington (L. Carb.).

Chonetes logani Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 30, pl. 2, fig. 12.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 116.—Hall, Pal. New York, IV, 1867, pl. 22, figs. 23, 26-28;—Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 25.—Herrick, Bull. Denison Univ., III, 1888, p. 35, pl. 3, fig. 12; pl. 7, fig. 22.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 25.

Loc. Burlington, Iowa; Quincy, Illinois; Licking County, Ohio.

Chonetes logani aurora Hall. Tully-Burlington (Dev.-L. Carb.).

Chonetes logani var. aurora Hall, Pal. New York, IV, 1867, p. 137, pl. 22, figs. 16-18;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 9, 18.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 215, pl. 29, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 9, 18.

Chonetes aurora Williams, Bull. Geol. Soc. America, I, 1890, p. 491, pl. 12, figs. 10, 11.

Loc. Tully and Deruyter, New York; Athabasca, Mackenzie, and Red Deer rivers, Northwest Territory, Canada; Cuyahoga and Licking counties, Ohio; Burlington, Iowa.

Chonetes loganensis Hall and Whitfield. Kinderhook (L. Carb.).

Chonetes loganensis Hall and Whitfield, King's Geol. Expl. 40th Paral., IV, 1877, p. 253, pl. 4, fig. 9.

Loc. Logan Canyon, Wahsatch Range, Utah.

Chonetes maclurea Norwood and Pratten=C. coronatus.

Chonetes macrostriata Walcott=Stropheodonta macrostriata.

Chonetes manitobensis Whiteaves. Upper Devonian.

Chonetes manitobensis Whiteaves, Cont. to Canadian Pal., I, 1892, p. 281, pl. 37, figs. 1, 2.

Loc. Manitoba Island, Lake Manitoba, Canada.

Chonetes martini Norwood and Pratten=C. coronatus.

Chonetes melonicus Billings. Oriskany (Dev.).

Chonetes melonica Billings, Pal. Fossils, II, 1874, p. 15, fig. 6.

Loc. Little Gaspé, Quebec, Canada.

Chonetes mesolobus Norwood and Pratten. Upper Carboniferous.

Chonetes mesoloba Nor. and Prat., Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 27, pl. 2, fig. 7.—White, Wheeler's Geogr. Geol. Expl. Survey west 100 Merid., 1875, p. 123, pl. 9, fig. 7.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 47, fig. 22.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 228.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 22.

Loc. Belleville, Illinois; Charboniere, Missouri; Flint Ridge, Ohio; New Mexico; Arizona.

Chonetes michiganensis Stevens. Upper Carboniferous.

Chonetes michiganensis Stevens, American Jour. Sci., 2d ser., XXV, 1858, p. 263.

Loc. Battle Creek, Michigan.

Chonetes millipunctata Meek and Worthen=Aulacorhynchus millipunctatum.

Chonetes minima Hall (non Sowerby)=C. undulatus.

Chonetes mucronata Meek and Hayden (non Hall)=C. granulifer.

Chonetes mucronatus Hall. Oriskany-Hamilton (Dev.).

Strophomena mucronata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 180, fig. 3.

Chonetes laticosta Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 119.—Billings, Pal. Fossils, II, 1874, p. 20.

Chonetes mucronata Hall, Pal. New York, IV, 1867, p. 124, pl. 20, fig. 1; pl. 21, fig. 1.—Nicholson, Pal. Prov. Ontario, 1873, p. 74.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 6, 7.

Chonetes mucronata? Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 124.

Loc. New York; Cayuga, Ontario; Gaspé; Eureka district, Nevada.

Obs. See C. stübeli.

Chonetes multicosta A. Winchell. Kinderhook and Burlington (L. Carb.).
Chonetes multicosta A Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 5;—Proc. American Phil. Soc., XII, 1870, p. 250.
Loc. Burlington, Iowa; Hickman and Maury counties, Tennessee.

Chonetes muricata Hall=Strophalosia muricata.

Chonetes nana Norwood and Pratten (non de Verneuil)=C. yandellanus.

Chonetes novascoticus Hall. Arisaig and Niagara (Sil.).
Chonetes novascotica Hall, Canadian Nat. Geol., V, 1860, p. 144, fig. 2.—Dawson, Acadian Geol., 3d ed., 1878, p. 595, fig. 199.—Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 155, pl. 22, figs. 11–14;—Eleventh Rep. State Geol. Indiana, 1882, p. 293, pl. 22, figs. 11–14.
Loc. Arisaig, Nova Scotia; Waldron, Indiana.

Chonetes onettianus Rathbun. Middle Devonian.
Chonetes onettiana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 253, pl. 10, figs. 43, 48.
Loc. Province of Para, Brazil.

Chonetes ornatus Shumard. Chouteau (L. Carb.).
Chonetes ornata Shumard, Geol. Rep. Missouri, 1855, p. 202, Pl. C, fig. 1.—Keyes, Geol. Survey Missouri, V, 1895, p. 53, pl. 38, fig. 2.
Loc. Louisiana and Hannibal, Missouri.
Obs. See C. geniculatus White.

Chonetes parvus Shumard. Upper Carboniferous.
Chonetes parva Shumard, Geol. Rep. Missouri, 1855, p. 201.
Loc. Boone County, Missouri.
Obs. Keyes says this species is a synonym for C. flemingi=C. variolatus.

Chonetes permianus Shumard. Upper Carboniferous.
Chonetes permiana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 390.
Loc. Mouth of Delaware Creek, Texas.

Chonetes planumbonus Meek and Worthen. Keokuk (L. Carb.).
Chonetes planumbona Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 450;—Geol. Survey Illinois, II, 1866, p. 253, pl. 18, fig. 1.
Loc. Monroe County, Illinois; Crawfordsville, Indiana; Kings Mountain, Kentucky.

Chonetes platynotus White. Upper Carboniferous.
Chonetes platynota White, Wheeler's Geogr. Geol. Expl. Survey west 100 Merid., Prel. Rep., 1874, p. 19;—Ibidem, Final Rep., IV, 1875, p. 121, pl. 9, fig. 6.
Loc. Santa Fe, New Mexico; near Salt Lake, Utah.

Chonetes pulchellus A. Winchell. Waverly (L. Carb.).
Chonetes pulchella A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 410;—Ibidem, 1865, p. 115;—Proc. American Phil. Soc., XII, 1870, p. 250.—Herrick, Bull. Denison Univ., III, 1888, p. 37, pl. 3, fig. 14.
Loc. Moscow, Hillsdale County, Michigan; Trumbull, Summit, and Licking counties, Ohio; Shafers, Pennsylvania; Hickman County, Tennessee.

Chonetes punctatus Simpson. Lower Helderberg (Dev.).
Chonetes punctata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 438, fig. 3.
Loc. Hazardville, Carbon County, Pennsylvania.

Chonetes pusillus Hall. Hamilton (Dev.).
Chonetes armata Norwood and Pratten (non Bouchard), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 28.

Chonetes pusillus Hall—Continued.

Chonetes pusilla Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 149;—Pal. New York, IV, 1867, p. 128, pl. 21, fig. 6.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 93, pl. 13, fig. 2.

Loc. Bakeoven, Illinois; Fort Resolution, Great Slave Lake, British America.

Obs. In the Illinois State collection there is a specimen of C. armatus N. and P. with an old label attached. This specimen is identical with C. pusillus Hall.

Chonetes reversa Whitfield=Chonostrophia reversa.

Chonetes rücki A. Ulrich. Middle Devonian.

Chonetes rücki A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 79, pl. 5, figs. 1, 2.

Loc. Chahuarani, Icla, and Tarabuco, Bolivia.

Chonetes sarcinulatus Norwood and Pratten.

Chonetes sarcinulata Norwood and Pratten (non Schlotheim), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 28.

Obs. It is impossible to point out the American representative intended by these authors for this species.

Chonetes scitulus Hall. Marcellus-Chemung (Dev.).

Chonetes scitula Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 147;—Pal. New York, IV, 1867, p. 130, pl. 21, fig. 4;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 3, 4, 27, 32, 40, 44.—Herrick, Bull. Denison Univ., III, 1888, p. 36, pl. 1, fig. 4.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 548, pl. 11, fig. 10.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 3, 4, 27, 32, 40, 44.—Whitfield, Geol. Ohio, VII, 1895, p. 443, pl. 7, fig. 10.—Kindle, Bull. American Pal., 6, 1896, p. 37.

Chonetes scitulus Beecher, American Jour. Sci., XLI, 1891, p. 357, pl. 17, fig. 14.

Loc. Moscow, Hamburg, etc., New York; Meadville, Pennsylvania; Delaware and Licking counties, Ohio.

Chonetes setigerus (Hall). Marcellus-Waverly (Dev.-L. Carb.).

Strophomena setigera Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 180, fig. 2; p. 222, fig. 3.

Chonetes setigera de Koninck, Recher. Animaux Foss., I, 1847, p. 215, pl. 20, fig. 7.—Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 150;—Pal. New York, IV, 1867, p. 129, pl. 21, fig. 2; p. 142, pl. 22, figs. 1-5;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 2, 5, 19.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 125.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 24.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 2, 5, 19.

Chonetes setigera? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 411.

Loc. New York; Meadville, Pennsylvania; Ohio; Union City, Branch County, Michigan; Eureka district, Nevada.

Chonetes shumardianus de Koninck. Keokuk (L. Carb.).

Chonetes shumardiana de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 192, pl. 20, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 24.

Loc. The Knobs, Jefferson County, Kentucky.

Chonetes smithii Norwood and Pratten=C. granulifer.

Chonetes striatellus (Dalman). Silurian.

Orthis striatella Dalman, Kgl. Svens. Vetens.-Akad. Handl., 1828, p. 111, pl. 1, fig. 5.

Chonetes striatella Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 595.

Loc. Europe; Cape Louis Napoleon, lat. 79° 38′.

Chonetes stübeli A. Ulrich. Middle Devonian.

Chonetes stübeli A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 80, pl. 5, figs. 3, 4.

Loc. Rio Sicasica, Bolivia.

Obs. Probably the same as C. mucronatus.

Chonetes subquadratus Nettelroth. Hamilton (Dev.).

Chonetes subquadrata Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 67.

Loc. Falls of Ohio.

Chonetes tenuistriatus Hall. Arisaig (Sil.).

Chonetes tenuistriata Hall, Canadian Nat. Geol., V, 1860, p. 145, fig. 3.—Dawson, Acadian Geol., 3d ed., 1878, p. 596, fig. 200.

Loc. East River, Nova Scotia.

Chonetes tumidus Herrick. Waverly (L. Carb.).

Chonetes tumidus Herrick, Bull. Denison Univ., III, 1888, p. 36, pl. 2, fig. 21.

Loc. Moots Run, Licking County, Ohio.

Chonetes tuomyi Norwood and Pratten=C. coronatus.

Chonetes undulatus Hall. Niagara (Sil.).

Chonetes minima Hall (non Sowerby), Twenty-eighth Rep. New York State Mus. Nat. Hist., Doc. ed., 1876, pl. 22, fig. 15.

Chonetes undulata Hall, Ibidem, 1879, p. 155, pl. 22, fig. 15;—Eleventh Rep. State Geol. Indiana, 1882, p. 294, pl. 22, fig. 15.

Loc. Waldron, Indiana.

Chonetes variolatus (d'Orbigny). Upper Carboniferous.

Leptæna variolata d'Orbigny, Voyage dans l'Amérique Meridionale; Paléontologie, 1842, p. 49.

Productus variolata d'Orbigny, Ibidem, 1842, pl. 4, figs. 10, 11.

Chonetes variolata de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 206, pl. 20, fig. 2.—Hall, Stansbury's Expl. Great Salt Lake, 1852, p. 410, pl. 3, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 28.

Chonetes flemingi Norwood and Pratten, Ibidem, 1854, p. 26, pl. 2, fig. 5.—Geinitz, Carbon u. Dyas in Nebraska, 1866, p. 59.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15B, fig. 11.—Keyes, Geol. Survey Missouri, V, 1895, p. 54, pl. 38, fig. 6.

Loc. Yarbichambi, Bolivia; Guernsey, etc., Ohio; Illinois; Missouri; Kansas; Nebraska.

Obs. Compare with C. parvus.

Chonetes verneuilianus Norwood and Pratten. Upper Carboniferous.

Chonetes verneuiliana Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 26, pl. 2, fig. 6.—Newberry, Ives' Rep. Colorado River of the West, 1861, p. 128.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 170, pl. 1, fig. 10.—Hall, Second Rep. New York State Geol., 1883, pl. 47, figs. 20, 21.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 128, pl. 25, figs. 7, 8.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, figs. 20, 21.

Loc. Carboniere, Missouri; Indiana; Illinois; Missouri; Kansas; Nebraska; banks of Colorado River.

Chonetes verneuilianus utahensis Meek. Upper Carboniferous.

Chonetes verneuiliana var. utahensis Meek, Simpson's Rep. Expl. Great Basin, Ter. Utah, 1876, p. 348, pl. 2, fig. 2.

Loc. Near Humboldt Mountains, Utah.

Chonetes vicinus (Castelnau). Hamilton (Dev.).

Leptæna vicina Castelnau, Systeme Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 14, fig. 9.

Chonetes vicina de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 203.

Chonetes deflecta Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 149;—Pal. New York, IV, 1867, p. 126, pl. 21, figs. 7, 8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 47, fig. 28.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 24, pl. 2, fig. 8.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 16, fig. 28.

Chonetes gibbosa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 145.

Loc. Ontario County, New York; Columbus, Ohio; Wisconsin; Eureka district, Nevada.

Obs. Castelnau's specimens are from "Ontario County, New York." His figures are good and can not be compared with any other species than the well-known C. deflectus Hall, a species occurring abundantly in Ontario County.

Chonetes yandellanus Hall. Corniferous (Dev.).

Chonetes nana de Koninck (non de Verneuil), Recher. Animaux Foss., Pt. I, 1847, p. 213.—Norwood and Pratten (non de Verneuil), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 28.

Chonetes yandellana Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 118;—Pal. New York, IV, 1867, p. 123, pl. 20, fig. 4.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 68, pl. 17, figs. 16–19; pl. 31, figs. 20, 30.

Loc. Falls of Ohio; Columbus, Ohio.

CHONOPECTUS Hall and Clarke. Genotype Chonetes fischeri N. and P.

Chonopectus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 312;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 295.

Chonopectus fischeri (Norwood and Pratten).
Kinderhook and Burlington (L. Carb.).

Chonetes fischeri Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 25, pl. 2, fig. 3.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 517, pl. 7, fig. 1;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 17, 31.

Chonopectus fischeri Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 312, pl. 15B, figs. 20–23; pl. 16, figs. 17, 31.

Loc. Burlington, Iowa; Warren, Pennsylvania.

CHONOSTROPHIA Hall and Clarke.
Genotype Chonetes reversa Whitfield.

Chonostrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 310;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 294.

Chonostrophia complanata Hall. Oriskany (Dev.).

Chonetes complanata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 56;—Pal. New York, III, 1859, p. 418, pl. 93, fig. 1;—Second Ann. Rep. New York State Geol., 1883, pl. 47, figs. 13, 29.

Chonostrophia complanata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 311, pl. 16, figs. 13, 29.

? Strophomena sp. A, A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 70, pl. 14, fig. 24 (? 23).

Loc. Albany and Schoharie counties, New York; Cayuga, Ontario; Cumberland, Maryland; ? Bolivia.

Chonostrophia dawsoni (Billings). Lower Devonian.

Chonetes dawsoni Billings, Pal. Fossils, II, 1874, p. 18, fig. 8.

Chonostrophia dawsoni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 311.

Loc. Gaspé and Percé, Quebec, Canada.

Cleiothyris hirsuta Hall—Continued.

Cliothyris hirsuta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 46, figs. 25–28.

Loc. Spergen Hill, Indiana; Alton and Chester, Illinois; Princeton, Kentucky; Montana.

Cleiothyris missouriensis (Swallow). Upper Carboniferous.

Spirigera missouriensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 650.

Loc. Montgomery and Chariton counties, Missouri.

Cleiothyris obmaxima (McChesney). Keokuk (L. Carb.).

Athyris obmaxima McChesney, Descriptions New Pal. Foss., 1861, p. 80.

?Spirigera obmaxima White, Wheeler's Expl. Survey west 100 Merid., IV, 1875, p. 92, pl. 5, fig. 12.

Loc. Nauvoo and Warsaw, Illinois; Keokuk, Iowa; Mountain Spring, Nevada; Ophir City, Utah.

Obs. The specimen figured by White may be Athyris incrassata Hall.

Cleiothyris obvia (McChesney). Kaskaskia (L. Carb).

Athyris obvia McChesney, Descriptions New Pal. Foss., 1861, p. 81.

Loc. Kaskaskia, Illinois.

Obs. Probably a synonym for C. roissyi.

Cleiothyris orbicularis (McChesney). Upper Carboniferous.

Athyris orbicularis McChesney, Descriptions New Pal. Foss., 1860, p. 47.

Loc. "Extensively distributed in the Western States."

Obs. Specimens of this species in the United States National Museum donated by Professor Worthen show it to be a Cleiothyris.

Cleiothyris reflexa (Swallow). Warsaw (L. Carb.).

Spirigera reflexa Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 88.

Loc. Barretts Station, St. Louis County, Missouri.

Obs. Should be compared with C. roissyi. Regarded by Keyes as a synonym for Seminula trinuclea. Swallow's species, however, does not appear to be a Seminula.

Cleiothyris roissyi (L'Éveillé). Keokuk-Kaskaskia (L. Carb.).

Spirifer de roissyi L'Éveillé, Mémoires Soc. Géol. de France, II, 1835, p. 39, pl. 2, figs. 18–20.

Terebratula royssii Marcou, Geol. North America, 1858, p. 51, pl. 6, fig. 10.

Athyris sublamellosa Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 702, pl. 27, fig. 1.—Derby, Bull. Cornell Univ., I, 1874, p. 10, pl. 2, figs. 9–12; pl. 3, figs. 15–21, 29; pl. 6, fig. 16; pl. 9, figs. 5, 6.

Athyris parvirostris Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 451.

Spirigera americana Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 89.

Spirigera pectinifera Swallow (non Sowerby), Ibidem, 1863, p. 88.

Athyris planosulcata Geinitz (non Phillips), Carbon u. Dyas in Nebraska, 1866, p. 42.—Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 254, pl. 18, fig. 8.

Spirigera planosulcata? White, Wheeler's Rep. Geogr. Geol. Expl. Survey west 100 Merid., IV, 1875, p. 143, pl. 10, fig. 5.

Athyris planosulcata? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 257, pl. 4, figs. 10, 11.

?Athyris roissyi Meek, Ibidem, 1877, p. 82, pl. 9, fig. 3.

Athyris hirsuta Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 222, pl. 18, fig. 5.

Cliothyris roysii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 91, pl. 46, figs. 23, 24; pl. 84, fig. 32.

Cleiothyris roissyi (L'Éveillé).—Continued.

Cliothyris sublamellosa Hall and Clarke, Ibidem, 1893, p. 91.

Loc. Europe; Mississippi Valley; White Pine and Eureka districts, Nevada; Salt Lake City, etc., Utah; Lake Valley mining district, etc., New Mexico; Lake County, Colorado; Guatemala; Bomjardin and Itaituba, Brazil.

Obs. American specimens usually referred to this species are constantly smaller and are often without sinus or fold. If these differences are regarded as of sufficient importance to distinguish American specimens from typical C. roissyi then this species will be known as C. sublamellosa Hall. Of Spirigera americana Swallow, authentic specimens have been seen by the writer in Professor Hall's collection. These are identical with Athyris sublamellosa.

Meek's Athyris roissyi (1877) will probably prove to be a new species of Seminula.

See C. clintonensis, C. reflexa Swallow, and C. obvia McChesney.

Cleiothyris squamosa (Worthen). St. Louis (L. Carb.).

Athyris squamosa Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 24;—Geol. Survey Illinois, VIII, 1890, p. 103, pl. 11, fig. 2.

Loc. Monroe County, Illinois.

CLINTONELLA Hall and Clarke.
Genotype C. vagabunda Hall and Clarke.

Clintonella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 159;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 814.

Clintonella vagabunda Hall and Clarke. Clinton (Sil.).

Clintonella vagabunda Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 160, pl. 52, figs. 1–11.

Loc. ?Orleans County, New York.

CLITAMBONITES Pander. Genotype Pronites adscendens Pander.

Klitambonites Pander, Beitrage zur Geognosie des Russischen Reiches, 1830, p. 70, pl. 3, fig. 14; pl. 28, figs. 16, 17.

Clitambonites Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1289, fig. 1059.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 233.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 377.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 274.

Clitambonites adscendens (? Pander). Ordovician.

Orthisina adscendens (Pander) Kayser, Paleontographica, Suppl., III, 1876, p. 20, pl. 2, figs. 9–11.

Loc. Europe; Juan Pobre and Laja, Cordillere San Juan, Argentine Republic.

Obs. This identification is probably erroneous.

Clitambonites(?) borealis (Castelnau).
"Magnesian limestone" = ? Galena (Ord.).

Terebratula borealis Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 40, pl. 14, fig. 14.

Terebratula turpis de Verneuil, Ibidem, 1843, p. 40, footnote.

Loc. "Magnesian limestone of Green Bay, Wisconsin."

Obs. The figure is not satisfactory. The species seems to be related to C. diversus Shaler.

Clitambonites diversus (Shaler). Trenton-Lorraine (Ord.).

Orthisina diversa Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 67.

Orthisina veneuili Billings (non Eichwald), Catalogue Sil. Foss. Anticosti, 1866, pp. 43, 74.

Hemipronites americanus Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 72;—Geol. Wisconsin, IV, 1882, p. 243, pl. 10, figs. 15–17.

Clitambonites diversus (Shaler)—Continued.

Streptorhynchus americanus Miller, N. American Geol. Pal., 1889, p. 378.

Clitambonites americanus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 239, pl. 15A, figs. 1-8.

Clitambonites diversa Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 378, pl. 30, figs. 11-17.—Whiteaves, Pal. Fos., III, Pt. III, 1897, p. 166.

Loc. Anticosti; Cannon Falls, Kenyon, etc., Minnesota; Oshkosh, Wisconsin; Ottawa and Lake Winnipeg, Canada.

Obs. See C. borealis.

Clitambonites diversus altissimus Winchell and Schuchert. Trenton (Ord.).

Clitambonites americanus var. Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, figs. 7, 8.

Clitambonites diversa var. altissima Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 381, pl. 30, figs 18, 19.

Loc. Near Cannon Falls, Minnesota.

Clitambonites (?) johannensis Matthew. Upper Cambrian.

Orthisina johannensis Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 49, pl. 12, figs. 13a-13c.

Loc. Near St. John, New Brunswick.

Clitambonites planus retroflexus (de Verneuil). Lower Ordovician.

Gonambonites plana var. retroflexa de Verneuil, Beitrage zur Geognosie des Russischen Reiches, 1830, p. 77, pl. 25, figs. 1, 2.

Clitambonites (Gonambonites) plana var. retroflexa Matthew, Trans. Roy. Soc. Canada, 2d ser., I, 1896, p. 266, pl. 2, figs. 1a-1c.

Loc. Mc. Feei, Cape Breton, Nova Scotia.

CLORINDA Barrande. Genotype C. armata Barrande.

Clorinda Barrande, Système Silurien Bohème, V, 1879.

Barrandella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 241, 243;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 844.

Clorinda arcuosa (McChesney). Niagara (Sil.).

Pentamerus arcuosus McChesney, Descriptions New Pal. Foss., 1861, p. 87.

Loc. Milwaukee, Wisconsin.

Clorinda areyi (Hall and Clarke). Clinton (Sil.).

Barrandella areyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 242, 368, pl. 71, figs. 14-16.

Loc. Rochester, New York.

Clorinda barrandei (Billings). Anticosti (Sil.).

Pentamerus barrandi Billings, Geol. Survey Canada; Rep. Progress for 1856, 1857, p. 296;—Geol. Canada, 1863, p. 316, fig. 327.

Barrandella barrandii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 243, fig. 174; pl. 71, figs. 17-20.

Loc. Anticosti.

Clorinda fornicata (Hall). Clinton and Niagara (Sil.).

Pentamerus fornicatus Hall, Pal. New York, II, 1852, p. 81, pl. 24, fig. 7.

Pentamerus fornicatus var. Hall, Descrip. n. sp. Fossils, Waldron, Indiana, 1879, p. 16;—Eleventh Rep. State Geol. Indiana, 1882, p. 299, pl. 27, fig. 15;—Trans. Albany Institute, X, 1883, p. 72.

Barrandella fornicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 243, pl. 70, figs. 11-13.

Loc. Lockport, New York; Waldron, Indiana; Wisconsin.

Conchidium decussatum (Whiteaves). Silurian.

Pentamerus decussatus Whiteaves, Canadian Record of Science, 1891, p. 295, pl. 3, figs. 3, 4.—Calvin, Bull. Lab. Nat. Hist. State Univ. Iowa, XI, 1892, p. 164, pl. 11, figs. 1–3; pl. 12, fig. 2.

Conchidium decussatum Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 65, figs. 1, 2; pl. 66, fig. 15.

Loc. Grand Rapids of the Saskatchewan, etc., Canada.

Conchidium exponeum Hall and Clarke. Niagara (Sil.).

Conchidium exponeus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 66, figs. 6–9.

Loc. Louisville, Kentucky.

Conchidium georgiæ Hall and Clarke. Clinton (Sil.).

Conchidium georgiæ Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 369, pl. 66, figs. 18, 19.

Loc. Trenton, Georgia.

Conchidium greenei Hall and Clarke. Niagara (Sil.).

Conchidium greenii Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 235, 368, pl. 66, figs. 20–22.

Loc. Near Milwaukee, Wisconsin.

Conchidium knappi (Hall and Whitfield). Niagara (Sil.).

Pentamerus knappi Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 184.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 55, pl. 28, figs. 1–4.

Pentamerus? knappi Hall and Whitfield, Twenty-seventh Rep. New York State Cab. Nat. Hist., 1875, pl. 10, figs. 10–12.

Conchidium knappi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 64, figs. 11–13.

Loc. Louisville, Kentucky.

Conchidium knighti (Nettelroth). ?Corniferous (Dev.).

Pentamerus knighti Nettelroth (non Sowerby), Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 57, pl. 29, figs. 1, 2, 17.

Conchidium nettelrothi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 234, pl. 64, figs. 14–16.

Loc. Louisville, Kentucky.

Obs. This species is very much like C. nysius and may be identical with it (Ami says that C. knighti occurs in the Upper Silurian at Arisaig, Nova Scotia).

Conchidium laqueatum (Conrad). Niagara (Sil.).

Pentamerus laqueatus Conrad, Proc. Acad. Nat. Sci. Philadelphia, VII, 1855, p. 441.

Pentamerus nobilis Emmons, Manual of Geol., 1860, p. 107, figure.

Conchidium laqueatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 232, fig. 168; p. 234, pl. 65, figs. 3–9.

Loc. Delphi, Indiana.

Conchidium littoni Hall. Niagara (Sil.).

Pentamerus littoni Hall, Pal. New York, III, 1859, p. 262.—Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 186;—Twenty-seventh Rep. Ibidem, 1875, pl. 10, figs. 8, 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 58, pl. 27, figs. 12, 13.

Conchidium littoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 64, figs. 9, 10.

Loc. Hardin County, Tennessee; Louisville, Kentucky.

Conchidium multicostatum Hall. Niagara (Sil.).

Pentamerus multicostatus Hall, Geol. Survey Wisconsin; Rep. Progress, 1860, p. 1;—Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 373, pl. 13, figs. 22–24.

Conchidium multicostatum Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 64, fig. 6; pl. 66, fig. 10.

Loc. Wauwatosa and Waukesha, Wisconsin.

Conchidium nettelrothi Hall and Clarke=C. knighti.

Conchidium nysius (Hall and Whitfield). Niagara (Sil.).

Pentamerus nysius var. crassicosta Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 184;—Twenty-seventh Rep. Ibidem, 1875, pl. 10, figs, 4–7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 60, pl. 28, figs. 5–8.

Pentamerus nysius var. tenuicostatus Nettelroth, Ibidem, 1889, p. 60.

Conchidium nysius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 64, figs. 1, 8, 27.

Loc. Louisville, Kentucky.

Obs. See C. tenuicostatum.

Conchidium obsoletum Hall and Clarke. Niagara (Sil.).

Conchidium obsoletum Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 67, figs. 8, 9.

Loc. Genoa, Ottawa County, Ohio.

Conchidium occidentale Hall. Guelph (Sil.).

Pentamerus occidentalis Hall, Pal. New York, II, 1852, p. 341, pl. 79, figs. 1, 2.—Billings, Geol. Canada, 1863, p. 337, fig. 341.—Nicholson, Pal. Prov. Ontario, 1875, p. 67, fig. 35.—Whitfield, Geol. Wisconsin, IV, 1882, p. 314, pl. 17, fig. 10; pl. 23, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 239.

Conchidium(?) occidentalis Hall and Clarke, Ibidem, 1895, pl. 67, figs. 1–5.

Loc. Gault and Guelph, Ontario; Point St. Vital, Lake Huron; Williamstown, Wisconsin.

Conchidium(?) salinense (Swallow). "Base of Chemung" (Dev.).

Pentamerus salinensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 652.—Keyes, Geol. Survey Missouri, V, 1895, p. 104.

Loc. Moniteau County, Missouri.

Obs. The geological horizon is probably Corniferous or Hamilton.

Conchidium scoparium Hall and Clarke. Guelph (Sil.).

Conchidium scoparium Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 67, figs. 6, 7.

Loc. Durham, Ontario.

Conchidium tenuicostatum (Hall and Whitfield). Niagara (Sil.).

Pentamerus nysius var. tenuicosta Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 184;—Twenty-seventh Rep. Ibidem, 1875, pl. 10, figs. 1–3.

Pentamerus complanatus Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 53, pl. 27, figs. 14–16.

Conchidium tenuicostatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 64, figs. 3–5.

Loc. Louisville, Kentucky.

Obs. P. nysius is described as consisting of two varieties. If these varieties are species, as pointed out by Nettelroth, then P. nysius will be based upon and supplant variety crassicosta, while variety tenuicosta must be elevated to specific rank. P. complanatus Nettelroth, therefore, becomes a synonym for C. tenuicostatum, as both are established upon the same specimens.

Conchidium unguiforme (Ulrich). Niagara (Sil.).

Gypidia unguiformis Ulrich, Contrib. American Pal., 1886, p. 28, pl. 3, fig. 2.

Gypidula unguiformis Miller, N. American Geol. Pal., 1889, p. 346.

Conchidium unguiformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 235, pl. 66, figs. 1-4.

Loc. Louisville, Kentucky.

CONOTRETA Walcott. Genotype C. rusti Walcott.

Conotreta Walcott, Proc. U. S. Nat. Mus., XII, 1890, p. 365 (extract 1889).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 104, 167;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 250.

Conotreta rusti Walcott Trenton (Ord.).

Conotreta rusti Walcott, Proc. U. S. Nat. Mus., XII, 1890, p. 365, figs. 1-4 (extract 1889).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 104, pl. 4K, figs. 16-21.

Loc. Trenton Falls, New York; Covington, Kentucky.

Conradia Hall and Clarke (non Adams)=Dinobolus.

CRANÆNA Hall and Clarke. Genotype Terebratula romingeri Hall.

Cranæna Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 297;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 865.

Cranæna iowensis (Calvin). Middle Devonian.

Terebratula (Cryptonella) iowensis Calvin, Bull. Lab. Nat. Hist. Univ. Iowa, I, 1890, p. 174, pl 3, fig. 4.

Cranæna iowensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 297, pl. 80, figs. 36-39; pl. 83, fig. 40.

Loc. Fayette, Iowa; Fulton, Missouri.

Cranæna romingeri Hall. Hamilton (Dev.).

Terebratula romingeri Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 48, figs. 22, 23;—Pal. New York, IV, 1867, p. 389, pl. 60, figs. 17-25, 66, 67.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 155, pl. 16, figs. 20-22.

Cranæna romingeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 297, fig. 215; pl. 80, figs. 13-19.

Loc. Thunder Bay, Michigan; Waterloo, Iowa; York and Hamburg, New York; Clarke County, Indiana.

CRANIA Retzius. Genotype Anomia craniolaris Linné.

Crania Retzius, Schrift. Ges. Naturf. Freunde, Berlin, II, 1781, p. 72.—Dall, Bull. Mus. Comp. Zool., III, 1871, p. 27;—Bull. U. S. Nat. Mus., 8, 1877, p. 21.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 31.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 145, 169.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 372.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 260.

Crania acadiensis Hall. Arisaig (Sil.).

Crania acadiensis Hall, Canadian Nat. Geol., V, 1860, p. 144, fig 1.—Dawson, Acadian Geol., 3d ed., 1878, p. 595, fig. 198.

Loc. East River, Nova Scotia.

Crania agaricina Hall and Clarke. Lower Helderberg (Dev.).

Crania agaricina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, fig. 2.

Loc. Albany County, New York; Decatur County, Tennessee.

Crania albersi Miller and Faber. Utica (Ord.).

Crania albersi Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., XVII, 1894, p. 154, pl. 8, figs. 17-19.

Loc. Cincinnati, Ohio.

Crania alternata James=C. scabiosa.

Crania anna Spencer. Niagara (Sil.).

Crania anna Spencer, Bull. Univ. Missouri, I, 1884, p. 57;—Trans. St. Louis Acad. Sci., IV, 1886, p. 607, pl. 8, fig. 4.

Loc. Hamilton, Ontario.

Crania asperula James=C. scabiosa.

Crania aurora Hall. Schoharie Grit (Dev.).

Crania aurora Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 30;—Pal. New York, IV, 1867, p. 27, pl. 3, fig. 12.

Loc. Knox, Albany County, New York.

Crania bella Billings. No. 5 Gaspé Series (?Dev.).

Crania bella Billings, Pal. Fossils, II, 1874, p. 15, fig. 5.

Loc. Cape Bon Ami, Gaspé, Canada.

Crania blairi Miller=C. rowleyi.

Crania bordeni Hall and Whitfield=C. sheldoni.

Crania carbonaria Whitfield=C. modesta.

Crania centralis Hall. Portage (Dev.).

Crania centralis Hall, Pal. New York, V, Pt. II, 1879, pl. 88, fig. 2.

Loc. Watkins, New York.

Crania chesterensis Miller and Gurley. Kaskaskia (L. Carb.).

Crania chesterensis Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 12, 1897, p. 47, pl. 3, figs. 24–26.

Loc. Chester, Illinois.

Crania(?) columbiana Walcott. Middle Cambrian.

Crania? columbiana Walcott, Proc. U. S. Nat. Mus., XI, 1888, p. 441.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 150.

Loc. Mount Stephan, British Columbia.

Obs. Probably a species of Acrotreta.

Crania costata James=C. scabiosa.

Crania crenistriata Hall. Corniferous and Hamilton (Dev.).

Crania crenistria Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 78, fig. 6, on p. 76;—Pal. New York, IV, 1867, p. 28, pl. 3, figs. 13–16.—Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pl. 4H, figs. 6–12.

Loc. Alexander, etc., New York; Columbus, Ohio; Louisville, Kentucky; Alpena, Michigan.

Obs. See C. sheldoni White.

Crania(?) deformata (Hall). Chazy (Ord.).

Orbicula? deformata Hall, Pal. New York, I, 1847, p. 23, pl. 4 bis, fig. 10.

Crania? deformata Miller, N. American Geol. Pal., 1889, p. 341.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 150.

Loc. Chazy, New York.

Obs. This species is not well established and had better be dropped since the type specimen does not preserve the generic or specific characters.

Crania dentata Ringueberg. Niagara (Sil.).

Crania dentata Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, 1886, p. 16, pl. 2, fig. 6.

Loc. Lockport, New York.

?Crania dubia Foerste. Clinton (Sil.).

?Crania dubia Foerste, Geol. Ohio, VII, 1895, p. 565, pl. 37, fig. 17.

Loc. Dayton, Ohio.

Obs. May not be a brachiopod.

Crania dyeri Miller. Utica (Ord.).

Crania dyeri Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 13, fig. 3.

Loc. Cincinnati, Ohio.

Crania famelica Hall and Whitfield. Hamilton (Dev.).

Crania famelica Hall and Whitfield, Descriptions n. sp. Fossils, 1872, p. 17, pl. 11, figs. 6, 7;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 236, pl. 11, figs. 6, 7.

Loc. Cerro Gordo, Iowa; Callaway County, Missouri.

Obs. Compare with Craniella hamiltoniæ Hall.

Crania favincola Hall and Clarke. Middle Devonian.

Crania favincola Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, fig. 33.

Loc. Crab Orchard, Kentucky.

Crania gracilis Ringueberg. Niagara (Sil.).

Crania gracilis Ringueberg, Bull. Buffalo Soc. Nat. Sci. V, 1886, p. 17, pl. 2, fig. 7.

Crania pannosa Ringueberg, Ibidem, 1886, p. 17, pl. 2, fig. 8.

Loc. Lockport, New York.

Obs. Species of Crania are very variable in shape, and since both forms are attached to one Orthoceras, it is probable that but a single species is here represented.

Crania granosa Hall and Clarke. Hamilton (Dev.).

Crania granosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, figs. 19, 20.

Loc. Centerfield, New York.

Crania granulosa N. H. Winchell. Trenton (Ord.).

Crania granulosa N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 63.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 373, pl. 29, figs. 34, 35.

Loc. Minneapolis, Minnesota.

Crania gregaria Hall=Craniella hamiltoniæ.

Crania greenei Miller. Upper Helderberg (Dev.).

Crania greenii Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 310, pl. 9, fig. 7.

Loc. Falls of Ohio.

Obs. Probably the same as Craniella hamiltoniæ.

Crania halli Sardeson=Craniella ulrichi.

Crania hamiltoniæ Hall=Craniella hamiltoniæ.

Crania lælia Hall. Utica and Lorraine (Ord.).

Crania lælia Hall, Descriptions n. sp. Crinoidea and other Fossils, 1866, p. 13;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 220, pl. 7, fig. 16.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 12.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 75, pl. 1, fig. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 1.

Loc. Cincinnati and Oxford, Ohio; Richmond, Indiana.

Crania lævis Keyes. Chouteau (L. Carb.).

Crania lævis Keyes, Geol. Survey Missouri, V, 1895, p. 40.

Loc. Louisiana, Missouri.

Crania leoni Hall. Portage and Chemung (Dev.).

Crania leoni Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 78, figs. 7, 8 on p. 76;—Pal. New York, IV, 1867, p. 30, pl. 3, figs. 27–30, (?25, 26).—Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pl. 4H, figs. 34, 35.

Loc. Leon, New York. Portage of Ontario County, New York (Clarke).

Crania modesta White and St. John. Upper Carboniferous.

Crania modesta White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 118.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 121, pl. 35, fig. 9; pl. 36, fig. 5.

Crania carbonaria Whitfield, Annals New York Acad. Sci., II, 1882, p. 229;—Ibidem, V, 1891, p. 599, pl. 15, figs. 11, 12;—Geol. Ohio, VII, 1895, p. 484, pl. 11, figs. 11, 12.

Loc. Fremont County, Iowa; Vermilion and Sullivan counties, Indiana; Carbon Hill, Ohio; Manhattan, Kansas.

Crania multipunctata Miller=C. scabiosa.

Crania pannosa Ringueberg=C. gracilis.

Crania parallela Ulrich=C. scabiosa.

Crania percarinata Ulrich=C. scabiosa.

Crania(?) permiana Shumard. Upper Carboniferous.

Crania permiana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 395.

Loc. Guadalupe Mountains, New Mexico.

Obs. Probably not a Crania.

Crania pulchella Hall and Clarke. Lower Helderberg (Dev.).

Crania pulchella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 180, pl. 4H, fig. 3.

Loc. Albany County, New York.

Crania radicans A. Winchell=Strophalosia radicans.

Crania reposita White. Burlington (L. Carb.).

Crania reposita White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 30.

Loc. Burlington, Iowa.

Crania reticularis Miller=Trematis reticularis.

Crania(?) reversa Sardeson. St. Peter (Ord.).

Crania(?) reversa Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 77, pl. 3, figs. 6, 7.

Loc. St. Paul, Minnesota.

Crania rowleyi Gurley. Chouteau (L. Carb.).

Crania rowleyi Gurley, New Carb. Fossils, 1, 1883, p. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 13.

Crania blairi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 310, pl. 9, figs. 5, 6.

Loc. Pike County and Sedalia, Missouri.

Crania scabiosa Hall. Utica and Lorraine (Ord.).

Crania scabiosa Hall, Descriptions n. sp. Crinoidea and other Foss., 1866, p. 13;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 220, pl. 7, fig. 15.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 74, pl. 1, fig. 17.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 148, pl. 4H, figs. 23-28, 30, 31.

Crania multipunctata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 13, fig. 4.

Crania percarinata Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 98, pl. 4, fig. 12.

Crania parallela Ulrich, Ibidem, 1878, p. 98, pl. 4, fig. 13.

Crania asperula James, The Palæontologist, 3, 1879, p. 22.

Crania costata James, Ibidem, 1879, p. 22.

Crania alternata James, Ibidem, 1879, p. 23.

Loc. Cincinnati, etc., Ohio; Indiana; Illinois; Wisconsin.

Obs. The shells of Crania are adapted to the objects upon which they are cemented.

Crania scabiosa Hall—Continued.

C. scabiosa has been found growing on Rafinesquina, Strophomena, Rhynchonella, Pleurotomaria, and Monticulipora. In nearly all cases this species partakes more or less of the ornamentation of its host. The variation pointed out by authors is accidental and has no specific value.

Crania setifera Hall. Niagara (Sil.).

Crania setifera Hall, Trans. Albany Institute, IV, 1863, p. 209 (non Hall, 1866);—Twenty-eighth Rep. New York State Mus. Nat. Hist., Doc. ed., 1876, pl. 21, figs. 8–10;—Ibidem, 1879, p. 148, pl. 21, figs. 8–10;—Eleventh Rep. State Geol. Indiana, 1882, p. 283, pl. 21, figs. 8–10.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 18.

Loc. Waldron, Indiana.

Crania setigera Hall. Trenton and Lorraine (Ord.).

Crania setigera Hall, Descriptions n. sp. Crinoidea and other Fossils, 1866, p. 12;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 220, pl. 7, fig. 15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, figs. 14–16.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 372, pl. 29, figs. 32, 33.

Loc. Mineral Point and Beloit, Wisconsin; Decorah, Iowa; Minneapolis, Cannon Falls, etc., Minnesota; Wilmington, Illinois.

Crania sheldoni White. Hamilton (Dev.).

Crania sheldoni White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.

Crania bordeni Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 187;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 36, 37.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 32, pl. 2, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, figs. 4, 5.

Loc. New Buffalo and Iowa City, Iowa; Falls of Ohio.

Obs. This species may not be distinct from C. crenistria.

Crania siluriana Hall. Niagara (Sil.).

Crania siluriana Hall, Trans. Albany Institute, IV, 1863, p. 208;—Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 148, pl. 21, figs. 3–7;—Eleventh Rep. State Geol. Indiana, 1882, p. 282, pl. 21, figs. 3–7.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 13, pl. 1, figs. 1, 2.

Loc. Waldron, Indiana.

Crania socialis Ulrich. Utica (Ord.).

Crania socialis Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 98, pl. 4, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 29.

Loc. Cincinnati, Ohio.

Crania spinigera Hall. Niagara (Sil.).

Crania spinigera Hall, Descriptions n. sp. Foss. Waldron, Indiana, 1879, p. 13;—Eleventh Rep. State Geol. Indiana, 1882, p. 283, pl. 27, fig. 1;—Trans. Albany Institute, X, 1883, p. 69.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, fig. 17.

Loc. Waldron, Indiana.

Crania trentonensis Hall. Trenton (Ord.).

Crania trentonensis Hall, Descriptions n. sp. Crinoidea and other Fossils, 1866, p. 12;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 219, pl. 7, figs. 11, 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4H, figs. 21, 22.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 374, pl. 29, figs. 36, 37.

Loc. Middleville, New York; Cannon Falls, Minnesota; Janesville, Wisconsin; Dixon, Illinois.

CRANIELLA Œhlert. Genotype C. meduanensis Œhlert.

Craniella Œhlert, Bull. Soc. Études Scientif. d'Angers, 1888, p. 37.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 153, 170.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 374.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 262.

Craniella(?) clintonensis Foerste. Clinton (Sil.).

Craniella? clintonensis Foerste, Geol. Ohio, VII, 1895, p. 565, pl. 37, figs. 3a, 3b.
Loc. Todds Fork, Ohio.

Craniella hamiltoniæ Hall. Hamilton (Dev.).

Crania hamiltoniæ Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 77, figs. 4, 5, on p. 76;—Pal. New York, IV, 1867, p. 27, pl. 3, figs. 17-23.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 214.
?Crania hamiltoniæ? Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 12, fig. 10.
Crania gregaria Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 31;—Pal. New York, IV, 1867, p. 29, pl. 3, fig. 24.
Craniella hamiltoniæ Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 148, 153, pl. 41, figs. 3-16.
Loc. Cazenovia, Hamilton, etc., New York; Hay and Athabasca rivers, Canada. (Waverly group, Moote Run, Licking County, Ohio, according to Herrick.)
Obs. See Crania greenei Miller.

Craniella(?) ulrichi Hall and Clarke. Trenton (Ord.).

Craniella ulrichi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 153, 181, pl. 4, figs. 1, 2.
Crania halli Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 8-10.
Craniella? ulrichi Winchell and Schuchert, Minnesota Geól. Survey, III, 1893, p. 375, pl. 29, figs. 38, 39.
Loc. Minneapolis, St. Paul, and Fountain, Minnesota.

Craniops Hall=Pholidops.

CRYPTACANTHIA White and St. John.
Genotype Waldheimia? compacta White and St. John.

Cryptacanthia White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 119.—Dall, American Jour. Conch., VI, 1870, p. 114.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 300;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 867.

Cryptacanthia compacta White and St. John. Upper Carboniferous.

Waldheimia? (Cryptacanthia) compacta White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 119, fig. 3.
Cryptacanthia compacta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 301, fig. 225.
Loc. Madison County, Missouri.

CRYPTONELLA Hall, 1867. Genotype Terebratula rectirostra Hall.

?Cryptonella Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, pp. 101, 102;—Fifteenth Rep. Ibidem, 1862, p. 160, pl. 3, figs. 8, 9.—Billings, Canadian Nat. Geol., VII, 1862, p. 392.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 43, figs. 1-7 on p. 42;—American Jour. Sci., 2d ser., XXXV, 1863, p. 396.—Billings, Ibidem, XXXVI, 1863, p. 238.—Hall, Trans. Albany Institute, IV, 1863, pp. 132, 148.
Centronella (partim) A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 123.
Cryptonella Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 164;—Pal. New York, IV, 1867, p. 392.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 286;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 860.
Obs. This genus can not be considered as established before 1867.

Cryptonella calvini Hall and Whitfield=Dielasma calvini.

Cryptonella(?) circulus Walcott. Devonian.

Cryptonella? circula Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 163, pl. 15, fig. 2.

Loc. Lone Mountain, Nevada.

Obs. Additional material shows that this species attained a length of 1 inch.

Cryptonella eudora Hall and Whitfield, 1873=Dielasma calvini.

Cryptonella(?) eudora Hall. Chemung-Waverly (Dev.-L. Carb.).

Cryptonella (Terebratula) eudora Hall, Pal. New York, IV, 1867, p. 398, pl. 61, figs. 31–41.

Cryptonella eudora Herrick, Bull. Denison Univ., III, 1888, p. 48, pl. 5, fig. 10;—Geol. Ohio, VII, 1895, pl. 21, fig. 10.

Loc. Ithaca, New York; Licking County, Ohio.

Cryptonella(?) eximia Hall. Lower Helderberg (Dev.).

Cryptonella eximia Hall, Fifteenth Rep. New York State Cab. Nat. Hist., 1862, p. 160, pl. 3, figs. 6, 7;—Sixteenth Rep. Ibidem, 1863, p. 43, figs. 10, 11.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 80, figs. 11, 12.

Loc. Not given.

Cryptonella(?) inconstans (Herrick). Waverly (L. Carb.).

Terebratula? inconstans Herrick, Bull. Denison Univ., IV, 1888, p. 24, pl. 3, figs. 8, 9; pl. 11, fig. 18.

Cryptonella(?) inconstans Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 79, figs. 31, 32.

Terebratula inconstans Herrick, Geol. Ohio, VII, 1895, pl. 23, fig. 17.

Loc. Ashland County and Lodi, Ohio.

Cryptonella iowensis Calvin=Cranæna iowaensis.

Cryptonella iphis Hall. Corniferous (Dev.).

Cryptonella iphis Hall, Pal. New York, IV, 1867, p. 396, pl. 61, figs. 26–28.

Loc. Cayuga, Ontario.

Cryptonella lens Hall. Corniferous (Dev.).

Terebratula lens Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 89;—Pal. New York, IV, 1867, p. 386, pl. 60, figs. 1–4.

Cryptonella lens Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 199.

Loc. Clarence Hollow, New York; Falls of Ohio.

Cryptonella lincklæni Hall=Eunella lincklæni.

Cryptonella ovalis Miller. Hamilton (Dev.).

Cryptonella ovalis Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 76, pl. 13, figs. 1, 2.

Loc. Bunker Hill, Indiana.

Cryptonella pinonensis Walcott. Upper Devonian.

Cryptonella pinonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 163, pl. 4, fig. 4.

Loc. Pinon Range, Nevada.

Cryptonella planirostris Hall. Marcellus, Hamilton (Dev.).

Terebratula planirostra Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 89.

Cryptonella planirostra Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 101;—Sixteenth Rep. Ibidem, 1863, p. 44;—Pal. New York, IV, 1867, p. 395, pl. 61, figs. 9–27.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 287, fig. 208; pl. 80, figs. 5–10.

Loc. Seneca and Canandaigua lakes, New York.

Cryptonella rectirostris Hall. Hamilton (Dev.).

Terebratula rectirostra Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 88.

Cryptonella rectirostra Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 101;—Sixteenth Rep. Ibidem, 1863, p. 44;—Pal. New York, IV, 1867, p. 394, pl. 61, figs. 1-8.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 286, pl. 80, figs. 1-4.

Loc. Bellona, York, Moscow, etc., New York; Falls of Ohio.

Cryptonella subelliptica Hall and Clarke. Waverly (L. Carb.).

Cryptonella subelliptica Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 81, figs. 41-43.

Loc. Sciotoville, Ohio.

CYCLORHINA Hall and Clarke. Genotype Rhynchospira nobilis Hall.

Cyclorhina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 830.

Cyclorhina nobilis Hall. Hamilton (Dev.).

Rhynchospira nobilis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 83.

Rhynchospira and Trematospira? nobilis Hall, Pal. New York, IV, 1867, pp. 277, 412, pl. 63, figs. 33-36.

Retzia (Trematospira) nobilis Whiteaves, Cont. Canadian Pal., I, 1889, p. 116.

Cyclorhina nobilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 207, pl. 61, figs. 1-12.

Loc. Darien, New York; Thedford, Ontario.

CYCLOSPIRA Hall and Clarke. Genotype Orthis bisulcata Emmons.

Cyclospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 146.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 469.—Hall and Clarke, Thirteenth Ann. Rep. New York State Geologist, 1895, p. 808.

Cyclospira bisulcata (Emmons). Trenton (Ord.).

Orthis bisulcata Emmons, Geol. New York; Rep. Second Dist., 1842, p. 396, fig. 4.

Atrypa bisulcata Hall, Pal. New York, I, 1847, p. 139, pl. 33, fig. 3.

Genus? bisulcata Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 65.

Camarella bisulcata Miller, American Pal. Foss., 1877, p. 107.

Camarella owatonnensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 1-3.

Cyclospira bisulcata? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 470, pl. 34, figs. 49-54.

Cyclospira bisulcata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 147, figs. 133-136; pl. 54, figs. 38-40;—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 180.

Loc. Adams, Jefferson County, New York; Ottawa, Canada; Cannon Falls, etc., Minnesota; Lake Winnipeg, Manitoba.

Cyclospira(?) sparsiplica Foerste. Clinton (Sil.).

Cyclospira? sparsiplica Foerste, Geol. Ohio, VII, 1895, p. 593, pl. 37A, fig. 18.

Loc. Dayton, Ohio.

Obs. May be a species of Parastrophia or a rhynchonelloid.

CYRTIA Dalman. Genotype Anomites exporrectus Wahlenberg.

Cyrtia Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 97.—Billings, Canadian Jour., VI, 1861, p. 262.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 93.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 40;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 759.

Cyrtia acutirostris Shumard=Cyrtina acutirostris.

Cyrtia alta Hall. Waverly (L. Carb.).

Spirifer alta Hall, Proc. American Phil. Soc., X, 1866, p. 246;—Pal. New York, IV, 1867, p. 248, pl. 43, figs. 1–7.

Syringothyris alta Schuchert, Ninth Ann. Rep. New York State Geol., 1890, p. 35.

Cyrtia alta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42, pl. 26, figs. 1–5; pl. 39, figs. 37, 38.

Loc. Meadville, Pennsylvania; Bedford, Ohio.

Cyrtia biplicata Hall=Cyrtina biplicata.

Cyrtia curvilineata White=Cyrtina curvilineata.

Cyrtia cyrtiniformis (Hall and Whitfield). Chemung (Dev.).

Spirifera cyrtinaformis Hall and Whitfield, Twenty-third Rep. New York State Cab. Nat. Hist., 1872, p. 238, pl. 11, figs. 21–24;—Extract, 1872, p. 19, pl. 11, figs. 21–24.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 222.

Cyrtia cyrtiniformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42, pl. 25, figs. 26–32.

Loc. Rockford, Iowa; Hay River, Canada.

Obs. Compare with C. norwoodi Meek.

Cyrtia dalmani Hall=Cyrtina dalmani.

Cyrtia exporrecta (Wahlenberg). Niagara (Sil.).

Anomites exporrectus Wahlenberg, Nova Acta Regias Soc. Scient. Upsal, VIII, 1821, p. 64.

Spirifera (Cyrtia) trapezoidalis Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 183.

Cyrtia trapezoidalis Hall and Whitfield, Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 19–21.

Cyrtia exporrecta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 93, pl. 27, figs. 6–8, 20.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42, pl. 28, figs. 1, 48, 49, 51.

Loc. Europe; Louisville, Kentucky.

Cyrtia exporrecta arrecta Hall and Whitfield=C. myrtea.

Cyrtia gigas Troost=Syringothyris gigas.

Cyrtia hamiltonensis Hall=Cyrtina hamiltonensis.

Cyrtia meta (Hall). Clinton and Niagara (Sil.).

Spirifer radiatus (pars) Hall, Pal. New York, II, 1852, p. 66, pl. 22, figs. 2a–2c, 2t.

Spirifera meta Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 372, pl. 13, figs. 12, 13.

Cyrtia radians Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 42, 362, pl. 28, figs. 4, 5, 50, 52; pl. 39, fig. 33.

Loc. Lockport and Rochester, New York; Milwaukee, Wisconsin.

Cyrtia missouriensis Swallow=Cyrtina missouriensis.

Cyrtia myrtia Billings. Anticosti and Niagara (Sil.).

Cyrtia myrtia Billings, Pal. Fossils, I, 1862, p. 165, fig. 149.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 42.

Cyrtia trapezoidalis var. arrecta Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 183.

Cyrtia exporrecta Hall and Whitfield, Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 22, 23.

Cyrtia exporrecta var. arrecta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 94, pl. 27, fig. 21; pl. 34, fig. 35; pl. 37, figs. 60, 61.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 2, 3; pl. 39, fig. 32.

Loc. Anticosti; Louisville, Kentucky.

Cyrtia norwoodi (Meek). Middle Devonian.
Spirifera norwoodi Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 308.
Spirifera utahensis Meek, note appended to extra copies of the above-cited paper, 1860;—Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 345, pl. 1, fig. 4;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 39, pl. 3, fig. 1.
Loc. Buell Valley, Utah.
Obs. Compare with C. crytiniformis Hall and Whitfield.

Cyrtia occidentalis Swallow=Cyrtina occidentalis.

Cyrtia radians Hall and Clarke=C. meta.

Cyrtia rostrata Hall=Cyrtina rostrata.

Cyrtia trapezoidalis Hisinger=C. exporrecta.

Cyrtia trapezoidalis arrecta Hall and Whitfield=C. myrtia.

Cyrtia triquetra Hall=Cyrtina triquetra.

Cyrtia umbonata Hall=Cyrtina umbonata.

CYRTINA Davidson. Genotype Cyrtia heteroclita Defrance.
Cyrtina Davidson, Mon. British Carb. Brachiopoda, Pal. Soc., 1858, p. 66.—Hall, Pal. New York, IV, 1867, p. 263;—Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 251.—Herrick, Bull. Dennison Univ., IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 95.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 43;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 763.

Cyrtina acutirostris (Shumard). Chouteau (L. Carb.).
Cyrtia acutirostris Shumard, Geol. Rep. Missouri, 1855, p. 204, pl. C, fig. 3.
Cyrtina acutirostris Miller, N. American Geol. Pal., 1889, p. 342.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 38–42, 44, 54.—Keyes Geol. Survey Missouri, V, 1895, p. 89, pl. 39, fig. 10.
Loc. Hannibal and Louisiana, Missouri.

Cyrtina affinis Billings. Oriskany (Dev.)
Cyrtina dalmani Billings, Canadian Nat. Geol., VIII, 1863, p. 37.
Cyrtina affinis Billings, Pal. Fossils, II, 1874, p. 49, pl. 3A, fig. 6.
Loc. Grand Greve, Gaspé.

Cyrtina billingsi Meek. Hamilton (Dev.).
Cyrtina billingsi Meek, Trans. Chicago Acad. Sci., I, 1868, p. 97, pl. 14, fig. 6.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 227.
Loc. Clearwater and Athabasca rivers, British America.

Cyrtina biplicata Hall. Upper Helderberg (Dev.).
Cyrtia biplicata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 165.
Cyrtina biplicata Hall, Pal. New York, IV, 1867, p. 266, pl. 27, figs. 5–10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 7–10.
Loc. Albany and Schoharie counties, etc., New York; Michigan.

Cyrtina burlingtonensis Rowley. Burlington (L. Carb.).
Cyrtina burlingtonensis Rowley, American Geologist, XII, 1893, p. 308, pl. 14, figs. 15–17.
Loc. Louisiana, Missouri.
Obs. Compare with C. neogenes.

Cyrtina crassa Hall. Corniferous (Dev.).
Cyrtina crassa Hall, Pal. New York, IV, 1867, p. 267, pl. 27, figs. 11, 12.—Hall and Whitfield, Twenty-seventh Rep. New York State Cab. Nat. Hist., 1875, pl. 9, figs. 14–16.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 95, pl. 13, figs. 21–24.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 13–15.
Loc. **Vienna, New York; Falls of Ohio.**

Cyrtina(?) curupira Rathbun. Middle Devonian.

Cyrtina(?) curupira Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 242, pl. 10, figs 1, 6.

Loc. Erere, Province of Para, Brazil.

Cyrtina curvilineata White. Hamilton (Dev.).

Cyrtia curvilineata White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 25.

Cyrtina curvilineata? Hall, Pal. New York, IV, 1867, p. 270, pl. 44, figs. 53-55.

Cyrtina curvilineata Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 28, figs. 11, 12

Loc. Iowa City, Iowa.

Cyrtina dalmani Billings (non Hall)=C. affinis.

Cyrtina dalmani (Hall). Lower Helderberg (Dev.).

Cyrtia dalmani Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 64;—Pal. New York, III, 1859, p. 206, pl. 24, fig. 1.

Cyrtina dalmani Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 383, pl. 7, fig. 3.

Loc. Albany and Schoharie counties, New York; Perry County, Missouri; Decatur County, Tennessee; Dalhousie, New Brunswick.

Cyrtina davidsoni Walcott. Middle and Upper Devonian.

Cyrtina davidsoni Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 146, pl. 3, fig. 2.

Loc. White Pine district, Nevada.

Cyrtina hamiltonensis Hall. Up. Helderberg, Ham., and Port. (Dev.).

Cyrtia hamiltonensis Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 166.—Billings, Canadian Jour., VI, 1861, p. 262, figs. 80-82;—Geol. Canada, 1863, p. 384, fig. 415.

Cyrtina hamiltonensis Hall, Pal. New York, IV, 1867, p. 268, pl. 27, figs. 1-4; pl. 44, figs. 26-33, 38-52.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 99, pl. 14, figs. 5, 7, 10.—Nicholson, Pal. Prov. Ontario, 1874, p. 83.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 147.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 96, pl. 13, figs. 4-12.—Whiteaves, Cont. to Canadian Pal., I, 1891, pp. 226, 288.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 23-33, 43, 45, 46, 53.—Kindle, Bull. American Pal., 6, 1896, p. 35.

Cyrtina panda Meek, Trans. Chicago Acad. Sci., I, 1868, p. 100, pl. 14, fig. 8.

Loc. New York; Pennsylvania; Maryland; Cayuga and Thedford, Ontario; Louisville, Kentucky; Independence, Iowa; Eureka district, Nevada; Mackenzie and Athabasca rivers, and lakes Manitoba and Winnipegosis, British America.

Obs. C. panda is a variation of this species with a higher ventral area.

Cyrtina hamiltonensis recta Hall. Hamilton and Chemung (Dev.).

Cyrtina hamiltonensis var. recta Hall, Pal. New York, IV, 1867, p. 270, pl. 44, figs. 34-37.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 97, pl. 13, figs. 13-16.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 21, 22.

Loc. Allegany County, New York; Falls of Ohio.

Cyrtina lachrymosa Hall and Clarke. Waverly (L. Carb.).

Cyrtina lachrymosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 46, 362, pl. 28, figs. 36, 37, 47.

Loc. Richfield, Ohio.

Cyrtina missouriensis (Swallow). Hamilton (Dev.).

Cyrtia missouriensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 647.

Cyrtina missouriensis Miller, N. American Geol. Pal., 1889, p. 343.

Loc. Callaway County, Missouri.

Obs. Regarded by Keyes as a synonym for C. umbonata.

Cyrtina neogenes Hall and Clarke. Burlington (L. Carb.).
Cyrtina neogenes Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, fig. 41.
Loc. Burlington, Iowa.
Obs. Compare with C. burlingtonensis.

Cyrtina(?) occidentalis (Swallow). Hamilton (Dev.).
Cyrtia occidentalis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 648.
Cyrtina? occidentalis Miller, N. American Geol. Pal., 1889, p. 343.
Syringothyris occidentalis Keyes, Geol. Survey Missouri, V, 1889, p. 86.
Loc. Callaway County, Missouri.
Obs. This is probably a Spirifer with a high area as in S. asperus, or it is a Cyrtia.

Cyrtina panda Meek=C. hamiltonensis.

Cyrtina pyramidalis (Hall). Niagara (Sil.).
Spirifer pyramidalis Hall, Pal. New York, II, 1852, p. 266, pl. 54, fig. 7.
Cyrtina pyramidalis Miller, N. American Geol. Pal., 1889, p. 343.
Loc. Lewiston, New York.

Cyrtina rostrata Hall. Oriskany and Corniferous (Dev.).
Cyrtia rostrata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 64;—Pal. New York, III, 1859, p. 429, pl. 96, figs. 1-6; pl. 98, fig. 8.—Billings, Canadian Jour., VI, 1861, p. 263.
Cyrtina rostrata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 25, figs. 1-8; pl. 28, fig. 6.
Loc. Albany County, New York; Cumberland, Maryland; Cayuga, Ontario.

Cyrtina triplicata Simpson. Waverly (L. Carb.).
Cyrtina triplicata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 439, fig. 4.
Loc. Warren, Pennsylvania.

Cyrtina triquetra (Hall). Hamilton (Dev.).
Cyrtia triquetra Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 513.
Cyrtina triquetra Meek, Trans. Chicago Acad. Sci., I, 1868, p. 99.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 436, pl. 13, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 28, figs. 14, 35.
Loc. Rock Island, Illinois.

Cyrtina umbonata (Hall). Hamilton (Dev.).
Cyrtia umbonata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 512, pl. 5, fig. 2.
Cyrtina umbonata Miller, N. American Geol. Pal., 1889, p. 343.—Keyes, Geol. Survey Missouri, V, 1895, p. 90.
Loc. Buffalo, Iowa; Rock Island, Illinois; Callaway County, Missouri.
Obs. See C. missouriensis.

Cyrtina umbonata alpenaensis Hall and Clarke. Hamilton (Dev.).
Cyrtina umbonata var. alpenensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 362, pl. 28, figs. 16-20.
Loc. Alpena, Michigan.

DALMANELLA Hall and Clarke.
Genotype Orthis testudinaria Dalman.
Orthis (group of O. testudinaria) Hall, Bull. Geol. Soc. America, I, 1889, p. 21.
Dalmanella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 205, 223.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 439.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 170.

Dalmanella amœna N. H. Winchell. Trenton (Ord.).

Orthis amœna Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 65.

Orthis (D.) amœna Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 453, pl. 33, figs. 48-50.

Loc. Spring Valley, Minnesota.

Dalmanella arcuaria Hall and Clarke. Niagara (Sil.).

Dalmanella arcuaria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 224, 341, pl. 5C, figs. 20, 21.

Loc. Perry County, Tennessee.

Dalmanella bellula (Meek). Lorraine (Ord.).

Orthis bellula (James MS.) Meek, Pal. Ohio, I, 1873, p. 103, pl. 8, fig. 5; Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 31.

Dalmanella bellula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Loc. Cincinnati, Ohio.

Dalmanella concinna Hall. Lower Helderberg (Dev.).

Orthis concinna Hall, Pal. New York, III, 1859, p. 172, pl. 13, figs. 1-3.

Dalmanella concinna Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.

Loc. Cumberland, Maryland.

Dalmanella crispata (Emmons). Lorraine (Ord.).

Orthis crispata Emmons, Geol. New York; Rep. Second Dist., 1842, p. 404, fig. 5.

Dalmanella crispata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Loc. Lorraine, New York.

Dalmanella devonica (Walcott). Lower Devonian.

Skenidium devonicum Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 116, pl. 13, fig. 4.

Loc. Eureka district, Nevada.

Obs. The type specimen has no spondylium and therefore is no Scenidium.

Dalmanella electra (Billings). Calciferous (Ord.).

Orthis electra Billings, Pal. Fossils, I, 1862, p. 79, fig. 72; p. 217;—Geol. Canada, 1863, p. 231, fig. 246.

Orthis electra? White, Wheeler's Rep. Geol. Geogr. Expl. west 100 Merid., IV, 1875, p. 55.

Dalmanella electra Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223.

Loc. Point Levis and St. John, Canada; Newfoundland; House Range, Utah.

Dalmanella electra major (Matthew). Calciferous (Ord.).

Orthis electra var. major Matthew, Trans. Royal Soc. Canada, X, 1893, p. 100, pl. 7, fig. 3.

Loc. Near St. John, New Brunswick.

Dalmanella electra lævis (Matthew). Calciferous (Ord.).

Orthis electra var. lævis Matthew, Trans. Royal Soc. Canada, X, 1893, p. 100.

Loc. Near St. John, New Brunswick.

Dalmanella elegantula (Dalman). Clinton and Niagara (Sil.).

Orthis elegantula Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, p. 117, pl. 2, fig. 6.—Hall, Pal. New York, II, 1852, p. 252, pl. 52, fig. 3.—Billings, Canadian Nat. Geol., I, 1856, p. 136, pl. 2, fig. 5.—Roemer, Sil. Fauna west. Tennessee, 1860, p. 62, pl. 5, fig. 7.—Billings, Geol. Canada, 1863, p. 312, fig. 320.—Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 150, pl. 21, figs. 11-17;—Eleventh Rep. State Geol. Indiana, 1882, p. 285, pl. 21, figs. 11-17;—Second Ann. Rep. New York State Geol., 1883,

Dalmanella macleodi (Whitfield). Calciferous (Ord.).

Orthis macleodi Whitfield, Bull. American Mus. Nat. Hist., II, 1889, p. 43, pl. 7, figs. 1-4.

Dalmanella macleodi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Loc. Beekmantown, New York.

Dalmanella melita (Hall and Whitfield). Upper Cambrian.

Leptæna melita Hall and Whitfield, King's U. S. Geol. Survey, 40th Parl., IV, 1877, p. 208, pl. 1, figs. 13, 14.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 22.

Loc. Eureka district, Nevada.

Obs. This species is related to D. evadne (Billings).

Dalmanella(?) nettoana (Rathbun). Middle Devonian.

Orthis nettoana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 247, pl. 10, figs. 7, 10, 13;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 22.

Loc. Province of Para, Brazil.

Dalmanella parva (de Verneuil). Anticosti (Sil.).

Orthis parva (Pander) de Verneuil, Geology of Russia and the Ural Mountains, 1845, p. 188, pl. 13, fig. 3.—Billings, Cat. Sil. Foss. Anticosti, 1866, p. 41.

Loc. Europe; Anticosti.

Dalmanella perelegans Hall. Lower Helderberg (Dev.).

Orthis perelegans Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 44, fig. 1;—Pal. New York, III, 1859, p. 171, pl. 13, figs. 4-12;—Second Ann. Rep. New York State Geol., 1883, pl. 35, figs. 32, 33.

Dalmanella perelegans Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 34, 35.

Loc. Albany and Schoharie counties, New York; Decatur County, Tennessee.

Dalmanella planiconvexa Hall. Lower Helderberg and Oriskany (Dev.).

Orthis planoconvexa Hall, Pal. New York, III, 1859, p. 168, pl. 12, figs. 1-6.

Dalmanella planoconvexa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.

Loc. Albany County, New York; Cumberland, Maryland.

Dalmanella(?) plicifera (Hall). Chazy (Ord.).

Leptæna plicifera Hall, Pal. New York, I, 1847, p. 19, pl. 4 bis, fig. 1.

Strophomena plicifera Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.

Loc. Chazy, New York.

Dalmanella pogonipensis (Hall and Whitfield). Pogonip (Ord.).

Orthis pogonipensis Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 232, pl. 1, figs. 9, 10.

Strophomena nemea H. and W., Ibidem, 1877, p. 233, pl. 1, fig. 15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 71.

Loc. White Pine and Eureka districts, Nevada.

Obs. These are shells of the D. perveta group. S. nemea is based on a dorsal valve of O. pogonipensis.

Dalmanella quadrans Hall. Lower Helderberg (Dev.).

Orthis quadrans Hall, Pal. New York, III; Corrigenda in vol. with plates, 1861, pl. 12, figs. 9-12.

Dalmanella quadrans Hall and Clarke, Ibidem, VIII, Pt. I, 1892, p. 224.

Loc. Catskill and Schoharie, New York.

Dalmanella stonensis (Safford). Trenton (Ord.).

Orthis stonensis Safford, Geol. Tennessee, 1869, p. 286.

Dalmanella stonensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224, pl. 5C, figs. 4, 5.

Loc. Near Nashville, Tennessee.

Dalmanella subæquata (Conrad). Trenton (Ord.).

Orthis subæquata Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 118, pl. 32, fig. 2;—Geol Wisconsin, I, 1862, p. 42, figs. 1-3, and p. 436;—Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 19-24.

Orthis minneapolis N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 63.

Orthis perveta Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 17, 18 (?16).

Dalmanella subæquata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 207, 224, pl. 5C, figs. 6-11.

Dalmanella perveta Hall and Clarke, Ibidem, 1892, p. 224, pl. 5C, figs. 13, 14.

Orthis (D.) subæquata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 446, pl. 33, figs. 30-36.

Loc. Mineral Point, Wisconsin; Minneapolis, St. Paul, Cannon Falls, Fountain, etc., Minnesota; Decorah and McGregor, Iowa; Auburn, Lincoln County, Missouri; Montreal, Canada.

Dalmanella subæquata circularis N. H. Winchell. Trenton (Ord.).

Orthis circularis N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 66.

Orthis (D.) subæquata var circularis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 452, pl. 33, figs. 46, 47.

Loc. Minneapolis, Cannon Falls, etc., Minnesota; Highbridge, Kentucky; Lebanon, Tennessee.

Dalmanella subæquata conradi N. H. Winchell. Trenton (Ord.).

Orthis conradi N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 68.

Orthis (D.) subæquata var. conradi Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 449, pl. 33, figs. 37-39.

Loc. Minneapolis, Minnesota; Decorah, Iowa; Janesville and Beloit, Wisconsin; Montreal, Canada; ?Eureka district, Nevada.

Dalmanella subæquata gibbosa (Billings). Chazy-Trenton (Ord.).

Orthis gibbosa Billings, Geol. Survey Canada; Rep. Progress for 1856, 1857, p. 296;—Canadian Nat. Geol., IV, 1859, p. 434.

Dalmanella gibbosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Orthis (D.) subæquata var. gibbosa Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 451, pl. 33, figs. 43-45.

Loc. Near Ottawa and Bellville, Canada; Minneapolis, Cannon Falls, etc., Minnesota; Decorah, Iowa; Mineral Point, Wisconsin; in the Chazy, Island of Montreal, and Pallideau Islands, Lake Huron.

Dalmanella subæquata pervetus (Conrad). Trenton (Ord.).

Orthis perveta Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 120, pl. 32, fig. 5.—Billings, Canadian Nat. Geol., IV, 1859, p. 434, fig. 10.—Hall, Geol. Wisconsin, I, 1862, p. 42, fig. 7.—Billings, Geol. Canada, 1863, p. 130, fig. 57.

Orthis media N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 64.

Dalmanella subæquata pervetus (Conrad)—Continued.

Orthis kassubæ N. H. Winchell, Ibidem, 1880, p. 65.

?Orthis perveta Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 72, pl. 11, fig. 3.

Dalmanella perveta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 5C, fig. 12.

Orthis (D.) subæquata var. perveta Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 450, pl. 33, figs. 40-42.

Loc. Mineral Point, Beloit, etc., Wisconsin; Minneapolis, St. Paul, Cannon Falls, etc., Minnesota; Decorah, Iowa; Dixon, Illinois; Tennessee.

Dalmanella subcarinata Hall. Lower Helderberg (Dev.).

Orthis subcarinata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 43, figs. 1, 2;—Pal. New York, III, 1859, p. 169, pl. 12, figs. 7, 8, 13-21 (not figs. 9-12=D. quadrans).—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 373, pl. 7, fig. 6.—Whitfield, Geol. Wisconsin, IV, 1882, p. 320, pl. 25, figs. 3, 4.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 35, figs. 23-31.

?Orthis subcarinata Tscherneyschew, Fauna Untern Devon des Urals, Mém. Com. Géol., Russia, IV, 1885, p. 57, pl. 7, fig. 97.

Dalmanella subcarinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 25-33.

Loc. Catskill, Schoharie, etc., New York; Perry and Pike counties, Missouri; Decatur County, Tennessee; Waubakee, Wisconsin; Arisaig, Nova Scotia (Ami); Russia.

Dalmanella superstes Hall and Clarke. Chemung (Dev.).

Dalmanella superstes Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, 342, pl. 5C, figs. 44-47.

Loc. Near Howard, Steuben County, New York.

Dalmanella tenuilineata (Hall). Chemung (Dev.).

Atrypa? tenuilineata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 271, fig. 4.

Orthis leonensis Hall, Pal. New York, IV, 1867, p. 62, pl. 8, figs. 3-8.

Dalmanella leonensis Hall and Clarke, Ibidem, VIII, Pt. I, 1892, p. 224, pl. 5C, figs. 42, 43.

Loc. Leon, Conewango, etc., New York.

Dalmanella tersa (Sardeson). Lorraine (Ord.).

Orthis tersus Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 331, pl. 5, figs. 11-13;—American Geol., XIX, 1897, p. 100, pl. 5, figs. 8-13.

Loc. Wilmington, Illinois; Nye, Wisconsin.

Dalmanella testudinaria (Dalman). Chazy-Lorraine (Ord.).

Orthis testudinaria Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, p. 115, pl. 2, fig. 4.—Conrad, Ann. Rep. Geol. Survey New York, 1839, p. 63.—Hall, Pal. New York, I, 1847, p. 117, pl. 32, fig. 1; p. 288, pl. 79, fig. 4.—Billings, Canadian Nat. Geol., I, 1856, p. 40, fig. 1.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 601.—Billings, Geol. Canada, 1863, p. 165, fig. 144.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 20.—Whitfield, Geol. Wisconsin, IV, 1882, p. 258, pl. 12, figs. 5-7.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 1-4, 6-13.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 72, pl. 11, fig. 10.—Sardeson, American Geol., XIX, 1897, p. 92.

Orthis striatula Emmons, Geol. New York; Rep. Second Dist., 1842, p. 394, fig. 3.

Orthis testudinaria? Emmons, Ibidem, 1842, p. 404, fig. 4.—White, Wheeler's Expl. Survey west 100 Merid., IV, 1875, p. 72.

Orthis disparilis Owen (non Conrad), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, fig. 23 (see specimens U. S. Nat. Mus., Cat. Invert. Foss., 17887).

Dalmanella testudinaria (Dalman)—Continued.

Dalmanella testudinaria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 206, 218, 224, pl. 5B, figs. 27-39.

Orthis rogata Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 331, pl. 5, figs. 1-4;—American Geol., XIX, 1897, p. 95, pl. 4, figs. 1-10.

Orthis (Dalmanella) testudinaria Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 441, pl. 33, figs. 17-22.—Whiteaves, Pal. Foss., III, Pt. III, 1897, pp. 177, 241.

Loc. Europe; throughout the extent of the formations in America.

Dalmanella testudinaria emacerata Hall. Utica (Ord.).

Orthis emacerata Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 121;—Fifteenth Rep. Ibidem, 1862, pl. 2, figs. 1-3.—Billings, Canadian Nat. Geol., VII, 1862, p. 393.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 24.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 14, 15.—Keyes, Geol. Survey Missouri, V, 1895, p. 58.—Sardeson, American Geol., XIX, 1897, p. 102, pl. 5, figs. 14, 18, 28.

Orthis cyclus James, Cincinnati Quart. Jour. Sci., I, 1874, p. 19.

Dalmanella emacerata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224, pl. 5C, figs. 1, 2.

Orthis macrior Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 330, pl. 5, figs. 5-7.

Orthis (D.) testudinaria var. emacerata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 445, pl. 33, figs. 23, 24.

Loc. Cincinnati, Ohio; Spring Valley and Granger, Minnesota; Cape Girardeau, Missouri; St. Croix, Quebec, Canada.

Dalmanella testudinaria futilis (Sardeson). Trenton (Ord.).

Orthis futilis Sardeson, American Geol., XIX, 1897, p. 104, pl. 5, figs. 25-27.

Loc. Near Granger and Wykoff, Minnesota.

Dalmanella testudinaria ignota (Sardeson). Lorraine (Ord.).

Orthis ignota Sardeson, American Geol., XIX, 1897, p. 99, pl. 5, figs. 1-7.

Loc. Near Spring Valley, Minnesota.

Dalmanella testudinaria meeki (Miller). Lorraine (Ord.).

Orthis emacerata Meek (non Hall), Pal. Ohio, I, 1873, p. 109, pl. 8, figs. 1, 2

Orthis meeki Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 20.—Sardeson, American Geol., XIX, 1897, p. 98, pl. 4, figs. 24-29.

Orthis jugosa James, The Palæontologist, 4, 1879, p. 31.

Dalmanella meeki Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 206, 224, pl. 5C, fig. 3.

Orthis corpulenta Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 330, pl. 5, figs. 8-10;—American Geol., XIX, 1897, p. 101, pl. 4, figs. 11-19.

Orthis (D.) testudinaria var. meeki Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 445, pl. 33, figs. 25-29.

Loc. Oxford, etc., Ohio; Spring Valley, Minnesota.

Dalmanella testudinaria multisecta (Meek). Utica (Ord.).

Orthis emacerata var. multisecta (James MS.) Meek, Pal. Ohio, I, 1873, p. 112, pl. 8, fig. 3.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 22.

Orthis multisecta Sardeson, American Geol., XIX, 1897, p. 97, pl. 4, figs. 20-23.

Dalmanella multisecta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 224.

Loc. Cincinnati, Ohio.

Dalmanella testudinaria porrecta (Sardeson). Trenton (Ord.).

Orthis porrecta Sardeson, American Geol., XIX, 1897, p. 104, pl. 5, figs. 19-24.

Loc. Near Granger, Minnesota.

DELTHYRIS Dalman. Genotype Delthyris elevata Dalman.

Delthyris Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 99.—Dall, American Jour. Conch., VI, 1870, p. 116.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 9 and 16 under caption Septati (non p. 19).

Spirifera "lamellosa" Hall, Ninth Ann. Rep. New York State Geol., 1890, p. 11.

Obs. Specimens of D. elevata examined by the writer show a distinct median septum in the ventral valve.

Delthyris acanthoptera Conrad=Spirifer acanthopterus.
Delthyris acanthota Hall=Spirifer disjunctus.
Delthyris acuminata Conrad=Spirifer acuminatus.
Delthyris acuminata Hall (non Conrad)=D. mesicostalis.
Delthyris acutilirata Conrad=Platystrophia acutilirata.
Delthyris arenaria Vanuxem=Spirifer arenosus.
Delthyris arenosa Conrad=Spirifer arenosus.
Delthyris audacula Conrad=Spirifer audaculus.
Delthyris bialveata Conrad=Spirifer radiatus.
Delthyris biloba Conrad=Bilobites varicus.
Delthyris brachynota Hall=Platystrophia biforata.
Delthyris chemungensis Conrad=Spirifer disjunctus.
Delthyris congesta Hall=Spirifer granulosus.

Delthyris consobrina (d'Orbigny). Hamilton (Dev.).

Delthyris ziczac Hall (non Roemer), Geol. New York; Rep. Fourth Dist., 1843, p. 200, fig. 5.

Spirifera consobrina d'Orbigny, Prodrome Pal., I, 1850, p. 98.—Miller, N. American Geol. Pal., 1889, p. 372.

Spirifer clio Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 94.

Spirifera ziczac Hall, Pal. New York, IV, 1867, p. 222, pl. 35, figs. 15-23;—Second Ann. Rep. New York State Geol., 1883, pl. 59, fig. 9; pl. 60, fig. 18.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 554, pl. 11, fig. 13;—Geol. Ohio, VII, 1895, p. 448, pl. 7, fig. 13.

Spiriferina? ziczac Whitfield, Geol. Wisconsin, IV, 1882, p. 332, pl. 25, figs. 23, 24.

Spirifer consobrinus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 34, figs. 9, 18; pl. 37, figs. 9, 10.

Loc. Moscow, York, Darien, etc., New York; Columbus, Ohio; Milwaukee, Wisconsin; Louisville, Kentucky.

Delthyris cuspidata Hall=Spirifer disjunctus.
Delthyris decemplicatus Hall=D. sulcata.
Delthyris disjuncta Hall=Spirifer disjunctus.
Delthyris duodenaria Hall=Spirifer duodenarius.
Delthyris duplicata Conrad=Spirifer duplicatus.
Delthyris euruteines Owen=Spirifer euruteines.
Delthyris expansa Owen=Pterotheca expansa, a Pteropod.
Delthyris fimbriata Conrad=Reticularia fimbriata.
Delthyris granulifera Hall=Spirifer granulosus.
Delthyris granulosa Conrad=Spirifer granulosus.
Delthyris inermis Hall=Spirifer disjunctus.
Delthyris lævis Hall=Reticularia lævis.
Delthyris lynx Hall=Platystrophia lynx and biforata.
Delthyris macronota Hall=Spirifer macronotus.

Delthyris mesicostalis Hall. Ithaca and Chemung (Dev.).

Delthyris mesacostalis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 269, fig. 9.

Delthyris acuminata Hall (non Conrad), Ibidem, 1843, p. 270, fig. 5.

Spirifera mesacostalis Hall, Pal. New York, IV, 1867, p. 240, pl. 40, figs. 1-3.

Spirifera mesacostalis? Hall, Second Ann. Rep. New York State Geol., 1883, pl. 59, figs. 32-34.

Spirifera mesacostalis var. acuminata Hall, Ibidem, 1883, figs. 27-31.

Spirifer mesacostalis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 34, figs. 32-34.—Kindle, Bull. American Pal., 6, 1896, p. 35.

Loc. Ithaca, Philipsburg, Olean, etc., New York.

Delthyris perlamellosa (Hall). Lower Helderberg (Dev.).

Spirifer perlamellosa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 57, figs. 1-5 on p. 58;—Pal. New York, III, 1859, p. 201, pl. 26, figs. 1, 2.—Billings, Geol. Canada, 1863, p. 957, fig. 455.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 35, figs. 7-13.

Delthyris macropleura Rogers (non Conrad), Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 643.

Spirifera perlamellosa Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 384, pl. 7, fig. 9.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 60, figs. 5-13.

Spirifera perlamellosa? Keyes, Geol. Survey Missouri, V, 1895, p. 77.

Loc. Schoharie, Carlisle, etc., New York; Cumberland, Maryland; Pennsylvania; Square Lake, Maine; Perry County, Missouri; Decatur County, Tennessee.

Delthyris raricosta Conrad. Upper Helderberg (Dev.).

Delthyris raricosta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 262, pl. 14, fig. 18.

Delthyris undulatus Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 132, fig. 3.

Spirifer raricosta Billings, Canadian Jour., VI, 1861, p. 258, figs. 71-73 on p. 259;—Geol. Canada, 1863, p. 372, fig. 392.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 135, pl. 4, fig. 2; pl. 14, fig. 12.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 35, figs. 5, 6, 14-17.

?Spirifer hesione Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 117, pl. 3, fig. 17.

Spirifera raricosta Hall, Pal. New York, IV, 1867, p. 192, pl. 27, figs. 30-34; pl. 30, figs. 1-9.—Nicholson, Pal. Prov. Ontario, 1873, p. 82.—Billings, Pal. Fossils, II, 1874, p. 47, pl. 3A, fig. 5.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 60, figs. 14-17.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 128, pl. 17, figs. 38-42.

Loc. Schoharie, Caledonia, etc., New York; Columbus, Ohio; Falls of Ohio; Eureka district, Nevada; Port Colborne, Ontario; Square Lake, Maine; Grand Greve, Gaspé.

Delthyris rugatina Conrad=D. sulcata.

Delthyris(?) rugicosta (Hall). Arisaig (Sil.).

Spirifera rugæcosta Hall, Canadian Nat. Geol., V, 1860, p. 145.—Dawson, Acadian Geol., 3d ed., 1878, p. 596.

Loc. Arisaig, Nova Scotia.

Delthyris sculptilis Hall. Hamilton (Dev.).

Delthyris sculptilis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 202.

Spirifera sculptilis? Billings, Canadian Jour., VI, 1861, p. 262, fig. 79.

Spirifera sculptilis Billings, Geol. Canada, 1863, p. 386, fig. 423.—Hall, Pal. New York, IV, 1867, p. 221, pl. 35, figs. 10-14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 132, pl. 31, fig. 13.

Spirifer sculptilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 37, fig. 8.

Loc. Ludlowville, York, etc., New York; Monroe County, Pennsylvania; Bosanquet, Ontario; Falls of Ohio.

Delthyris sinuatus Hall=Bilobites bilobus.

Delthyris staminea Hall=Spirifer crispus.

Delthyris sulcata Hisinger. Niagara (Sil.).

Delthyris sulcata Hisinger, Petref. Suecica, 1837, p. 73, pl. 21, fig. 8.

Delthyris rugatina Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261.

Delthyris decemplicatus Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 105, fig. 4.

Spirifer sulcatus Hall, American Jour. Sci., XX, 1849, p. 228;—Pal. New York, II, 1852, p. 261, pl. 54, fig. 2.—Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 7.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 60, figs. 1-4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 35, figs. 1-4.

Loc. Europe; Lockport, Rochester, etc., New York; Hamilton, Ontario.

Obs. Davidson regards this species as synonymous with D. elevata Dalman, 1828.

Delthyris undulatus Vanuxem=D. raricosta.

Delthyris varica Conrad=Bilobites varicus.

Delthyris ziczac Hall=D. consobrina.

DERBYA Waagen. Genotype Derbya regularis Waagen.

Derbyia Waagen, Palæontologica Indica, Ser. XIII, I, 1884, pp. 576, 591.

Derbya Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 261;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 286.

Derbya affinis Hall and Clarke. Upper Carboniferous.

Derbya affinis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 349, pl. 11B, figs. 4, 5.

Loc. Near Kansas City, Missouri.

Derbya bennetti Hall and Clarke. Upper Carboniferous.

Derbya bennetti Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 263, 348, pl. 11A, figs. 34-39.

Loc. Near Kansas City, Missouri.

Derbya biloba Hall. Upper Carboniferous.

Streptorhynchus biloba Hall, Second Ann. Rep. New York State Geol., 1883, pl. 41, figs. 4, 5.

Derbya biloba Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 350, pl. 11, figs. 4, 5.

Loc. Winterset, Iowa.

Derbya broadheadi Hall and Clarke. Upper Carboniferous.

Derbya broadheadi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 263, 347, pl. 11A, figs. 23, 24.

Loc. Near Kansas City, Missouri.

Derbya correanus (Derby). Upper Carboniferous.

Streptorhynchus correanus Derby, Bull. Cornell Univ., I, 1874, p. 32, pl. 6, fig. 11; pl. 7, figs. 1-4, 8, 10, 11-14, 17.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 41, figs. 18-22.

Derbya correanus Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 592.

Derbya correana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 11, figs. 18-22; pl. 20, figs. 10, 11.

Loc. Itaituba, Brazil.

Derbya(?) costatula Hall and Clarke. Kaskaskia (L. Carb.).

Derbya? costatula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 346, pl. 11B, figs. 16, 17.

Loc. Crittenden County, Kentucky.

Derbya crassa (Meek and Hayden). Upper Carboniferous.

Orthis arachnoides Roemer (non Phillips), Kreidebildung Texas, 1852, p. 89, pl. 11, fig. 9.—Hall, Mexican Bound. Survey, 1857, pl. 20, fig. 3.

Orthisina crassa Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1858, p. 261.

Orthis lasallensis McChesney, Descriptions New Pal. Fossils, 1860, p. 32;—Ibidem, 1865, pl. 1, fig. 6.

Orthis richmonda McChesney, Descriptions New Pal. Foss., 1860, p. 32;—Ibidem, 1865, pl. 1, fig. 5.

Hemipronites crassus Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. Knowl., XIV, 172, 1864, p. 26, pl. 1, fig. 7.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 174, pl. 5, fig. 10; pl. 8, fig. 1.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 570, pl. 25, fig. 12.—Herrick, Bull. Denison Univ., II, 1887, p. 50, pl. 2, fig. 19.

Orthis crenistria Geinitz (non Phillips), Carbon u. Dyas in Nebraska, 1866, p. 46, pl. 3, figs. 20, 21.

Hemipronites lasallensis McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 28, pl. 1, fig. 6.

Hemipronites richmonda McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 28, pl. 1, fig. 5.

Hemipronites crenistria White, Wheeler's Expl. Survey west 100 Merid., IV, 1875, p. 124, pl. 10, fig. 9.

Streptorhynchus richmondi Hall, Second Ann. Rep. New York State Geol., 1883, pl. 40, figs. 10, 11.

Hemipronites crassa White, Thirteenth Rep. State Geol. Indiana, 1884, p. 129, pl. 26, figs. 4-11.

Derbyia crassa Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 592.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 10, figs. 10, 11; pl. 11A, figs. 28-33; pl. 11B, figs. 23, 24; pl. 20, figs. 12, 13.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 28 (extract).

Streptorhynchus crenistria Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 229;—Geol. Survey Missouri, V, 1895, p. 67, pl. 38, fig. 8.

Streptorhynchus crassum Miller, N. American Geol. Pal., 1889, p. 378.

?Streptorhynchus crassum Whitfield, Annals New York Acad. Sci., V, 1891, p. 580, pl. 13, figs. 11, 12;—Geol. Ohio, VII, 1893, p. 468, pl. 9, figs. 11, 12.

Loc. Leavenworth, Kansas; Nebraska City, Nebraska; Illinois; Missouri; Iowa; Ohio; Arkansas; Utah; Nevada; northern New Mexico; San Saba Valley, Texas.

Derbya cymbula Hall and Clarke. Upper Carboniferous.

Derbya cymbula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 348, pl. 11B, figs. 2, 3.

Loc. Near Kansas City, Missouri.

Derbya kaskaskiaensis (McChesney). Kaskaskia (L. Carb.).

Orthis kaskaskiensis McChesney, Descriptions New Pal. Foss., 1860, p. 31.

Derbya kaskaskiensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 11B, fig. 6.

Loc. Kaskaskia, Chester, and Crittenden, Illinois.

Derbya keokuk Hall. Knobstone-Keokuk (L. Carb.).

Orthis crenistria Yandell and Shumard, Cont. Geol. Kentucky, 1847, pp. 19, 21.

Orthis keokuk Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 640, pl. 19, fig. 5.—Keyes, Geol. Survey Missouri, V, 1895, p. 63.

Streptorhynchus keokuk Hall, Second Ann. Rep. New York State Geol., 1883, pl. 41, figs. 1–3.

Streptorhynchus crenistria Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 279, pl. 18, fig. 14.

Derbya keokuk Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 11, figs. 1–3.

Loc. Keokuk, Iowa; Warsaw and Nauvoo, Illinois; New Providence, Indiana; Clark County, Missouri; Nevada.

Derbya pratteni (McChesney). Upper Carboniferous.

Orthis pratteni McChesney, Descriptions New Pal. Foss., 1860, p. 33.

Loc. Charbonier, Missouri.

Derbya robusta (Hall). Upper Carboniferous.

Orthis umbraculum? Owen (non Schloth.), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 5, fig. 11 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17945).

Orthis robusta Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 743, pl. 28, fig. 5.

Streptorhynchus robusta Hall, Second Ann. Rep. New York State Geol., 1883, pl. 40, figs. 12–17.

Derbyia robusta Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 592.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 262, pl. 10, figs. 12–17; pl. 11B, figs. 7, 8.

Loc. St. Clair County, Illinois.

Derbya ruginosa Hall and Clarke. Keokuk (L. Carb.).

Derbya ruginosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 346, pl. 11A, figs. 25–27.

Loc. New Providence, Indiana.

Dicellomus Hall=Obolella.

Dicellomus crassa Hall=Obolella crassa.

Dicellomus polita Hall=Obolella polita.

Dicœlosia King=Bilobites.

Dicraniscus Meek=Triplecia.

Dicraniscus ortoni Meek=Triplecia ortoni.

DICTYONELLA Hall. Genotype Rhynchonella? reticulata Hall.

Dictyonella Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 274.

Eichwaldia Hall, Ibidem, 1867, pp. 274–277, with figs.—Dall, American Jour. Conch., VI, 1870, p. 98.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 307;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 903.

Dictyonella anticostiensis (Billings). Anticosti (Sil.).

Eichwaldia anticostiensis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 10.

Loc. Anticosti.

Dictyonella concinna Hall. ?Niagara (Sil.).

Eichwaldia concinna Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 278.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, fig. 5.

Loc. Perry and Decatur counties, Tennessee.

Dictyonella corallifera Hall. Niagara (Sil.).

Atrypa corallifera Hall, Pal. New York, II, 1852, p. 281, pl. 58, fig. 5.

Eichwaldia corallifera Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 278.

Loc. Lockport and Rochester, New York.

Dictyonella gibbosa Hall. Niagara (Sil.).

Eichwaldia gibbosa Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 278.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, figs. 6, 7.

Loc. Perry and Decatur counties, Tennessee.

Dictyonella reticulata Hall. Niagara (Sil.).

Rhynchonella? reticulata Hall, Trans. Albany Institute, IV, 1863, p. 217.

Eichwaldia reticulata Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, pp. 275-277, figs. 1-7;—Twenty-eighth Rep. Ibidem, 1879, p. 169, pl. 26, figs. 50-54;—Eleventh Rep. State Geol. Indiana, 1882, p. 312, pl. 26, figs. 50-54.—Foerste, Bull. Denison Univ., I, 1885, p. 91, pl. 13, fig. 4.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 31, pl. 3, figs. 11-13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 308, figs. 229-235; pl. 83, figs. 8-13.—Foerste, Geol. Ohio, VII, 1895, p. 594, pl. 25, fig. 4.

Loc. Waldron, Indiana; Dayton, Ohio; Wisconsin.

DIELASMA King. Genotype Terebratulites elongatus Schlotheim.

Epithyris King (non Phillips), Mon. Permian Foss., Pal. Soc., 1850, p. 46.—Dall, American Jour. Conch., VI, 1870, p. 103.

Dielasma King, Proc. Dublin Univ. Zool. Bot. Assoc., I, 1859, p. 260.—Beecher and Schuchert, Biol. Soc. Washington, VIII, 1893, pp. 71-82.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 293;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 863.

Dielasma bovidens (Morton). Upper Carboniferous.

Terebratula bovidens Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 4.—Meek, Final Rep. U. S. Geol. Survey, Nebraska, 1872, p. 187, pl. 1, fig. 7; pl. 2, fig. 4.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 572, pl. 25, fig. 15.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 137, pl. 32, figs. 17-19.—Keyes, Geol. Survey Missouri, V, 1895, p. 105.

Terebratula bovidens? Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 711.—McChesney, Trans. Chicago Acad. Sci., I, 1869, p. 37, pl. 1, fig. 2.

Terebratula millipunctata Hall, Expl. Surveys R. R. Route Miss. River, Pacific Ocean, III, 1856, p. 101, pl. 2, figs. 1, 2;—Trans. Albany Institute, IV, 1858, p. 35.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.—White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 119.

Terebratula elongata Shumard (non Schlotheim), Trans. St. Louis Acad. Sci., I, 1859, p. 392.

Terebratula geniculosa McChesney, Descriptions New Pal. Foss., 1861, p. 82;—Ibidem, 1865, pl. 1, fig. 2.

Dielasma? bovidens White, Wheeler's Expl. Survey west 100 Merid., Prel. Rep., 1874, p. 21.

Dielasma bovidens (Morton)—Continued.

Terebratula (Dielasma) bovidens White, Ibidem, Final Rep., IV, 1875, p. 144, pl. 11, fig. 10.

Terebratula hastata Walcott (non Sowerby), Mon. U. S. Geol. Survey, VIII, 1884, p. 224.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 30.

Dielasma bovidens Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 295, 296, fig. 213; pl. 81, figs. 29-35.

Loc. Putnam Hill, Ohio; Indiana; Illinois; Missouri; Iowa; Nebraska; Arkansas; New Mexico; Eureka district, Nevada; Guadalupe Mountains, Texas.

Dielasma burlingtonense White. Kinderhook (L. Carb.).

Terebratula burlingtonensa White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 228.

Terebratula (Dielasma) burlingtonensis White, Wheeler's Expl. Survey west 100 Merid., IV, 1875, p. 93.

Dielasma burlingtonensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 296, pl. 81, figs. 9-11.

Loc. Burlington, Iowa; Mountain Spring, Nevada.

Dielasma calvini (Hall and Whitfield). Chemung (Dev.).

Crpytonella eudora Hall and Whitfield (non Hall, 1867), Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 225.

Cryptonella calvini Hall and Whitfield, Ibidem, 1873, p. 239.

?Cryptonella calvini Whiteaves, Cont. Canadian Pal., I, 1891, p. 235.

Dielasma calvini Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 296, pl. 80, figs. 20-22.

Loc. Hackberry Grove, Iowa; Mackenzie and Peace rivers, Canada.

Dielasma formosum Hall. Warsaw (L. Carb.).

Terebratula formosa Hall, Trans. Albany Institute, IV, 1858, p. 7.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 55, pl. 6, figs. 59-64.—White, Eleventh Rep. State Geol. Indiana, 1882, p. 361, pl. 39, figs. 6-8.—Hall, Twelfth Rep. Ibidem, 1883, p. 337, pl. 29, figs. 59-64.

Dielasma formosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 296, pl. 81, figs. 12-26.

Loc. Bloomington and Spergen Hill, Indiana; Alton and Warsaw, Illinois; Caldwell County, Kentucky.

Dielasma gorbyi (Miller). Keokuk (L. Carb.).

Terebratula gorbyi Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 77, pl. 13, figs. 3, 4.

Loc. Edwardsville and Crawfordsville, Indiana.

Dielasma hochstetteri (Toula). Upper Carboniferous.

Terebratula hochstetteri Toula, Sitzb. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 1, pl. 1, fig. 1.—Derby, Bull. Cornell Univ., I, 1874, p. 63.

Loc. Near Cochabamba, Bolivia.

Obs. Probably synonymous with D. bovidens (Morton).

Dielasma itaitubaense (Derby). Upper Carboniferous.

Terebratula itaitubensis Derby, Bull. Cornell Univ., I, 1874, p. 1, pl. 2, figs. 1, 3, 8, 16; pl. 3, fig. 24; pl. 6, fig. 15.

Dielasma itaitubensis Waagen, Palæontologica Indica, Ser. XIII, I, 1882, p. 348.—de Koninck, Annales du Musée Royal d'Histoire Naturelle de Belgique, XIV, 1887, p. 26, pl. 5, figs. 1-10, 45, 50.

Loc. Beach at Itaituba, Brazil; Belgium.

Dielasma obovatum Hall and Clarke. ?Upper Carboniferous.

Dielasma obovata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 81, figs. 38-40.

Loc. Kentucky.

Dielasma occidentale (Miller). Chouteau (L. Carb.).

Terebratula occidentalis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 313, pl. 9, figs. 10-13.

Loc. Sedalia, Missouri.

Dielasma(?) rowleyi (Worthen). Burlington (L. Carb.).

Terebratula rowleyi Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 23;—Geol. Survey Illinois, VIII, 1890, p. 102, pl. 11, fig. 6.—Keyes, Geol. Survey Missouri, V, 1895, p. 105, pl. 40, fig. 15.

Dielasma rowleyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 296, pl. 81, figs. 27, 28.

Loc. Pike County, Missouri.

Dielasma sacculus (Martin). Upper Carboniferous.

Conchyliolithus anomites sacculus Martin, Petref. Derbesiana, 1809, tab. 46, figs. 1, 2.

Terebratula sacculus Dawson, Acadian Geol., 1855, p. 219, fig. 27.—Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 169, pl. 9, figs. 1-3.—Dawson, Acadian Geol., 3d ed., 1878, p. 289, fig. 87.

Loc. Europe; Windsor, Nova Scotia.

Dielasma shumardianum (Miller). Kaskaskia (L. Carb.).

Terebratula arcuata Swallow (non Roemer, 1840), Trans. St. Louis Acad. Sci., II, 1863, p. 83.—Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1872, p. 470.

Terebratula shumardana Miller, American Pal. Foss., 2d ed., 1883, p. 299.

Loc. St. Genevieve County, Missouri; Chester, Illinois; near Virginia City, Montana.

Obs. Regarded by Meek and White as probably synonymous with D. bovidens (Morton).

Dielasma turgidum (Hall). Warsaw and St. Louis (L. Carb.).

Terebratula turgida Hall, Trans. Albany Institute, IV, 1858, p. 6.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 54, pl. 6, figs. 53-58.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 336, pl. 29, figs. 53-58.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 586, pl. 13, figs. 21, 22;—Geol. Ohio, VII, 1895, p. 473, pl. 9, figs. 21, 22.

Dielasma turgida Beecher and Schuchert, Proc. Biol. Soc. Washington, VIII, 1893, p. 73, pl. 10, figs. 1-6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 296, pl. 81, figs. 1-8.

Loc. Bloomington and Spergen Hill, Indiana; Crittenden County, Kentucky; Maxville and Newtonville, Ohio; Alton and Warsaw, Illinois; Pella, Iowa; Boonville, Missouri.

DIGNOMIA Hall. Genotype Lingula alveata Hall.

Dignomia Hall, Notes on some New or Imperfectly Known Forms among the Brach., 1872, p. 2, pl. 13, fig. 3;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 245, pl. 13, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 14, 163;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 230.

Dignomia alveata Hall. Hamilton (Dev.).

Lingula alveata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 23;—Pal. New York, IV, 1867, p. 12, pl. 2, figs. 14, 15.

Dignomia alveata Hall—Continued.

Dignomia alveata Hall, Notes on some New or Imperfectly Known Forms among the Brach., 1872, p. 2, pl. 13, fig. 3;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, pl. 13, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 14, pl. 1, figs. 24, 25.—Clarke, Thirteenth Ann. Rep. New York State Geologist, 1895, p. 187, pl. 4, fig. 1.

Loc. Canandaigua Lake, etc., New York.

DINOBOLUS Hall. Genotype Obolus conradi Hall.

Dinobolus Hall, Notes on some New or Imperfectly Known Forms among the Brach., (March) 1871, p. 4;—Ibidem, 1872, p. 4;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 247.—Hall and Whitfield, Pal. Ohio, II, 1873, p. 130.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 36, 46, 164;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 237.

Obolellina Billings, Canadian Nat. Geol., VI (December) 1871, p. 222;—Ibidem, VI, 1872, p. 326, figs. 1, 2;—American Jour. Sci., 3d ser., III, 1872, p. 270.

Conradia Hall (non Adams), Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 250.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 159.

Dinobolus canadaensis (Billings). Black River and Trenton (Ord.).

Obolus canadensis Billings, Canadian Nat. Geol., III, 1858, p. 441, fig. 20–23 (non fig. 19 = D. magnificus);—Geol. Survey Canada; Rep. Prog. for 1857, 1858, p. 189, figs. 20–23 (non fig. 19);—Geol. Canada, 1863, p. 142, figs. 75.

Obolellina canadensis Billings, Canadian Nat. Geol., VI, 1871, p. 222;—Ibidem, 1872, p. 326, fig. 15; fig. 6, p. 329.

Dinobolus canadensis Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 162, pl. 19, fig. 7.

Loc. Pauquette Rapids, etc., Canada.

Dinobolus conradi Hall. Niagara (Sil.).

Obolus conradi Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1868, p. 368, pl. 13, figs. 1, 2.

Obolus (Trimerella?) conradi Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 351, pl. 5, fig. 7.

Trimerella conradi Dall, American Jour. Conch., VII, 1871, p. 83.

Dinobolus conradi Hall, Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 247 (also extracts 1871, 1872).—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 160, pl. 18, figs. 1–5.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 130, pl. 7, figs. 3, 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 38, pl. 4B, figs. 13–24.

Loc. Port Byron, Illinois; Leclaire, Iowa; Racine and Grafton, Wisconsin; Crawford, Ohio; England; Gotland.

Dinobolus magnificus (Billings). Black River-Trenton (Ord.).

Obolus canadensis Billings (partim), Geol. Surv. Canada, Rep. Prog. for 1857, 1858, p. 189, fig. 19 (non 20–23);—Canadian Nat. Geol., III, 1858, p. 441, fig. 19 (non figs. 20–23 = D. canadensis).

Obolellina magnificus Billings, Ibidem, n. ser., VI, 1872, p. 329, fig. 7.

Dinobolus magnificus Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 164, pl. 19, fig. 8.—Nicholson, Pal. Prov. Ontario, 1875, p. 17, fig. 6.

Loc. Pauquette Rapids, etc., Canada.

Dinobolus(?) parvus Whitfield. Galena (Ord.).

Dinobolus? parvus Whitfield, Geol. Wisconsin, IV, 1882, p. 347, pl. 27, figs. 8–10.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 356, fig. 27.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 166.

Loc. Whitewater, Wisconsin; Wykoff, Minnesota; Lake Winnipeg, Canada.

DINORTHIS Hall and Clarke. Genotype Orthis pectinella Emmons.

Dinorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 195, 222.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 420.

Plæsiomys Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 196.

Dinorthis and Plæsiomys Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 266.

Dinorthis deflecta (Conrad.) Trenton (Ord.).

Strophomena deflecta Conrad, Proc. Acad. Nat Sci. Philadelphia, I, 1843, p. 332.—Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.

Strophomena recta Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 332.—Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.

Leptæna deflecta Hall, Pal. New York, I, 1847, p. 113, pl. 31B, fig. 5.

Leptæna recta Hall, Ibidem, 1847, p. 113, pl. 31B, fig. 6.

Streptorhynchus rectus Miller, American Pal. Foss., 1877, p. 134.

Streptorhynchus deflectum Miller, N. American Geol. and Pal., 1889, p. 378.

Plæsiomys deflecta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 197, 222, pl. 5A, figs. 28-34.

Plæsiomys recta Hall and Clarke, Ibidem, 1892, pp. 197, 222.

Plæsiomys loricula Hall and Clarke, Ibidem, 1892, pp. 197, 341, pl. 5A, figs. 31-34.

Orthis (Dinorthis) deflecta Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 422, pl. 32, figs. 24-30.

Loc. Mineral Point, Beloit, Janesville, Wisconsin; Dixon, Illinois; Minneapolis, St. Paul, etc., Minnesota; McGregor, Iowa; central Tennessee; Highbridge, Kentucky.

Dinorthis fontinalis (White). Calciferous (Ord.).

Strophomena fontinalis White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 54, pl. 3, fig. 4;—Prelim. Rep., p. 10, 1874.

Loc. Fish Spring, House Range, Utah.

Obs. Related to D. deflecta (Conrad).

Dinorthis iphigenia (Billings). Trenton (Ord.).

Orthis iphigenia Billings, Pal. Fossils, I, 1862, p. 133, pl. 110.

Plæsiomys iphigenia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Ottawa, Canada.

Dinorthis meedsi Winchell and Schuchert. Trenton (Ord.).

Orthis meedsi Winchell and Schuchert, American Geol., IX, April 1, 1892, p. 289.

Orthis minnesotensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 332, pl. 5, figs. 14-17.

Orthis (Dinorthis) meedsi Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 427, pl. 32, figs. 39-42.

Loc. Cannon Falls, Kenyon, Preston, etc., Minnesota; Decorah and McGregor, Iowa; Neenah and Oshkosh, Wisconsin.

Dinorthis meedsi germana Winchell and Schuchert. Trenton (Ord.).

Orthis meedsi var. germana Winchell and Schuchert, American Geol., IX, 1892, p. 290.

Orthis (D.) meedsi var. germana Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 428, pl. 32, figs. 43-45.

Loc. Cannon Falls, Kenyon, and Fountain, Minnesota.

Dinorthis pectinella (Emmons). Trenton (Ord.).

Orthis pectinella Emmons, Geol. New York; Rep. Second Dist., 1842, p. 394, fig. 2.—Hall, Pal. New York, I, 1847, p. 123, pl. 32, fig. 10.—Billings, Canadian Nat. Geol., I, 1856, p. 205, fig. 5 —Rogers, Geol. Pennsylvania, II, Pt. II,

Dinorthis pectinella (Emmons)—Continued.

1858, p. 818, fig. 602.—Billings, Geol. Canada, 1863, p. 165, fig. 147.—Hall, Second Ann Rep. New York State Geol., 1883, pl. 34, figs. 39, 40.

Orthis pectinella var. semiovalis Hall, Pal. New York, I, 1847, p. 124, pl. 32, fig. 11.—Miller, N. American Geol. Pal., 1889, p. 359.

Orthis charlottæ N. H. Winchell, Eighth Rep. Geol. Nat. Hist. Survey Minnesota, 1880, p. 67.

Dinorthis pectinella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 195, 222, 228, pl. 5, figs. 27-33

Orthis (Dinorthis) pectinella Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 424, pl. 32, figs. 31-34.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 175.

Loc. Middleville, Trenton Falls, etc., New York; Pennsylvania; Mercer County, Kentucky; Ontario, Canada; Decorah, Iowa; St. Paul, Minneapolis, and Cannon Falls, Minnesota; Lake Winnipeg, Canada.

Dinorthis pectinella sweeneyi N. H. Winchell. Trenton (Ord.).

Orthis sweeneyi N. H. Winchell, Ninth Rep. Geol. Nat. Hist. Survey Minnesota, 1881, p. 117.

Dinorthis sweeneyi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 196, 222, 228, pl. 5, figs. 34-36.

Orthis (Dinorthis) pectinella var. sweeneyi Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 426, pl. 32, figs. 35-38.

Loc. St. Paul, Cannon Falls, etc., Minnesota; Decorah and McGregor, Iowa.

Dinorthis platys (Billings). °Chazy (Ord.).

Orthis platys Billings, Canadian Nat. Geol., IV, 1859, p. 438, fig. 15;—Geol. Canada, 1863, p. 129, fig. 54.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 218.

Loc. Island of Montreal, Canada.

Dinorthis porcata (McCoy). Trenton and Lorraine (Ord.).

Orthis porcata McCoy, Silurian Foss. of Ireland, 1846, p. 32, pl. 3, fig. 14.—Billings, Pal. Fossils, I, 1862, p. 135, fig. 111;—Geol. Canada, 1863, p. 312, fig. 319.

Orthis anticostiensis Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 19, pl. 6.

Plæsiomys porcata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 197, 222, pl. 5A, figs. 20, 21.

Loc. Ireland; Ottawa, Canada; Anticosti.

Dinorthis proavita Winchell and Schuchert. Lorraine (Ord.).

Orthis proavita Winchell and Schuchert, American Geol., IX, April 1, 1892, p. 290.

Orthis petræ Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 332, pl. 5, figs. 18-21.

Orthis (Dinorthis) proavita Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 431, pl. 32, figs. 51-57.—? Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 176.

Loc. Spring Valley, Minnesota; Wilmington, Illinois; Lake Winnipeg, Canada.

Dinorthis retrorsa (Salter). Trenton and Lorraine (Ord.).

Orthis retrorsa Salter, Mem. Geol. Survey Great Britain, II, 1858, p. 373, pl. 27, figs. 3, 4.—Billings, Pal. Fossils, I, 1862, p. 136, figs. 112, 113.—Meek, Pal. Ohio, I, 1873, p. 92, pl. 11, fig. 7.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 37.

Orthis carleyi Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 120, fig. in text;—Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 28, 29.

Orthis? kennicotti McChesney, New Pal. Fossils, 1861, p. 78.

Discina keokuk Gurley=Orbiculoidea keokuk.
Discina lodensis Hall=Orbiculoidea lodiensis.
Discina magnifica Herrick=Orbiculoidea magnifica.
Discina manhattensis Meek and Hayden=Orbiculoidea manhattanensis.
Discina marginalis Whitfield=Orbiculoidea marginalis.
Discina media Hall=Orbiculoidea lodiensis media.
Discina meekana Whitfield=Orbiculoidea missouriensis.
Discina microscopica Shumard=Acrotreta microscopica.
Discina minuta Hall=Orbiculoidea minuta.
Discina missouriensis Shumard=Orbiculoidea missouriensis.
Discina munda Miller and Gurley=Orbiculoidea munda.
Discina neglecta Hall=Orbiculoidea neglecta.
Discina newberryi Hall=Lingulodiscina newberryi.
Discina nitida Meek and Worthen=Orbiculoidea missouriensis.
Discina nitida=Orbiculoidea nitida.
Discina patellaris Winchell=Orbiculoidea patellaris.
Discina pelopea Billings=Schizotreta pelopea.

Discina(?) pileolus Whiteaves. ? Lower Cretaceous.

Discina pileolus Whiteaves, Cont. Canadian Pal., I, 1889, p. 159, pl. 21, fig. 3.

Loc. Rink Rapids on Lewis River, British America.

Obs. "Professor Hyatt thinks that the fossils from this locality are Jurassic" (Stanton).

Discina pleurites Meek=Lingulodiscina pleurites.
Discina randalli Hall=Orbiculoidea randalli.
Discina saffordi Winchell=Orbiculoidea saffordi.
Discina sampsoni Miller=Orbiculoidea sampsoni.

Discina(?) semipolita Whiteaves. Cretaceous.

Discina semipolita Whiteaves, Mesozoic Fossils, I, Geol. Survey Canada, 1884, p. 252, pl. 33, fig. 9.

Loc. Queen Charlotte Island.

Discina seneca Hall=Orbiculoidea seneca.
Discina solitaria Ringueberg=Schizotreta tenuilamellata.

?Discina sublamellosa Ulrich. Lorraine (Ord.).

Discina sublamellosa Ulrich, Jour. Cincinnati, Soc. Nat. Hist., I, 1878, p. 97, pl. 4, fig. 11.—Miller, N. American Geol. Pal., 1889, p. 344.

Loc. Covington, Kentucky.

Obs. Probably not a brachiopod.

Discina subtrigonalis McChesney=Orbiculoidea subtrigonalis.
Discina tenuilamellata var. subplana Hall=Orbiculoidea subplana.
Discina tenuilineata Meek and Hayden=Orbiculoidea tenuilineata.
Discina tenuistriata Ulrich=Orbiculoidea tenuistriata.
Discina trigonalis McChesney=Orbiculoidea subtrigonalis.
Discina truncata Hall=Schizobolus concentricus.
Discina truncata Emmons=Orbiculoidea lamellosa.
Discina tullia Hall=Orbiculoidea tullia.
Discina utahensis Meek=Orbiculoidea utahensis.

Discina(?) vancouverensis Whiteaves. Cretaceous.

Discina vancouverensis Whiteaves, Mesozoic Fossils, I, Geol. Survey Canada, 1879, p. 177, pl. 20, fig. 6.

Loc. Admiralty Island.

Discina vanuxemi Hall=Orbiculoidea vanuxemi.

Discina varsoviensis Worthen=Orbiculoidea varsaviensis.

Discinella Hall=Operculum of Pteropod.

DISCINISCA Dall. Genotype Discina lamellosa Broderip.

Discinisca Dall, Bull. Mus. Comp. Zoology, III, 1871, p. 37.

Discinisca lugubris (Conrad). Miocene and Pliocene.

Capulus lugubris Conrad, Jour. Acad. Nat. Sci. Philadelphia, VII, 1834, p. 143.

Orbicula lugubris Conrad, Fossils Medial Tertiary For. U. S., 1845, p. 75, pl. 43, fig. 2.—Tuomey and Holmes, Foss. South Carolina, 1855, p. 17, pl. 5, fig. 1.—Dall, Republication of Conrad's Foss. Medial Tert. For. U. S., 1893, p. 101, pl. 43, fig. 2.

Discina lugubris, Whitfield, Mon. U. S. Geol. Survey, XXIV, 1894, p. 23, pl. 1, figs. 1-3.

Loc. St. Marys County, Maryland; Petersburg, Virginia; Peedee River, South Carolina; Atlantic City, Shiloh, and Bridgeton, New Jersey.

Obs. Referred to Discinisca on authority of Dr. W. H. Dall.

Discinisca multilineata (Conrad). Miocene.

Orbicula multilineata Conrad, Fossils Medial Tertiary For. U. S., 1845, p. 75, pl. 43, fig. 3.—Tuomey and Holmes, Foss. South Carolina, 1855, p. 18, pl. 5, fig. 2.—Dall, Republication of Conrad's Foss. Medial Tert. For. U. S., 1893, p. 101, pl. 43, fig. 3.

Loc. City Point, Virginia; Pedee River, South Carolina.

Obs. Probably a less worn variety of D. lugubris (Dall).

DISCINOPSIS Matthew. Genotype Acrotreta? gulielmi Matthew.

Discinopsis (Matthew MS.) Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 105, 167;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 250.

Discinopsis gulielmi Matthew. Middle Cambrian.

Acrotreta? gulielmi Matthew, Trans. Royal Soc. Canada, 1886, p. 37, pl. 5, fig. 14.

Discinopsis gulielmi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 105, pl. 3, figs. 20-24.

Loc. Portland, New Brunswick.

EATONIA Hall. Genotype Atrypa peculiaris Conrad.

Eatonia Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 90;—Twelfth Rep. Ibidem, 1859, p. 35;—Pal. New York, III, 1859, p. 432.—Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 111.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 205;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 829.

Eatonia coulteri Miller and Gurley. Oriskany (Dev.).

Eatonia coulteri Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893, p. 72, pl. 7, figs. 8-11.

Loc. Jackson County, Illinois.

Eatonia eminens Hall. Lower Helderberg (Dev.).

Eatonia eminens Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 92;—Pal. New York, III, 1859, p. 242, pl. 37, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206.

Loc. Decatur County, Tennessee.

Eatonia medialis (Vanuxem). Lower Helderberg (Dev.).

Atrypa medialis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 120, fig. 4.

Eatonia medialis Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 90, figs. 1-7;—Pal. New York, III, 1859, p. 241, pl. 37, fig. 1.—Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 111, pl. 3, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 29-35.

Loc. Schoharie, Carlisle, Catskill, etc., New York; Square Lake, Maine.

Eatonia peculiaris (Conrad). Lower Helderberg and Oriskany (Dev.).

Atrypa peculiaris Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 56.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 123, fig. 3.—Hall, Ibidem, Rep. Fourth Dist, 1843, p. 148, fig. 3.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 640.

Atrypa? nustella Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 14, fig. 3.

Eatonia peculiaris Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 37, figs. 1-7;—Pal. New York, III, 1859, p. 244, pl. 38, figs. 21-26; pl. 51, fig. 2; p. 436, pl. 101, fig. 2; pl. 101A, fig. 1;—Fifteenth Rep. New York State Cab. Nat. Hist., 1862, pl. 11.—Billings, Geol. Canada, 1863, p. 957, fig. 450.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 395, pl. 8, fig. 2.—Billings, Pal. Fossils, II, 1874, p. 40, pl. 3A, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 17-26.

Eatonia peculiaris? Keyes, Geol. Survey Missouri, V, 1895, p. 104.

Loc. Schoharie, etc., New York; Pennsylvania; Cumberland, Maryland; Jackson and Perry counties, Missouri; Gaspé.

Eatonia pumila Hall. Oriskany (Dev.).

Eatonia pumila Hall, Pal. New York, III, 1859, p. 437, pl. 101, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 206.

Loc. Albany County, New York.

Eatonia singularis (Vanuxem). Lower Helderberg (Dev.).

Atrypa singularis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 120, fig 3.

Eatonia singularis Hall, Pal. New York, III, 1859, p. 242, pl. 38, figs. 14-20.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 13-16.

Loc. Schoharie, etc., New York.

Eatonia sinuata Hall. Oriskany (Dev.).

Eatonia sinuata Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 91;—Pal. New York, III, 1859, p. 438, pl. 101A, figs. 3-6.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 36-38.

Loc. Cumberland, Maryland.

Eatonia(?) variabilis Whiteaves. Hamilton (Dev.).

Eatonia variabilis Whiteaves, Cont. to Canadian Pal., I, 1891, p. 233, pl. 29, figs. 6-9.

Loc. Hay River, Canada.

Eatonia whitfieldi Hall. Oriskany (Dev.).

Eatonia whitfieldi Hall, Pal. New York, III, 1859, p. 437, pl. 101A, fig. 2.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 206, pl. 61, figs. 27, 28.

Loc. Cumberland, Maryland.

EICHWALDIA Billings. Genotype Eichwaldia subtrigonalis Billings.

Eichwaldia Billings, Geol. Survey Canada; Rep. Progress for 1857, 1858, p. 190;—Canadian Nat. Geol., III, 1858, p. 442.

Eichwaldia of other authors=Dictyonella.

Eichwaldia subtrigonalis Billings. Trenton (Ord.).

Eichwaldia subtrigonalis Billings, Geol. Survey Canada; Rep. Progress for 1857, 1858, p. 192, fig. 24;—Canadian Nat. Geol., III, 1858, p. 443, fig. 24;—Geol. Canada, 1863, p. 142, fig. 76.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 310, figs. 241, 242; pl. 83, figs. 1-4.

Loc. Panquette Rapids, Canada.

ELKANIA Ford. Genotype Obolella desiderata Billings.

Billingsia Ford (non de Koninck, 1876), American Jour. Sci., 3d ser., XXXI, 1885, p. 466.

Elkania Ford, American Jour. Sci., 3d ser., XXXII, 1886, p. 325.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 75, 165;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 241.

Elkania ambigua (Walcott). Pogonip (base of Ord.).

Obolella? ambigua Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 67, pl. 1, fig. 2.

Elkania ambigua Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 78.

Loc. Eureka district, Nevada.

Elkania desiderata (Billings). Upper Cambrian.

Obolella desiderata Billings, Pal. Fossils, I, 1862, p. 69, fig. 62 on p. 68.

Obolella? desiderata Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.

Billingsia desiderata Ford, American Jour. Sci., 3d ser., XXXI, 1886, p. 466, figs. 1, 2.

Elkania desiderata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 77, pl. 3, figs. 15-19.

Loc. Point Levis, Canada.

ENTELETES Fischer de Waldheim. Genotype Orthis lamarcki Fisch.

Enteletes Fischer de Waldheim, Oryct. Gouv. Moscou, 1830, p. 193, tab. 26, figs. 6, 7.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 550.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 185, 214;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 272.

Syntrielasma Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 277;—Geol. Survey Illinois, II, 1866, p. 321, fig. 36.

Enteletes andii (d'Orbigny). Upper Carboniferous.

Terebratula andii d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 45, pl. 3, figs. 14, 15.

Orthis andii Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 3.

Syntrielasma andii Derby, Bull. Cornell Univ., I, 1874, p. 62.

Rhynchonella andii Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302.

Enteletes andii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Yarbichambi and Lake Titicaca, Bolivia; Santa Cruz.

Enteletes gaudryi (d'Orbigny). Upper Carboniferous.

Terebratula gaudryi d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 45.

Terebratula antissiensis d'Orbigny, Ibidem, 1842, pl. 3, fig. 16 (non pl. 2).

Syntrielasma gaudryi Derby, Bull. Cornell Univ., I, 1874, p. 62.

Enteletes gaudryi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Yarbichambi, Bolivia.

Enteletes hemiplicata Hall. Upper Carboniferous.

Spirifer hemiplicata Hall, Stansbury's Exped. Great Salt Lake, 1852, p. 409, pl. 4, fig. 3.

Enteletes hemiplicata Hall—Continued.

Rhynchonella angulata Geinitz (non Linné), Carbon u. Dyas Nebraska, 1866, p. 37, pl. 3, figs. 1-4.

Syntrielasma hemiplicata Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 323, fig. 36; p. 324, fig. 37.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 177, pl. 6, fig. 1; pl. 8, fig. 12.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 26, fig. 20.—Kayser, Richthofens China, IV, 1883, p. 179, pl. 24, figs. 2, 3.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 131, pl. 26, figs. 15-18.—Keyes, Geol. Survey Missouri, V, p. 76, pl. 39, fig. 8.

Camerophoria giffordi Worthen, Bull. Illinois State Mus., 1, 1882, p. 39;—Geol. Survey Illinois, VII, 1883, p. 318, figs. a-c.

Enteletes hemiplicata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 215, 226, pl. 7A, figs. 44-52.

Loc. Weston, Platte County, Missouri; Vandalia and Alta, Illinois; Stennett, Iowa; Kansas City, Missouri; Nebraska City, Nebraska; Lo Ping, China.

EUMETRIA Hall.

Genotype Retzia verneuiliana Hall=Terebratula marcyi Shumard.

Eumetria Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 59.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 487.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 115, figs. 104, 105;—Thirteenth Ann. Rep. New York State Geol., 1895, p. 795.

Eumetria(?) altirostris (White). Kinderhook (L. Carb.).

Retzia (Acambona?) altirostris White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 28.

Loc. Burlington, Iowa.

Eumetria marcyi (Shumard). St. Louis and Kaskaskia (L. Carb.).

Terebratula serpentina? Owen (non de Koninck), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3A, fig. 13 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17955).

Terebratula marcyi Shumard, Marcy's Rep. U. S. Expl. Red River of Louisiana, 1854, p. 177, pl. 1, fig. 4.

Retzia verneuiliana Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 657, pl. 23, fig. 1;—Trans. Albany Institute, IV, 1858, p. 9.

Retzia vera Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 704, pl. 27, fig. 3.

Eumetria vera Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 55, figs. 1-3, and p. 59.

Eumetria verneuiliana Hall, Ibidem, 1863, p. 55, fig. 2.—Whitfield, Bull. American Mus. Nat. Hist., 1882, p. 50, pl. 6, figs. 28-30.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 335, pl. 29, figs. 28-30.

Retzia radialis Walcott (non Phillips), Mon. U. S. Geol. Survey, VIII, 1884, p. 220, pl. 7, figs. 5, 5a (5b?).

Retzia marcyi Miller, N. American Geol. Pal., 1889, p. 366.

Eumetria verneuiliana and vera Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 117, figs. 104, 105, pl. 50, figs. 13-26, 34, 37; pl. 83, figs. 26, 27.

Loc. Washington and Crawford counties, Arkansas; Floyd County and elsewhere in Indiana; Alton, Illinois; Greene County, Missouri; Iowa; Cumberland Mountain, Tennessee.

Obs. Hall and Clarke (1893), in treating of the American species of Eumetria (E. vera and var. costata, and E. verneuiliana), say they "are, perhaps, all representatives of the same species." The writer regards them as one species, varying in different localities in size and number of striations. Owen was the first to observe this form and identified it provisionally with T. serpentina de Koninck. Shumard, however, believed it to be distinct from that species, and gave the name T. marcyi four years prior to that of Hall.

Eumetria marcyi costata Hall. Kaskaskia (L. Carb.).

Retzia vera var. costata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 704, pl. 27, fig. 3.

Eumetria vera var. costata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 51, figs. 27-33.

Loc. Chester, Illinois; Crittenden County, Kentucky.

Eumetria vera Hall = E. marcyi.

Eumetria verneuiliana Hall = E. marcyi.

Eumetria woosteri (White). ? Upper Carboniferous.

Retzia woosteri White, Bull. U. S. Geol. Survey Terr., V, 1879, p. 215;—Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 134, pl. 34, fig. 8.

Loc. Near Greeley, Colorado.

Obs. Closely related with E. marcyi of the Lower Carboniferous.

EUNELLA Hall and Clarke. Genotype Terebratula sullivanti Hall.

Eunella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290;—Thirteenth Ann. Rep. New York State Geol., 1895, p. 861.

Eunella harmonia Hall. Corniferous (Dev.).

Terebratula harmonia Hall, Pal. New York, IV, 1867, p. 388, pl. 60, figs. 11-16.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 154, pl. 17, figs. 1-4.

Eunella harmonia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, pl. 80, figs. 33-35.

Loc. Falls of Ohio; Ontario, Canada.

Eunella lincklæni Hall. Marcellus and Hamilton (Dev.).

Terebratula lincklæni Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 88;—Pal. New York, IV, 1867, corrigenda.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 155, pl. 17, figs. 22-24.

Cryptonella lincklæni Hall, Fourteenth Rep. New York State Cab. Nat. Hist., 1861, p. 101;—Sixteenth Rep. Ibidem, 1863, p. 44.

Cryptonella? lincklæni Hall, Pal. New York, IV, 1867, p. 397, pl. 60, figs. 49-65.

Terebratula lincklæni var. Hall, Ibidem, 1867, p. 418, pl. 60, figs. 32-37.

Eunella lincklæni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, pl. 80, figs. 28-32.

Loc. Clarke County, Indiana; Hamilton and Canandaigua Lake, New York; Thunder Bay, Michigan.

Eunella simulator Hall. Hamilton (Dev.).

Terebratula simulator Hall, Pal. New York, IV, 1867, p. 391, pl. 60, figs. 69, 70.

Eunella simulator Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, pl. 80, fig. 27.

Loc. Thedford, Ontario.

Eunella sullivanti Hall. Corniferous (Dev.).

Terebratula sullivanti Hall, Pal. New York, IV, 1867, p. 387, pl. 60, figs. 5-10, 68.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 291, pl. 37, figs. 9, 10.

Eunella sullivanti Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 290, fig. 210, pl. 80, figs. 23-26.

Loc. Columbus and Sandusky, Ohio; near Cayuga, Ontario, and Lakes Manitoba, and Winnipegosis, Canada.

GLASSIA Davidson. Genotype Atrypa obovata Sowerby.

Glassia Davidson, Geol. Mag., n. ser., VIII, 1881, p. 11;—Sup. British Devonian and Silurian Brach., Pal. Soc., 1882, p. 38.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 152, figs. 142-145;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 811.

Glassia romingeri Hall and Clarke. Trenton (Ord.).
Glassia romingeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 153, pl. 83, figs. 32–35.
Loc. Drift near Ann Arbor, Michigan.

Glassia schucherti Ulrich=Catazyga headi.

GLOSSINA Phillips. Genotype Lingula attenuata Sowerby.
Glossina Phillips, Mem. Geol. Survey Great Britain, II, Pt. II, 1848, p. 370.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 29.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 15, 164;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 230.

Glossina acuminata Hall and Clarke=Lingulepis acuminata.

Glossina crassa (Hall). Trenton (Ord.).
Lingula crassa Hall, Pal. New York, I, 1847, p. 98, pl. 30, fig. 8.
Loc. Middleville and Lake Champlain, New York.

Glossina cyane (Billings). Calciferous (Ord.).
Lingula cyane Billings, Pal. Fossils, I, 1865, p. 216, fig. 200.
Loc. Near Portland Creek, Newfoundland.

Glossina deflecta Winchell and Schuchert. Trenton and Lorraine (Ord.).
Lingula (Glossina) deflecta Winchell and Schuchert, American Geol., IX, 1892, p. 284;—Minnesota Geol. Survey, III, 1893, p. 348, pl. 29, figs. 15–18.
Loc. Near Fountain and Spring Valley, Minnesota.

Glossina dubia (d'Orbigny). Ordovician.
Lingula dubia d'Orbigny, Voyage dans l'Amérique Méridionale, 1842, p. 29, pl. 2, fig. 7.
Loc. Tacopaya, Bolivia.

Glossina flabellula Hall and Clarke. Waverly (L. Carb.).
Lingula (Glossina) flabellula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 15, 172, pl. 1, figs. 33, 31.
Loc. Sciotoville, Ohio.

Glossina hurlbuti N. H. Winchell. Trenton (Ord.).
Lingula hurlbuti N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist., Survey Minnesota, 1880, p. 62.
Lingula (Glossina) hurlbuti Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 347, pl. 29, figs. 13, 14.
Loc. Mantorville and near Spring Valley, Minnesota.

Glossina leana (Hall). Hamilton (Dev.).
Lingula leana Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 20;—Pal. New York, IV, 1867, p. 9, pl. 2, fig. 12.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 106, pl. 13, fig. 2.
Loc. Bristol, New York; Lone Mountain, Nevada.

Glossina nebraskaensis (Meek). Upper Carboniferous.
Lingula scotica var. nebraskensis Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 158, pl. 8, fig. 3.
Lingula nebraskensis Miller, N. American Geol. Pal., 1889, p. 350.
Loc. Nebraska City, Nebraska.

Glossina perovata (Hall). Clinton (Sil.).
Lingula perovata Hall, Pal. New York, II, 1852, p. 55, pl. 20, fig. 3.
Loc. Rochester, New York.

Glossina sedaliaensis (Miller). Chouteau (L. Carb.).

Lingula sedaliensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 308, pl. 9, fig. 2.

Loc. Sedalia, Missouri.

Obs. This species is probably the same as G. waverlyensis.

Glossina spatiosa (Hall). Lower Helderberg (Dev.).

Lingula spatiosa Hall, Pal. New York, III, 1859, p. 158, pl. 9, fig. 10.

Loc. Near Hudson, New York.

Glossina trentonensis (Conrad). Trenton and Utica (Ord.).

Lingula trentonensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 266, pl. 15, fig. 11.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 48.

Lingula attenuata? Hall (non Sowerby), Pal. New York, I, 1847, p. 94, pl. 30, fig. 1.

Lingula daphne Billings, Pal. Fossils, I, 1862, p. 50.

?Lingula attenuata A. Ulrich, N. Yahrb. f. Mineral, Beilagebaud, VIII, 1892, p. 7, pl. 1, fig. 3.

Loc. Glens Falls, Trenton Falls, Middleville, New York; Wisconsin; Montreal and Ottawa, Canada; ?near Vacas, Bolivia.

Glossina triangulata (Nettelroth). Hamilton (Dev.).

Lingula triangulata Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 34, pl. 26, fig. 1.

Loc. Falls of Ohio.

Glossina waverlyensis (Herrick). Waverly (L. Carb.).

Lingula scotica?? Meek, Pal. Ohio, II, 1875, p. 276, pl. 14, fig. 9.

Lingula waverlyensis Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 18, pl. 3, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 9, pl. 4K, fig. 7.

Lingula (scotica var.) waverlyensis Herrick, Geol. Ohio, VII, 1895, pl. 22, fig. 1.

Loc. Berea and Newark, Ohio; Oil City, Pennsylvania.

Obs. See G. sedaliaensis (Miller).

Goniocœlia Hall=Pentagonia.

Goniocœlia uniangulata Hall=Pentagonia unisulcata.

Gotlandia Dall=Trimerella.

Gypidia Dalman=Conchidium.

Gypidia unguiformis Ulrich=Conchidium unguiformis.

GYPIDULA Hall. Genotype Pentamerus occidentalis Hall.

Gypidula Hall, Twentieth Rep. New York State Cab. Nat. Hist., 1867, p. 163;—Pal. New York, IV, 1867, pp. 373, 380.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 161.

Sieberella Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1311.

Gypidula and Sieberella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 245;—Thirteenth Ann. Rep. New York State Geol., 1895, pp. 845, 846.

Gypidula comis (Owen). Middle Devonian.

Atrypa comis Owen, Geol. Rep. Wisconsin, Iowa, Minnesota, 1852, p. 583, pl. 3A, fig. 4 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17928).

Pentamerus (n. sp.?) Owen, Ibidem, 1852, pl. 3A, fig. 11 (Ibidem, Cat., 17929).

Pentamerus occidentalis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 514, pl. 6, fig. 2 (non Pentamerus occidentalis Hall, 1852).

Pentamerus galeatiformis Meek and Worthen, Geol. Survey, Illinois, II, 1866, p. 325.

Gypidula occidentalis Hall, Pal. New York, IV, 1867, p. 380, pl. 58A, figs. 1–8.

Gypidula comis (Owen)—Continued.

Pentamerus comis Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 428, pl. 13, fig. 6.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 290.

Pentamerus (Gypidula) comis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 159, pl. 3, figs. 4, 7; pl. 14, fig. 15; pl. 15, fig. 5.

Gypidula comis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247, fig. 177; pl. 72, figs. 15–24.

Loc. Independence and Davenport, Iowa; Rock Island, Illinois; Eureka district, Nevada; lakes Manitoba and Winnipegosis, Canada.

Gypidula coppingeri (Etheridge). Silurian.

Pentamerus coppingeri Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 594, pl. 25, figs. 2, 3.

Loc. Offley Island, lat. 81° 16′.

Gypidula galeata (Dalman). Lower Helderberg and Middle Devonian.

Atrypa galeata Dalman, Kongl. Svenska, Vet.-Akad. Handl., för 1827, 1828, p. 46, pl. 5, fig. 4.—Troost, Sixth Geol. Rep. Tennessee, 1841, p. 15.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 117, fig. 1.—Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 14, fig. 4.

Pentamerus galeatus Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 105, figs. 1–3.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 646.—Hall, Pal. New York, III, 1859, p. 257, pl. 46, fig. 1; pl. 47, fig. 1.—Billings, Geol. Canada, 1863, p. 957, fig. 454.

Pentamerus galeatus var. Whiteaves, Cont. to Canadian Pal., I, 1891, p. 234.

Sieberella galeatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 246, fig. 175; pl. 72, figs. 7–13.

Loc. Europe; Albany and Schoharie counties, New York; Cumberland, Maryland; Pennsylvania; St. Blandine, New Brunswick; Mackenzie River, Canada.

Gypidula globulosa (Nettelroth). Niagara (Sil.).

Pentamerus globulosus Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 54.

Loc. Louisville, Kentucky.

Gypidula knotti (Nettelroth). Niagara (Sil.).

Pentamerus knotti Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 56, pl. 32, figs. 9–12.

Loc. Louisville, Kentucky.

Gypidula læviuscula Hall. Middle Devonian.

Gypidula læviuscula Hall, Pal. New York, IV, 1867, p. 381, pl. 58, figs. 22, 23.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248, pl. 72, figs. 25, 26.

Loc. Waterloo, Iowa.

Gypidula lotis (Walcott). Upper Devonian.

Pentamerus lotis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 161, pl. 3, fig. 9.

Gypidula lotis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248.

Loc. White Pine mining district, Nevada.

Gypidula munda Calvin. Middle Devonian.

Gypidula munda Calvin, Bull. U. S. Geol. Geogr. Survey Terr., IV, 1878, p. 730.

Gypidula mundula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248.

Loc. Independence, Iowa.

Gypidula nucleus (Hall and Whitfield). ? Clinton (Sil.).

Pentamerus galeatus Hall and Whitfield, Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, pp. 197, 200a.

Pentamerus nucleus Hall and Whitfield, Twenty-seventh Rep. New York State Cab. Nat. Hist., 1875, pl. 9, figs. 30–32.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 59, pl. 27, figs. 25–27; pl. 33, figs. 27–33.

Gypidula nucleus (Hall and Whitfield)—Continued.
Sieberella nucleus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247, pl. 72, figs. 1-3.
Loc. Louisville, Kentucky.

Gypidula occidentalis Hall=G. comis.

Gypidula pseudogaleata (Hall). Lower Helderberg (Dev.).
Pentamerus pseudogaleatus Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 106, figs. 1-6;—Pal. New York, III, 1859, p. 259, pl. 46, fig. 2.
Sieberella pseudogaleata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 242, pl. 72, fig. 14.
Loc. Schoharie and Carlisle, New York.

Gypidula rœmeri (Hall and Clarke). Silurian.
Pentamerus galeatus Roemer (not Dalman), Sil. Fauna west. Tennessee, 1860, p. 73, pl. 5, fig. 14.
Sieberella rœmeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247, pl. 72, fig. 6.
Loc. Decatur County, Tennessee.

Gypidula romingeri Hall and Clarke. Hamilton (Dev.).
Gypidula romingeri Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248, pl. 72, figs. 27-33.
Loc. Alpena, Michigan.

Gypidula subglobosa (Meek and Worthen). Hamilton (Dev.).
Pentamerus subglobosus Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 429, pl. 13, fig. 5.
Gypidula subglobosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 248.
Loc. Rock Island, Illinois.

Gypidula uniplicata (Nettelroth). Niagara (Sil.).
Pentamerus uniplicatus Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 63, pl. 33, figs. 25, 26.
Sieberella uniplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 247.
Loc. Louisville, Kentucky.

HARTTINA Hall and Clarke. Genotype Centronella anna Hartt.
Harttina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 292;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 862.

Harttina coutinhoana (Derby). Upper Carboniferous.
Waldheimia coutinhoana Derby, Bull. Cornell Univ., I, 1874, p. 3, pl. 3, fig. 22; pl. 8, fig. 6; pl. 9, figs. 1, 2.
Harttina coutinhoana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 292.
Loc. Bomjardim, Brazil.

Harttina anna (Hartt). Upper Carboniferous.
Centronella anna Hartt, Dawson's Acadian Geol., 3d ed., 1878, p. 300, fig. 99.
Harttina anna Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 292, figs. 211, 212; pl. 79, figs. 37-39.
Loc. Windsor, Nova Scotia.

Hallina Winchell and Schuchert=Zygospira.

HEBERTELLA Hall and Clarke. Genotype Orthis sinuata Hall.
Group of Orthis occidentalis Hall, Bull. Geol. Soc. America, I, 1889, p. 20.
Hebertella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 198, 222.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 432.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 266.

Hebertella battis (Billings). Calciferous (Ord.).

Orthis battis Billings, Pal. Fossils, I, 1865, p. 185.

Hebertella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Point Levis, Canada.

Hebertella bellirugosa (Conrad). Trenton (Ord.).

Orthis bellarugosa Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 118, pl. 32, fig. 3.

Hebertella bellarugosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Orthis (Hebertella?) bellarugosa Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 434, pl. 33, figs. 1–4.

Loc. Mineral Point, Janesville, Neenah, etc., Wisconsin; Minneapolis, St. Paul, Cannon Falls, etc., Minnesota; Decorah and McGregor, Iowa; Curdsville, Kentucky; Rutherford County, Tennessee.

Hebertella borealis (Billings). Chazy-Trenton (Ord.).

Orthis borealis Billings, Canadian Nat. Geol., IV, 1859, p. 436, fig. 14;—Geol. Canada, 1863, p. 129, fig. 56· p. 167, fig. 148.—Meek, Pal. Ohio, I, 1873, p. 101, pl. 8, fig. 4.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 28.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 36, pl. 34, figs. 14–20.

Hebertella borealis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Orthis (Hebertella) borealis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 433, fig. 33.

Loc. Caughnawaga, St. Genevieve, Isle Bizard, and Cornwall, Canada; Frankfort, Kentucky; Nashville, Tennessee; Cannon Falls, etc., Minnesota; Wisconsin (Whitfield).

Hebertella daytonensis (Foerste). Clinton (Sil.).

Orthis daytonensis Foerste, Bull. Denison Univ., I, 1885, p. 87, pl. 13, figs. 13, 20, 21.

Hebertella daytonensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Orthis (Hebertella) daytonensis Foerste, Geol. Ohio, VII, 1895, p. 575, pl. 25, figs. 13, 20, 21.

Loc. Dayton, Ohio.

Hebertella fausta (Foerste). Clinton (Sil.).

Orthis fausta Foerste, Bull. Denison Univ., I, 1885, p. 85, pl. 13, figs. 15, 16.

Hebertella fausta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Orthis (Hebertella) fausta and var. squamosa Foerste, Geol. Ohio, VII, 1895, pp. 573, 574, pl. 25, figs. 15a–15d, 16a, 16b; pl. 37A, figs. 19a, 19b.

Loc. Dayton, Ohio.

Hebertella imperator (Billings). Chazy (Ord.).

Orthis imperator Billings, Canadian Nat. Geol., IV, 1859, p. 435, figs. 11–13;—Geol. Canada, 1863, p. 129, fig. 55.

Hebertella imperator Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Hawkesbury and Cornwall, Canada.

Hebertella insculpta Hall. Lorraine (Ord.).

Orthis insculpta Hall, Pal. New York, I, 1847, p. 125, pl. 32, fig. 12.—Billings, Geol. Canada, 1863, p. 167, fig. 150.—Meek, Pal. Ohio, I, 1873, p. 99, pl. 9, fig. 1.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 40.

Orthis bellarugosa Hall (non Conrad), Second Ann. Rep. New York State Geol., 1883, pl. 35, fig. 22.

Hebertella insculpta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, fig. 13.

Hebertella insculpta Hall—Continued.

Orthis (Hebertella) insculpta Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 435.

Loc. Oxford, etc., Ohio; Richmond, Indiana; Wilmington, Illinois; Iron Ridge, Wisconsin; Lattners, Iowa.

Hebertella lonensis (Walcott). Pogonip (Ord.).

Orthis lonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 74, pl. 11, fig. 6.

Hebertella lonensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Eureka district, Nevada.

Hebertella maria (Billings). Lorraine (Ord.).

Orthis maria Billings, Pal. Fossils, I, 1862, p. 137, fig. 114.

Hebertella sinuata or maria? Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, figs. 9, 10.

Loc. Anticosti; Colby, Kentucky.

Hebertella occidentalis Hall. Lorraine (Ord.).

Orthis occidentalis Hall, Pal. New York, I, 1847, p. 127, pl. 32A, fig. 2; pl. 32B, fig. 1;—Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 72.—Billings, Geol. Canada, 1863, p. 210, fig. 210.—Meek, Pal. Ohio, I, 1873, p. 96, pl. 9, fig. 3.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 70, pl. 4, fig. 11.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 34.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 485, pl. 2, figs. 10-12;—Tenth Rep. State Geol. Indiana, 1881, p. 117, pl. 2, figs. 10-12.—Whitfield, Geol. Wisconsin, IV, 1882, p. 260, pl. 12, figs. 17, 18.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 34, figs. 31-34; pl. 35, figs. 16-21.

Orthis subjugata Hall, Pal. New York, I, 1847, p. 129, pl. 32C, fig. 1.

Orthis subjugata(?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, figs. 4, 5 (see specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17885).

Hebertella occidentalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, figs. 11, 12.

Loc. Cincinnati, Oxford, etc., Ohio; Richmond, Indiana; Savanna, Illinois; Cape Girardeau, Missouri; Delafield, Wisconsin; Silver City, New Mexico.

Hebertella occidentalis sinuata Hall. Lorraine (Ord.).

Orthis sinuata Hall, Pal. New York, I, 1847, p. 128, pl. 32B, fig. 2.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 36.—Shaler, Fossil Brachiopoda Ohio Valley, 1887, pl. 8.

Orthis occidentalis var. sinuata Meek, Pal. Ohio, I, 1873, p. 98.

Hebertella sinuata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222, pl. 5A, figs. 1-8.

Loc. Cincinnati, Ohio.

Hebertella scovilli (Miller). Lorraine (Ord.).

Orthis scovilli Miller, Jour. Cincinnati Soc. Nat. Hist., V, 1882, p. 40, pl. 1, fig. 5.

Hebertella scovilli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 222.

Loc. Lebanon, Ohio.

Hemipronites americanus Whitfield=Clitambonites diversus.

Hemipronites apicalis Whitfield=Polytœchia apicalis.

Hemipronites crassus McChesney=Derbya crassa.

Hemipronites crenistria White (non Meek or Phillips)=Derbya crassa.

Hemipronites crenistria Meek, and Herrick=Orthothetes crenistria.

Hemipronites propinquus Meek and Worthen=Orthothetes subplanus.

HEMITHYRIS d'Orbigny. Genotype Rhynchonella psittacea Gmel.

Hemithyris d'Orbigny, Ann. Sci. Nat., VIII, 1850, p. 246; XIII, 1850, p. 322.

Hemithyris psittacea (Chemnitz). Pliocene and Recent.

Anomia rostrum psittacea Chemnitz, Neues syst. Conch.-Cab., VIII, 1785, pl. 78, fig. 713.

Rhynchonella psittacea Davidson, Trans. Linnæan Soc. London, IV, 1887, p. 163, pl. 24, figs. 1-11.

Loc. Fossil. Gulf of St. Lawrence, Canada.

HETERORTHIS Hall and Clarke. Genotype Orthis clytie Hall.

Heterorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 207, 223;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 268.

Heterorthis clytie Hall. Trenton (Ord.).

Orthis clytie Hall, Fourteenth Rep New York State Cab. Nat. Hist., 1861, p. 90;—Fifteenth Rep., Ibidem, 1862, pl. 2, figs. 4, 5.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 34.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 75, pl. 1, figs. 18, 19.

Heterorthis clytie Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 202, 223, pl. 5B, figs 20-24.

Loc. Frankfort and Paris, Kentucky.

HINDELLA Davidson. Genotype Athyris umbonata Billings.

Hindella Davidson, Suppl. British Sil. Brach., Pal. Soc., 1882, p. 130.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 63, figs. 46-51;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 769.

Hindella prinstana (Billings). Anticosti (Sil.).

Athyris prinstana Billings, Pal. Fossils, I, 1862, p. 145, fig. 122.

Meristella prinstana Miller, N. American Geol. Pal., 1889, p. 354.

Hindella prinstana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 64, pl. 41, fig. 28; pl. 49, fig. 1.

Loc. Anticosti.

Hindella umbonata (Billings). Anticosti (Sil.).

Athyris umbonata Billings, Pal. Fossils, I, 1862, p. 144, fig. 121;—Geol. Canada, 1863, p. 317, fig. 331.

Hindella umbonata Davidson, Suppl. British Sil. Brach., Pal. Soc., 1882, p. 130, fig. in text.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 64, figs. 46-51; pl. 41, figs. 26, 27, 29, 30.

Meristella umbonata Foerste, Bull. Denison Univ., I, 1885, p. 88, pl. 13, fig. 2;—Geol. Ohio, VII, 1895, p. 590, pl. 25, fig. 2.

Loc. Anticosti; Dayton, Ohio (Foerste).

HIPPARIONYX Vanuxem.

Genotype Hipparionyx proximus Vanuxem.

Hipparionyx Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 124, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 257;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 284.

Hipparionyx consimilaris Vanuxem=Atrypa reticularis.

Hipparionyx proximus Vanuxem. Oriskany (Dev.).

Hipparionyx proximus Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 124, fig. 29, No. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 257, pl. 9, figs. 33-36; pl. 15A, figs. 9-11.

Atrypa unguiformis (Conrad) Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 149, fig. 4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 826, fig. 651

Orthis conradi Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 37, pl. 15, fig. 4.

Orthis unguiformis Castelnau, Ibidem, 1843, p. 37, pl. 15, fig. 3.—Emmons, Manual Geol., 1860, p. 129, fig. 115.

Hipparionyx proximus Vanuxem—Continued.

Orthis hipparionyx Hall, Pal. New York, III, 1859, p. 407, pl. 89, figs. 1-4; pl. 90, figs. 1-7; pl. 91, figs. 4, 5; pl. 94, fig. 4.

Strophodonta intermedia Hall, Pal. New York, III, 1859, p. 482, pl. 95A, figs. 13, 14.

Streptorhynchus hipparionyx Hall, Second Ann. Rep. New York State Geol., 1883, pl. 39, figs. 33-36.

Loc. Schoharie and Albany counties, New York; Frankstown, Pennsylvania; Cumberland, Maryland; Cayuga, Ontario.

Obs. This species does not occur in Germany according to Kayser.

HOMŒOSPIRA Hall and Clarke. Genotype Rhynchospira evax Hall.

Homœospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 792.

Homœospira apriniformis Hall. Niagara (Sil.).

Atrypa aprinis Hall (non de Verneuil), Pal. New York, II, 1852, p. 280, pl. 57, fig. 7.

Rhynchospira? aprinis Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 77.

Rhynchospira apriniformis Hall, Pal. New York, III, 1859, p. 485.

Rhynchonella aprinis Miller, N. American Geol. Pal., 1889, p. 367.

Homœospira apriniformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 111, pl. 83, figs. 24, 25.

Loc. Lockport, New York.

Homœospira evax Hall. Niagara (Sil.).

Rhynchospira evax Hall, Trans. Albany Institute, IV, 1863, p. 213.

Retzia evax Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 160, pl. 25, figs. 13-21;—Eleventh Rep. State Geol. Indiana, 1882, p. 302, pl. 25, figs. 13-21.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 55, pl. 5, figs. 1-9.

Homœospira evax Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, pl. 50, figs. 15-20 (?32-35).

Loc. Waldron, Indiana; ?Perry County, Tennessee.

Homœospira sobrina (Beecher and Clarke). Niagara (Sil.).

Retzia sobrina Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 61, pl. 5, figs. 10-16.

Homœospira sobrina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, pl. 50, figs. 26-28.

Loc. Waldron, Indiana.

HUSTEDIA Hall and Clarke. Genotype Terebratula mormoni Marcou.

Hustedia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 120;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 797.

Hustedia(?) meekana (Shumard). Upper Carboniferous.

Retzia(?) meekana Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 295, pl. 11, fig. 7.

Loc. Guadalupe Mountains, New Mexico.

Hustedia mormoni (Marcou). Upper Carboniferous.

Terebratula mormoni Marcou, Geol. N. America, February, 1858, p. 51, pl. 6, fig. 11;—Trans. St. Louis Acad. Sci., III, 1875, p. 252.

Retzia punctulifera Shumard, Trans. St. Louis Acad. Sci., I, June, 1858, p. 220.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 32, pl. 1, fig. 1.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 181, pl. 1, fig. 13; pl. 5, fig. 7.

Hustedia mormoni (Marcou)—*Continued.*

Retzia mormoni Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.—Geinitz, Carb. u. Dyas Nebraska, 1866, p. 39, pl. 3, fig. 6.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 141, pl. 10, fig. 7;—Thirteenth Rep. State Geol. Indiana, 1884, p. 136, pl. 35, figs. 10–12.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 231;—Geol. Survey Missouri, V, 1895, p. 95, pl. 41, fig. 2.

Retzia subglobosa McChesney, Descriptions New Pal. Foss., 1860, p. 45;—Ibidem, 1865, pl. 1, fig. 1.

Retzia compressa Meek, Geol. Survey California, I, 1864, p. 14, pl. 2, fig. 7.—Kayser, Richthofens China, IV, 1883, p. 176, pl. 22, figs. 1–4.

Eumetria punctulifera Derby, Bull. Cornell Univ., I, 1874, p. 4, pl. 8, figs. 4, 5, 7, 8, 10; pl. 9, fig. 3.

Retzia radialis Walcott (non Phillips), Mon. U. S. Geol. Survey, VIII, 1884, p. 220, pl. 7, figs. 5d–5h.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 31.

Hustedia mormoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 120, fig. 106; pl. 51, figs. 1–9.

Loc. Salt Lake City, Utah; Santa Fe, New Mexico; Nevada; Shasta County, California; Nebraska; Kansas; Arkansas; Missouri; Iowa; Illinois; Indiana; Bomjardim and Itaituba, Brazil; Lo Ping, China.

Hustedia(?) papillata (Shumard). Upper Carboniferous.

Retzia papillata Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 294, pl. 11, fig. 9.

Loc. Guadalupe Mountains, New Mexico.

Obs. Compare with H. mormoni.

Hustedia(?) triangularis (Miller). Chouteau (L. Carb.).

Retzia triangularis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 315, pl. 9, figs. 25, 26.

Loc. Sedalia, Missouri.

HYATTELLA Hall and Clarke. Genotype Atrypa congesta Conrad.

Hyattella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 61, fig. 45;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 767.

Hyattella congesta (Conrad). Clinton (Sil.).

Atrypa congesta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265, pl. 16, fig. 18.—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 71, fig. 2;—Pal. New York, II, 1852, p. 67, pl. 23, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 136, pl. 2, fig. 4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 823, fig. 632.

Atrypa quadricostata Hall, Pal. New York, II, 1852, p. 68, pl. 23, fig. 2.

Triplesia? congesta Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 77.

Triplesia? quadricostata Hall, Ibidem, 1859, p. 78.

Rhynchonella quadricostata Miller, N. American Geol. Pal., 1889, p. 369.

Camerella congesta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 48.

Hyattella congesta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 61, fig. 45; pl. 40, figs. 23–28; pl. 81, figs. 26–28.

Loc. Rochester, Reynales Basin, etc., New York; Flamborough Head, Ontario; Pennsylvania; Louisville, Kentucky.

Hyattella junia (Billings). Anticosti (Sil.).

Athyris junia Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 46.

Hyattella junia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 62, pl. 40, figs. 29–31.

Loc. Anticosti.

HYPOTHYRIS King. Genotype Atrypa cuboides Sowerby.

Hypothyris King (non Phillips), Ann. Mag. Nat. Hist., XVIII, 1846, p. 28;—Mon. Permian Foss., Pal. Soc., 1850, pp. 81, 100, 111.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 200;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 828.

Hypothyris castanea (Meek). Middle Devonian.

Rhynchonella castanea Meek, Trans. Chicago Acad. Sci., I, 1868, p. 93, pl. 13, fig. 9.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 153, pl. 15, figs. 1, 4.—Whiteaves, Cont. to Canadian Pal., I, 1891, p. 232.

Liorhynchus castaneus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 59, figs. 28, 29.

Loc. Lockhart and Mackenzie River, Canada; Eureka district, Nevada.

Hypothyris cuboides (Sowerby). Tully (Dev.).

Atrypa cuboides Sowerby, Trans. Geological Soc., 2d ser., V, 1840, pl. 6, fig. 24.—Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 163, fig. 1.—Hall, Ibidem, Rep. Fourth Dist., 1843, pp. 215, 216, fig. 1.

Rhynchonella venustula Hall, Pal. New York, IV, 1867, p. 346, pl. 54A, figs. 24–43.—Williams, Bull. Geol. Soc. America, I, 1890, p. 493, pl. 13, figs. 4, 8, 14, 23, 24, 27, 29, 31–34.

Hypothyris cuboides and venustula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 200, pl. 60, figs. 49–55.

Loc. Europe; Tully, Ovid, Penn Yan, etc., New York.

Hypothyris emmonsi (Hall and Whitfield). Middle Devonian.

Rhynchonella emmonsi Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 247, pl. 3, figs. 4–8.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 157.

Rhynchonella intermedia Barris, Proc. Davenport Acad. Nat. Sci., II, 1878, p. 285, pl. 11, figs. 5, 6.

Rhynchonella cuboides Whiteaves, Cont. to Canadian Pal., I, 1891, p. 231.

Hypothyris emmonsi and intermedia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 200.

Loc. White Pine district, Nevada; Davenport, Iowa; Hay and Peace rivers, Canada.

IPHIDEA Billings. Genotype Iphidea bella Billings.

Iphidea Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 477;—Pal. Fossils, II, 1874, p. 76.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 100.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 97, 166;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 249.—Walcott, Proc. U. S. National Mus., XIX, 1897, p. 707.

Micromitra Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 479.

Kutorgina (pars) Dall, Bull. U. S. National Mus., 8, 1877, p. 40.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 101.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 90.

Paterina Beecher, American Jour. Science, 3d ser., XLI, 1891, p. 345.—Hall and Clarke, Eleventh Rep. N. Y. State Geologist, 1894, p. 247.

Iphidea alabamaensis Walcott. Middle Cambrian.

Iphidea alabamaensis Walcott, Proc. U. S. National Mus., XIX, 1897, p. 713, pl. 59, figs. 5, 5a.

Loc. Coosa Valley, Cherokee County, Alabama; near Rogersville, Tennessee.

Iphidea bella Billings. Lower Cambrian.

Iphidea bella Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 447, fig. 13;—Pal. Fossils, II, 1874, p. 76, fig. 44.—Walcott, Bull, U. S. Geol. Survey, 30, 1886,

Iphidea bella Billings—Continued.

p. 100, pl. 7, fig. 4;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 608, pl. 67, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 98, fig. 54, pl. 4, figs. 8, 9.

Loc. Trois Pistoles, below Quebec, Canada; Anse au Loup, Labrador.

Iphidea crenistria Walcott. Middle Cambrian.

Iphidea crenistria Walcott, Proc. U. S. National Mus., XIX, 1897, p. 713, pl. 59, figs. 4–4b.

Loc. Grand Canyon of the Colorado.

Iphidea labradorica (Billings). Lower Cambrian.

Obolus labradoricus Billings, Geol. Vermont, II, 1861, p. 946, fig. 345;—Pal. Fossils, I, 1861, p. 6, fig. 6;—Geol. of Canada, 1863, p. 284, fig. 291.

Kutorgina labradorica Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 104, pl. 9, fig. 2;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 3.

Paterina labradorica Beecher, American Jour. Sci., 3d ser., XLI, 1891, pp. 345, 356, pl. 17, figs. 1, 2.

Loc. Anse au Loup, Straits of Belle Isle, Labrador; Conception Bay, Newfoundland.

Iphidea labradorica swantonensis Walcott. Lower Cambrian.

Kutorgina labradorica var. swantonensis Walcott, Proc. U. S. Nat. Mus., XII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 2.

Loc. East of Swanton and Highgate Springs, Vermont.

Iphidea logani Walcott. Middle Cambrian.

Iphidea logani Walcott, Proc. U. S. National Mus., XIX, 1897, p. 711, pl. 59, figs. 2–2b.

Loc. Trois Pistoles, Quebec, Canada.

Iphidea ornatella Hall and Clarke=I. superba.

Iphidea pannulus (White). Lower and Middle Cambrian.

Trematis pannulus White, Wheeler's Expl. Survey west 100th Merid., Prel. Rep., 1874, p. 6.

Trematis? pannulus White, Ibidem, Final Rep., IV, 1875, p. 36, pl. 1, fig. 4.

Kutorgina pannula Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 105, pl. 7, fig. 3; pl. 8, fig. 2;—American Jour. Sci., 3d ser., XXXIV, 1887, p. 190, pl. 1, fig. 14;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 5.

Loc. Pioche, Nevada; Wasatch Mountains, Utah; Mount Stephan and Castle Mountain, British Columbia; Washington County, New York; Island of Orleans in the Sillery conglomerate.

Iphidea pealei Walcott. Middle Cambrian.

Iphidea pealei Walcott, Proc. U. S. National Mus., XIX, 1897, p. 712, pl. 59, figs. 3–3c.

Loc. Near Hillsdale, Montana.

Iphidea prospectensis Walcott. Lower Cambrian.

Kutorgina prospectensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 19, pl. 9, fig. 1;—Bull. U. S. Geol. Survey, 30, 1886, p. 106, pl. 9, fig. 3;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 610, pl. 69, fig. 4.

Loc. Eureka district, Nevada.

Iphidea sculptilis Meek. Upper Cambrian.

Iphidea (??) sculptilis Meek, Sixth Ann. Rep. U. S. Geol. Survey Territories, 1873, p. 479.

Micromitra sculptilis Meek, Ibidem, 1873, p. 479.

Kutorgina minutissima Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 207, pl. 1, figs. 11, 12.

Iphidea sculptilis Meek—Continued.

Kutorgina sculptilis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 20, pl. 1, fig. 7; pl. 9, fig. 7.

Loc. Gallatin City, Montana; Eureka district, Nevada.

Obs. The ventral pedicle foramen in this species, the genotype of Micromitra, is partially closed posteriorly, but otherwise does not seem to differ generically from Iphidea.

Iphidea stissingensis (Dwight). Middle Cambrian.

Kutorgina stissingensis Dwight, American Jour. Sci., 3d ser., XXXVIII, 1889, p. 145, pl. 6, figs. 5-8;—Trans. Vassar Brothers' Inst., V, 1891, p. 105, pl. 1, figs. 5-8.

Loc. Stissing Mountain, Duchess County, New York.

Iphidea superba Walcott. Middle Cambrian.

Iphidea cnf.? ornatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4, figs. 6, 7.

Iphidea superba Walcott, Proc. U. S. National Mus., XIX, 1897, p. 711, pl. 59, figs. 1-1c.

Loc. Grand Canyon of the Colorado.

Isogramma Meek and Worthen=Aulacorhynchus.

Isogramma millipunctata Meek and Worthen=Aulacorhynchus millipunctatum.

KINGENA Davidson. Genotype Terebratula lima Defrance.

Kingena Davidson, Mon. British Cret. Brach., Pal. Soc., I, 1853, p. 42.

Kingena leonensis (Conrad). Washita (Lower Cret.).

Terebratula leonensis Conrad, Emory's Rep. U. S. and Mexican Bound. Survey, I, 1857, p. 164, pl. 21, fig. 2.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18.

Loc. Leon Springs, Texas; also Denison, Texas (Hill).

Kingena wacoensis (Roemer). Washita (Lower Cret.).

Terebratula sp. undet. Roemer, Texas, 1849, p. 408.

Terebratula wacoensis Roemer, Kreidebildung von Texas, 1852, p. 81, pl. 6, fig. 2.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18.

Terebratula choctawensis Shumard, Marcy's Rep. Red River Louisiana, 1854, p. 195, pl. 2, fig. 3.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19.

?Terebratula wacoensis Whiteaves, Mesozoic Foss., Geol. Surv. Canada, I, 1879, p. 177.

Loc. Near New Braunfels, Texas; Trent River, Vancouver Island. "I have traced its continuity from the Red River to the Rio Grande" (Hill).

Obs. Gabb is correct in regarding T. choctawensis as a synonym for T. wacoensis. "The Vancouver specimens are doubtful" (Stanton).

Klitambonites Pander=Clitambonites.

Kouinckiana americana Swallow=Productus swallovi.

KUTORGINA Billings. Genotype Obolella cingulata Billings.

Kutorgina Billings (partim), Geol. Vermont, II, 1861, p. 948, figs. 347-349.—Billings (partim), Pal. Fossils, I, 1861, p. 9, figs. 8-10.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 40.—Walcott (partim), Bull. U. S. Geol. Survey, 30, 1886, p. 101.—Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 345.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 90, 166, 183;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 247.

Kutorgina cingulata Billings. Lower Cambrian.

Obolella (Kutorgina) cingulata Billings, Geol. Vermont, II, 1861, p. 948, figs. 347-349;—Pal. Fossils, I, 1861, p. 8, figs. 8-10.

Obolella cingulata Billings, Geol. Canada, 1863, p. 284, fig. 287.

Kutorgina cingulata Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 102, pl. 9, fig. 1.—Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 345.—Walcott, Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 609, pl. 69, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 92, figs. 47-49; pl. 4, figs. 10-17.

Loc. Anse au Loup, Labrador; Swanton and Georgia, Vermont; Malvern Hills, England; Island of Bornholm, Sweden.

Kutorgina labradorica Walcott=Iphidea labradorica.

Kutorgina labradorica var. swantonensis Walcott=Iphidea labradorica swantonensis.

Kutorgina latourensis Matthew=Billingsella latourensis.

Kutorgina minutissima Hall and Whitfield=Iphidea sculptilis.

Kutorgina pannula White=Iphidea pannulus.

Kutorgina prospectensis Walcott=Iphidea prospectensis.

?Kutorgina pterineoides Matthew. Middle Cambrian.

Kutorgina ? pterineoides Matthew, Trans. Royal Soc. Canada, III, 1886, p. 43, pl. 5, fig. 19.

Loc. Hanford Brook and St. Martins, New Brunswick.

Obs. It is not certain that this species is a brachiopod. May be the operculum of a pteropod.

Kutorgina sculptilis Walcott=Iphidea sculptilis.

Kutorgina stissingensis Dwight=Iphidea stissingensis.

Kutorgina whitfieldi Walcott=Billingsella whitfieldi.

LEIORHYNCHUS Hall. Genotype Orthis quadricostata Vanuxem.

Leiorhynchus Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 75;—Twentieth Rep. Ibidem, 1867, p. 272;—Pal. New York, IV, 1867, p. 355.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 411.

Liorhynchus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 193;—Thirteenth Ann. Rep. New York State Geologist, 1895, p. 827.

Obs. A subgenus of Camarotœchia, differing only in exterior ornamentation.

Leiorhynchus boonense (Shumard). Burlington (L. Carb.).

Rhynchonella boonensis Shumard, Geol. Rep. Missouri, 1855, p. 205, pl. C, fig. 6.—Keyes, Geol. Survey Missouri, V, 1895, p. 101.

Liorhynchus boonensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 60, fig. 35.

Loc. Columbia, Boone County, and Cooper County, Missouri.

Leiorhynchus dubium Hall. Marcellus (Dev.).

Leiorhynchus dubius Hall, Pal. New York, IV, 1867, p. 364, pl. 56, figs. 22-25.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 59, figs. 6, 7.

Rhynchonella dubia Tschernyschew, Mém. Comité Géologique de St. Petersburg, III, 3, 1887, p. 90, pl. 14, fig. 7.

Loc. New York; Urals of Russia.

Leiorhynchus globuliforme (Vanuxem). Chemung (Dev.).

Atrypa globuliformis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 182, fig. 2.

Leiorhynchus globuliformis Hall, Pal. New York, IV, 1867, p. 364, pl. 57, figs. 26-29.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 23-27.

Loc. Otsego County, New York.

Leiorhynchus greeneanum (Ulrich). Waverly (L. Carb.).

Rhynchonella greenana Ulrich, Cont. American Pal., I, 1886, p. 26, pl. 3, fig. 1.

Liorhynchus greenianus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194.

Pugnax greenianus Hall and Clarke, Ibidem, 1895, pl. 60, figs. 36–38.

Loc. Near New Albany, Indiana.

Leiorhynchus (?) hecate Clarke. Genesee (Dev.).

Leiorhynchus(?) hecate Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 31, pl. 3, fig. 4.

Loc. Ontario County, New York.

Obs. Probably the same as Spirifer pluto Clarke.

Leiorhynchus iris Hall. Chemung (Dev.).

Leiorhynchus iris Hall, Pal. New York, IV, 1867, p. 360, pl. 56, figs. 41–43.

Loc. Rockford, Iowa.

Leiorhynchus kelloggi Hall. Hamilton (Dev.).

Leiorhynchus kelloggi Hall, Pal. New York, IV, 1867, p. 361, pl. 57, figs. 1–12.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 18–20, 32, 33.

Leiorhynchus kelloggi? Whitfield, Geol. Wisconsin, IV, 1882, p. 334, pl. 26, fig. 9.

Rhynchonella kelloggi Tschernyschew, Mém. Comité Géologique de St. Petersburg, III, 3, 1887, p. 91, pl. 14, fig. 14.

Loc. Ohio; New York; Milwaukee, Wisconsin; Urals of Russia.

Leiorhynchus laura (Billings). Marcellus-Hamilton (Dev.).

Rhynchonella? laura Billings, Canadian Jour., V, May, 1860, p. 273, figs. 26–28;—Geol. Canada, 1863, p. 384, fig. 418.

Leiorhynchus multicosta Hall, Thirteenth Rep. New York State Cab. Nat. Hist., December, 1860, p. 85, figs. 14, 15, on p. 94;—Pal. New York, IV, 1867, p. 358, pl. 56, figs. 26–40.

Leiorhynchus laura Billings, Canadian Nat. Geol., n. ser., VII, 1874, p. 240.

Rhynchonella (Leiorhynchus) laura Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 159.

?Rhynchonella multicosta Tschernyschew, Devon. im Donetz Becken, 1886, pl. 15, figs. 1–3;—Mém. Comité Géologique de St. Petersburg, III, 3, 1887, p. 92.

Liorhynchus multicosta and laura Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 8–10, 13–17.

Loc. Thedford and Bosanquet, Ontario; New York; Eureka district, Nevada; ?Russia.

Leiorhynchus lesleyi Hall and Clarke. Upper Devonian.

Liorhynchus lesleyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 368, pl. 59, figs. 34–36.

Loc. "Pennsylvania."

Leiorhynchus limitare (Vanuxem). Marcellus (Dev.).

Orthis limitaris Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 146, fig. 3.

Atrypa limitaris Hall, Ibidem, Rep. Fourth Dist., 1843, p. 182, fig. 11.

Leiorhynchus limitaris Hall, Thirteenth Rep. New York State Cab. Nat Hist., 1860, p. 85;—Pal. New York, IV, 1867, p. 356, pl. 56, figs. 6–21.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 550, pl. 11, fig. 11;—Geol. Ohio, VII, 1895, p. 444, pl. 7, fig. 11.

Rhynchonella limitaris Tschernyschew, Mémoires du Comité Géologique de St. Petersburg, 1887, III, 3, pl. 14, fig. 5.

Liorhynchus limitaris Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 12, 35.

Loc. Schoharie, Marcellus, Avon, etc., New York; Delaware County, Ohio (Whitfield); Urals of Russia.

Leiorhynchus mesicostale Hall. Portage-Chemung (Dev.).

Atrypa mesacostalis Hall, Geol. New York; Rep. Fourth Dist., 1843, Tables Organic Remains, 64, fig. 1.

Leiorhynchus mesacostalis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 86, fig. 1;—Pal. New York, IV, 1867, p. 362, pl. 67, figs. 18-25.—Kindle, Bull. American Pal., 6, 1896, p. 37.

Rhynchonella mesacostalis Tschernyschew, Mémoires du Comité Géologique de St. Petersburg, 1887, p. 91, pl. 14, figs. 3, 4.

Liorhynchus mesacostalis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 11, 12.

Loc. Ithaca, Elmira, Bath, etc., New York; Urals of Russia.

Leiorhynchus multicosta Hall=L. laura.

Leiorhynchus mysia Hall. Marcellus (Dev.).

Leiorhynchus mysia Hall, Pal. New York, IV, 1867, p. 357, pl. 56, figs. 1-5.

Loc. Schoharie, New York.

Leiorhynchus nevadaense Walcott. Middle Devonian.

Rhynchonella (Leiorhynchus) nevadensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 157, pl. 14, fig. 9.

Loc. Eureka district, Nevada.

Leiorhynchus newberryi Hall. Waverly (L. Carb.).

Leiorhynchus newberryi Hall, Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 240, pl. 11, figs. 25-27.

Liorhynchus newberryi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194, pl. 59, figs. 37, 38.

Loc. Kelloggsville, Ashtabula County, Ohio.

Leiorhynchus quadricostatum (Vanuxem). Genesee (Dev.).

Orthis quadricostata Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 168, fig. 2.

Atrypa (Orthis) quadricostata Hall, Ibidem, Rep. Fourth Dist., 1843, p. 223, fig. 2.

Leiorhynchus quadricostata Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 86;—Pal. New York, IV, 1867, p. 357, pl. 56, figs. 44-49.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 24.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 71.

Leiorhynchus quadricostata? Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 79, pl. 3, fig. 9.

Liorhynchus quadricostatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 193, pl. 59, figs. 21, 22.

Loc. Ithaca, Seneca Lake, Cayuga Lake, New York; Falls of Ohio; White Pine district, Nevada.

Leiorhynchus robustum Hall and Clarke. Chemung (Dev.).

Liorhynchus robustus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pl. 59, figs. 30, 31.

Loc. Steuben County, New York.

Leiorhynchus sesquiplicatum A. Winchell. Hamilton (Dev.).

Leiorhynchus sesquiplicatus A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 95.

Loc. Grand Traverse district, Michigan.

Leiorhynchus sinuatum Hall. Chemung (Dev.).

Leiorhynchus sinuatus Hall, Pal. New York, IV, 1867, p. 362, pl. 57, figs. 13-17.

Rhynchonella (Leiorhynchus) sinuatus Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 158, pl. 14, fig. 5.

Liorhynchus sinuatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 194.

Loc. Ithaca and Chemung Narrows, New York; Eureka district, Nevada.

Leptæna quadrilatera Shaler=L. rhomboidalis.

Leptæna recedens Sardeson=Plectambonites sericeus.

Leptæna recta Hall=Dinorthis deflecta.

Leptæna rhomboidalis (Wilckens). Trenton-Waverly (Ord.-L. Carb.).

Conchita rhomboidalis Wilckens, Nachrict von selten Versteinerungen, 1769, p. 77, pl. 8, figs. 43, 44.

Strophomena undulosa Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 54.

Strophomena depressa Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 79, fig. 5.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 77, fig. 5; p. 104, fig. 2.—Billings, Canadian Nat. Geol., I, 1856, p. 59, pl. 1, fig. 5.—Roemer, Sil. Fauna west. Tennessee, 1860, p. 65, pl. 5, fig. 2.

Strophomena undulatus Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 139, fig. 3.

Strophomena undulata Hall, Ibidem, Rep. Fourth Dist., 1843, p. 175, fig. 3.—Yandell and Shumard, Cont. Geol. Kentucky, 1847, p. 11.

Productus? sulcatus Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 13, fig. 7.

Productus sulcifer de Verneuil, Ibidem, 1843, p. 39.

Leptæna tenuistriata Hall, Pal. New York, I, 1847, p. 108, pl. 31A, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 8, figs. 12-16.

Leptæna depressa Hall, Pal. New York, II, 1852, p. 62, pl. 21, fig. 8; p. 257, pl. 53, fig. 6.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 823, fig. 630.

Strophomena rugosa Hall, Pal. New York, III, 1859, p. 195, pl. 19, fig. 1.

Strophomena rhomboidalis Billings, Canadian Jour., VI, 1861, p. 336, figs. 111, 112;—Geol. Canada, 1863, p. 311, fig. 314; p. 367, fig. 373;—Proc. Portland Soc. Nat. Hist., 1863, p. 107, pl. 3, fig. 1.—Hall, Pal. New York, IV, 1867, p. 76, pl. 12, figs. 16-18; p. 414, pl. 15, figs. 15, 16.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 426, pl. 10, fig. 7.—Meek, Pal. Ohio, I, 1873, p. 75, pl. 5, fig. 6.—Billings, Pal. Foss., II, 1874, p. 27.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 85, pl. 5, fig. 5 —Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 253, pl. 4, fig. 4.—Hall, Twenty-eighth Rep. New York State Mus. Nat. Hist., 1879, p. 151, pl. 22, figs. 4-10.—Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 1.—Hall, Eleventh Rep. State Geol. Indiana, 1882, p. 288, pl. 22, figs. 4-10;—Second Ann. Rep. New York State Geol., 1883, pl. 38, figs. 17-31.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 118.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 18, pl. 2, figs. 1-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 150, pl. 18, figs. 1-3.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 298.—Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 357, pl. 17, figs. 18-21.—Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 6.

Strophomena analoga Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 173, pl. 9, fig. 18.—Dawson, Acadian Geol., 3d ed., 1878, p. 295, fig. 95.

Leptæna quadrilatera Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 65.

Strophomena gibbosa James, Cincinnati Quart. Jour. Sci., I, 1874, p. 333.

Strophomena tenuistriata Miller, Ibidem, II, 1875, p. 55.—Hall, Second Ann. Rep. New York State Geol., 1883, pl. 38, figs. 12-16.

Leptæna rhomboidalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 279, pl. 8, figs. 17-31; pl. 15A, figs. 40-42; pl. 20, figs. 21-24.—Foerste, Geol. Ohio, VII, 1895, p. 566.

Leptæna (Strophomena) rhomboidalis, Beecher, American Jour. Sci., 3d ser., XLIV, 1892, p. 150, pl. 1, figs. 7-9.

Plectambonites rhomboidalis Keyes, Geol. Survey Missouri, V, 1895, p. 70, fig. 6.

Loc. Generally distributed in the above-given formations throughout America and Europe.

Leptæna rhomboidalis ventricosa Hall. Oriskany (Dev.).

Strophomena depressa var. ventricosa Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 55.

Strophomena rugosa var. ventricosa Hall, Pal. New York, III, 1859, p. 417, pl. 94, figs. 2, 3.

Leptæna rhomboidalis var. ventricosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, fig. 43.

Loc. Albany and Schoharie counties, New York; Cumberland, Maryland; Cayuga, Ontario.

Leptæna rugosa=L. rhomboidalis.

Leptæna saxea Sardeson=Plectambonites sericeus.

Leptæna sericea Sowerby=Plectambonites sericeus.

Leptæna sordida Billings=Leptella sordida.

Leptæna(?) stelzneri Kayser. Ordovician.

Leptæna stelzneri Kayser, Palæontographica, Suppl., III, 1876, p. 21, pl. 3, fig. 21.

Loc. Guaco, Argentine Republic.

Obs. Since this species has a high ventral area and a perforated deltidium it is probably a Clitambonites.

Leptæna striata Hall=Strophonella striata.

Leptæna subplana Hall=Orthothetes subplanus.

Leptæna subquadrata Hall=Christiania subquadrata.

Leptæna subtenta Hall=Strophomena trentonensis or S. rugosa subtenta.

Leptæna sulcata de Verneuil=Strophomena sulcata.

Leptæna tenuilineata Hall=Rafinesquina tenuilineata.

Leptæna tenuistriata Hall=L. rhomboidalis.

Leptæna transversalis=Plectambonites transversalis.

Leptæna transversalis var. alabamaensis Foerste = Plectambonites transversalis alabamaensis.

Leptæna trilobata Owen=Strophomena trilobata.

Leptæna unicostata Meek and Worthen. Lorraine (Ord.).

Leptæna (n. sp.?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, fig. 3. [See specimen in U. S. Nat. Mus., Cat. Invert. Foss., 17908.]

Strophomena unicostata Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 335, pl. 4, fig. 11.—Whitfield, Geol. Wisconsin, IV, 1882, p. 262, pl. 12, fig. 14.

Rafinesquina unicostata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, fig. 39; pl. 20, fig. 25.

Leptæna unicostata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 411, pl. 32, figs. 6-9.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 174.

Loc. Savanna and Wilmington, Illinois; Delafield and Iron Ridge, Wisconsin; Spring Valley and Granger, Minnesota; Lattners, Iowa; Rapids of the Nelson River, Lake Winnipeg, Manitoba.

Leptæna variolata d'Orbigny=Chonetes variolatus.

Leptæna vicina Castelnau=Chonetes vicinus.

LEPTÆNISCA Beecher. Genotype Leptæna concava Hall.

Leptænisca Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 239, pl. 9, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 300;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 291.

Leptænisca adnascens Hall and Clarke. Lower Helderberg (Dev.).

Leptænisca adnascens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 301, 352, pl. 15A, figs. 22, 23.

Loc. Near Clarksville, New York.

Leptænisca concava Hall. Lower Helderberg (Dev.).

Leptæna concava Hall, Tenth Rep. New York State Cab. Nat. Hist., 1857, p. 47;—Pal. New York, III, 1859, p. 197, pl. 18, fig. 2.

Leptæna? (subgenus?) concava Hall, Second Ann. Rep. New York State Geol., 1883, pl. 46, figs. 30, 31.

Leptænisca concava Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 238, pl. 9, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 300, pl. 15, figs. 30, 31; pl. 15A, figs. 19-21.

Loc. Albany County, New York; Decatur County, Tennessee.

Leptænisca tangens Hall and Clarke. Lower Helderberg (Dev.).

Leptænisca tangens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 301, 352, pl. 15A, figs. 24-30.

Loc. Near Clarksville, New York.

LEPTELLA Hall and Clarke. Genotype Leptæna sordida Billings.

Leptella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 277.

Leptella decipiens (Billings). Calciferous (Ord.).

Leptæna decipiens Billings, Pal. Fossils, I, 1862, p. 74, fig. 67; p. 219;—Geol. Canada, 1863, p. 231, fig. 243.

Leptella decipiens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 294.

Loc. Point Levis, Canada; Portland Creek, Newfoundland.

Leptella sordida (Billings). Calciferous (Ord.).

Leptæna sordida Billings, Pal. Fossils, I, 1862, p. 73, fig. 66;—Geol. Canada, 1863, p. 231, fig. 242.

Leptella sordida Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293, pl. 15A, figs. 12-16.

Loc. Point Levis, Canada.

LEPTOBOLUS Hall. Genotype L. lepis Hall.

Leptobolus Hall, Description n. sp. Foss. from Hudson River Group, 1871, p. 3;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 226.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 73, 165;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 241.

Leptobolus grandis Matthew. Lowest Ordovician.

Leptobolus grandis Matthew, Trans. Royal Soc. Canada, X, 1874, p. 91, pl. 16, fig. 7.

Loc. Hardingville, New Brunswick.

Leptobolus insignis Hall. Utica (Ord.).

Leptobolus insignis Hall, Descrip. n. sp. Foss. from Hudson River Group, 1871, p. 3, pl. 3, fig. 17;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 227, pl. 7, fig. 17.—Nicholson, Pal. Province Ontario, 1875, p. 85.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 74, pl. 3, figs. 1-6.

Loc. Middleville, Utica, etc., New York; Ottawa, Canada; Cincinnati, Ohio.

Leptobolus lepis Hall. Utica (Ord.).

Leptobolus lepis Hall, Description n. sp. Foss. from Hudson River Group, 1871, p. 3, pl. 3, figs. 19, 20;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 226, pl. 7, figs. 19, 20.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 69, pl. 1, figs. 10, 11.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 74, pl. 3, figs. 8-10.

Loc. Cincinnati, Ohio.

Leptobolus occidentalis Hall. Maquoketa (Ord.).

Leptobolus occidentalis Hall, Description n. sp. Foss. from Hudson River Group, 1871, p. 3, pl. 3, fig. 18;—Twenty-fourth Rep. New York State Cab. Nat. Hist., 1872, p. 227, pl. 7, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 3, fig. 7.

Loc. Hawleys Mills, Iowa; Platteville, Wisconsin; Ottawa, Canada (Ami).

Leptocœlia Hall = Anoplotheca.

Leptocœlia propria Hall = Anoplotheca flabellites.

Leptocœlia disparilis Hall = Atrypina disparilis.

Leptocœlia imbricata Hall = Atrypina imbricata.

LEPTOSTROPHIA Hall and Clarke.

Genotype Stropheodonta magnifica Hall.

Leptostrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 281.

Obs. This is a subdivision of Stropheodonta. The following species have been referred to it: S. magnifica, S. perplana, S. textilis, S. beckei, S. magniventra, S. junia, S. irene, S. blainvillei, and S. tullia.

LINDSTRŒMELLA Hall and Clarke. Genotype L. aspidium H. and C.

Lindstrœmella Hall and Clarke, Extract Pal. New York, VIII, 1890, p. 134;—Pal. New York, VIII, Pt. I, 1892, p. 134;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 257.

Lindstrœmella aspidium Hall and Clarke. Hamilton (Dev.).

Lindstrœmella aspidium Hall and Clarke, Extract Pal. New York, VIII, 1890, p. 134, pl. 4E, figs. 25-28;—Pal. New York, VIII, Pt. I, 1892, pp. 134, 178, pl. 4E, figs. 25-28.

Loc. Leonardsville, Hamilton, Darien, etc., New York.

LINGULA Bruguière. Genotype Lingula anatina Lamarck.

Lingula Bruguière, Encyclopédie Méthodique, I, 1792, pl. 250.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 68.—Hall, Pal. New York, IV, 1867, p. 5.—Dall, American Jour. Conch., VI, 1870, pp. 153, 154.—Meek, Hayden's U. S. Geol. Survey Terr., IX, 1876, p. 7.—Dall, Bull. U. S. Nat. Museum, 8, 1877, p. 43.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 2, 161.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 338.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 226.

Lingula acuminata Hall = Lingulepis acuminata.

Lingula acutangula Roemer = Lingulepis acutangulus.

Lingula acutirostris Hall. Clinton (Sil.).

Lingula acutirostra Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 77, fig. 9 on p. 76;—Pal. New York, II, 1852, p. 56, pl. 20, fig. 5.

Loc. Wolcott, New York.

Obs. Based upon a single specimen now lost.

Lingula æqualis Hall. Trenton (Ord.).

Lingula æqualis Hall, Pal. New York, I, 1847, p. 95, pl. 30, fig. 3.—Walcott, Proc. U. S. Nat. Mus., XI, 1888, p. 480, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 9, fig. 4.

Loc. Middleville, Trenton Falls, and Rome, New York.

Lingula alba-pinensis Walcott. Upper Devonian.

Lingula albapinensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 108, pl. 2, fig. 1.

Loc. White Pine district, Nevada.

Lingula alveata Hall=Dignomia alveata.
Lingula ampla Owen=Lingulella ampla.
Lingula antiqua Emmons=Lingulepis acuminata.
Lingula antiqua Hall, 1851, 1862, Hayden, 1863 (non Hall, 1847)=Lingulepis pinniformis.
Lingula antiquata Emmons=Lingulepis acuminata.

Lingula artemis Billings. Gaspé No. 5 (L. Dev.).
Lingula artemis Billings, Pal. Fossils, II, 1874, p. 14, fig. 4.
Loc. Gaspé, Cape Bon Ami.

Lingula atra Herrick. Waverly (L. Carb.).
Lingula atra Herrick, Bull. Denison Univ., IV, 1888, pp. 13, 16, pl. 10, fig. 30;—Geol. Ohio, VII, 1895, pl. 22, figs. 5, 6.
Loc. Cuyahoga River, Ohio.

Lingula attenuata Hall=Glossina trentonensis.
Lingula aurora Hall=Lingulella aurora.
Lingula aurora var. Hall=Lingulella stoneana.

Lingula belli Billings. Chazy (Ord.).
Lingula belli Billings, Canadian Nat. Geol., IV, 1859, p. 431, figs. 7, 8;—Geol. Canada, 1863, p. 124, fig. 47.
Loc. Island of Montreal, Allumette Island, Canada.

Lingula beltrami Winchell and Schuchert. Lorraine (Ord.).
Lingula beltrami Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 351, figs. 25a, 25b.
Loc. Spring Valley, Minnesota.

Lingula bicarinata Ringueberg. Niagara (Sil.).
Lingula bicarinata Ringueberg, Proc. Acad. Nat. Sci. Philadelphia, 1884, p. 149, pl. 3, fig. 8.—Miller, N. American Geol. Pal., 1889, p. 349.
Loc. Lockport, New York.

Lingula billingsana Whiteaves=Lingulella billingsana.

Lingula bisulcata Ulrich. Utica (Ord.).
Lingula bisulcata Ulrich, American Geologist, III, 1889, p. 380, fig. 2, on p. 378.
Loc. Ludlow, Kentucky.

Lingula brevirostris Meek and Hayden. Jurassic.
Lingula brevirostris Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1858, p. 50;—Ibidem, 1860, p. 419;—Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1865, p. 69, pl. 3, fig. 3.—Whitfield, Powell's Geol. Geogr. Survey Rocky Mt. Region, 1880, p. 346, pl. 3, figs. 4, 5.
Loc. Black Hills, Dakota.

Lingula briseis Billings. Trenton (Ord.).
Lingula briseis Billings, Pal. Fossils, I, 1862, p. 48, fig. 52;—Geol. Canada, 1863, p. 161, fig. 136.
Loc. Bayonne River, Canada.

Lingula (??) calumet N. H. Winchell. ? Cambrian.
Lingula calumet N. H. Winchell, Thirteenth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1885, p. 65.—Miller, N. American Geol. Pal., 1889, p. 349.
Loc. Pipestone, Minnesota.
Obs. It is not certain that these specimens are organic.

Lingula(?) canadaensis Billings. Trenton and Lorraine (Ord.).

Lingula canadensis Billings, Pal. Fossils, I, 1862, p. 114, fig. 95;—Geol. Canada, 1863, p. 210, fig. 209.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 27.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 352, fig. 26.

Loc. Anticosti; in the Galena at Mantorville and Hader, Minnesota.

Lingula carbonaria Shumard. Upper Carboniferous.

Lingula carbonaria Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 215.

Loc. Clarke County, Missouri.

Lingula centrilineata Hall. Lower Helderberg (Dev.).

Lingula centrilineata Hall, Pal. New York, III, 1859, p. 155, pl. 9, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 15.

Loc. Albany County, New York.

Lingula ceryx Hall. Schoharie (Dev.).

Lingula ceryx Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 19;—Pal. New York, IV, 1867, p. 5, pl. 2, fig. 1.

Loc. Clarkesville, New York.

Lingula cincinnatiensis Hall and Whitfield. Lorraine (Ord.).

Lingulella (Dignomia) cincinnatiensis Hall and Whitfield, Pal. Ohio, II, 1875, p. 67, pl. 1, figs. 2, 3.

Lingulella cincinnatiensis Miller, American Pal. Foss., 1877, p. 115.

Loc. Cincinnati, Ohio.

Lingula clathrata Winchell and Schuchert. Trenton (Ord.).

Lingula clathrata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 345, pl. 29, fig. 42.

Loc. St. Paul, Minnesota.

Lingula clintoni Vanuxem. Clinton (Sil.).

Lingula oblonga Conrad (non Eichwald), Third Ann. Rep. Geol. Survey New York, 1839, p. 65.—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 77, fig. 4;—Pal. New York, II, 1852, p. 54, pl. 20, fig. 1.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 823, fig. 629.

Lingula clintoni Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 79, fig. 4.

Lingula suboblonga d'Orbigny, Prodrome Pal. Stratig., 1850, p. 34.

Loc. Cayuga County, New York; Pennsylvania; Hamilton, Ontario; Arisaig, Nova Scotia (Honeyman and Ami).

Lingula cobourgensis Billings. Trenton (Ord.).

Lingula cobourgensis Billings, Pal. Fossils, I, 1862, p. 50, fig. 54;—Geol. Canada, 1863, p. 161, fig. 132.

Lingula cobourgensis? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 346, pl. 29, fig. 12.

Loc. Cobourg and Colingwood, Canada; ?Minneapolis, Minnesota; in the Utica at Ottawa, Canada (Ami).

Lingula coheni A. Ulrich. Middle Devonian.

Lingula coheni A. Ulrich, N. Yahrb. f. Mineral., Beilageband, VIII, 1892, p. 82, pl. 5, fig. 11.

Loc. Near Pulquina, Bolivia.

Lingula complanata Williams. Hamilton-Ithaca (Dev.).

Lingula nuda Hall, Pal. New York, IV, 1867, pl. 2, fig. 4 (not figs. 5, 6).

Lingula complanata Williams, Proc. American Ass. Adv. Sci., XXX, 1882, p. 188;—Bull. U. S. Geol. Survey, 3, 1884, pp. 14, 15, 20, 22.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 17.

Loc. Ithaca and Canandaigua Lake, New York.

Lingula compta Hall and Clarke. Hamilton (Dev.).

Lingula compta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 171, pl. 1, fig. 16.

Loc. Canandaigua Lake, New York.

Lingula concentrica Vanuxem=Schizobolus concentricus.

Lingula concentrica Conrad. ? Corniferous (Dev.).

Lingula concentrica Conrad, Third Ann. Rep. Geol. Survey New York, 1839, p 64.

Loc. "Helderberg Mountains," New York.

Obs. Insufficiently defined to be recognized.

Lingula covingtonensis Hall and Whitfield. Utica (Ord.).

Lingula covingtonensis Hall and Whitfield, Pal. Ohio, II, 1875, p. 67, pl. 1, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 8.

Loc. Covington, Kentucky.

Lingula crassa Hall=Glossina crassa.

Lingula crawfordsvillensis Gurley. Keokuk (L. Carb.).

Lingula crawfordsvillensis Gurley, New Carboniferous Foss., 1, 1883, p. 2.—Miller, N. American Geol. Pal., 1889, p. 350.

Loc. Crawfordsville, Indiana.

Obs. Should be compared with L. varsaviensis.

Lingula cuneata Conrad. Medina (Sil.).

Lingula cuneata Conrad, Third Ann. Rep. Geol. Survey New York, 1839, pp. 63, 64.—Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 48, fig. 5;—Pal. New York, II, 1852, p. 8, pl. 4, fig. 2.—Hall and Clarke, Pal. New York, VIII Pt. I, 1892, p. 12, pl. 1, figs. 11, 12; pl. 4K, fig. 9.

Lingulella cuneata Miller, N. American Geol. Pal., 1889, p. 352.

Loc. Medina and Lockport, New York.

Lingula curta Conrad. Trenton-Utica (Ord.).

Lingula curta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 266, pl. 15, fig. 12.—Hall, Pal. New York, I, 1847, p. 97, pl. 30, fig. 6.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 604.—Billings, Geol. Canada, 1863, p. 161, fig. 138; p. 201, fig. 197.—Emerson, Geol. Frobischer Bay; Nourse's Narr. Hall's Arctic Exped., App., III, 1879, p. 578.

Loc. East Canada Creek and Middleville, New York; Carlisle, etc., Pennsylvania; Montmorency Falls, Canada; Frobischer Bay.

Lingula cuyahoga Hall. Chemung-Waverly (Dev.-L. Carb.).

Lingula cuyahoga Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 24;—Pal. New York, IV, 1867, p. 15, pl. 1, fig. 5.—Herrick, Bull. Denison Univ., IV, 1888, p. 13;—Geol. Ohio, VII, 1895, pl. 22, fig. 9.

Lingula cuyahoga ? Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 18.

Loc. Akron and Cuyahoga Falls, Ohio; Chemung group, Panama, New York.

Lingula cyane Billings=Glossina cyane.

Lingula daphne Billings=Glossina trentonensis.

Lingula dawsoni Matthew=Lingulella dawsoni.

Lingula delia Hall. Hamilton (Dev.).

Lingula delia Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 22;—Pal. New York, IV, 1867, p. 12, pl. 2, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 15, pl. 1, fig. 29.

Loc. Canandaigua Lake, New York.

Lingula densa Hall. Hamilton (Dev.).

Lingula densa Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 22;—Pal. New York, IV, 1867, p. 11, pl. 2, figs. 10, 11.

Lingula densa Hall—Continued.
Lingula densa? Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 15, pl. 1, fig. 23.
Loc. Summit and Centerfield, New York.

Lingula desiderata Hall. Corniferous (Dev.).
Lingula desiderata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 19;—Pal. New York, IV, 1867, p. 6, pl. 2, fig. 2.
Loc. Ontario County, New York.

Lingula(?) dolata Sardeson. Calciferous (Ord.).
Lingula dolata Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, pl. 6, fig. 12.
Loc. Stillwater, Minnesota.

Lingula dubia d'Orbigny=Glossina dubia.

Lingula elderi Whitfield. Trenton and Lorraine (Ord.).
Lingula elderi Whitfield, American Jour. Sci., 3d ser., XIX, June, 1880, p. 472, figs. 1, 2;—Geol. Wisconsin, IV, 1882, p. 345, pl. 27, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 11, pl. 1, figs. 21, 22.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 339, pl. 29, figs. 1-4.
Lingula minnesotensis N. H. Winchell, Eighth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, July, 1880, p. 61.
Loc. Rochester, Minneapolis, etc., Minnesota; Beloit, Wisconsin; Cincinnati, Ohio.

Lingula elegantula Shaler=L. rectilateralis.
Lingula elliptica Hall (non Phillips)=L. subelliptica.

Lingula(?) elliptica Emmons. Cambrian.
Lingula elliptica Emmons (non Phillips, 1836), American Geology, Pt. II, 1855, p. 112.
Loc. Augusta County, Virginia.
Obs. This species belongs to another genus. The specific name will therefore not conflict with that of Phillips.

Lingula elongata Hall. Trenton (Ord.).
Lingula elongata Hall, Pal. New York, I, 1847, p. 97, pl. 30, fig. 5.—Billings, Geol. Canada, 1863, p. 161, fig. 135.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 165.
Loc. Lewis County, New York; Lake Winnipeg, Manitoba; Ottawa, Canada, in the Utica terrane (Ami).

Lingula ererensis Rathbun. Middle Devonian.
Lingula ererensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 16.
Loc. Erere, Province of Para, Brazil.

Lingula exilis Hall=Lingulodiscina exilis.

Lingula eva Billings. Black River (Ord.).
Lingula eva Billings, Canadian Nat. Geol., VI, 1861, p. 150;—Geol. Canada, 1863, p. 141, fig. 73.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 341, pl. 29, figs. 5, 6.
Loc. Murray Bay, Canada; Fremont, Winona County, Minnesota.

Lingula forbesi Billings. Lorraine (Ord.).
Lingula forbesi Billings, Pal. Fossils, I, 1862, p. 115, fig. 96.
Loc. Anticosti.

Lingula gannensis Herrick. Waverly (L. Carb.).
Lingula gannensis Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 17, pl. 3, figs. 2, 3;—Geol. Ohio, VII, 1895, pl. 22, figs. 2, 3.
Loc. Gann, Knox County, Ohio.

Lingula gibbosa Hall. Niagara (Sil.).

Lingula gibbosa Hall, Description n. sp. Foss. Waldron, Indiana, 1879, p. 13;—Eleventh Rep. State Geol. Indiana, 1882, p. 284, pl. 27, fig. 2;—Trans. Albany Institute, X, 1883, p. 69.

Loc. Waldron, Indiana.

Lingula gorbyi Miller. Chouteau (L. Carb.).

Lingula gorbyi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 309, pl. 9, figs. 3, 4.

Loc. Sedalia, Missouri.

Lingula gracana Rathbun. Middle Devonian.

Lingula gracana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 259, fig. 2.

Loc. Erere, Province of Para, Brazil.

Lingula halli White. Burlington (L. Carb.).

Lingula halli White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 30.

Loc. Burlington, Iowa.

Lingula howleyi Matthew. Lower Ordovician.

Lingula howleyi Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 259, pl. 1, fig. 3.

Loc. Kelleys Island, Conception Bay, Newfoundland.

Obs. Appears to be a synonym for L. murrayi Billings.

Lingula hurlbuti N. H. Winchell = Glossina hurlbuti.

Lingula huronensis Billings. Chazy (Ord.).

Lingula huronensis Billings, Canadian Nat. Geol., IV, 1859, p. 433, fig. 9;—Geol. Canada, 1863, p. 124, fig. 48.

Loc. St. Joseph Island, Lake Huron.

Lingula indianaensis Miller and Gurley. Keokuk (L. Carb.).

Lingula indianensis Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893, p. 69, pl. 7, fig. 1.

Loc. Crawfordsville, Indiana.

Lingula ingens Spencer. Niagara (Sil.).

Lingula ingens Spencer, Bull. Univ. State Missouri, 1884, p. 56;—Trans. St. Louis Acad. Sci., IV, 1886, p. 606, pl. 8, fig. 6.

Loc. Hamilton, Ontario.

Lingula insularis Billings. Anticosti (Sil.).

Lingula insularis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 40.

Loc. Anticosti.

Lingula iole Billings. Calciferous (Ord.).

Lingula iole Billings, Pal. Fossils, I, 1865, p. 215, fig. 199.

Loc. Near Portland Creek, Newfoundland.

Lingula iowaensis Owen. Galena (Ord.).

Lingula iowensis Owen, Geol. Rep. Iowa, Wisconsin, and Illinois, 1844, p. 70, pl. 15, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 8, pl. 1, fig. 14.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 349, pl. 29, figs. 19-22.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 164.

Lingula quadrata? Owen (not Eich.), Geol. Rep. Wisconsin, Iowa, and Minnesota, 1851, pl. 2B, fig. 8. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17873.]

Lingula quadrata Hall, Geol. Wisconsin, I, 1862, p. 46, fig. 1, and p. 435.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 305, pl. 2, fig. 4.

Lingulella iowensis Whitfield, Geol. Wisconsin, IV, 1882, p. 242, pl. 9, fig. 1.

Loc. Wisconsin; Iowa; Minnesota; Illinois; Lake Winnipeg, Manitoba.

Lingula irene Billings=Lingulella irene.

Lingula iris Billings. Calciferous (Ord.).
Lingula iris Billings, Pal. Fossils, I, 1865, p. 301, fig. 290.
Loc. Point Levis, Canada.

Lingula kingstonensis Billings. Black River (Ord.).
Lingula kingstonensis Billings, Pal. Fossils, I, 1862, p. 48, fig. 51;—Geol. Canada, 1863, p. 141, fig. 74.
Loc. Long Island, near Kingston, Canada.

Lingula lamellata Hall, 1852 (partim, non Hall, 1843)=L. tæniola.

Lingula lamellata Hall. Niagara (Sil.).
Lingula lamellata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 108, fig. 2;—Pal. New York, II, 1852, p. 249, pl. 53, figs. 1, 2 (non p. 55, pl. 20, fig. 4=L. tæniola).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 16, pl. 1, figs. 9, 10; pl. 4K, figs. 10-13.
Loc. Lockport and Rochester, New York; Hamilton, Ontario.

Lingula leana Hall=Glossina leana.

Lingula ligea Hall. Hamilton-Portage (Dev.).
Lingula ligea Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 76;—Pal. New York, IV, 1867, p. 7, pl. 1, fig. 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 107, pl. 2, fig. 2.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 62.
Lingula ligea var. Hall, Pal. New York, IV, 1867, p. 8, pl. 2, fig. 8.
Lingula ligea? Whitfield, Annals New York Acad. Sci., V, 1891, pp. 547, 573, pl. 11, figs. 3, 4;—Geol. Ohio, VII, 1895, p. 441, pl. 7, figs. 3, 4; p. 462.
Loc. Seneca Lake, Ithaca, etc., New York; Thedford, Ontario (Whiteaves); Delaware County, Ohio (Whitfield); Eureka district, Nevada.

Lingula ligea nevadaensis Walcott. Lower Devonian.
Lingula ligea var. nevadensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 107, pl. 2, fig. 3.
Loc. Eureka district, Nevada.

Lingula lingulata Hall and Clarke. Clinton (Sil.).
Lingula lingulata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 173, pl. 4K, fig. 5.
Loc. Hamilton, Ontario.

Lingula lonensis Walcott. Lower Devonian.
Lingula lonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 108, pl. 13, fig. 1.
Loc. Lone Mountain, Nevada.

Lingula lucretia Billings. Gaspé No. 5 (Dev.).
Lingula lucretia Billings, Pal. Fossils, II, 1874, p. 14, fig. 3.
Loc. Cape Bon Ami, Gaspé.

Lingula lyelli Billings. Chazy (Ord.).
Lingula lyelli Billings, Canadian Nat. Geol., IV, 1859, p. 348, fig. 1; p. 431;—Geol. Canada, 1863, p. 124, fig. 49.
Loc. Alumette Island.

Lingula maida Hall. Hamilton (Dev.).
Lingula maida Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 20;—Pal. New York, IV, 1867, p. 9, pl. 2, fig. 13.
Loc. Moscow, New York.

Lingula manni Hall. Corniferous (Dev.).

Lingula manni Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 20;—Pal. New York, IV, 1867, p. 6, pl. 2, fig. 3.—Whitfield, Annals New York Acad. Sci., V, 1891, p. 546, pl. 11, figs. 1, 2;—Geol. Ohio, VII, 1895, p. 441, pl. 7, figs. 1, 2.

Loc. Delaware County, Ohio.

Lingula mantelli Billings. Calciferous (Ord.).

Lingula mantelli Billings, Canadian Nat. Geol., IV, 1859, p. 349, figs. 1e-1f;—Geol. Canada, 1863, p. 113, fig. 20.

Loc. St. Eustache, Canada.

Lingula (?) manticula White. Upper Cambrian.

Lingula? manticula White, Wheeler's Expl. Survey west 100 Merid., Prel. Rep., 1874, p. 9;—Ibidem, Final Rep., IV, 1875, p. 52, pl. 3, fig. 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 13, pl. 9, fig. 3; pl. 11, fig. 2.

Loc. Schell Creek Range, Nevada.

Lingula marginata d'Orbigny (non Phillips)=L. submarginata.

Lingula matthewi Hartt=Acrothele matthewi.

Lingula meeki Herrick. Waverly (L. Carb.).

Lingula meeki Herrick, Bull. Denison Univ., IV, 1888, pp. 13, 18, pl. 10, fig. 31;—Geol. Ohio, VII, 1895, pl. 22, figs. 7, 8.

Loc. Cuyahoga Valley, Ohio.

Lingula melie Hall. Waverly (L. Carb.).

Lingula melie Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 24;—Pal. New York, IV, 1867, p. 14, pl. 1, figs. 3, 4.—Meek, Pal. Ohio, II, 1875, p. 276, pl. 14, fig. 3.—Herrick, Bull. Denison Univ., IV, 1888, p. 13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 12, fig. 9; pl. 1, fig. 32.—Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 1; pl. 22, fig. 10.

Loc. Chagrin Falls and Berea, Ohio.

Lingula membranacea Winchell. Waverly (L. Carb.).

Lingula membranacea A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 3.—Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 17, pl. 3, fig. 4;—Geol. Ohio, VII, 1895, pl. 22, fig. 4.

Lingula (Lingulella?) membranacea Meek, Pal. Ohio, II, 1875, p. 275, pl. 14, fig. 4.

Loc. Burlington, Iowa; Harts Grove and Loudonville, Ohio; Shafers, Pennsylvania.

Lingula metensis Terquem? Lower Lias (Jurassic).

Lingula cf. metensis (Terquem) Möricke, Neues Jahrbuch f. Mineral., Beilageband, IX, 1894, p. 58, pl. 5, fig. 10.

Loc. Sierra de la Ternera; Mine Amolanes, Chile.

Lingula minnesotensis N. H. Winchell=L. elderi.

Lingula minuta Meek. Hamilton (Dev.).

Lingula minuta Meek, Trans. Chicago Acad. Sci., I, 1868, p. 87, pl. 13, fig. 1.

Loc. Near Fort Resolution, Great Slave Lake, British America.

Lingula modesta E. O. Ulrich. Trenton-Lorraine (Ord.).

Lingula modesta Ulrich, American Geologist, III, 1889, p. 382, fig. 4 on p. 378.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 344, pl. 29, fig. 41.

Lingula vanhorni Hall and Clarke (non Miller), Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 4.

Loc. Covington and Frankfort, Kentucky; Lattners, Iowa; Granger and Wykoff, Minnesota.

Lingula paliformis Hall = Lingulella paliformis.

Lingula papillosa Emmons. Trenton (Ord.).

Lingula papillosa Emmons, American Geology, Pt. II, 1855, p. 202, fig. 64;—Manual Geol., 1860, p. 99, fig. in text.

Loc. Unknown.

Lingula paracletus Hall and Clarke. Waverly (L. Carb.).

Lingula paracletus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 10, 12, fig. 8; p. 172.

Loc. Chardon, Ohio.

Lingula parrishi Miller. Upper Carboniferous.

Lingula parrishi Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 307, pl. 8, fig. 2; pl. 9, fig. 1.

Loc. Kansas City, Missouri.

Lingula perlata Hall. Lower Helderberg (Dev.).

Lingula perlata Hall, Pal. New York, III, 1859, p. 156, pl. 9, figs. 3–5.

Loc. Albany and Schoharie counties, New York.

Lingula perovata Hall = Glossina perovata.

Lingula perplexa Hall = L. subelliptica.

Lingula perryi Billings. ? Chazy (Ord.).

Lingula perryi Billings, Pal. Fossils, I, 1861, p. 20, fig. 23;—Geol. Vermont, II, 1861, p. 957, fig. 363;—Geol. Canada, 1863, p. 274, fig. 278.

Loc. Highgate Spring, Vermont.

Lingula philomela Billings. Trenton and Lorraine (Ord.).

Lingula philomela Billings, Pal. Fossils, I, 1862, p. 49, fig. 53;—Geol. Canada, 1863, p. 161, fig. 133.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 8.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 342, pl. 29, figs. 7, 8.

Loc. Montmorency Falls, Ottawa, etc., Canada; Florenceville, Iowa.

Lingula plagemanni Möricke. Jurassic.

Lingula plagemanni Möricke, Neues Jahrbuch f. Mineral., Beilageband, IX, 1894, p. 59, pl. 5, fig. 9.

Loc. Canales and Caracoles, Bolivia.

Lingula pinnaformis Hall = Lingulepis pinniformis.

Lingula polita Hall = Obolella polita.

Lingula prima Hall = Lingulepis prima.

Lingula procteri Ulrich = L. vanhorni.

Lingula progne Billings. Trenton-Utica (Ord.).

Lingula progne Billings, Pal. Fossils, I, 1862, p. 47, fig. 50;—Geol. Canada, 1863, p. 161, fig. 134; p. 201, fig. 196.

Loc. Montreal, Collingwood, Ottawa, etc., Canada.

Lingula punctata Hall. Hamilton and Ithaca (Dev.).

Lingula punctata Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 21;—Pal. New York, IV, 1867, p. 10, pl. 1, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 11, 17, pl. 1, figs. 26–28.

Loc. Canandaigua Lake and Summit, New York; Portage group at Ithaca (Williams).

Lingula quadrata, American authors = L. rectilateralis and L. iowaensis.

Lingula spatulata Vanuxem—Continued.

Tschernyschew, Mémoires du Comité Géologique de St. Pétersbourg, 1887, p. 116, pl. 14, fig. 29.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 1, fig. 15.

Lingula spatulata? Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 258, fig. 1;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 16.

Loc. Lodi, Seneca Lake, etc., New York; Portage group at Ithaca, New York (Williams); Erere, Province of Para, Brazil; Urals of Russia.

Lingula stautoniana Rathbun. Middle Devonian.

Lingula stautoniana Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 259, fig. 3.

Loc. Erere, Province of Para, Brazil.

Lingula(?) striata Emmons. Cambrian.

Lingula striata Emmons, American Geology, Pt. II, 1855, p. 112, pl. 1, fig. 17;—Manual Geol., 1860, p. 88, fig. 74.

Loc. Augusta County, Virginia.

Lingula subelliptica d'Orbigny. Clinton (Sil.).

Lingula elliptica Hall (non Phillips), Geol. New York; Rep. Fourth Dist., 1843, p. 76, fig. 7.

Lingula subelliptica d'Orbigny, Prodrome de Pal., I, 1850, p. 34.

Lingula perplexa Hall, Miller's American Pal. Fossils, 1877, p. 244.

Loc. Wolcott, New York.

Lingula submarginata d'Orbigny. Ordovician.

Lingula marginata d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 28, pl. 2, fig. 5.

Lingula submarginata d'Orbigny, Prodrome de Pal., I, 1850, p. 14.

Loc. Tacopaya, Bolivia.

Lingula suboblonga d'Orbigny=L. clintoni.

Lingula subspatulata Meek and Worthen (non Hall and Meek)=Barroisella subspatulata.

Lingula subspatulata Hall and Meek. Upper Cretaceous.

Lingula subspatulata Hall and Meek, Mem. American Acad. Arts Science, n. ser., V, 1854-1856, p. 380, pl. 1, fig. 2.—White, Rep. Geogr. Geol. Survey west 100th Merid., IV, 1875, p. 169, pl. 15, fig. 4.

Lingula subspatulata? Whiteaves, Cont. Canadian Pal., I, 1889, p. 185.

Loc. Near Red Cedar Island, Nebraska; near old Fort Wingate, New Mexico; Rolling River, Manitoba.

Lingula tæniola Hall and Clarke. Clinton (Sil.).

Lingula lamellata Hall (partim), Pal. New York, II, 1852, p. 55, pl. 20, fig. 4.

Lingula tæniola Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pp. 18, 173, pl. 4K, fig. 8.

Loc. Clinton, New York; Hamilton, Ontario.

Lingula thedfordensis Whiteaves. Hamilton (Dev.).

Lingula thedfordensis Whiteaves, Extract Cont. Canadian Pal., I, 1887, p. 3, pl. 15, fig. 1;—Cont. Canadian Pal., I, 1889, p. 111, pl. 15, fig. 1.

Loc. Thedford, Ontario.

Lingula tighti Herrick. Upper Carboniferous.

Lingula tighti Herrick, Bull. Denison Univ., II, 1887, p. 43, pl. 4, fig. 5.

Loc. Newark, Ohio.

Lingula trentonensis Conrad=Glossina trentonensis.

Lingula triangulata Nettelroth=Glossina triangulata.

Lingula triquetra Clarke. Portage (Dev.).

Lingula triquetra Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 62, pl. 3, fig. 11.
Loc. Ontario County, New York.

Lingula truncata Sowerby. Neocomian (Cret.).

Lingula truncata Sowerby, Trans. Geol. Soc. London, IV, 1836, pl. 14, fig. 15.—Davidson, British Cret. Brach., Pal. Soc., 1852, p. 6, pl. 1, figs. 27, 28, 31.—Behrendsen, Zeit. der Deutschen Geol. Gessel., XLIV, 1892, p. 27.
Loc. Europe; Arrogo, Triuguico, Argentine Republic.

Lingula umbonata Cox. Upper Carboniferous.

Lingula umbonata Cox, Owen's Geol. Survey Kentucky, III, 1857, p. 576, pl. 10, fig. 4.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 120, pl. 25, fig. 14.—Herrick, Bull. Denison Univ., II, 1887, p. 144, pl. 14, fig. 2.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 226;—Geol. Survey Missouri, V, 1895, p. 38, pl. 35, fig. 4.
Loc. Crittenden, Union, and Hancock counties, Kentucky; Newark, Ohio; Des Moines, Iowa; Clinton and Kansas City, Missouri.

Lingula vanhorni Hall and Clarke (partim)=L. modesta.

Lingula vanhorni Miller. Trenton and Lorraine (Ord.).

Lingula vanhorni Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 9, fig. 1;—Eighteenth Rep. Geol. Survey Indiana, 1894, p. 309.
Lingula procteri Ulrich, American Geologist, III, 1889, p. 377, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 12, pl. 1, figs. 5-7.
Loc. Versailles, Indiana; Covington and Burgin, Kentucky.
Obs. An examination of the type specimen led to the above synonymy.

Lingula varsaviensis Worthen. Warsaw (L. Carb.).

Lingula varsoviense Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 24;—Geol. Survey Illinois, VIII, 1890, p. 104, pl. 11, fig. 8.
Loc. Warsaw and Hamilton, Illinois.

Lingula waverlyensis Herrick=Glossina waverlyensis.

Lingula whitfieldi Ulrich. Lorraine (Ord.).

Lingula whitfieldi Ulrich, American Geologist, III, 1889, p. 381, fig. 3 on p. 378.
Loc. Covington, Kentucky.

Lingula whitei Walcott. Lower Devonian.

Lingula whitii Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 109, pl. 13, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 11, pl. 1, fig. 31.
Loc. Eureka district, Nevada.

Lingula winona Hall=Lingulella winona.

LINGULASMA E. O. Ulrich. Genotype L. schucherti Ulrich.

Lingulasma Ulrich, American Geologist, III, 1889, p. 383.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 24, 46, 163.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 353.—Hall and Clarke, Eleventh Ann. Rep. New York State Geologist, 1894, p. 335.
Lingulelasma Miller, N. American Geol. Pal., 1889, p. 351.

Lingulasma galenaense Winchell and Schuchert. Galena (Ord.).

Lingulasma galenensis Winchell and Schuchert, American Geol., IX, 1892, p. 285;—Minnesota Geol. Survey, III, 1893, p. 354, pl. 30, figs. 1-4.
Loc. Fillmore and Goodhue counties, Minnesota; Decorah, Iowa; Neenah and Oshkosh, Wisconsin.

Lingulasma schucherti Ulrich. Lorraine (Ord.).

Lingulasma schucherti Ulrich, American Geologist, III, 1889, p. 389, fig. 5 on p. 378.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 24, pl. 2, figs. 17-23.

Lingulelasma schucherti Miller, N. American Geol. Pal., 1889, p. 351.

Loc. Wilmington and Savanna, Illinois.

LINGULELLA Salter. Genotype Lingula davisi McCoy.

Lingulella Salter, Mem. Geol. Survey Great Britain, III, 1866, p. 333.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 55, 163;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 232.

Lingulella affinis Billings=Lingulobolus affinis.

Lingulella ampla (Owen). Middle Cambrian.

Lingula ampla Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852, p. 583, pl. 1B, fig. 5.—Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 125, pl. 6, fig. 10;—Trans. Albany Institute, V, 1867, p. 101.

Loc. Trempealeau, Wisconsin; Winona, Minnesota.

Lingulella aurora Hall. Upper Cambrian.

Lingula aurora Hall, Ann. Geol. Rep. Wisconsin, 1861, p. 24;—Geol. Surv. Wisconsin, I, 1862, p. 21, fig. 4; p. 435;—Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 126, pl. 6, figs. 4, 5;—Trans. Albany Institute, V, 1867, p. 103.

Lingulella aurora Hall, Twenty-third Rep. New York State Cab. Nat. Hist., 1873, p. 244.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 2, figs. 12, 13.

Loc. Mazomanie, Wisconsin; Osceola, Wisconsin, and Otisville, Minnesota (Sardeson).

Lingulella(?) billingsana (Whiteaves). Upper Cambrian.

Lingula billingsana Whiteaves, American Jour. Sci., 3d ser., XVI, 1878, p. 226.

Lingula cfr. billingsiana Matthew, Trans. Royal Soc. Canada, X, 1894, p. 93, pl. 16, fig. 6.

Loc. Conception Bay, Newfoundland.

Lingulella cælata (Hall). Lower Cambrian.

Orbicula cælata Hall, Pal. New York, I, 1847, p. 290, pl. 79, fig. 9.

Obolella cælata Billings, Canadian Nat. Geol., 2d ser., VI, 1871, p. 218.

Obolella (Obolus) cælata Ford, American Jour. Sci., 3d ser., II, 1871, p. 33.

Lingulella cælata Ford, Ibidem, XV, 1878, p. 127.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 95, pl. 7, fig. 1;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 607, pl. 67, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 57, pl. 2, figs. 1-4.

Lingula ? cælata Matthew, Trans. New York Acad. Sci., XIV, 1895, p. 126.

Loc. Troy and Schodack Landing, New York; New Brunswick.

Lingulella cincinnatiensis Hall and Whitfield=Lingula cincinnatiensis.

Lingulella(?) cuneata Matthew. Lowest Ordovician.

Lingulella(?) cuneata Matthew, Trans. Royal Soc. Canada, X, 1894, p 92, pl. 16, fig. 5.

Loc. Hardingville, New Brunswick.

Lingulella dawsoni Matthew. Middle Cambrian.

Lingula? dawsoni (Matthew MS.) Walcott, Bull. U. S. Geol. Survey, 10, 1884, p. 15, pl. 5, fig. 8.

Lingulella dawsoni Matthew, Trans. Royal Soc. Canada, III, 1886, p. 33, pl. 5, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 58, pl. 2, fig. 5.

Loc. Portland, etc., New Brunswick.

Lingulella ella (Hall and Whitfield). Lower and Middle Cambrian.

Lingulepis ella Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 232, pl. 1, fig. 8.

Lingulella ella Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 97, pl. 7, fig. 2; pl. 8, fig. 4;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 607, pl. 67, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 58, figs. 19-21.

Loc. Wasatch Range, Utah; near Pioche, Nevada.

Lingulella granvillensis Walcott. Lower Cambrian.

Lingulella granvillensis Walcott, American Jour. Sci., 3d ser., XXXIV, 1887, p. 188, pl. 1, fig. 15;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 607, pl. 67, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 58.

Lingulella cfr. granvillensis Matthew, Trans. New York Acad. Sci., XIV, 1895, p. 114.

Loc. North Granville, New York; ? New Brunswick.

Lingulella(?) inflata Matthew. Middle Cambrian.

Lingulella? inflata Matthew, Trans. Royal Soc. Canada, III, 1886, p. 33, pl. 5, fig. 7;—Trans. New York Acad. Sci., XIV, 1895, p. 127, pl. 5, fig. 3.

Loc. Hanford Brook, St. Martins, New Brunswick.

Lingulella inflata ovalis Matthew. ? Middle Cambrian.

Lingulella inflata var. ovalis Matthew, Trans. New York Acad. Sci., XIV, 1895, p. 127, pl. 5, fig. 4.

Loc. Hanford Brook, New Brunswick.

Lingulella irene (Billings). Upper Cambrian and Calciferous.

Lingula irene Billings, Pal. Fossils, I, 1862, p. 71, fig. 64;—Geol. Canada, 1863, p. 230, fig. 240.

Loc. Point Levis, Canada.

Lingulella lævis Matthew. Upper Cambrian.

Lingulella lævis Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 39, pl. 12, figs. 4a, 4b.

Loc. Near St. John, New Brunswick.

Lingulella lamborni Meek. ?Upper Cambrian.

Lingulella lamborni Meek, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 185, fig. 1.—Keyes, Geol. Survey Missouri, V, 1895, p. 38, pl. 35, fig. 5.

Loc. Madison County, Missouri.

Lingulella linguloïdes Matthew. Middle Cambrian.

Lingulella linguloides Matthew, Trans. Royal Soc. Canada, III, 1886, p. 34, pl. 5, fig. 8.

Loc. Porters Brook, St. Martins, New Brunswick.

Lingulella macconelli Walcott. Middle Cambrian.

Lingulella macconelli Walcott, Proc. U. S. Nat. Museum, XI, 1888, p. 441.

Loc. Mt. Stephens, British Columbia.

Lingulella martinensis Matthew. Middle Cambrian.

Lingulella martinensis Matthew, Trans. Royal Soc. Canada, IV, 1890, p. 155, pl. 8, fig. 4;—Trans. New York Acad. Sci., XIV, 1895, p. 113, pl. 2, fig. 6.

Loc. Hanford Brook, New Brunswick.

Lingulella minuta Hall and Whitfield. Up. Camb. and Pogonip (Ord.).

Lingulella? minuta Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 206, pl. 1, figs. 3, 4.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 13.

Loc. Eureka district, Nevada.

Lingulella(?) paliformis Hall. Hamilton (Dev.).

Lingula paliformis Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 76, fig. 1.

Lingula palæformis Hall, Pal. New York, IV, 1867, p. 8, pl. 1, fig. 7.—Whitfield, Geol. Wisconsin, IV, 1882, p. 324, pl. 25, fig. 10.

Lingulella? palæformis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 59, 64, pl. 2, figs. 6–8.

Loc. Cayuga Lake, New York; Milwaukee, Wisconsin.

Lingulella radula Matthew. Middle Cambrian.

Lingulella radula Matthew, Trans. Royal Soc. Canada, VIII, 1891, p. 147, pl. 15, figs. 7, 8.

Loc. St. John, New Brunswick.

Lingulella roberti Matthew. Lower Ordovician.

Lingulella roberti Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 256, pl. 1, fig. 2.

Loc. Cape Breton, Nova Scotia.

Lingulella selwyni Matthew. Lower Ordovician.

Lingulella selwyni Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 255, pl. 1, fig. 1.

Loc. Cape Breton, Nova Scotia.

Lingulella? spissa=Sphærobolus spissus.

Lingulella starri Matthew. Middle Cambrian.

Lingulella starri Matthew, Trans. Royal Soc. Canada, VIII, 1891, p. 146, pl. 15, figs. 5, 6.

Loc. St. Johns, New Brunswick.

Lingulella starri minor Matthew. Upper Cambrian.

Lingulella starri var. minor Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 58.

Loc. Near St. John, New Brunswick.

Lingulella stoneana Whitfield. Upper Cambrian.

Lingula aurora var. Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 127, pl. 6, figs. 6–8;—Trans. Albany Institute, V, 1867, p. 104;—Twenty-third Rep. New York State Cab. Nat. Hist., 1873, pl. 13, fig. 5.

Lingulella stoneana Whitfield, Geol. Wisconsin, IV, 1882, p. 334, pl. 27, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 2, figs. 9–11.

Loc. Prairie du Sac and Mazomanie, Wisconsin.

Lingulella winona (Hall). Middle Cambrian.

Lingula winona Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 126, pl. 6, fig. 9;—Trans. Albany Institute, V, 1867, p. 102.—Sardeson, Bull. Minnesota Acad. Nat. Sci., IV, 1896, p. 96.

Loc. Lansing, Iowa; Wisconsin.

LINGULEPIS Hall. Genotype Lingula pinniformis Owen.

Lingulepis Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 129.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 1.—Hall, Trans. Albany Institute, V, 1867, p. 106.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 59, 163;—Eleventh Ann. Rep. New York State Geologist, 1894, p. 231.

Obs. The essential difference between Lingulepis and Lingulella is that the ventral beak of the former is often much attenuated. The amount of attenuation, however, is often a very changeable feature in specimens of a species from a locality. It is this variation and the want of large collections that has lead to the making of too many species of Lingulepis.

Lingulepis pinniformis (Owen)—Continued.

Orbicula prima Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, figs. 17, 19.

Lingulepis pinnaformis Hall, Sixteenth Rep. New York State Cab. Nat. Hist., 1863, p. 129, pl. 6, figs. 14–16;—Trans. Albany Institute, V, 1867, p. 107.—Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 335, pl. 2, figs. 1–4;—Geol. Wisconsin, IV, 1882, p. 169, pl. 1, figs. 2, 3.

Lingulepis pinniformis and dakotensis Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, pp. 2, 3, pl. 1, fig. 1.

Lingulepis dakotensis Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 337, pl. 2, figs. 10, 11.

Lingulepis pinniformis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 60, figs. 22, 23; pl. 1, figs. 35, 36.

Loc. Falls of St. Croix, Hudson, etc., Wisconsin; Black Hills, South Dakota.

Obs. This species also occurs at Ausable Chasm and Whitehall, New York, and are there regarded as L. acuminata. It may be advisable to refer Owen's species to L. acuminata (Conrad).

Lingulepis prima Meek and Hayden=Obolella polita.

Lingulepis prima (Hall). Upper Cambrian.

Lingula ovata Emmons, Geol. New York; Rep. Second Dist., 1842, p. 105 (undefined).

Lingula prima (Conrad MS.) Hall, Pal. New York, I, 1847, p. 3, pl. 1, fig. 2.—Emmons, American Geology, Pt. II, 1855, p. 202.

Obolella prima Whitfield, Bull. American Mus. Nat. Hist., I, 1884, p. 142, pl. 14, figs. 3–5.

Lingulepis minima Whitfield, Ibidem, 1884, p. 141, pl. 14, figs. 1, 2.

Lingulella? prima Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 69.

Loc. Keeseville, Essex, etc., New York; ?Black Hills, South Dakota.

Lingulepis primiformis Whitfield. Upper Cambrian.

Lingulepis primæformis Whitfield, Ludlow's Rep. Reconn. Black Hills South Dakota, 1875, p. 103, pl. 1, fig. 4.

Loc. Black Hills, South Dakota.

LINGULOBOLUS Matthew. Genotype Lingulella(?) affinis Billings.

Lingulobolus Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 260.

Lingulobolus affinis (Billings). Lower Ordovician.

Lingulella? affinis Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 468, fig. 4;—Pal. Fossils, II, 1874, p. 67, fig. 35.

Lingulepis affinis Walcott, American Jour. Sci., 3d ser., XXXVII, 1889, p. 381.

Lingulobolus affinis Matthew, Trans. Royal Soc. Canada, 2d ser., I., 1896, p. 261, pl. 1, fig. 4.

Loc. Bell Island, Newfoundland.

Lingulobolus affinis cuneata Matthew. Lower Ordovician.

Lingulobolus affinis var. cuneata Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 262, pl. 1, figs. 4e, 4d.

Loc. Great Bell Island, Conception Bay, Newfoundland.

LINGULODISCINA Whitfield. Genotype Lingula exilis Hall.

Lingulodiscina Whitfield, Bull. American Mus. Nat. Hist., III, 1890, p. 122, figs. 1–8.

Œhlertella Hall and Clarke, Pal. New York, VIII, Pt. I, 1890, pp. 133, 168;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 257.

Lingulodiscina(?) connata (Walcott). Lower Carboniferous.

Discina connata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 214, pl. 7, fig. 3.

Loc. Eureka district, Nevada.

Lingulodiscina exilis (Hall). Marcellus (Dev.).

Lingula exilis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 77, fig. 2;—Pal. New York, IV, 1867, p. 7, pl. 1, figs. 8, 9.

Lingulodiscina exilis Whitfield, Bull. American Mus. Nat. Hist., III, 1890, p. 122, figs. 1–8.

Loc. Schoharie County, New York.

Lingulodiscina newberryi (Hall). Waverly (L. Carb.).

Discina newberryi Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 30;—Pal. New York, IV, 1867, p. 25, pl. 1, figs. 10, 11.

Discina (Orbiculoidea) newberryi Meek, Pal. Ohio, II, 1875, p. 277, pl. 14, fig. 1.

Discina newberryi Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 213, pl. 18, fig. 3.—Keyes, Geol. Survey Missouri, V, 1895, p. 40.

Orbiculoidea newberryi Herrick, Bull. Denison Univ., IV, 1888, p. 12;—Geol. Ohio, VII, 1895, pl. 22, figs. 11, 13.

Œhlertella newberryi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 132, pl. 4F, fig. 18.

Loc. Cuyahoga Falls, Akron, and Farmington, Ohio; Eureka district, Nevada.

Obs. This species should be compared with Orbiculoidea(?) capax (White.)

Lingulodiscina pleurites (Meek). Waverly (L. Carb.).

Discina (Orbiculoidea?) pleurites Meek, Pal. Ohio, II, 1875, p. 278, pl. 14, fig. 2.

Orbiculoidea pleurites Herrick, Bull. Denison Univ., IV, 1888, pp. 12, 19, pl. 3, fig. 5;—Geol. Ohio, VII, 1895, pl. 22, fig. 12.

Œhlertella pleurites Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 132, pl. 4E, figs. 21–24; pl. 4F, figs. 19, 20.

Loc. Newark and Gann, Knox County, Ohio.

LINGULOPS Hall. Genotype L. whitfieldi Hall.

Lingulops Hall, Notes on some New or Imperfectly Known Forms among the Brachiopoda, 1871, p. 2;—Ibidem, 1872, p. 2, pl. 13, figs. 1, 2;—Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 244, pl. 13, figs. 1, 2.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 164.—Hall and Clarke, Pal. New York, VIII, Pt. 1, 1892, pp. 18, 46, 163;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 233.

Lingulops granti Hall and Clarke. Niagara (Sil.).

Lingulops granti Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 19, 173, pl. 4K, figs. 14, 15.

Loc. Hamilton, Ontario.

Lingulops norwoodi (James). Utica (Ord.).

Lingula norwoodi James, Cincinnati Quart. Jour. Sci., II, 1875, p. 10, fig. 2;—Jour. Cincinnati Soc. Nat. Hist., VI, 1883, p. 235, pl. 10, fig. 1.

Lingulops norwoodi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 19, pl. 2, figs. 24–26.

Loc. Covington, Kentucky.

Lingulops whitfieldi Hall. Maquoketa (Ord.).

Lingulops whitfieldi Hall, Notes on some New or Imperfectly Known Forms among the Brachiopoda, 1872, p. 2, pl. 13, fig. 12;—Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, pl. 13, figs. 1, 2.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 164, pl. 19, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 19, pl. 2, figs. 27–30.

Loc. Near Lattners, Dubuque County, Iowa.

LINNARSSONIA Walcott. Genotype Obolella transversa Hartt.

Linnarssonia Walcott, American Jour. Sci., 3d ser., XXIX, 1885, p. 115; XXX, p. 21.—Matthew, Trans. Royal Soc. Canada, III, 1886, p. 35.—Hall and

LINNARSSONIA Walcott—Continued.

Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 107, 167;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 251.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 42.

Linnarssonia belti Davidson. Upper Cambrian.

Linnarssonia belti ? Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 42, pl. 12, figs. 7a–7c.

Loc. Near St. John, New Brunswick.

Linnarssonia misera (Billings). Middle Cambrian.

Obolella? misera Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 470.

Linnarssonia misera Matthew, Trans. Royal Soc. Canada, III, 1886, p. 35, fig. 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 108, pl. 8, figs. 35–37.

Loc. Trinity Bay, Newfoundland; St. Martins, New Brunswick.

Linnarssonia pretiosa (Billings). Upper Cambrian.

Obolella pretiosa Billings, Pal. Fossils, I, 1862, p. 68, fig. 61;—Geol. Canada, 1863, p. 230, fig. 239.

Obolella? pretiosa Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.

Linnarssonia pretiosa Dawson, Trans. Royal Soc. Canada, VII, 1889, p. 53, fig. 26.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 70, pl. 3, figs. 43, 44.

Loc. Bridge of the Grand Trunk Railroad across the Chaudiere River; Cape Rouge; Little Metis; Sillery and Point Levis, Canada.

Linnarssonia sagittalis taconica Walcott. Lower and Middle Cambrian.

Linnarssonia taconica Walcott, American Jour. Sci., 3d ser., XXXIV, 1887, p. 189, pl. 1, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 106.

Linnarssonia sagittalis Walcott, Proc. U. S. Nat. Mus., XI, 1888, p. 442.

Linnarssonia sagittalis var. taconica Walcott, American Jour. Sci., 3d ser., XXXVIII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 610, pl. 68, fig. 1.

Loc. Washington County, New York; Mount Stephan, British Columbia.

Linnarssonia taconica Walcott=L. sagittalis taconica.

Linnarsonia transversa (Hartt). Middle Cambrian.

Obolella transversa Hartt, Dawson, Acadian Geol., 2d ed., 1868, p. 644.—Walcott, Bull. U. S. Geol. Survey, 10, 1884, p. 16, pl. 1, fig. 5.

Linnarssonia transversa Walcott, American Jour. Sci., 3d ser., XXIX, 1885, p. 116, figs. 3, 4, 6.—Matthew, Trans. Royal Soc. Canada, III, 1886, p. 35, pl. 5, fig. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 108, pl. 3, figs. 38–42.—Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 125, pl. 5, figs. 1, 2.

Loc. St. John, New Brunswick.

LISSOPLEURA Whitfield. Genotype Rhynchonella æquivalvis Hall.

Lissopleura Whitfield, Bull. Am. Mus. Nat. Hist., VIII, 1896, p. 232.

Lissopleura æquivalvis (Hall). Lower Helderberg (Dev.).

Rhynchonella æquivalvis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 66;—Pal. New York, III, 1859, p. 224, pl. 29, pp. 2, 3.

Lissopleura æquivalvis Whitfield, Bull. Am. Mus. Nat. Hist., VIII, 1896, p. 232, figs. 1–5.

Loc. Helderberg Mountains, New York.

MARTINIA McCoy. Genotype Anomites glabra Martin.

Martinia McCoy, Carboniferous Fossils Ireland, 1844, p. 128, fig. 18; p. 139, fig. 132.—King, Mon. Permian Fossils, Pal. Soc., 1850, pp. 81, 134.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 19.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 528.—Herrick, Bull. Denison Univ., IV, 1888, p. 14.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 9, 32, 40.

Martinia athyroides A. Winchell. Hamilton (Dev.).
Martinia athyroides A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.
Loc. Grand Traverse region, Michigan.

Martinia glabra (Martin). Upper Carboniferous.
Anomites glabra Martin, Petrefacta Derbiensia, 1809, pl. 48, figs. 9, 10.
Spirifera glabra Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 170, pl. 9, figs. 9, 10.—Dawson, Acadian Geology, 3d ed., 1878, p. 291, fig. 89.
Loc. Europe; Pictou, Windsor, etc., Nova Scotia.

Martinia glabra contracta (Meek and Worthen). Kaskaskia (L. Carb.).
Spirifera glabra var. contracta Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 143;—Geol. Survey Illinois, II, 1866, p. 298, pl. 23, fig. 5.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 136, pl. 10, fig. 2.
Spirifera (Martinia) contractus Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 583, pl. 13, figs. 17-19.
Spirifera (Martinia) contracta Whitfield, Geol. Ohio, VII, 1895, p. 471, pl. 9, figs. 17-19.
Loc. Chester, Illinois; Newtonville, Ohio; Lincoln County, Nevada.

Martinia glanscerasi (White). Hamilton (Dev.).
Spirifera glanscerasi White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 24.
Loc. Iowa City, Iowa.

Martinia(?) insolita A. Winchell. Huron (Dev.).
Spirifera? insolita A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.

Martinia lævigata (Swallow). Keokuk (L. Carb.).
Spirifera lævigata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.
Loc. Iowa and Missouri.
Obs. Regarded by Keyes as a synonym for Spirifer logani.

Martinia maia (Billings). Corniferous (Dev.).
Athyris maia Billings, Canadian Jour. Sci., V, 1860, p. 276, figs. 33, 34;—Geol. Canada, 1863, p. 373, fig. 398.
Athyris? maia Nicholson, Pal. Prov. Ontario, 1874, p. 88.
Spirifera maia Hall, Pal. New York, IV, 1867, p. 116, pl. 63, figs. 6-13.—Davidson, Suppl. British Sil. Brach., Paleontographical Soc., 1882, p. 122.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 549, pl. 11, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 38, figs. 5, 6.—Whitfield, Geol. Ohio, VII, 1895, p. 444, pl. 7, fig. 14.
Spirifera (Martinia) maia Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 141, pl. 14, fig. 13 (?pl. 3, fig. 1).
Loc. St. Marys, Township of Blanchard, Ontario; Columbus and Delaware, Ohio; Eureka district, Nevada.

Martinia meristoides Meek. Middle Devonian.
Spirifera (Martinia) meristoides Meek, Trans. Chicago Acad. Sci, I, 1868, p. 106, pl. 14, fig. 3.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 142.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 226.
Loc. Mackenzie River Basin, British America.

Martinia planoconvexa Meek and Hayden=Ambocœlia planiconvexa.

Martinia sublineata Meek. Middle Devonian.
Spirifera (Martinia) sublineata Meek, Trans. Chicago Acad. Sci., I, 1868, p. 103, pl. 14, fig. 1.
Loc. Great Slave Lake, British America.

Martinia subumbona (Hall). Hamilton-Portage (Dev.).

Orthis subumbona Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 168.
Ambocœlia subumbona Hall, Thirteenth Rep. Ibidem, 1860, p. 71.
Spirifera subumbona Hall, Pal. New York, IV, 1867, p. 234, pl. 33, figs. 22–30.
Martinia subumbona Miller, N. American Geol. Pal., 1889, p. 352.
Spirifer subumbona Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 29, fig. 14.
Loc. Shore of Lake Erie, Tully, and McKinneys Station, New York.
Obs. Professor Williams says this species is a synonym for Ambocœlia gregaria.

MEEKELLA White and St. J. Genotype Plicatula striatocostata Cox.

Meekella White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 120, figs. 4–6.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 175.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 576.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 264;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 287.

Meekella occidentalis (Newberry). Upper Carboniferous.

Streptorhynchus occidentalis Newberry, Ives's Rep. Colorado River of the West, 1861, p. 126, pl. 1, fig. 5.
Meekella occidentalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 266, pl. 11B, figs. 18, 19.
Loc. Canyon of Cascade River.
Obs. See Meekella pyramidalis.

Meekella (?) occidentalis (Swallow). Upper Carboniferous.

Orthisina occidentalis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 82.
Loc. Caldwell County, Missouri.
Obs. If a Meekella it should be compared with M. striaticostata. Regarded by Keyes as a synonym for M. striaticostata.

Meekella pyramidalis (Newberry). Upper Carboniferous.

Streptorhynchus pyramidalis Newberry, Ives's Rep. Colorado River of the West, 1861, p. 126, pl. 2, figs. 11–13.
Meekella pyramidalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 266.
Loc. Colorado River.
Obs. This species is quite distinct from M. striaticostata Cox, with which it has been confounded. M. occidentalis Newberry, however, may prove to be but a large individual of M. pyramidalis.

Meekella striaticostata (Cox). Upper Carboniferous.

Plicatula striatocostata Cox, Owen's Geol. Survey Kentucky, III, 1857, p. 568, pl. 8, fig. 7.
Orthisina shumardianus Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 183.
Orthisina missouriensis Swallow, Ibidem, 1858, p. 219.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, III, 1859, p. 26.
Orthisina shumardiana Meek and Hayden, Ibidem, 1859, p. 26.
Orthis striatocosta Geinitz, Carbon und Dyas in Nebraska, 1866, p. 48, pl. 3, figs. 22–24.
Meekella striatocostata White and St. John, Trans. Chicago Acad. Sci., I, 1868, pp. 120, 122, figs. 4–6.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 175, pl. 5, fig. 12.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 26, fig. 21.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 26, pl. 9, fig. 4.—Kayser, Richthofen's China, IV, 1883, p. 178, pl. 23, fig. 8.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 130, pl. 26, figs. 12–14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 265, pl. 10, figs. 18–23; pl. 11B, figs. 20–22.—Keyes, Geol. Survey Missouri, V, 1895, p. 68, pl. 39, fig. 1.

Merista elongata (Hall). Lower Helderberg (Dev.).

Camarium elongatum Hall, Pal. New York, III, 1859, p. 488, pl. 95A, fig. 4.

Loc. Cumberland, Maryland.

Obs. Probably only a variety of M. typa.

Merista houghtoni Winchell=Meristella houghtoni.

Merista lævis Hall=Meristella lævis.

Merista lata Hall=Meristella lata.

Merista lens Hall=Meristella lens.

Merista meeki Hall=Meristella meeki.

Merista princeps Hall=Meristella princeps.

Merista subquadrata Hall=Meristella subquadrata.

Merista tennesseensis Hall and Clarke. Lower Helderberg (Dev.).

Merista tennesseensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 71, 365, pl. 42, figs. 1-6.

Loc. Perry County, Tennessee.

Merista typus Hall. Lower Helderberg (Dev.).

Camarium typum Hall, Pal. New York, III, 1859, p. 487, pl. 95A, figs. 2a, 3, 5, 6.

Merista typum Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 10-13.

Merista typa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 42, figs. 7-12.

Loc. Cumberland, Maryland.

MERISTELLA Hall, 1860. Genotype Merista arcuata Hall.

?Meristella Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Meristella Hall, Thirteenth Rep. Ibidem, 1860, pp. 74, 93;—Sixteenth Rep. Ibidem, 1863, p. 50, figs. 27-34;—Trans. Albany Institute, IV, 1863, p. 139;—American Jour. Sci., 2d ser., XXXV, 1863, p. 396; XXXVI, p. 11;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, pp. 155, 258;—Pal. New York, IV, 1867, p. 295.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 97.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 73, figs. 55, 56;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 773.

Athyris Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 115.

Meristella arcuata Hall. Lower Helderberg (Dev.).

Merista arcuata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 95, figs. 1-4;—Pal. New York, III, 1859, p. 249, pl. 41, fig. 1 (?2).

Meristella arcuata Hall, Ibidem, IV, 1867, p. 298, figs. 1, 2.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 43, figs. 1, 2; pl. 44, fig. 5.

Loc. Albany and Schoharie counties, New York; St. Blandine, New Brunswick.

Meristella barrisi Hall. Marcellus-Hamilton (Dev.).

Meristella barrisi Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Pal. New York, IV, 1867, p. 304, pl. 49, figs. 5-22.—?Tschernyschew, Mémoires du Comité Géologique de St. Pétersbourg, III, 3, 1887, p. 55, pl. 9, figs. 12, 15; pl. 13, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 25, 26; pl. 44, figs. 27-30.

Loc. York and Leroy, New York; Urals of Russia.

Meristella bella (Hall). Lower Helderberg (Dev.).

Merista bella Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 92, figs. 1-7;—Pal. New York, III, 1859, p. 248, pl. 40, fig. 1.

Meristella bella Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 510, pl. 5, figs. 8-10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 7-9; pl. 44, figs. 1-3.—Whitfield, Geol. Ohio, VII, 1895, p. 412, pl. 1, figs. 8-10.

Loc. Albany and Schoharie counties, New York; Greenfield, Ohio; Lake Temiscouata, New Brunswick.

Meristella(?) blancha (Billings). Lower Helderberg (Dev.).

Athyris blancha Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 115, pl. 3, fig. 13.

Meristina (?) blancha Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 68, pl. 41, figs. 22, 23.

Loc. Square Lake, Maine.

Obs. Compare with Meristella arcuata.

Meristella clusia (Billings). Corniferous (Dev.).

Athyris? clusia Billings, Canadian Jour. Sci., V, 1860, p. 279.

Loc. Cayuga, Ontario.

Meristella doris Hall. Upper Helderberg (Dev.).

Meristella doris Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Pal. New York, IV, 1867, p. 303, pl. 50, figs. 1-12.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 21, 22.

Charionella doris Billings, Geol. Canada, 1863, p. 374, figs. 400E, 401a, b.

Loc. Schoharie and Williamsville, New York; Cayuga, Ontario.

Meristella elissa Hall=Meristella nasuta.

Meristella haskinsi Hall. Hamilton (Dev.).

Meristella haskinsi Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 84;—Pal. New York, IV, 1867, p. 306, pl. 49, figs. 23-35.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 43, figs. 23, 24; pl. 44, fig. 31.

Loc. Seneca Lake, York, Moscow, etc., New York; Thedford, Ontario.

Meristella (?) houghtoni (A. Winchell). Huron (Dev.).

Merista houghtoni Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407.

Meristella (?) houghtoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78.

Loc. Port aux Barques, Michigan.

Meristella (?) incerta Simpson. Waverly (L. Carb.).

Meristella incerta Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 442, fig. 7.

Loc. Warren, Pennsylvania.

Obs. Based upon a crushed and broken specimen.

Meristella lævis (Vanuxem). Lower Helderberg (Dev.).

Atrypa lævis Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 120, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 642.

Merista lævis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 94, figs. 1-6;—Pal. New York, III, 1859, p. 247, pl. 39, figs. 3, 4.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 376, pl. 7, fig. 8.

Meristella lævis Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 510, pl. 5, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 3-6; pl. 44, fig. 4.—Whitfield, Geol. Ohio, VII, 1895, p. 411, pl. 1, figs. 6, 7.

Loc. Albany and Schoharie counties, New York; Greenfield, Ohio; Perry County, Missouri; Pennsylvania; Square Lake, Maine; St. Blandine, New Brunswick.

Meristella (?) lævis (Hall). Lower Helderberg (Dev.).

Meganteris lævis Hall (non Vanuxem), Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 99.

Rensselæria lævis Hall, Pal. New York, III, 1859, p. 256, pl. 40, fig. 2.

Loc. Albany County, New York.

Meristella lata Hall. Oriskany (Dev.).

Merista lata Hall, Pal. New York, III, 1859, p. 431, pl. 101, fig. 3.

Meristella lata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78, pl. 44, fig. 12.

Loc. Albany and Schoharie counties, New York; Cayuga, Ontario.

Meristella lens (A. Winchell). Hamilton (Dev.).

Merista lens A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.

Meristella lens Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78.

Loc. Grand Traverse region, Michigan.

Meristella lenta Hall. Oriskany (Dev.).

Meristella lenta Hall, Pal. New York, IV, 1867, p. 420, pl. 63, figs. 19-22.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 44, figs. 15-18.

Loc. Cayuga, Ontario.

Meristella maria Hall=Meristina maria.

Meristella meeki Hall. Lower Helderberg (Dev.).

Merista meeki Hall, Tenth Rep. N. Y. State Cab. Nat. Hist, 1857, p. 97;—Pal. New York, III, 1859, p. 252, pl. 44, fig. 6.

Camarium meeki Hall, Ibidem, III, 1859, p. 486.

Meristella meeki Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 78.

Loc. Perry County, Tennessee.

Meristella meta Hall. Hamilton (Dev.).

Meristella meta Hall, Pal. New York, IV, 1867, p. 308, pl. 49, figs. 1-4.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 43, figs. 29, 30.

Loc. Delphi, New York.

Meristella nasuta (Conrad). Upper Helderberg (Dev.).

Atrypa nasuta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265.

Terebratula valenciennii Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 39, pl. 13, fig. 6.

Meristella nasuta Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 8, 9;—Fifteenth Rep. Ibidem, 1862, p. 160, figs. 17-22 on p. 161;—Pal. New York, IV, 1867, p. 299, pl. 48, figs. 1-25.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 98, pl. 15, figs. 2-8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 18-20; pl. 44, figs. 13, 14, 19-26.

Athyris clara Billings, Canadian Jour. Sci., V, 1860, p. 274, figs. 29-32;—Geol. Canada, 1863, p. 373, fig. 397;—Canadian Nat. Geol., n. ser., VII, 1874, p. 240.

Meristella clissa Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 100;—Fifteenth Rep. Ibidem, 1862, pl. 3, figs. 21, 22.

Athyris nasuta Nicholson, Pal. Prov. Ontario, 1874, p. 86.

Meristella (Whitfieldia) nasuta Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 148, pl. 3, fig. 8.

Loc. Schoharie, Clarence, Williamsville, etc., New York; Cayuga, Ontario; Columbus and Dublin, Ohio; Falls of Ohio; Lone Mountain, Nevada.

Meristella nucleolata Whitfield=Whitfieldella nucleolata.

Meristella princeps Hall. Lower Helderberg (Dev.).

Merista princeps Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 95, figs. 1-5;—Pal. New York, III, 1859, p. 251, pl. 44, figs 1-5.

Camarium princeps Hall, Ibidem, III, 1859, p. 486.

Meristella princeps Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 93, figs. 5-7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 43, figs. 10-13.

Loc. Carlisle and Schoharie, New York; St. Blandine, New Brunswick.

Meristella rectirostra Hall=Meristina rectirostris.

Meristella riskowskyi A. Ulrich. Middle Devonian.

Meristella riskowskyi A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 64, pl. 4, figs. 16-18.

Loc. Chahuarani and near Oconi, Bolivia.

Meristella rostrata Hall. Hamilton (Dev.).

Atrypa rostrata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 202, fig. 2.
Athyris? rostrata Billings, Canadian Jour. Sci., V, 1860, p. 281, figs. 43, 44.
Charionella rostrata Billings, Geol. Canada, 1863, p. 385, fig. 420.
Meristella rostrata Hall, Pal. New York, IV, 1867, p. 307, pl. 50, figs. 13–17.—Hall and Clarke, Ibidem, Vol. VIII, Pt. II, 1895, pl. 43, figs. 27, 28.
Loc. Eighteen Mile Creek, etc., New York; Bosanquet, Ontario.

Meristella subquadrata Hall. Lower Helderberg (Dev.)

Merista subquadrata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 93;—Pal. New York, III, 1859, p. 249, pl. 40, fig. 3.
Meristella subquadrata Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 78, pl. 43, figs. 14, 15.
Loc. Schoharie and Carlisle, New York.

Meristella unisulcata Hall = Pentagonia unisulcata.

Meristella unisulcata biplicata Hall = Pentagonia unisulcata biplicata.

Meristella unisulcata uniplicata Hall = Pentagonia unisulcata uniplicata.

Meristella walcotti Hall and Clarke. Oriskany (Dev.).

Meristella walcotti Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 77, 365, figs. 55, 56, pl. 43, figs. 16, 17; pl. 44, figs. 6–11, 23, 32.
Loc. Cayuga, Ontario.

MERISTINA Hall. Genotype Meristella maria Hall.

Meristina Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 157;—Pal. New York, IV, 1867, p. 299.—Nettelroth (partim), Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 101.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 65;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 770.
Whitfieldia Davidson, Supplement British Sil. Brach., Paleontographical Soc., 1882, p. 107.—Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 73.

Meristina maria Hall. Niagara (Sil.).

Athyris tumida Roemer, Sil. Fauna west. Tennessee, 1860, p. 70, pl. 5, fig. 12.
Meristella maria Hall, Trans. Albany Institute, IV, 1863, p. 212.—Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 196.
Meristina maria Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 157;—Pal. New York, IV, 1867, p. 299.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 132, pl. 7, figs. 5, 6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 101, pl. 29, figs. 7–10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 67, pl. 41, figs. 1–17.
Meristella tumida Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 597.
Meristella (Meristina) maria Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 159, pl. 25, figs. 8–12;—Eleventh Rep. State Geol. Indiana, 1882, p. 299, pl. 25, figs. 8–12.
Whitfieldia maria Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 73, pl. 7, figs. 1–3.
Loc. Waldron, Indiana; Springfield, Ohio; Louisville, Kentucky; Perry County, Tennessee; Bridgeport, Illinois; Racine, Wisconsin; Bessels Bay, 81° 6′.
Obs. This species is not identical with M. tumida Dalman.

Meristina nitida Hall = Whitfieldella nitida.

Meristina rectirostris Hall. Niagara (Sil.).

Meristella rectirostra Hall, Descriptions n. sp. Fossils from Waldron, Indiana, 1879, p. 15;—Eleventh Rep. State Geol. Indiana, 1882, p. 301, pl. 27, figs. 10–14;—Trans. Albany Institute, X, 1883, p. 71.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 67, pl. 7, figs. 4, 5, 11–13.

Meristina rectirostris Hall—Continued.

Meristina rectirostra Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 68, figs. 52, 53, pl. 41, figs. 18-21.

Loc. Waldron, Indiana.

Meristina trisinuata (McChesney). Niagara (Sil.).

Pentamerus trisinuatus McChesney, Descriptions New Pal. Fossils, 1861, p. 86.

Athyris? trisinuatus McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 33, pl. 8, fig. 2.

Loc. Milwaukee, Wisconsin.

Obs. Probably synonymous with Meristina maria.

METAPLASIA Hall and Clarke. Genotype Spirifer pyxidata Hall.

Metaplasia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 56;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 762.

Metaplasia disparilis (Hall). Corniferous (Dev.).

Spirifer disparilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 134.

Spirifera disparilis Hall, Pal. New York, IV, 1867, p. 204, pl. 30, figs. 10-15.

Metaplasia pyxidata Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 39, figs. 19-22.

Loc. Williamsville and Clarence Hollow, New York.

Metaplasia pyxidata Hall. Oriskany (Dev.).

Spirifer pyxidata Hall, Pal. New York, III, 1859, p. 428, pl. 100, figs. 9-12.

Metaplasia pyxidata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 56.

Loc. Albany and Schoharie counties, New York; Cumberland, Maryland; Cayuga, Ontario.

Micromitra Meek=Iphidea.

MIMULUS Barrande. Genotype M. perversus Barrande.

Mimulus Barrande, Système Silurien du Centre de la Bohème, V, 1879, p. 109.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 272;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 289.

Mimulus waldronensis (Miller and Dyer). Niagara (Sil.).

Spirifera (?) waldronensis Miller and Dyer, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 37, pl. 2, fig. 3.

Triplesia putillus Hall, Descriptions n. sp. Fossils Waldron, Indiana, 1879, p. 16;—Eleventh Rep. State Geol. Indiana, 1882, p. 298, pl. 27, figs. 19-22;—Trans. Albany Institute, X, 1883, p. 72.

Streptis waldronensis Beecher and Clarke, Mem. New York State Mus., I, 1889, p. 30, pl. 3, figs. 9, 10.

Mimulus waldronensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 273, pl. 11C, figs. 23-28.

Loc. Waldron, Indiana.

MONOMORELLA Billings. Genotype M. prisca Billings.

Monomorella Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 220;—American Jour. Sci., 3d ser., III, 1872, p. 358.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 155.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 40, 46;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 238.

Monomorella egani Hall and Clarke. Niagara (Sil.).

Monomorella egani Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 175, pl. 4C, fig. 16.

Loc. Near Grafton, Wisconsin.

Monomorella greenei Hall and Clarke. Niagara (Sil.).
Monomorella greenii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 174, pl. 4D, figs. 5-10.
Loc. Near Grafton, Wisconsin; Risingsun, Ohio.

Monomorella kingi Hall and Clarke. Niagara (Sil.).
Monomorella kingi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 174, pl. 4D, figs. 1, 2.
Loc. Near Cedarburg, Wisconsin; Hawthorne, Illinois.

Monomorella newberryi Hall and Whitfield. Niagara (Sil.).
Monomorella newberryi Hall and Whitfield, Pal. Ohio, II, 1875, p. 131, pl. 7, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4C, figs. 1, 2.
Loc. Genoa, Ohio.

Monomorella orbicularis Billings. Guelph (Sil.).
Monomorella orbicularis Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 221;—American Jour. Sci., 3d ser., III, 1872, p. 359.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 158, pl. 17, fig. 10.
Monomorella cnf. orbicularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4C, figs. 3-5.
Loc. Hespelar, Ontario; near Grafton, Wisconsin.

Monomorella ortoni Hall and Clarke. Niagara (Sil.).
Monomorella ortoni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 42, 175, pl. 4C, figs. 14, 15.
Loc. Risingsun, Wood County, Ohio.

Monomorella ovata Whiteaves. Guelph (Sil.).
Monomorella ovata Whiteaves, Pal. Fossils, III, 1884, p. 5, pl. 2, fig. 1; pl. 8, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 42, pl. 4D, figs. 13-15.
Loc. Durham, Ontario.

Monomorella ovata lata Whiteaves. Guelph (Sil.).
Monomorella ovata var. lata Whiteaves, Pal. Fossils, III, 1884, p. 6, pl. 2, fig. 2; pl. 8, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4, figs. 11, 12; pl. 4C, figs. 17, 18.
Loc. Durham, Ontario; Hawthorne, Illinois.

Monomorella prisca Billings. Guelph (Sil.).
Monomorella prisca Billings, Canadian Nat. Geol, n. ser., VI, 1871, p. 221;—American Jour. Sci., 3d ser., III, 1872, p. 359.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 156, pl. 17, figs. 5-8.—Nicholson, Pal. Prov. Ontario, 1875, p. 68, fig. 38.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4C, figs. 6-13.
Loc. Hespelar and Elora, Ontario; Risingsun, Wood County, Ohio; Hawthorne, Port Byron, and Cicero, Illinois.

NEWBERRYA Hall. Genotype Rensselæria? johanni Hall.
Rensselandia Hall, Pal. New York, IV, 1867, p. 385.
Newberria Hall, Cont. Canadian Pal., I, 1891, p. 236;—Tenth Ann. Rep. N. Y. State Geol., 1891, p. 91 (extract, p. 4).—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 261;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 851.
Obs. It is unfortunate that Rensselæria johanni is the type for two generic names. Adhering strictly to the rules of nomenclature Rensselandia will take precedence over Newberrya. The first term is, however, improperly constructed and is without meaning.

Newberrya claypolei Hall. Hamilton (Dev.).

Rensselæria marylandica? Claypole, Proc. American Phil. Soc., 1883, p. 235.

Newberria claypolii Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 9, extract, pl. 5, figs. 1-9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 263, pl. 78, figs. 1-9.

Loc. Perry County, Pennsylvania.

Newberria? condoni McChesney=Megalanteris condoni.

Newberrya johannis Hall. Middle Devonian.

Rensselæria? johanni Hall, Pal. New York, IV, 1867, p. 385, pl. 58A, figs. 9-20.

Rensselandia johanni Hall, Ibidem, 1867, at end of description.

Newberria johanni Hall, Cont. Canadian Pal., I, 1891, p. 237.

Newberria johannis Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 8, extract, pl. 6, figs. 1-11.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 262, pl. 78, figs. 10-16.

Loc. Waterloo, Iowa.

Newberrya lævis (Meek). Middle Devonian.

Rensselæria lævis Meek, Trans. Chicago Acad. Sci., I, 1868, p. 108, pl. 13, fig. 8; pl. 14, fig. 4.

Newberria lævis Hall, Cont. Canadian Pal., I, 1891, p. 237, pl. 30, figs. 3, 4.

Newberria lævis Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 7, extract, pl. 6, figs. 12-15.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 264, pl. 78, figs. 17-20.

Loc. Mackenzie, Onion, and Lockhart rivers, Canada.

Newberrya missouriensis Swallow. Hamilton (Dev.).

Newberria missouriensis (Swallow MS.) Hall, Tenth Ann. Rep. N. Y. State Geol., 1891, p. 9, extract, pl. 5, figs. 10-12.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 263, pl. 78, figs. 21-23.

Loc. Moniteau County, Missouri.

NOTOTHYRIS Waagen. Genotype Terebratula subvesicularis David.

Nototbyris Waagen, Palæontologica Indica, Ser. XIII, I, 1882, p. 375.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 857.

Nototbyris (?) smithii Derby. Middle Devonian.

Nototbyris (?) smithii Derby, Archivos do Museu Nacional do Rio De Janeiro, IX, 1890, p. 81.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 267, 275.

Loc. Head of the Paraguay in Matto-Grosso, Brazil.

NUCLEOSPIRA Hall. Genotype Spirifer ventricosa Hall.

Nucleospira Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 24;—Pal. New York, III, 1859, p. 219;—Ibidem, IV, 1867, p. 278.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 103.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 142;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 806.

Nucleospira barrisi White. Kinderhook (L. Carb.).

Nucleospira barrisi White, Jour. Boston Soc. Nat. Hist., VIII, 1860, p. 227.

Loc. Burlington, Iowa.

Nucleospira concentrica Hall. Lower Helderberg (Dev.).

Nucleospira concentrica Hall, Pal. New York, III, 1859, p. 223, pl. 28B, figs. 15-19.—Hall and Clarke, Ibidem, VIII, Pt. II, 1895, pl. 48, fig. 7.

Loc. Decatur County, Tennessee.

Nucleospira concinna Hall. Corniferous-Hamilton (Dev.).
Atrypa concinna Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 200, fig. 3.
Nucleospira concinna Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, pp. 25, 26;—Pal. New York, IV, 1867, p. 279, pl. 45, figs. 33–57.—Davidson, Suppl. British Silurian Brach., Palæontographical Society, 1882, p. 121.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 147.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 103, pl. 32, figs. 1–4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 145, fig. 131; pl. 48, figs. 12–17, 19–34; pl. 84, fig. 38.
Loc. Moscow, Darien, etc., New York; Monroe County, Pennsylvania; Thedford, Ontario; Hardy County, Virginia; Columbus, Ohio; Falls of Ohio; Lone Mountain, Nevada.

Nucleospira elegans Hall. ?Niagara and L. Helderberg (Sil. and Dev.).
Nucleospira elegans Hall, Pal. New York, III, 1859, p. 222, pl. 28B, figs. 10–15.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 104.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 48, figs. 8–11.
Loc. Cherry Valley, New York; Cumberland, Maryland. In the Niagara near Louisville, Kentucky (Nettelroth).

Nucleospira indianensis Miller=Parazyga hirsuta.

Nucleospira pisiformis Hall. Niagara (Sil.).
Orthis pisum Hall (non Sowerby), Pal. New York, II, 1852, p. 250, pl. 2, fig. 1.
Nucleospira pisiformis Hall, Pal. New York, III, 1859, pl. 28B;—Trans. Albany Institute, IV, 1863, p. 226;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 160, pl. 25, figs. 22–28;—Eleventh Rep. State Geol. Indiana, 1882, p. 301, pl. 25, figs. 22–28.—Kayser, Richthofens China, IV, 1883, p. 47, pl. 4, figs. 9–11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 104, pl. 33, figs. 7–9.—Keyes, Geol. Survey Missouri, V, 1895, p. 94, pl. 41, fig. 5.
Loc. Wolcott, New York; Waldron, Indiana; Louisville, Kentucky; Pike County, Missouri; Tshau-Tien, China.

Nucleospira rotundata Whitfield. Waterlime (Sil.).
Nucleospira rotundata Whitfield, Ann. New York Acad. Sci., II, 1882, p. 194;—Ibidem, V, 1891, p. 511, pl. 5, figs. 11–14;—Geol. Ohio, VII, 1895, p. 413, pl. 1, figs. 11–14.
Loc. Greenfield, Ohio.

Nucleospira ventricosa Hall. Lower Helderberg (Dev.).
Spirifer ventricosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 57.
Nucleospira ventricosa Hall, Pal. New York, III, 1859, p. 220, pl. 14, fig. 1; pl. 28B, figs. 2–9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 145, figs. 128–130; pl. 48, figs. 2–6, 18; pl. 84, figs. 39, 40.
Loc. Schoharie, Cherry Valley, etc., New York; Cumberland, Maryland.

OBOLELLA Billings. Genotype O. chromatica Billings.
Obolella Billings, Geol. Vermont, II, 1861, p. 946;—Pal. Fossils, I, 1861, p. 7.—Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 131.—Meek and Hayden, Smithsonian Cont. to Knowledge, XIV, 172, 1864, p. 3.—Hall, Trans. Albany Institute, V, 1867, p. 108.—Dall, American Jour. Conchology, VI, 1870, pp. 162, 164.—Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 217, figs. 5, 6;—American Jour. Sci., 3d ser., III, 1872, p. 355, figs. 5–7;—Ibidem, 3d ser., XI, 1876, p. 176.—Ford, Ibidem, 3d ser., XXI, 1881, p. 131.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 109.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 66, 164;—Eleventh Ann. Rep. N. Y. State Geologist, 1894,

OBOLELLA Billings—Continued.

p. 240.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 39.—Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, p. 116.

Dicellomus Hall, Twenty-third Rep. N. Y. State Cab. Nat Hist., 1873, p. 246.

Obolella ambigua Walcott=Elkania ambigua.

Obolella atlantica Walcott. Lower Cambrian.

Obolella atlantica Walcott, Proc. U. S. Nat. Mus., XII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 611, pl. 71, fig. 1.

Loc. Conception Bay, Newfoundland; Attleboro, Massachusetts.

Obolella cælata Billings=Lingulella cælata.

Obolella chromatica Billings. Lower Cambrian.

Obolella chromatica Billings, Geol. Vermont, II, 1861, p. 947, fig. 346;—Pal. Fossils, I, 1861, p. 7, fig. 7;—Geol. Canada, 1863, p. 284, fig. 288.—Hall, Trans. Albany Institute, V, 1867, p. 110.—Billings, American. Jour. Sci., 3d ser., XI, 1876, p. 176, figs. 1-4.—Ford, Ibidem, 3d ser., XXI, 1881, p. 133, figs. 3, 4, 5.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 112, pl. 11, fig. 1;—Tenth Ann. Rep. U. S. Geol. Survey, p. 611, pl. 71, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 70.

Loc. Anse au Loup, Canada.

Obolella cingulata Billings=Kutorgina cingulata.

Obolella circe Billings. Lower Cambrian.

Obolella circe Billings, Canadian Nat. Geol., n. ser., IV, 1871, p. 218;—American Jour. Sci., III, 1872, p. 357.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 118, pl. 10, fig. 3;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 611, pl. 71, fig. 3.

Loc. Trois Pistoles, Canada.

Obolella crassa (Hall). Lower Cambrian.

Orbicula? crassa Hall, Pal. New York, I, 1847, p. 290, pl. 79, fig. 8.

Avicula? desquamata Hall, Ibidem, 1847, p. 292, pl. 80, fig. 2.

Obolella crassa Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 218.—Ford, Amer. Jour. Sci., 3d ser., XV, 1878, p. 128;—Ibidem, 3d ser., XXI, 1881, p. 131, figs. 1, 2.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 114, pl. 10, fig. 1.—Shaler and Foerste, Bull. Mus. Comp. Zool., XVI, 1888, p. 27, pl. 1, fig. 1.—Walcott, Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 71, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 70, pl. 2, figs. 31-36.

Obolella desquamata Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 217, fig. 6;—American Jour. Sci., 3d ser., III, 1872, p. 355, fig. 6.

Obolella (Orbicula?) crassa Ford, American Jour. Sci., 3d ser., II, 1871, p. 33.

Dicellomus crassa Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 246, pl. 13, figs. 6-9.

Obolella chromatica (lap. crassa) Walcott, American Jour. Sci., 3d ser., XXIX, 1885, p. 116, figs. 1, 2;—Ibidem, XXX, 1890, p. 21.

Loc. Troy and Schodack Landing, New York; North Attleboro, Massachusetts; St. Simon and Bic Harbor, below Quebec, Canada.

Obolella desiderata Billings=Elkania desiderata.

Obolella desquamata Billings=Obolella crassa.

Obolella (?) discoidea Hall and Whitfield. Up. Camb. and Pogonip (Ord.).

Obolella discoidea Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 203, pl. 1, figs. 1, 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 14.

Obolella? discoidea Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 69.

Loc. Eureka district, Nevada.

Obolella gemma Billings. Lower Cambrian.

Obolella gemma Billings, Canadian Nat. Geol., n. ser., VI, 1871, p. 217, fig. 5;—American Jour. Sci., 3d ser., III, 1872, p. 357, fig. 5.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 116, pl. 10, fig. 2;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 71, fig. 5; pl. 72, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 71, fig. 30; pl. 2, figs. 42–44.

Loc. Bic and St. Simon harbors, below Quebec, Canada; Troy, New York.

Obolella (?) **gemmula** Matthew. Upper Cambrian.

Obolella (?) gemmula Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 41, pl. 12, figs. 8a–8c.

Loc. Near St. John, New Brunswick.

Obolella (?) **ida** Billings. Upper Cambrian and Calciferous (Ord.).

Obolella ida Billings, Pal. Fossils, I, 1862, p. 71, fig. 63, on p. 68.

Obolella ? ida Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.

Loc. Point Levis, Canada.

Obolella misera Billings=Linnarssonia misera.

Obolella minuta (Hall and Whitfield). Upper Cambrian.

Lingulepis ? minuta Hall and Whitfield, Rep. Geol. Expl. 40th Parl., IV, 1877, p. 206, pl. 1, figs. 3, 4.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 13.

Loc. Eureka district, Nevada.

Obolella nana Meek and Hayden. Middle Cambrian.

Obolella nana Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 435.—Billings, Pal. Fossils, I, 1862, p. 67.—Hayden, American Jour. Sci., 2d ser., XXXIII, 1863, p. 73.—Meek and Hayden, Smithsonian Cont. to Knowledge, XIV, 172, 1864, p. 4, pl. 1, fig. 3.—Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 340, pl. 2, figs. 14–17.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 69.

Loc. Black Hills, South Dakota.

Obolella nitida Ford. Lower Cambrian.

Obolella nitida Ford, American Jour. Sci., 3d ser., V, 1873, p. 213.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 118, pl. 11, fig. 2;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 72, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 69, 70.—?Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 125, pl. 2, fig. 8.

Loc. Troy, and Washington County, New York; Hanford Brook, New Brunswick.

Obolella pectenoides (Whitfield). Upper Cambrian.

Obolus pectenoides Whitfield, Ludlow's Rep. Reconn. Black Hills, Dakota, 1875, p. 103, figs. 1–3.

Obolus? pectenoides Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 338, pl. 2, figs. 18, 19.

Loc. Black Hills, South Dakota.

Obolella polita Hall. Middle Cambrian.

Obolus appolinus Owen (non Eichwald), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 1B, figs. 9, 11, 15, 20.

Lingula? polita Hall, Ann. Rep. Geol. Survey Wisconsin, 1861, p. 24;—Geol. Rep. Wisconsin, I, 1862, pp. 21, 435.

Obolella ? polita Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 133, pl. 6, figs. 17–21;—Trans. Albany Institute, V, 1867, p. 112.

Lingulepis prima Meek and Hayden, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 3, pl. 1, fig. 2.

Dicellomus polita Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 246.

Obolella polita Hall—Continued.

Obolella polita Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 339, pl. 2, figs. 12, 13.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 111.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 2, figs. 37-41.

Loc. Trempealeau, Wisconsin; Black Hills, South Dakota.

Obolella pretiosa Billings=Linnarssonia pretiosa.

Obolella prima Whitfield=Lingulepis prima.

Obolella transversa Hartt=Linnarssonia transversa.

Obolellina Billings=Dinobolus.

Obolellina canadensis Billings=Dinobolus canadaensis.

Obolellina galtensis Billings=Rhinobolus galtensis.

Obolellina magnifica Billings=Dinobolus magnificus.

OBOLUS Eichwald. Genotype Obolus appolinus Eichwald.

Obolus Eichwald, Zoologia Specialis, I, 1829, p. 274.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 80, figs. 33, 34; pp. 164, 337.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 43.—Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, pp. 25, 126.

Euobolus Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, pp. 25, 129, 133.

Obs. Both Euobolus and Obolus are based upon the same species.

Obolus appolinus Owen (non Eichwald)=Obolella polita.

Obolus canadensis Billings, 1858=Dinobolus magnificus.

Obolus canadensis Billings=Dinobolus canadaensis.

Obolus conradi Hall=Dinobolus conradi.

Obolus galtensis Billings=Rhinobolus galtensis.

Obolus labradoricus Billings=Iphidea labradorica.

Obolus (?) major Matthew. Lower Cambrian.

Obolus? major Matthew, Trans. Royal Soc. Canada, IV, 1890, p. 155, pl. 8, fig. 3.

Mickwitzia (?) major Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, p. 23.

Loc. Near St. John, New Brunswick.

Obolus (?) murrayi Billings. Cambrian.

Obolus? murrayi Billings, Pal. Fossils, I, 1865, p. 362.

Loc. Hare Bay, Newfoundland.

Obolus ? pectenoides Whitfield=Obolella pectinoides.

Obolus pulcher Matthew=Botsfordia pulchra.

Obolus pristinus Matthew. ?Middle Cambrian.

Obolus pristinus Matthew, Trans. N. Y. Acad. Sci., XIV, 1895, p. 121, pl. 4, fig. 1.

Loc. Hanford Brook, New Brunswick.

Obolus (?) refulgens Matthew. Middle Cambrian.

Obolus refulgens Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 44, pl. 12, figs. 6a-6d.

Obolus (?) refulgens Mickwitz, Mém. l'Acad. Imp. Sci. St. Pétersbourg, VIII, 1896, p. 23.

Loc. Near St. John, New Brunswick.

Œhlertella Hall and Clarke=Lingulodiscina.

Orbicula Cuvier=Crania.

Orbicula Sowerby, 1830=Discina.

Orbicula cælata Hall=Lingulella cælata.

Orbicula corrugata Hall=Lichenalia, a bryozoan.
Orbicula crassa Hall=Obolella crassa.
Orbicula deformata Hall=Crania deformata.

?Orbicula excentrica Emmons. Cambrian.

Orbicula excentrica Emmons, American Geology, Pt. II, 1855, p. 112, pl. 1, fig. 4.
Crania excentrica Miller, N. American Geol. Pal., 1889, p. 341.
Loc. Augusta County, Virginia.
Obs. Probably a gastropod.

Orbicula filosa Hall=Schizocrania filosa.
Orbicula grandis Vanuxem=Rœmerella grandis.
Orbicula lamellosa Hall (non Broderip)=Orbiculoidea lamellosa.
Orbicula lodensis Vanuxem=Orbiculoidea lodiensis.
Orbicula lugubris Conrad=Discinisca lugubris.
Orbicula minuta Hall=Orbiculoidea minuta.
Orbicula multilineata Conrad=Discinisca multilineata.
Orbicula parmulata Hall=Orbiculoidea parmulata.
Orbicula prima Owen=Lingulepis pinniformis.
Orbicula squamiformis Hall=Pholidops squamiformis.
Orbicula subtruncata Hall=Pholidops subtruncata.
Orbicula tenuilamellata Hall=Schizotreta tenuilamellata.
Orbicula terminalis Emmons=Trematis terminalis.
Orbicula truncata Emmons=Orbiculoidea lamellosa.

ORBICULOIDEA d'Orbigny. Genotype Orbicula morrisi Davidson.

Orbiculoidea d'Orbigny, Prodrome de Paléontologie stratigraphique, I, 1850, p. 44.—Dall, Bull. Mus. Comp. Zool., III, 1871, p. 37;—American Jour. Conch., VII, 1871, p. 74.—Herrick, Bull. Denison Univ., IV, 1888, p. 12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 125, fig. 64; p. 128, fig. 160 and pp. 160, 168.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 363.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 256.
Discina Hall (non Lamarck), Pal. New York, III, 1859, p. 159;—Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 130;—Pal. New York, IV, 1867, p. 15.

Orbiculoidea alleghania (Hall). Chemung (Dev.).

Discina alleghania Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 77, figs. 1, 2;—Pal. New York, IV, 1867, p. 25, fig. 1, pl. 1, fig. 17.
Loc. Hobbieville, Alleghany County, New York.

Orbiculoidea ampla Hall. Oriskany (Dev.).

Discina grandis Hall (non Vanuxem, 1842), Pal. New York, III, 1859, p. 406, pl. 92, fig. 1.
Discina ampla Hall, Ibidem, corrigenda in volume with plates, 1859.
Orbiculoidea ampla Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 127.
Loc. Albany County, New York; Cayuga, Ontario.

Orbiculoidea baini (Morris and Sharpe.) Middle Devonian.

Orbicula baini Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 277, pl. 10, fig. 5.—Sharpe and Salter, Trans. Geol. Soc. London, 2d ser., VII, 1856, p. 210, pl. 26, figs. 20–23.
Discina baini von Ammon, Zeits. Gessels. für Erdk., Berlin, XXVIII, 1893, p. 359, fig. 4.
Loc. Falkland Islands; Taquarassu, Matto-Grosso, Brazil; South Africa.

Orbiculoidea (?) capax (White). Kinderhook (L. Carb.).

Discina capax White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 30.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 112;—Proc. American Phil. Soc., XII, 1870, p. 249.

Loc. Burlington, Iowa; Girard and Rockville, Ohio (A. Winchell).

Obs. This species should be compared with Lingulodiscina newberryi Hall.

Orbiculoidea capuliformis (McChesney). Upper Carboniferous.

Discina capuliforma McChesney, New Pal. Fossils, 1860, p. 72;—Trans. Chicago Acad. Sci., I, 1868, p. 73, pl. 2, fig. 20.

Loc. Springfield, Illinois.

Obs. Compare with O. convexa Shumard.

Orbiculoidea conica Dwight=Schizotreta conica.

Orbiculoidea conradi (Hall). Lower Helderberg (Dev.).

Discina conradi Hall, Pal. New York, III, 1859, p. 161, pl. 9, figs. 16, 17; pl. 10A, fig. 2.

Loc. Near Hudson, New York.

Orbiculoidea convexa (Shumard). Upper Carboniferous.

Discina convexa Shumard, Trans. St. Loius Acad. Sci., I, 1858, p. 221.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 121, pl. 25, fig. 9.—Herrick, Bull. Denison Univ., II, 1887, pl. 3, fig. 19.—Keyes, Geol. Survey Missouri, V, 1895, p. 40, pl. 35, fig. 7.

Loc. Valley of Verdigris River, Kansas; Kansas City, Missouri; Vermilion County, Indiana; Newark, Ohio.

Obs. See Orbiculoidea capuliformis McChesney.

Orbiculoidea discus Hall. Lower Helderberg (Dev.).

Discina discus Hall, Pal. New York, III, 1859, p. 159, pl. 9, figs. 13–15.

Schizocrania (?) discus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 132.

Orbiculoidea discus Hall and Clarke, Ibidem, 1892, pl. 4E, fig. 13.

Loc. Near Hudson and Albany counties, New York.

Orbiculoidea doria (Hall). Hamilton (Dev.).

Discina doria Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 26;—Pal. New York, IV, 1867, p. 19, pl. 2, figs. 19–22, 31 (?30).—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 32.

Loc. Madison County, New York; Thedford, Ontario; Clark County, Indiana.

Orbiculoidea elmira (Hall). Chemung (Dev.).

Discina elmira Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 29;—Pal. New York, IV, 1867, p. 24, pl. 2, figs. 38, 39.

Loc. Elmira, New York; Wellsboro, Pennsylvania.

Orbiculoidea gallaheri (A. Winchell). Marshall (L. Carb.).

Discina gallaheri A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 112;—Proc. American Philosophical Soc., XII, 1870, p. 249.

Loc. Hillsdale, Michigan; Granville, Ohio; Shafers, Pennsylvania.

Orbiculoidea herzeri Hall and Clarke. Waverly (L. Carb.).

Orbiculoidea herzeri Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 126, 127, 178.

Orbiculoidea pulchra Hall and Clarke, Ibidem, 1892, pl. 4E, fig. 19; pl. 4F, figs. 9–13, 30, (?14–16).

Loc. Berea and Baconsburg, Ohio; Meadville, Pennsylvania.

Orbiculoidea humilis (Hall). Marcellus and Hamilton (Dev.).

Discina humilis Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 25;—Pal. New York, IV, 1867, p. 16, pl. 2, fig. 18.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 560;—Geol. Ohio, VII, 1895, p. 452, pl. 8, figs. 1, 2.

Loc. Bridgewater, Canandaigua Lake, etc., New York; Leroy, Ohio.

Orbiculoidea illinoisensis (Miller and Gurley). Upper Carboniferous.

Discina illinoiensis Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893, p. 70, pl. 7, figs. 2-5.

Loc. Knox and Peoria counties, Illinois.

Obs. Closely related to O. convexa.

Orbiculoidea jervisensis (Barrett). Oriskany (Dev.).

Discina jervensis Barrett, Annals N. Y. Acad. Sci., I, 1878, p. 121.

Loc. Port Jervis, New York.

Orbiculoidea keokuk (Gurley). Keokuk (L. Carb.).

Discina keokuk Gurley, New Carb. Fossils, 1884, p. 6.

Loc. Crawfordsville, Indiana.

Orbiculoidea lamellosa Hall. Trenton and Lorraine (Ord.).

Orbicula lamellosa Hall (non Broderip, 1833), Pal. New York, I, 1847, p. 99, pl. 30, fig. 10.

Orbicula truncata Emmons, American Geology, Pt. II, 1855, p. 200, fig. 62.

Discina truncata Emmons, Manual of Geol., 1860, p. 99.

Orbiculoidea lamellosa? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 364, pl. 29, fig. 25.

Orbiculoidea lamellosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4E, fig. 12.

Discina circe Billings, Pal. Fossils, I, 1862, p. 51, fig. 55;—Geol. Canada, 1863, p. 159, fig. 125.

Loc. Middleville and Lowville, New York; Bellville and Ottawa, Canada; Spring Valley, Minnesota.

Obs. Orbicula lamellosa Broderip, is the type species of Discinisca, and Hall's name will therefore stand.

Orbiculoidea lodiensis (Vanuxem). Genesee (Dev.).

Orbicula lodensis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 168, fig. 1.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 223, fig. 1.

Discina lodensis Hall, Pal. New York, IV, 1867, p. 22, pl. 1, fig. 14; pl. 2, fig. 35.—Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 257;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 17.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 112, pl. 2, fig. 5.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 24.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 547, pl. 11; fig. 7;—Geol. Ohio, VII, 1895, p. 442, pl. 7, fig. 7.

Discina sp. a A. Ulrich, N. Jahrb. für Mineral., Beilageband, VIII, 1892, p. 81, pl. 5, fig. 10.

Orbiculoidea lodensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4F, fig. 21.

Loc. Lodi, etc., New York; White Pine district, Nevada; Erere, Province of Para, Brazil; Chahuarani, Bolivia. In the Marcellus shale of Delaware County, Ohio (Whitfield).

Orbiculoidea lodiensis media Hall. Marcellus-Chemung (Dev.).

Discina media Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 27;—Pal. New York, IV, 1867, p. 20, pl. 2, figs. 25-29.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 113.

Orbiculoidea media Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4E, figs. 15-17.

Loc. Seneca and Canandaigua lakes, New York; Chemung group, Troupsburg, New York.

Orbiculoidea magnifica (Herrick). Waverly (L. Carb.).

Discina magnifica Herrick, Bull. Geol. Soc. America, II, 1891, p. 46, pl. 1, fig. 17.

Loc. Wooster, and Ashland County, Ohio.

Orbiculoidea manhattanensis (Meek and Hayden). Upper Carboniferous.

Discina manhattensis Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 25.

Loc. Near Manhattan, Kansas.

Orbiculoidea marginalis (Whitfield). Hamilton (Dev.).

Discina marginalis Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1880, p. 70;—Geol. Survey Wisconsin, IV, 1882, p. 325, pl. 25, fig. 11.

Orbiculoidea marginalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 127, pl. 4F, fig. 17.

Loc. Milwaukee, Wisconsin.

Orbiculoidea minuta (Hall). Marcellus-Hamilton (Dev.).

Orbicula minuta Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 180, fig. 9.

Discina minuta Hall, Pal. New York, IV, 1867, p. 16, pl. 1, fig. 16.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 112, pl. 13, fig. 5.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 547, pl. 11, figs. 5, 6;—Geol. Ohio, VII, 1895, p. 442, pl. 7, figs. 5, 6.

Orbiculoidea minuta Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 356, pl. 17, figs. 5-7;—American Jour. Sci., 3d ser., XLIV, 1892, p. 150, pl. 1, figs. 4-6.

Loc. Avon, New York; Delaware County, Ohio; near Eureka, Nevada.

Orbiculoidea missouriensis (Shumard). Upper Carboniferous.

Discina missouriensis Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 221.

Discina nitida? Meek and Worthen (non Phillips), Geol. Survey Illinois, V, 1873, p. 572, pl. 25, fig. 1.

Discina nitida White, Thirteenth Rep. State Geologist Indiana, 1884, p. 121, pl. 25, fig. 10.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 226.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 131, pl. 4F, figs. 23-28.—Keyes, Geol. Survey Missouri, V, 1895, p. 39, pl. 35, fig. 6.

Discina meekana Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 228.—Herrick, Bull. Denison Univ., II, 1887, p. 145, pl. 2, fig. 8.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 598, pl. 15, figs. 1-3;—Geol. Ohio, VII, 1895, p. 483, pl. 11, figs. 1-3.

Loc. Lexington, Missouri; Illinois; Carbon Hill and Flint Ridge, Ohio; Des Moines, Iowa; Vermilion County, Indiana.

Obs. This species is not D. nitida Phillips. It differs from it in form and in the muscular scars.

Orbiculoidea (?) munda (Miller and Gurley). Upper Carboniferous.

Discina munda Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 3, 1893, p. 71, pl. 7, figs. 6, 7.

Loc. Kansas City, Missouri.

Obs. This species may be a Lingulodiscina, but since the ventral valve is unknown satisfactory generic reference can not be made.

Orbiculoidea neglecta (Hall). Chemung (Dev.).

Discina neglecta Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 29;—Pal. New York, IV, 1867, p. 24, pl. 1, figs. 12, 13.

Loc. Ithaca, New York.

Orbiculoidea newberryi Meek=Lingulodiscina newberryi.

Orbiculoidea nitida (Phillips). Upper Carboniferous.

Orbicula nitida Phillips, Geol. Yorkshire, II, 1836, p. 221, pl. 9, figs. 10-13.

?Discina nitida Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 213, pl. 7, fig. 4.

Loc. England; White Pine district, Nevada.

Orbiculoidea numulus Hall and Clarke. Waterlime (Sil.).
Orbiculoidea numulus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 178, pl. 4E, fig. 14.
Loc. Marshall, New York.

Orbiculoidea parmulata (Hall). Medina (Sil.).
Orbicula parmulata Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 48, fig. 4;—Pal. New York, II, 1852, pl. 4, fig. 3.
Loc. Medina and Lockport, New York.

Orbiculoidea patellaris (A. Winchell). Kinderhook (L. Carb.).
Discina patellaris A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.
Loc. Burlington, Iowa.

Orbiculoidea pleurites Meek=Lingulodiscina pleurites.
Orbiculoidea pulchra Hall=Orbiculoidea hertzeri.

Orbiculoidea randalli Hall. Hamilton (Dev.).
Discina randalli Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 25;—Pal. New York, IV, 1867, p. 18, pl. 2, fig. 34.
Orbiculoidea randalli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4E, fig. 18.
Loc. Schoharie, New York.

Orbiculoidea saffordi (A. Winchell). Lower Carboniferous.
Discina saffordi A. Winchell, Geol. Tennessee, 1869, p. 443;—Proc. American Philosophical Soc., XII, 1870, p. 248.
Loc. "Just above Black Slate," Hickman County, Tennessee.

Orbiculoidea sampsoni (Miller). Chouteau (L. Carb.).
Discina sampsoni Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 80, pl. 13, figs. 10–12.
Loc. Sedalia, Missouri.

Orbiculoidea seneca (Hall). Hamilton (Dev.).
Discina seneca Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 26;—Pal. New York, IV, 1867, p. 20, pl. 2, figs. 23, 24.
Loc. East shore of Seneca Lake, New York.

Orbiculoidea subplana (Hall). Arisaig (Sil.).
Discina tenuilamellata var. subplana Hall, Canadian Nat. Geol., V, 1860, p. 144.—Dawson, Acadian Geol., 3d ed., 1878, p. 595.
Loc. Arisaig, Nova Scotia.

Orbiculoidea subtrigonalis (McChesney). Upper Carboniferous.
Discina subtrigonalis McChesney, New Pal. Fossils, 1865, p. 97.
Discina trigonalis McChesney, Ibidem, 1865, pl. 2, fig. 19;—Trans. Chicago Acad. Sci., I, 1868, p. 24, pl. 2, fig. 19.
Loc. Lasalle, Illinois.

Orbiculoidea tenuilineata (Meek and Hayden). Upper Carboniferous.
Discina tenuilineata Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 25.
Loc. Cottonwood Creek, Kansas.

Orbiculoidea tenuistriata (Ulrich). Utica (Ord.).
Discina tenuistriata Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 96, pl. 4, fig. 10.
Loc. Covington, Kentucky.

Orbiculoidea tullia (Hall). Tully (Dev.).

Discina tullia Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 28;—Pal. New York, IV, 1867, p. 22, pl. 2, figs. 16, 17.

Loc. Seneca Lake, New York.

Orbiculoidea utahensis (Meek). Upper Carboniferous.

Discina sp. undet., Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 99, pl. 10, fig. 3.

Discina utahensis Meek, Ibidem, 1877, p. 99 (also see footnote, p. 9).

Loc. Weber Canyon, Wasatch Range, Utah.

Orbiculoidea vanuxemi (Hall). Arisaig and Waterlime (Sil.).

Discina vanuxemi Hall, Pal. New York, III, 1859, p. 162, pl. 8, fig. 1.

Loc. Manlius-square, New York; Arisaig, Nova Scotia (Ami).

Orbiculoidea varsaviensis (Worthen). Keokuk (L. Carb.).

Discina varsoviensis Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 23;—Geol. Survey Illinois, VIII, 1890, p. 102, pl. 11, fig. 7.

Loc. Warsaw, Illinois.

ORISKANIA Hall and Clarke. Genotype O. navicella H. and C.

Oriskania Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 270;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 854.

Oriskania navicella Hall and Clarke. Oriskany (Dev.).

Oriskania navicella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 269, figs. 181–183, pl. 79, figs. 25–27.

Loc. Near Hudson, New York.

ORTHIDIUM Hall and Clarke. Genotype Orthis gemmicula Billings.

Orthidium Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 244;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 276.

Orthidium gemmicula (Billings). Calciferous (Ord.).

Orthis gemmicula Billings, Pal. Fossils, I, 1862, p. 75, fig. 68.

Orthidium gemmicula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 217, 244, pl. 7A, figs. 22–25.

Loc. Point Levis, Canada.

Orthis of authors.

Orthis Hall, Pal. New York, IV, 1867, p. 33.—Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 18.—Herrick, Bull. Denison University, IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 34.—Hall, Bull. Geol. Soc. America, I, 1889, p. 19.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 185, 186;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 264.

ORTHIS Dalman (emend Hall and Clarke).

Genotype Orthis calligramma Dalman.

Orthis Dalman, Kongl. Svenska Vet.-Akad. Handl., för 1827, 1828, pp. 93, 96.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 192.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 417.—Hall and Clarke, Eleventh Ann. Rep. State Geologist, 1894, p. 265.

Orthis æquivalvis Hall, 1847=Plectorthis æquivalvis.

Orthis æquivalvis Hall, 1857 (non 1847)=Orthis eryna.

Orthis æquivalvis Shaler (non Hall)=Rhipidomella uberis.

Orthis (?) **acuminata** Billings. Chazy (Ord.).

Orthis ? acuminata Billings, Canadian Nat. Geol., IV, 1859, p. 440, fig. 19.

Orthis acuminata Billings, Geol. Canada, 1863, p. 130, fig. 59.

Loc. Caughnawaga, Canada.

Orthis acutilirata Meek=Platystrophia acutilirata.
Orthis acutiloba Ringueberg=Bilobites acutilobus.
Orthis alata Shaler=Orthis davidsoni.
Orthis alsus Hall=Rhipidomella alsa.

Orthis (?) **alternans** Castelnau. Formation.?

Orthis alternans Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 38, pl. 14, fig. 2.

Loc. "From an erratic block, Lake of the Woods." Undeterminable.

Orthis amœna N. H. Winchell=Dalmanella amœna.
Orthis anticostiensis Shaler=Dinorthis porcata.

Orthis (?) **apicalis** Billings. ?Upper Cambrian.

Orthis ? apicalis Billings, Pal. Fossils, I, 1865, p. 301, fig. 291.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Point Levis and west end of Island of Orleans, Canada.

Orthis arachnoides Roemer and Hall (non Phillips)=Derbya crassa.
Orthis armanda Billings=Syntrophia armanda.
Orthis assimilis Hall=Rhipidomella assimilis.
Orthis aurelia Billings=Plectorthis aurelia.
Orthis aymara Salter=Anoplotheca flabellites.
Orthis barabuensis Winchell=Syntrophia barabuensis.
Orthis battis Billings=Hebertella battis.
Orthis bellarugosa Conrad=Hebertella bellirugosa.
Orthis bellarugosa Hall, 1883=Hebertella insculpta.
Orthis bellula Meek=Dalmanella bellula.

Orthis benedicti Miller. Niagara (Sil.).

Orthis benedicti Miller, Seventeenth Rep. State Geol. Indiana, 1891, p. 78, pl. 13, figs. 7-9.

Loc. Hartsville, Indiana.

Orthis bicostatus Vanuxem=Reticularia bicostata.
Orthis biforata of authors=Platystrophia biforata.
Orthis biforata acutilirata White=Platystrophia acutilirata.
Orthis billingsi Hartt=Billingsella billingsi.
Orthis biloba Hall=Bilobites bilobus.
Orthis bisulcata Emmons=Cyclospira bisulcata.
Orthis borealis Billings=Hebertella borealis.

Orthis(?) **buchi** d'Orbigny. Upper Carboniferous.

Orthis buchi d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 49.

Productus andii d'Orbigny, Ibidem, p. 54, pl. 5, figs. 1-3.—de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 238.

Loc. Yarbichambi, Bolivia.

Orthis calligramma Foerste (non Dalman)=Orthis flabellites.
Orthis calligramma davidsoni Nicholson and Hinde=Orthis davidsoni.

Orthis calligramma Kayser. Lower Ordovician.

Orthis calligramma Kayser (non Davidson), Palæontographica, Suppl., III, 1876, pp. 18, 26, pl. 3, figs. 9-18.

Loc. Cordillere San Juan, Argentine Republic.

Obs. These shells appear to be more closely related to O. plicatella than to O. calligramma.

Orthis canalis Hall=Dalmanella elegantula.
Orthis carbonaria Swallow=Rhipidomella pecosi.
Orthis carinata Hall=Schizophoria carinata.
Orthis carleyi Hall=Dinorthis retrorsa.

Orthis carausii Salter. Calciferous (Ord.).

Orthis carausii (Salter, MS.) Davidson, Geol. Mag. London, V, 1868, p. 315, pl. 16, fig. 23.
Orthis carausii? Matthew, Trans. Royal Soc. Canada, X, 1893, p. 102, pl. 7, fig. 7.
Loc. England; near St. John, New Brunswick.

Orthis (?) centrilineata Hall. Lorraine (Ord.).

Orthis centrilineata Hall, Pal. New York, I, 1847, p. 289, pl. 79, fig. 5*.
Loc. Lorraine and Turin, New York.

Orthis centrosa Miller=Platystrophia crassa.
Orthis charlottæ Winchell=Dinorthis pectinella.
Orthis cincinnatiensis Miller=Orthis? pumila.
Orthis (?) circularis N. H. Winchell=Dalmanella subæquata circularis.
Orthis circulus Hall=Rhipidomella circulus.
Orthis clarkensis Swallow=Rhipidomella clarkensis.
Orthis cleobis Hall=Rhipidomella cleobis.
Orthis clytie Hall=Heterorthis clytie.
Orthis coloradoensis Meek, 1870=Orthis ? desmopleura.
Orthis coloradoensis Shumard=Billingsella coloradoensis.
Orthis concinna Hall=Dalmanella concinna.

Orthis (?) concinna Morris and Sharpe. Lower Devonian.

Orthis concinna Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 275, pl. 10, fig. 2.
Loc. Falkland Islands.
Obs. Probably a species of Orthothetes.

Orthis conradi Castelnau=Hipparionyx proximus.
Orthis conradi N. H. Winchell=Dalmanella subæquata conradi.
Orthis cooperensis Swallow=Rhipidomella dubia.
Orthis cora d'Orbigny=Schizophoria cora.

Orthis corinna Billings. Calciferous (Ord.).

Orthis corinna Billings, Pal. Fossils, I, 1865, p. 302, fig. 292.
Orthis ? corinna Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.
Loc. Stanbridge, Quebec, Canada.

Orthis corpulenta Sardeson=Dalmanella testudinaria meeki.

Orthis costalis Hall. Chazy (Ord.).

Orthis costalis Hall, Pal. New York, I, 1847, p. 20, pl. 4 bis, fig. 4;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, figs. 35-38.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 228, pl. 5, figs. 15-17.
Loc. Chazy, New York.

Orthis costata Hall (non Sowerby)=Orthis pumila.
Orthis crassa James=Platystrophia crassa.
Orthis crenistria Geinitz=Derbya crassa.
Orthis crispata Emmons=Dalmanella crispata.
Orthis cumberlandia Hall=Rhipidomella cumberlandia.
Orthis cuneata Owen=Rhipidomella cuneata.

Orthis (?) eudocia Billings. Calciferous (Ord.).

Orthis eudocia Billings, Pal. Fossils, I, 1862, p. 83, fig. 76.

Loc. Point Levis, Canada.

Orthis (?) eurekaensis Walcott. Upper Cambrian.

Orthis eurekensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 22, pl. 9, fig. 8.

Protorthis? eurekensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 232.

Loc. Eureka district, Nevada.

Orthis euryone Billings. Calciferous (Ord.).

Orthis euryone Billings, Pal. Fossils, I, 1862, p. 78, fig. 71.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 228, pl. 5, fig. 4.

Orthis euryone? Matthew, Trans. Royal Soc. Canada, 1893, p. 101, pl. 7, fig. 5.

Loc. Point Levis, Canada; near St. John, New Brunswick.

Orthis evadne Billings=Dalmanella evadne.

Orthis fasciata Hall=Orthostrophia fasciata.

Orthis fausta Foerste=Hebertella fausta.

Orthis fissicosta Meek, and Miller=Plectorthis dichotoma.

Orthis fissicosta Hall=Plectorthis fissicosta.

Orthis (?) fissiplica Roemer. Niagara (Sil.).

Orthis fissiplica Roemer, Die silurische Fauna des west. Tennessee, 1860, p. 64, pl. 5, fig. 5.

Loc. Perry County, Tennessee.

Orthis flabella Hall=Orthis flabellites.

Orthis flabellites Foerste. Clinton and Niagara (Sil.).

Orthis flabellulum? Hall (non Sowerby), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 5.

Orthis flabellulum var. Hall, Pal. New York, II, 1852, pp. 254, 255, pl. 52, figs. 6, 7.

Orthis flabellulum Billings, Canadian Nat. Geol., I, 1856, p. 136, pl. 2, fig. 6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 38, pl. 34, fig. 30.

Orthis flabella Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, figs. 41, 42; pl. 35, figs. 6–8.—Foerste, Bull. Denison Univ., I, 1885, p. 82, pl. 13, fig. 12.

Orthis calligramma Foerste (non Dalman), Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 308, pl. 6, figs. 4, 5.

Orthis flabellites Foerste, Ibidem, 1890, p. 311.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 227, pl. 5, figs. 37–41; pl. 20, fig. 1.

Orthis (Dinorthis) calligramma Foerste, Geol. Ohio, VII, 1895, p. 570, pl. 25, figs. 12a, 12b; pl. 31, figs. 4, 5; pl. 37A, fig. 20.

Loc. Lockport, Rochester, etc., New York; Dayton, Ohio; Osgood, Indiana; Louisville, Kentucky; Milwaukee, Wisconsin; Dundas, Ontario.

Orthis flabellites spania Hall and Clarke. Niagara (Sil.).

Orthis flabellites var. spania Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, figs. 10.

Loc. Near Milwaukee, Wisconsin.

Orthis flabellulum Hall (non Sowerby)=Orthis flabellites.

Orthis (?) flava A. Winchell. Kinderhook (L. Carb.).

Orthis flava A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.

Loc. Burlington, Iowa.

Orthis futilis Sardeson=Dalmanella testudinaria futilis.

Orthis gemmicula Billings=Orthidium gemmicula.

Orthis gibbosa Billings=Dalmanella subæquata gibbosa.

Orthis goodwini Nettelroth=Rhipidomella goodwini.

Orthis kaskaskiensis McChesney=Derbya kaskaskiaensis.
Orthis kassubæ Winchell=Dalmanella subæquata pervetus.
Orthis kennicotti McChesney=Dinorthis retrorsa.
Orthis keokuk Hall=Derbya keokuk.
Orthis lasallensis McChesney=Derbya crassa.
Orthis laticosta Meek=Platystrophia laticosta.

Orthis (?) laticostata d'Orbigny. Devonian.

Orthis lacticostata d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 39.

Loc. ? Bolivia.

Orthis laurentina Billings=Billingsella? laurentina.

Orthis lenticularis Wahlenberg?. Upper Cambrian.

Orthis lenticularis (Wahl.) Kayser, Palæontographica, Suppl., III, 1876, p. 9, pl. 1, figs. 11, 12.—Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 46, pl. 12, figs. 9a–9d.

Loc. Province Salta and Jujuy, Argentine Republic; near St. John, New Brunswick.

Orthis lenticularis atrypoides Matthew. Upper Cambrian.

Orthis lenticularis var. atrypoides Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 48, pl. 12, figs. 11a, 11b.

Loc. Near St. John, New Brunswick.

Orthis lenticularis lyncioides Matthew. Upper Cambrian.

Orthis lenticularis var. lyncioides Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 49, pl. 12, figs. 10a–10c.

Loc. Near St. John, New Brunswick.

Orthis lenticularis strophomenoides Matthew. Upper Cambrian.

Orthis lenticularis var. strophomenoides Matthew, Trans. Royal Soc. Canada, IX, 1892, p. 49, pl. 12, figs. 12a, 12b.

Loc. Near St. John, New Brunswick.

Orthis lenticularis Vanuxem=Dalmanella lenticularis.
Orthis lentiformis Hall=Dalmanella lenticularis.
Orthis lentiformis Owen=Schizophoria striatula.
Orthis leonensis Hall=Dalmanella tenuilineata.
Orthis lepida Hall=Dalmanella lepida.

Orthis (?) leptænoides Emmons. Trenton (Ord.).

Orthis leptænoides Emmons, Geol. N. Y.; Rep. Fourth Dist., 1842, p. 396, fig. 1.

Loc. New York.

Obs. Undefined and figure too poor for identification.

Orthis leucosia Hall=Rhipidomella leucosia.
Orthis limitaris Vanuxem=Leiorhynchus limitare.
Orthis linneyi James=Orthorhynchula linneyi.
Orthis livia Billings=Rhipidomella livia.
Orthis lonensis Walcott=Hebertella lonensis.
Orthis loricula Hall=Dinorthis deflecta.
Orthis lucia Billings=Rhipidomella lucia.
Orthis lynx Eichwald=Platystrophia lynx and P. biforata.
Orthis maria Billings=Hebertella maria.
Orthis macfarlanii Meek=Schizophoria macfarlanii.

Orthis macleodi Whitfield=Dalmanella macleodi.

Orthis macrior Sardeson=Dalmanella testudinaria emacerata.

Orthis media Shaler=Rhipidomella media.

Orthis media N. H. Winchell=Dalmanella subæquata pervetus.

Orthis meeki Miller=Dalmanella testudinaria meeki.

Orthis menapiæ Hicks. Calciferous (Ord.).

Orthis menapiæ (Hicks MS.) Davidson, Geol. Mag. London, V, 1868, p. 314, pl. 16, figs. 24-28.—Matthew, Trans. Royal Soc. Canada, X, 1893, p. 101, pl. 7, figs. 2-6.

Loc. England; near St. Johns, New Brunswick.

Orthis merope Billings=Scenidium merope.

Orthis michelini L'Éveillé=Rhipidomella michelini.

Orthis michelini Meek, 1877=Rhipidomella nevadaensis.

Orthis michelini burlingtonensis Hall=Rhipidomella burlingtonensis.

Orthis (?) **minna** Billings. Calciferous (Ord.).

Orthis minna Billings, Pal. Fossils, I, 1865, p. 303, fig. 294.

Loc. Stanbridge, Quebec, Canada.

Orthis minneapolis N. H. Winchell=Dalmanella subæquata.

Orthis minnesotensis Sardeson=Dinorthis meedsi.

Orthis missouriensis Shumard. Cape Girardeau Limestone (Sil.).

Orthis missouriensis Shumard, Geol. Rep. Missouri, 1855, p. 205, pl. C, fig. 9.—Keyes, Geol. Survey Missouri, V, 1895, p. 60.

Loc. Two miles above Cape Girardeau, Missouri.

Orthis missouriensis Swallow (non Shumard)=Rhipidomella missouriensis.

Orthis mitis Hall=Rhipidomella mitis.

Orthis morganiana Derby=Orthotichia morganiana.

Orthis (?) **morrowensis** James. Lorraine (Ord.).

Orthis (?) morrowensis James, Cincinnati Quart. Jour. Sci., I, 1874, p. 21.

Loc. Warren County, Ohio.

Orthis multisecta (James) Meek=Dalmanella multisecta.

Orthis multistriata Hall=Schizophoria multistriata.

Orthis musculosa Hall=Rhipidomella musculosa.

Orthis (?) **mycale** Billings. Calciferous (Ord.).

Orthis mycale Billings, Pal. Fossils, I, 1862, p. 82, fig. 75.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217, pl. 7A, figs. 10, 11.

Loc. Point Levis, Canada.

Orthis neglecta James=Plectorthis dichotoma.

Orthis nettoana Rathbun=Dalmanella nettoana.

Orthis nevadensis Meek=Rhipidomella nevadaensis.

Orthis (?) **nisis** Hall and Whitfield. Niagara (Sil.).

Orthis nisis Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 181;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 4-8.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 42, pl. 27, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Louisville, Kentucky.

Orthis nucleus Hall=Ambocœlia umbonata.

Orthis oblata Hall=Rhipidomella oblata.

Orthis oblata emarginata Hall=Rhipidomella oblata emarginata.

Orthis obtusa Pander. Ordovician.

Orthis obtusa (Pander) Kayser, Palæontographica, Suppl., III, 1876, p. 19, pl. 3, figs. 1, 2.

Loc. Europe; Cordillere San Juan, Argentine Republic.

Orthis occasus Hall=Rhipidomella occasus.

Orthis occidentalis Hall=Hebertella occidentalis.

Orthis orthambonites Billings=O. panderiana.

Orthis palmata Sharpe and Salter=Anoplotheca flabellites.

Orthis panderiana Hall and Clarke. Calciferous (Ord.).

Orthis orthambonites Billings (non Murchison and de Verneuil), Pal. Fossils, I, 1862, p. 77, fig. 70;—Geol. Canada, 1863, p. 231, fig. 245.—Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 43.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 221, 228, pl. 5, figs. 1–3.—Matthew, Trans. Royal Soc. Canada, X, 1893, p. 101, pl. 7, fig. 4.

Orthis panderiana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 5, footnote.

Loc. Point Levis and St. John, Canada.

Orthis parva de Verneuil=Dalmanella elegantula.

Orthis pecosi Marcou=Rhipidomella pecosi.

Orthis (?) pectinata d'Orbigny. Devonian.

Orthis pectinatus d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 39.

Spirifer pectinatus d'Orbigny, Ibidem, 1842, pl. 2, figs. 13–15.

Loc. Lake Titicaca, Bolivia.

Obs. Probably a species of Orthothetes.

Orthis pectinella Emmons=Dinorthis pectinella.

Orthis pectinella Whitfield, 1882=Plectorthis whitfieldi.

Orthis pectinella semiovalis Hall=Dinorthis pectinella.

Orthis peduncularis Hall=Schizophoria peduncularis.

Orthis peloris Hall=Rhipidomella peloris.

Orthis penelope Hall=Rhipidomella penelope.

Orthis penniana Derby=Rhipidomella penniana.

Orthis pennsylvanica Simpson=Rhipidomella pennsylvanica.

Orthis pepina Hall=Billingsella coloradoensis.

Orthis perelegans Hall=Dalmanella perelegans.

Orthis perversa Hall=Orthothetes chemungensis perversus.

Orthis perveta Conrad=Dalmanella subæquata pervetus.

Orthis perveta Hall, 1883=Dalmanella subæquata.

Orthis petræ Sardeson=Dinorthis proavita.

Orthis (?) pigra Billings. Chazy (Ord.).

Orthis piger Billings, Canadian Nat. Geol., IV, 1859, p. 442.

Loc. Mingan Island.

Obs. This species is probably congeneric with Billingsella grandæva.

Orthis pisum Hall (non Murchison)=Nucleospira pisiformis.

Orthis plana Castelnau (non Pander)=Rafinesquina alternata.

Orthis planoconvexa Hall=Dalmanella planiconvexa.

Orthis platys Billings=Dinorthis platys.

Orthis plicata Vanuxem=Spirifer vanuxemi.

Orthis plicatella White (non Hall)=Orthis tricenaria.
Orthis plicatella Hall=Plectorthis plicatella.
Orthis pogonipensis Hall and Whitfield=Dalmanella pogonipensis.
Orthis porcata McCoy=Dinorthis porcata.

Orthis (?) porcia Billings. Chazy (Ord.).
Orthis porcia Billings, Canadian Nat. Geol., IV, 1859, p. 439, figs. 16-18;—Geol. Canada, 1863, p. 130, fig. 58.
Loc. Near Montreal, Canada.

Orthis porrecta Sardeson=Dalmanella testudinaria porrecta.
Orthis præumbona Hall=Ambocœlia præumbona.
Orthis pratteni McChesney=Derbya pratteni.
Orthis pravus Hall=Orthothetes pravus.
Orthis propinqua Hall=Schizophoria propinqua.
Orthis propinqua Nettelroth=Schizophoria striatula.

Orthis (?) pumila Ulrich. Lorraine (Ord.).
Orthis costata (non Sowerby) Hall, American Jour. Sci., XLVIII, 1845, p. 295.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 33.
Orthis pumila Ulrich, Catalogue Cincinnati Fossils, 1880, p. 14.
Orthis cincinnatiensis Miller, American Pal. Fossils, 2d ed., 1883, p. 296.
Loc. Cincinnati, Ohio.

Orthis (?) punctostriata Hall. Niagara (Sil.).
Orthis punctostriata Hall, Pal. New York, II, 1852, p. 254, pl. 52, fig. 5.
Orthis? punctostriata Hall and Clarke, Ibidem, VIII, Pt. I, 1892, p. 217, pl. 20, figs. 2-4.
Loc. Lockport, New York.

Orthis pyramidalis Hall=Scenidium pyramidalis.
Orthis quacoensis Matthew=Billingsella quacoensis.
Orthis quadrans Hall=Dalmanella quadrans.
Orthis quadricostata Vanuxem=Leiorhynchus quadricostatum.

Orthis(?) remnicha N. H. Winchell. Upper Cambrian.
Orthis remnicha N. H. Winchell, Fourteenth Ann. Rep. Geol. Nat. Hist. Survey of Minnesota, 1886, p. 317, pl. 2, fig. 7.
Loc. Red Wing, Minnesota; Cold Creek Canyon, Burnett County, Texas.

Orthis resupinata Hall, 1843 (non Martin)=Schizophoria tulliensis.
Orthis resupinata Martin=Schizophoria resupinata.
Orthis resupinata latirostrata Toula=Schizophoria cora.
Orthis resupinoides Cox=Schizophoria resupinoides.
Orthis retrorsa Salter=Dinorthis retrorsa.
Orthis rhynchonelliformis Shaler=Rhipidomella rhynchonelliformis.
Orthis richmonda McChesney=Derbya crassa.
Orthis robusta Hall=Derbya robusta.
Orthis rogata Sardeson=Dalmanella testudinaria.

Orthis (?) rugiplicata Hall and Whitfield. Niagara (Sil.).
Orthis rugæplicata Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 182;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 1-3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, figs. 25-27.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 44, pl. 27, figs. 1-3.
Orthis rugiplicata, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.
Loc. Louisville, Kentucky.

Orthis (?) ruida Billings. Anticosti (Sil.).

Orthis ruida Billings, Catalogue Silurian Fossils of Anticosti, 1866, p. 42.

Loc. Anticosti.

Orthis (?) saffordi Hall and Clarke. Trenton (Ord.).

Orthis ? saffordi, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 218, 340, pl. 5A, figs. 38–40.

Loc. "East Tennessee."

Orthis (?) salemensis Walcott. Lower Cambrian.

Orthis salemensis Walcott, American Jour. Sci., 3d ser., XXXIV, 1887, p. 190, pl. 1, fig. 17;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 612, pl. 72, fig. 6.

Loc. Washington County, New York; near Quebec, Canada.

Orthis saltensis Kayser. Upper Cambrian.

Orthis saltensis Kayser, Palæontographica, Suppl., III, 1876, p. 8, pl. 1, fig. 16.

Loc. Province Salta and Jujuy, Argentine Republic.

Orthis (??) sandbergeri N. H. Winchell. Upper Cambrian.

Orthis sandbergeri N. H. Winchell, Fourteenth Ann. Rep. Geol. Nat. Hist., Survey of Minnesota, 1886, p. 318, pl. 2, figs. 8, 9.

Loc. Red Wing, Minnesota.

Orthis schohariensis Castelnau=Strophonella schohariensis.

Orthis scovilli Miller=Hebertella scovilli.

Orthis sectostriata Ulrich=Plectorthis sectistriata.

Orthis semele Hall=Rhipidomella semele.

Orthis sinuata Hall=Hebertella sinuata.

Orthis (?) sola Billings. Lorraine (Ord.).

Orthis sola Billings, Catalogue Silurian Fossils of Anticosti, 1866, p. 12.

Loc. Anticosti.

Orthis solitaria Hall=Rhipidomella solitaria.

Orthis stonensis Safford=Dalmanella stonensis.

Orthis striatocostata Geinitz=Meekella striaticostata.

Orthis striatula Emmons (non Schlotheim)=Dalmanella testudinaria.

Orthis striatula of authors=Schizophoria striatula.

Orthis strophomenoides Hall=Orthostrophia strophomenoides.

Orthis subæquata Conrad=Dalmanella subæquata.

Orthis subcarinata Hall=Dalmanella subcarinata.

Orthis subcircula Simpson=Rhipidomella subcirculus.

Orthis subelliptica White and Whitfield=Rhipidomella subelliptica.

Orthis subjugata Hall=Hebertella occidentalis.

Orthis (?) subnodosa Hall. Niagara (Sil.).

Orthis subnodosa Hall, Descriptions of n. sp. Fossils from Waldron, Indiana, 1879, p. 14;—Eleventh Rep. State Geol. Indiana, 1882, p. 286, pl. 27, fig. 17;—Trans. Albany Institute, X, 1883, p. 70.—Nettelroth, Kentucky Fossil Shells, Mem., Kentucky Geol. Survey, 1889, p. 44.

Loc. Waldron, Indiana; Louisville, Kentucky.

Orthis suborbicularis Hall=Rhipidomella suborbicularis.

Orthis subquadrata Hall=Dinorthis subquadrata.

Orthis subumbona Hall=Martinia subumbona.

Orthis (?) sulivanti Morris and Sharpe. Lower Devonian.
Orthis sulivanti Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 275, pl. 10, fig. 1.
Loc. Falkland Islands; South Africa.

Orthis swallovi Hall=Schizophoria swallovi.
Orthis sweeneyi Winchell=Dinorthis pectinella sweeneyi.

Orthis (?) tenuidens Hall. Clinton (Sil.).
Orthis tenuidens Hall, Pal. New York, II, 1852, p. 58, pl. 20, fig. 9.
Loc. Oneida County, New York.
Obs. May be a species of Orthothetes.

Orthis (?) tenuis Morris and Sharpe. Lower Devonian.
Orthis tenuis Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 275, pl. 10, fig. 4; pl. 11, fig. 4.
Loc. Falkland Islands.
Obs. Similar to Chonostrophia complanata Hall.

Orthis (??) tenuistriata Hall. Portage (Dev.).
Orthis tenuistriata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 245, fig. 3.
Loc. Shores of Crooked Lake, New York.
Obs. This is not an Orthis; probably a pelecypod.

Orthis tersus Sardeson=Dalmanella tersa.
Orthis testudinaria Dalman=Dalmanella testudinaria.
Orthis testudinaria Owen, 1844=O. tricenaria.
Orthis thiemii White=Rhipidomella thiemei.
Orthis tioga Hall=Schizophoria tioga.

Orthis tricenaria Conrad. Trenton (Ord.).
Orthis tricenaria Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 121, pl. 32, fig. 8.—Salter, Canadian Organic Remains, Decade I, 1859, p. 39, pl. 9, figs. 1-4.—Hall, Geol. Wisconsin, I, 1862, p. 42, figs. 8-11.—Billings, Geol. Canada, 1863, p. 167, fig. 151.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 35, figs. 1-5.—?Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 74, pl. 11, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 191, 193, 221, 228, pl. 5, figs. 9-14.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 418, pl. 32, figs. 18-23.—Keyes, Geol. Survey Missouri, V, 1895, p. 60, pl. 39, fig. 4.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 175.
Orthis disparilis Conrad, Proc. Acad. Nat. Sci. Philadelphia, I, 1843, p. 333.—Hall, Pal. New York, I, 1847, p. 119, pl. 32, fig. 4.—Billings, Canadian Nat. Geol., IV, 1859, p. 440, fig. 20.—Hall, Geol. Wisconsin, I, 1862, p. 435.—Billings, Geol. Canada, 1863, p. 130, fig. 60.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 191, 221, 228.
Orthis testudinaria? Owen, Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, pl. 15, fig. 11.
?Orthis plicatella White (non Hall), Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 72, pl. 4, fig. 10.
Loc. Mineral Point, Wisconsin; Middleville, etc., New York; Kentucky; Tennessee; near Ottawa and Montreal, Canada; Mingan Islands; Lake Winnipeg, Manitoba; White Pine and Eureka districts, Nevada; Minneapolis, etc., Minnesota; Pike County, Missouri.
Obs. O. plicatella White and O. tricenaria Walcott may prove to be distinct from O. tricenaria Conrad.

Orthis (?) **trinucleus** Hall. Clinton (Sil.).

Orthis trinucleus Hall, Pal. New York, II, 1852, p. 58, pl. 20, fig. 8.

Loc. Wayne County, New York.

Orthis triplicatella Meek=Plectorthis triplicatella.

Orthis (?) **tritonia** Billings. Calciferous (Ord.).

Orthis tritonia Billings, Pal. Fossils, I, 1862, p. 76, fig. 69;—Geol. Canada, 1863, p. 231, fig. 244.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217, pl. 7A, figs. 12, 13.

Loc. Point Levis, Canada.

Orthis tubulostriata Hall=Rhipidomella tubulistriata.

Orthis tulliensis Vanuxem=Schizophoria tulliensis.

Orthis uberis Billings=Rhipidomella uberis.

Orthis umbonata Conrad=Ambocœlia umbonata.

Orthis umbraculum Owen (non von Buch)=Derbya robusta.

Orthis umbraculum Hall, 1852, Newberry, 1861=Orthothetes umbraculum.

Orthis unguiculus Hall, 1843 (non Phillips)=Ambocœlia gregaria.

Orthis unguiformis Castelnau, and Emmons=Hipparionyx proximus.

Orthis vanuxemi Hall=Rhipidomella vanuxemi.

Orthis vanuxemi pulchella Herrick=Rhipidomella vanuxemi pulchella.

Orthis varica Conrad=Bilobites varicus.

Orthis vespertilio Sowerby. Ordovician.

Orthis vespertilio (Sowerby) Kayser, Palæontographica, Suppl., III, 1876, p. 27, pl. 3, figs. 22, 23.

Loc. Europe; Potrero de los Angulos, etc., Argentine Republic.

Orthis whitfieldi N. H. Winchell=Plectorthis whitfieldi.

Orthisina d'Orbigny=Clitambonites.

Orthisina alberta Walcott=Billingsella alberta.

Orthisina alternata Hall=Orthothetes chemungensis perversus.

Orthisina americana Whitfield=Clitambonites diversus.

Orthisina arctostriata Hall=Orthothetes chemungensis arctistriatus.

Orthisina crassa Meek and Hayden=Derbya crassa.

Orthisina diversa Shaler=Clitambonites diversus.

Orthisina festinata Billings=Billingsella festinata.

Orthisina grandæva Billings=Billingsella grandæva.

Orthisina missouriensis Swallow=Meekella striaticostata.

Orthisina transversa Walcott=Billingsella transversa.

Orthisina verneuili Billings=Clitambonites diversus.

ORTHORHYNCHULA Hall and C. Genotype Orthis (?) linneyi James.

Orthorhynchula Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 181;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 824.

Orthorhynchula linneyi (James). Lorraine (Ord.).

Orthis (?) linneyi James, The Paleontologist, 5, 1881, p. 41.

Orthis linneyi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 41, pl. 34, figs. 7–18; errata, p. 1.

Orthorhynchula linneyi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 181, pl. 56, figs. 10–13, 19.

Loc. Near Danville, etc., Kentucky; Cincinnati, Ohio; Nashville, Tennessee.

ORTHOSTROPHIA Hall. Genotype Orthis strophomenoides Hall.

Orthostrophia Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 32-34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 199, 223, 253;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 267.

Orthostrophia (?) fasciata Hall. Niagara (Sil.).

Orthis fasciata Hall, Pal. New York, II, 1852, p. 255, pl. 52, fig. 8.

Orthostrophia ? fasciata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 200, 223.

Loc. Rochester and Lockport, New York.

Orthostrophia strophomenoides Hall. Lower Helderberg (Dev.).

Orthis strophomenoides Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 46;—Pal. New York, III, 1859, p. 177, pl. 14, fig. 2.

Orthis halli Safford, Geol. Tennessee, 1869, pp. 328, 533.

Orthostrophia strophomenoides Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 32-34.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 200, 223, pl. 5A, figs. 24-27; pl. 6, figs. 32-34.

Orthostrophia halli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 5A, figs. 22, 23.

Loc. Albany and Schoharie counties, New York; Square Lake, Maine; Perry County, Tennessee.

ORTHOTHETES Fischer de Wald. Genotype Spirifera crenistria Phil.

Orthothetes Fischer de Waldheim, Oryctographie du Gouvernement de Moscou, 1837, p. 133.—Waagen, Palæontologica Indica, Ser. XIII, I, p. 607, 1884.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 253;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 284.

Streptorhynchus Hall (non King), Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 61, figs. 1-6;—Pal. New York, IV, 1867, p. 64.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 139.

Orthothetes agassizi (Rathbun). Middle Devonian.

Streptorhynchus agassizi (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 248, pl. 9, figs. 3, 4, 10, 16, 17, 23, 25, 26, 28-30;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 24.

Loc. Erere, Province of Para, Brazil.

Orthothetes anomalus (A. Winchell). Hamilton (Dev.).

Crania (Pseudocrania) anomala A. Winchell, Geol. Rep. Lower Peninsula Michigan, 1866, p. 92.

Streptorhynchus anomala Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 152.

Loc. Grand Traverse region, Michigan.

Orthothetes bellulus Clarke. Marcellus (Dev.).

Orthothetes bellulus Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, pp. 176, 187, pl. 4, figs. 2-4.

Loc. Livonia salt shaft, Livonia, New York.

Orthothetes chemungensis (Conrad). Chemung (Dev.).

Strophomena chemungensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 12.

Strophomena bifurcata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 2.

Strophomena pectinacea Hall, Ibidem, 1843, p. 266, fig. 4.

Streptorhynchus chemungensis Hall, Pal. New York, IV, 1867, p. 67;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, fig. 9.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 117, pl. 13, fig. 16.

Streptorhynchus chemungensis var. pectinacea Hall, Pal. New York, IV, 1867, p. 73, pl. 10, fig. 6.

Orthothetes chemungensis (Conrad)—Continued.

Orthothetes chemungensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 10, fig. 9; pl. 11A, fig. 14.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 285.

Loc. New York and Pennsylvania; Eureka district, Nevada; Lake Winnipegosis, Canada; Waverly group of Ohio.

Orthothetes chemungensis arctistriatus Hall. Hamilton (Dev.).

Strophomena arctostriata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 3.

Orthisina arctostriata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, pp. 80, 81, figs. 1, 2; p. 112.

Streptorhynchus chemungensis var. arctostriata Hall, Pal. New York, IV, 1867, p. 71, pl. 9, figs. 1-12;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, fig. 8.

Hemipronites chemungensis var. arctostriata Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 35, pl. 3, fig. 2.

Streptorhynchus arctostriata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 117, pl. 13, fig. 7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 140, pl. 31, figs. 31-33.

Orthothetes chemungensis var. arctostriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 10, fig. 8.

Loc. New York; Falls of Ohio; Eureka district, Nevada.

Orthothetes chemungensis perversus (Hall). Cornif. and Ham. (Dev.).

Orthis perversa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 137.

Orthisina alternata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 81, figs. 1, 2; p. 112.

Streptorhynchus chemungensis var. perversus Hall, Pal. New York, IV, 1867, p. 72, pl. 9, figs. 13–17, 26.

Streptorhynchus chemungensis var. alternata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, fig. 7.

Orthothetes chemungensis var. alternata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 10, fig. 7.

Loc. New York; Bosanquet, Ontario; Eureka district, Nevada.

Orthothetes crenistria (Phillips?). Lower Carboniferous.

Streptorhynchus crenistria? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 410.

Streptorhynchus crenistria Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 173, pl. 9, fig. 19.—Dawson, Acadian Geology, 3d ed., 1878, p. 296, fig. 96.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 362.

Hemipronites crenistria? Meek, Pal. Ohio, II, 1875, p. 279, pl. 10, fig. 5.

Hemipronites crenistria Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. pl. 7, fig. 2.—Herrick, Bull. Denison Univ., III, 1888, p. 37, pl. 5, fig. 14; pl. 3, fig. 24; pl. 6, fig. 8; pl. 9, fig. 21; IV, p. 24, pl. 2, figs. 1, 5;—Geol. Ohio, VII, 1895, pl. 15, fig. 1; pl. 21, fig. 14.

Orthothetes crenistria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 11A, fig. 15.

Loc. Medina and Granville, Ohio; Port aux Barques, Michigan; East River and Shubenacadie, Nova Scotia; Feilden Isthmus, lat. 82° 43′; White Pine district, Nevada.

Obs. These references are unsatisfactory identifications of Phillips's species. It may prove that more than a single species is here included.

Orthothetes deformis Hall. Lower Helderberg (Dev.).

Orthis deformis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 44;—Pal. New York, III, 1859, p. 174, pl. 10A, fig. 13; pl. 15, fig. 3.

Orthothetes lens (White)—Continued.

Orthothetes lens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 256, pl. 11A, figs. 16-22.

Loc. Clarksville, etc., Missouri; Hamburg, Illinois; Medina County, Ohio (Winchell).

Orthothetes pandora (Billings). Upper Helderberg (Dev.).

Streptorhynchus pandora Billings, Canadian Jour., V, 1860, p. 226, figs. 12, 13;—Geol. Canada, 1863, p. 369, fig. 384.—Nicholson, Pal. Prov. Ontario, 1874, p. 70.

Streptorhynchus chemungensis var. pandora Hall, Pal. New York, IV, 1867, p. 68, pl. 4, figs. 11-19; pl. 9, figs. 18-25, 27;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 40, figs. 1-6.

Orthothetes chemungensis var. pandora Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 9, fig. 30; pl. 10, figs. 1-6.

Loc. Schoharie, Knoxville, Clarksville, etc., New York; Cayuga, Ontario; Columbus, Ohio (Whitfield); Eureka district, Nevada.

Orthothetes pravus Hall. (?Upper) Devonian.

Orthis prava Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 490.

Orthothetes prava Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 11A, fig. 13.

Loc. Lime Creek, Worth County, Iowa.

Orthothetes subplanus (Conrad). Niagara and L. Held. (Sil. and Dev.).

Strophomena subplana Conrad, Jour. Acad. Nat. Sci., Philadelphia, VIII, 1842, p. 258.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 104, fig. 1;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Leptæna subplana Hall, Pal. New York, II, 1852, p. 259, pl. 53, figs. 8-10.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, figs. 16, 17.

Strophomena pecten Roemer, Die Sil. Fauna west. Tennessee, 1860, p. 67, pl. 5, fig. 4.—Billings, Geol. Canada, 1863, p. 311, fig. 315;—Catalogue Silurian Fossils of Anticosti, 1866, p. 40.

Streptorhynchus (Strophodonta) subplanus Hall, Geol. Survey Wisconsin, I, 1862, p. 436.

Streptorhynchus subplanus Hall, Trans. Albany Institute, IV, 1863, p. 226;—Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 63, figs. 1, 2;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 151, pl. 21, figs. 26-33;—Eleventh Rep. State Geol. Indiana, 1882, p. 288, pl. 21, figs. 26-33;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 21-24; pl. 42, fig. 19.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 141, pl. 29, figs. 11, 12.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 23, pl. 2, figs. 14-20.

Streptorhynchus hemiaster Winchell and Marcy, Mem. Boston Soc. Nat. Hist., I, 1865, p. 93, pl. 2, fig. 10.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 392.

Hemipronites subplanus Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 349.

Hemipronites propinquus Meek and Worthen, Ibidem, III, 1868, p. 351, pl. 6, fig. 6.

Orthothetes subplana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 9, figs. 21-24; pl. 9A, fig. 19; pl. 11A, figs. 9-12.

Loc. Lockport, Rochester, etc., New York; Thorold, Ontario; Waldron, Indiana; Louisville, Kentucky; Thebes, Alexander County, and Bridgeport, Illinois; Pike County, Missouri; Decatur County, Tennessee; Arisaig, Nova Scotia (Ami); Anticosti.

Orthothetes tapajotensis (Derby). Upper Carboniferous.

Streptorhynchus tapajotensis Derby, Bull. Cornell Univ., I, 1874, p. 37, pl. 5, figs. 3, 6, 7, 9, 10; pl. 8. fig. 9.

Orthothetes tapajotensis (Derby)—Continued.

Orthothetes tapajotensis Waagen, Palæontologica Indica, Ser. XIII, I, 1884, pp. 607, 608.

Loc. Bomjardim and Itaituba, Brazil.

Orthothetes tenuis Hall. Niagara (Sil.).

Streptorhynchus tenuis Hall, Trans. Albany Institute, IV, 1863, p. 210;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 150, pl. 23, figs. 11-13;—Eleventh Rep. State Geol. Indiana, 1882, p. 287, pl. 23, figs. 11-13.—Foerste, Bull. Denison Univ., II, 1887, p. 105, pl. 8, figs. 31, 32, 38.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 142.

Orthothetes tenuis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255.

Strophomena (Orthothetes) tenuis Foerste, Geol. Ohio, VII, 1895, p. 568, pl. 27, figs. 31, 32, 38.

Loc. Waldron, Indiana; near Louisville, Kentucky; Dayton, Ohio.

Orthothetes umbraculum of authors (non von Buch). L. and Up. Carb.

Orthis umbraculum Hall, Stansbury's Expl. Survey Valley Great Salt Lake, Utah, 1852, p. 412, pl. 3, fig. 6.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 125.

Streptorhynchus umbraculum? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 117.

Hemipronites umbraculum? A. Winchell, Proc. American Philosophical Soc., XII, 1870, p. 251.

Orthothetes umbraculum Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 256.

Loc. Waverly group, Newark, Sciotoville, Warren, etc., Ohio; Up. Carb., Leavenworth, Kansas.

Orthothetes woolworthanus Hall. Lower Helderberg (Dev.).

Strophomena woolworthana Hall, Tenth. Rep. N. Y. State Cab. Nat. Hist., 1857, p. 48, figs. 1, 2;—Hall, Pal. New York, III, 1859, p. 192, pl. 17, figs. 1, 2.

Streptorhynchus woolworthana Billings, Geol. Canada, 1863, p. 957, fig. 449.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 25-31.

Orthothetes woolworthana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 255, pl. 9, figs. 25-31.

Loc. Schoharie, Carlisle, Clarksville, and Hudson, New York.

ORTHOTICHIA Hall and C. Genotype Orthis? morganiana Derby.

Orthotichia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 213;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 272.

Orthotichia morganiana (Derby). Upper Carboniferous.

Orthis? morganiana Derby, Bull. Cornell University, I, 1874, p. 29, pl. 3, figs. 1-9, 11, 34; pl. 4, figs. 6, 14, 15.

Orthis morganiana Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 564.

Orthotichia? morganiana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226, pl. 7, figs. 11-15.

Loc. Bomjardim and Itaituba, Brazil.

ORTHOTROPIA Hall and Clarke. Genotype O. dolomitica H. and C.

Orthotropia Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, explanation sheet to pl. 84, figs. 3-7.—Thirteenth Ann. Rep. N. Y. State Geol., 1895, p. 943.

Orthotropia dolomitica Hall and Clarke. Niagara (Sil.).

Orthotropia dolomitica Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, figs. 3-7.

Loc. Near Milwaukee, Wisconsin.

PARASTROPHIA Hall and C. Genotype Atrypa hemiplicata Hall.
Parastrophia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 221;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 839.

Parastrophia divergens Hall and Clarke. Lorraine (Ord.).
Parastrophia divergens Hall and Clarke, Pal. New York. VIII, Pt. II, 1895, pp. 222, 366, pl. 63, figs. 4-7.
Loc. Wilmington, Illinois.

Parastrophia greenei Hall and Clarke. Niagara (Sil.).
Parastrophia greenii Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 367, pl. 63, figs. 17-20, 22.
Loc. Milwaukee, Wisconsin.

Parastrophia hemiplicata Hall. Trenton (Ord.).
Atrypa hemiplicata Hall, Pal. New York, I, 1847, p. 144, pl. 33, fig. 10.—Billings, Canadian Nat. Geol., I, 1856, p. 208, figs. 20-23.
Atrypa circulus Hall, Pal. New York, I, 1847, p. 142, pl. 33, fig. 7;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 65.
Pentamerus hemiplicatus Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.—Billings, Canadian Jour., IV, 1859, p. 316.
Camarella hemiplicata Billings; Geol. Canada, 1863, p. 168, fig. 154.
Camarella circulus Miller, American Pal. Fossils, 1877, p. 107.
Camarella bernensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 4-6.
Anastrophia ? hemiplicata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 382, pl. 30, figs. 29-31.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 167.
Parastrophia hemiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 221, pl. 63, figs. 1-3.
Loc. Middleville, Watertown, etc., New York; Center County, Pennsylvania; Wisconsin; Minnesota; Ottawa and Lake Winnipeg, Canada.

Parastrophia hemiplicata rotunda (Winchell and Schu.). Trenton (Ord.).
Anastrophia ? hemiplicata var. rotunda W. and S., Minnesota Geol. Survey, III, 1893, p. 383, pl. 30, figs. 32-35.
Loc. Cannon Falls, Minnesota; Decorah, Iowa.

Parastrophia latiplicata Hall and Clarke. Niagara (Sil.).
Parastrophia latiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 368, pl. 63, figs. 23-27.
Loc. Milwaukee, Wisconsin.

Parastrophia multiplicata Hall and Clarke. Niagara (Sil.).
Parastrophia multiplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 222, 367, pl. 63, figs. 15, 16, 21.
Loc. Milwaukee, Wisconsin.

Parastrophia (?) obscura (Hall and Whitfield). Pogonip (Ord.).
Porambonites obscurus Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 234, pl. 1, fig. 16.
Porambonites ? obscurus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 228.
Loc. White Pine district, Nevada.
Obs. Based upon a single ventral valve which is insufficient to determine whether it belongs to Parastrophia or some rhynchonelloid. It is not a Porambonites.

Parastrophia ops (Billings). Anticosti (Sil.).

Camarella ops Billings, Pal. Fossils, I, 1862, p. 148, fig. 128.

Loc. Anticosti.

Obs. May be only a variety of P. reversa.

Parastrophia reversa (Billings). Anticosti (Sil.).

Pentamerus reversus Billings, Geol. Survey Canada; Rep. Progress for 1856, 1857, p. 295;—Canadian Jour., IV, 1859, p. 316.

Brachymerus reversus Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 69.

Anastrophia reversa Miller, American Pal. Foss., 1877, p. 104.

Parastrophia reversa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 63, figs. 8–14.

Loc. Anticosti.

Obs. Billings says this species is a large P. hemiplicata Hall. It appears, however, to be distinct. See P. ops Billings.

Parastrophia scofieldi (Winchell and Schuchert). Trenton (Ord.).

Anastrophia ? scofieldi W. and S., Minnesota Geol. Survey, III, 1893, p. 383, pl. 30, figs. 24–28.

Loc. Near Cannon Falls, Minnesota.

PARAZYGA Hall and Clarke. Genotype Atrypa hirsuta Hall.

Parazyga Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 127;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 800.

Parazyga deweyi Hall. Lower Helderberg (Dev.).

Waldheimia deweyi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 89.

Trematospira (Rhynchospira) deweyi Hall, Pal. New York, III, 1889, p. 216, pl. 36, fig. 3.

Parazyga deweyi Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 128, fig. 112, pl. 49, figs. 40–46.

Loc. Albany and Schoharie counties, New York.

Parazyga hirsuta Hall. Corniferous and Hamilton (Dev.).

Atrypa hirsuta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 168.

Trematospira hirsuta Hall, Thirteenth Rep. Ibidem, 1860, p. 101;—Fourteenth Rep. Ibidem, 1861, p. 101;—Fifteenth Rep. Ibidem, 1862, pl. 2, figs. 11–16;—Pal. New York, IV, 1867, p. 274, pl. 45, figs. 16–32.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 136, pl. 16, figs. 15–19.

Athyris ? chloe Billings, Canadian Jour., n. ser., V, 1860, p. 282, figs. 45–47.

Retzia chloe Billings, Geol. Canada, 1863, p. 385, fig. 419.

Nucleospira indianensis Miller, Seventeenth Rep. State Geol. Indiana, 1892, p. 79, pl. 13, figs. 13–15.

Parazyga hirsuta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 128, fig. 111; pl. 49, figs. 28–39.

Loc. New York; Thedford, Canada; Falls of Ohio; Bunker Hill, Indiana.

Paterina Beecher=Iphidea.

PATERULA Barrande. Genotype Paterula bohemica Barrande.

Paterula Barrande, Système Sil. du Centre de la Bohême, V, 1879, p. 110.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 78, 165;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 242.

Paterula amii n. sp. Calciferous (Ord.).

Paterula species Hall and Clarke, VIII, Pt. I, p. 78, pl. 4K, fig. 1.

Loc. Quebec, Canada.

PENTAGONIA Cozzens. Genotype Pentagonia peersii Cozzens= Atrypa unisulcata Conrad.

Pentagonia Cozzens, Annals Lyceum Nat. Hist. N. Y., IV, 1846, p. 158.—Meek and Hayden, Smithsonian Cont. Knowledge, XIV, 172, 1864, p. 16.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 80;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 775.

Goniocœlia Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 101.

Pentagonia peersii Cozzens=Pentagonia unisulcata.

Pentagonia unisulcata (Conrad). Oriskany to Hamilton (Dev.).

Atrypa unisulcata Conrad, Fifth Ann. Rep. Geol. Survey of N. Y., 1841, p. 56.—Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 10.

Pentagonia peersii Cozzens, Annals Lyceum Nat. Hist. N. Y., IV, 1846, p. 158, pl. 10, fig. 3.

Rhynchonella unisulcata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 125.

Athyris? unisulcata Billings, Canadian Journal, V, 1860, p. 279, figs. 39–42.

Goniocœlia uniangulata Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 101.

Meristella ? unisulcata Hall, Fifteenth Rep. Ibidem, 1862, pl. 2, figs. 17–25.

Athyris unisulcata Billings, Geol. Canada, 1863, p. 373, fig. 396.

Meristella (Pentagonia) unisulcata varieties biplicata and uniplicata Hall, Pal. New York, IV, 1867, p. 309, pl. 50, figs. 18–35.

Meristella unisulcata Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 99, pl. 15, figs. 9–16.

Pentagonia unisulcata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 80, pl. 42, figs. 22–32.

Loc. New York; county of Haldimand and Bosanquet, Ontario; Falls of Ohio.

PENTAMERELLA Hall. Genotype Atrypa arata Conrad.

Pentamerella Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 163;—Pal. New York, IV, 1867, pp. 373, 375.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 49.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 245;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 845.

Pentamerella arata (Conrad). Upper Helderberg (Dev.).

Atrypa arata Conrad, Fifth Ann. Rep. Geol. Survey N. Y., 1841, p. 55.

Atrypa octocostata Conrad, Ibidem, 1841, p. 55.

Pentamerus aratus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 120, figs. 1–10.—Billings, Canadian Journal, VI, 1861, p. 269, figs. 93–96;—Geol. Canada, 1863, p. 370, fig. 389.

Pentamerella arata Hall, Pal. New York, IV, 1867, p. 375, pl. 58, figs. 1–21.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 49, pl. 13, figs. 17-20.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 245, pl. 71, figs. 21–29.

? Pentamerus aratus Tschernyschew, Mém. Comité Géologique de St. Pétersbourg, III, 1887, p. 101, pl. 4, figs. 18, 19.

Loc. New York; Cayuga, etc., Ontario; Columbus, Ohio; Falls of Ohio; ? Urals of Russia.

Pentamerella borealis (Meek). Hamilton (Dev.).

Pentamerus borealis Meek, Trans. Chicago Acad. Sci., I, 1868, p. 95, pl. 13, fig. 11.

Loc. Anderson River, British America.

Pentamerella (?) compressa Ringueberg. Niagara (Sil.).

Pentamerella compressa Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, 1886, p. 15, pl. 2, fig. 4.

Pentamerella (?) compressa Ringueberg—Continued.

Loc. Lockport, New York.

Obs. May be a pathologic or compressed specimen of Spirifer crispus or S. sulcatus.

Pentamerella dubia Hall. ? Hamilton (Dev.).

Atrypa (n. sp.?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3A, fig. 1. [See specimen in U. S. Nat. Mus., Cat., Invert. Foss., 17927.]

Spirifer dubius Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 90.

Pentamerella dubia Hall, Pal. New York, IV, 1867, p. 379, pl. 58, figs. 38–43.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 245, pl. 71, figs. 32–38.

Loc. Iowa City, Iowa.

Obs. See Pentamerella micula Hall.

Pentamerella intralineata (A. Winchell). Hamilton (Dev.).

Pentamerus intralineatus A. Winchell, Geol. Rep. Lower Peninsula of Michigan, 1866, p. 94.

Loc. Grand Traverse region, Michigan.

Pentamerella micula Hall. ? Hamilton (Dev.).

Pentamerella micula Hall, Pal. New York, IV, 1867, p. 378, pl. 58, figs. 26, 27.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 245.

Loc. Iowa City, Iowa.

Obs. Compare with Pentamerella dubia Hall.

Pentamerella obsolescens Hall. ? Hamilton (Dev.).

Pentamerella obsolescens Hall, Pal. New York, IV, 1867, p. 379, pl. 58, figs. 24, 25.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 245.

Loc. Waterloo, Iowa.

Pentamerella pavilionensis Hall. Hamilton (Dev.).

Pentamerus papilionensis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 86.

Pentamerella papilionensis Hall, Pal. New York, IV, 1867, p. 377, pl. 58, figs. 28–37.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 50.

Pentamerella pavilionensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 245, pl. 71, figs. 30, 31.

Loc. Seneca and Canandaigua lakes, etc., New York; Falls of Ohio.

Pentamerella thusnelda Nettelroth. Corniferous (Dev.).

Pentamerella thusnelda Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 51, pl. 31, figs. 26–28.

Loc. Near Louisville, Kentucky.

Pentamerella ventricosa Hall=Clorinda ventricosa.

PENTAMERUS Sowerby. Genotype P. lævis Sowerby.

Pentamerus Sowerby, Mineral Conchology, I, 1813, p. 76.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 236;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 844.

Pentamerus arcuosus McChesney=Clorinda arcuosa.

Pentamerus aratus=Pentamerella arata.

Pentamerus barrandi Billings=Clorinda barrandei.

Pentamerus beaumonti Castelnau=P. oblongus.

Pentamerus bisinuatus McChesney=P. oblongus.

Pentamerus borealis Meek=Pentamerella borealis.

Pentamerus brevirostris Hall=Anastrophia brevirostris.

Pentamerus chicagoensis Winchell and Marcy=Clorinda ventricosa.
Pentamerus colletti Miller=Conchidium colletti.
Pentamerus comis Meek and Worthen=Gypidula comis.
Pentamerus complanatus Nettelroth=Conchidium tenuicostatum.
Pentamerus conchidium=Conchidium biloculare.
Pentamerus coppingeri Etheridge=Gypidula coppingeri.
Pentamerus crassoradius McChesney=Conchidium crassiradiatum.
Pentamerus decussatus Whiteaves=Conchidium decussatum.
Pentamerus deshayessii Castelnau=Rensselæria ovoides.
Pentamerus elongatus Vanuxem=Amphigenia elongata.
Pentamerus fornicatus Hall=Clorinda fornicata.
Pentamerus galeatiformis Meek and Worthen=Gypidula comis.
Pentamerus galeatus Hall=Gypidula galeata.
Pentamerus galeatus Hall and Whitfield=Gypidula nucleus.
Pentamerus galeatus Roemer=Gypidula rœmeri.
Pentamerus globulosus Nettelroth=Gypidula globulosa.
Pentamerus hemiplicatus Billings=Parastrophia hemiplicata.
Pentamerus interplicatus Hall=Anastrophia interplicata.
Pentamerus intralineatus Winchell=Pentamerella intralineata.
Pentamerus knappi Hall and Whitfield=Conchidium knappi.
Pentamerus knighti Sowerby=Conchidium knighti.
Pentamerus knotti Nettelroth=Gypidula knotti.
Pentamerus laqueatus Conrad=Conchidium laqueatum.
Pentamerus lenticularis White and Whitfield=Camarophorella lenticularis.
Pentamerus littoni Hall=Conchidium littoni.
Pentamerus lotis Walcott=Gypidula lotis.
Pentamerus multicostatus=Conchidium multicostatum.
Pentamerus nobilis Emmons=Conchidium laqueatum.
Pentamerus nucleus Hall and Whitfield=Gypidula nucleus.
Pentamerus nysius var. crassicosta Hall=Conchidium nysius.
Pentamerus nysius var. tenuicostatus Nettelroth=Conchidium nysius.
Pentamerus nysius var. tenuicosta Hall=Conchidium tenuicosta.

Pentamerus oblongus Sowerby. Clinton and Niagara (Sil.).

Pentamerus oblongus Sowerby, Murchison's Silurian System, 1839, p. 641, pl. 19, fig. 10.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 70, figs. 1-5.—Owen, Geol. Expl. Iowa, Wisconsin and Illinois, 1844, pl. 14, fig. 10.—Hall, American Jour. Sci., 2d ser., XX, 1849, p. 227;—Pal. New York, II, 1852, p. 79, pl. 25, fig. 1; pl. 26, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 58, pl. 1, figs. 2, 3;—Geol. Canada, 1863, p. 316, fig. 326.—Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 183;—Geol. Survey Ohio, Pal., II, 1875, p. 137, pl. 7, fig. 9.—Whitfield, Geol. Wisconsin, IV, 1882, p. 288, pl. 17, figs. 4-9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 60, pl. 33, figs. 15-17.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 237, figs. 169-171; pl. 67, fig. 20; pl. 68, figs. 1-5; pl. 69, figs. 1, 4-7, 13, 14; pl. 70, figs. 1-4.

Pentamerus beaumonti Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 38, pl. 13, fig. 9.

Pentamerus verneuili Hall=Anastrophia verneuili.

PHOLIDOPS Hall. Genotype Orbicula squamiformis Hall.

Pholidops Hall, Pal. New York, III, 1859, p. 489;—Thirteenth Rep., N. Y. State Cab. Nat. Hist., 1860, p. 92;—Fifteenth Rep. Ibidem, 1862, p. 195;—Pal. New York, IV, 1867, pp. 31, 413.—Dall, Bull. Mus. Comp., Zool., III, 1871, p. 27.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 155.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 376.—Hall and Clarke, Eleventh Rep. N. Y. State Geologist, 1894, p. 262.

Craniops Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 84.—Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1272.

Pholidops arenaria Hall. Oriskany (Dev.).

Pholidops arenaria Hall, Pal. New York, IV, 1867, p. 413, pl. 3, fig. 10.—Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pl. 4I, fig. 24.

Loc. Albany County and Hudson, New York.

Pholidops areolata Hall. Schoharie (Dev.).

Pholidops areolata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 31;—Pal. New York, IV, 1867, p. 31, pl. 3, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4I, figs. 25, 26.

Loc. Clarksville and Knox, New York.

Pholidops bellula Walcott. Lower Devonian.

Pholidops bellula Walcott, Mon. U. S. Geol Survey, VIII, 1884, p. 113, pl. 2, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157.

Loc. Eureka district, Nevada.

Pholidops calceola Hall and Clarke. Corniferous (Dev.).

Pholidops calceola Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 157, 182, pl. 4I, fig. 30.

Loc. Falls of Ohio.

Pholidops cincinnatiensis Hall. Lorraine (Ord.).

Pholidops cincinnatiensis Hall, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, pl. 7, fig. 10;—Pal. Ohio, I, 1873, p. 130, pl. 5, fig. 2.—Miller, Cincinnati Quart. Jour. Science, II, 1875, p. 14;—Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 107.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 4I, fig. 18.

Loc. Cincinnati, etc., Ohio.

Pholidops greenei Miller and Gurley. Hamilton (Dev.).

Pholidops greenei Miller and Gurley, Bull. Illinois State Mus. Nat. Hist., 12, 1897, p. 48, pl. 3, figs. 16–21.

Loc. Falls of Ohio.

Pholidops hamiltoniæ Hall. Hamilton (Dev.).

Pholidops hamiltoniæ Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 92;—Pal. New York, IV, 1867, p. 32, pl. 3, figs. 6–9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 4I, figs. 31–34 (37?).

Loc. Darien, Moscow, Canandaigua Lake, etc., New York.

Pholidops lamellosa Hall=Pholidops oblata.

Pholidops lepis Hall and Clarke. Corniferous (Dev.).

Pholidops lepis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157.

Loc. Not given.

Obs. A nomina nudum.

Pholidops linguloides Hall=Pholidops oblata.

Pholidops oblata Hall. Hamilton (Dev.).

Pholidops oblata Hall, Pal. New York, IV, 1867, p. 414, pl. 3, fig. 10.
Pholidops (?) linguloides Hall, Ibidem, 1867, p. 414.
Pholidops lamellosa Hall, Ibidem, 1867, pl. 3, fig. 11.
Pholidops linguloides and oblata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 4I, figs. 35, 36.
Loc. Aurora and Canandaigua Lake, New York.

Pholidops ovalis Hall. Niagara (Sil.).

Pholidops ovalis Hall, Trans. Albany Institute, IV, 1863, p. 209;—Pal. New York, IV, 1867, pl. 3, figs. 1, 2;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 149, pl. 21, figs. 1, 2;—Eleventh Rep. State Geol. Indiana, 1882, p. 284, pl. 21, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 4I, fig. 20.
Loc. Waldron, Indiana; Arisaig, Nova Scotia (Ami).
Obs. This species and P. squamiformis are probably identical with P. implicata Sowerby.

Pholidops ovata Hall. Lower Helderberg (Dev.).

Pholidops ovatus Hall, Pal. New York, III, 1859, p. 490, pl. 103B, fig. 7.
Pholidops ovata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 4I, figs. 22, 23.
Loc. Albany County, New York; ? Square Lake, Maine.

Pholidops patina Hall and Clarke. Corniferous (Dev.).

Pholidops patina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 182, pl. 4I, figs. 27–29.
Loc. De Ceuville, Ontario.

? Pholidops quadrangularis Walcott. Lower Devonian.

Pholidops quadrangularis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 114, pl. 2, fig. 7.
Loc. Lone Mountain, Nevada.
Obs. Apparently a plate of a crinoid.

Pholidops squamiformis Hall. Niagara (Sil.).

Orbicula ? squamiformis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 108, fig. 1;—Pal. New York, II, 1852, p. 250, pl. 53, fig. 4.
Craniops squamiformis Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 84.
Pholidops squamiformis Hall, Pal. New York, III, 1859, p. 490, pl. 103B, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 156, pl. 4I, fig. 21.
Loc. Lockport, Rochester, etc., New York.
Obs. See Pholidops ovalis Hall.

Pholidops subtruncata Hall. Lorraine (Ord.).

Orbicula ? subtruncata Hall, Pal. New York, I, 1847, p. 290, pl. 79, fig. 7.
Pholidops subtruncata Hall, Descrip. n. sp. of Crinoidea and other Fossils, 1866, p. 14;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 221, pl. 7, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4I, fig. 19.
Loc. Lorraine and Turin, New York. In the Trenton at Ottawa, Canada (Ami).

Pholidops terminalis Hall. Oriskany (Dev.).

Pholidops terminalis Hall, Pal. New York, III, 1859, p. 490, pl. 103B, fig. 8.—Hall and Clarke, Ibidem, VIII, Pt. I, 1892, p. 157.
Loc. Cumberland, Maryland.

Pholidops trentonensis Hall. Trenton (Ord.).

Pholidops trentonensis Hall, Descrip. n. sp. of Crinoidea and other Fossils, 1866, p. 14;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 221, pl. 7, fig. 8.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 157, pl. 4I, fig. 17.
Loc. Middleville, New York.

Pholidops trentonensis minor Winchell and Schuchert. Trenton (Ord.).

Pholidops trentonensis var. minor Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 376, pl. 29, fig. 40.

Loc. St. Paul and Cannon Falls, Minnesota.

PHOLIDOSTROPHIA Hall and Clarke. Genotype Strophodonta nacrea Hall=Chonetes (?) iowensis Owen.

Pholidostrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 287;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 281.

Pholidostrophia iowaensis (Owen). Corniferous and Hamilton (Dev.).

Chonetes (?) iowensis Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, p. 584, pl. 3A, fig. 7. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17942.]

Chonetes sp. undet. Owen, Ibidem, 1852, pl. 3A, fig. 17. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17916.]

Strophomena (Strophodonta) nacrea Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 144.

Strophomena lepida Hall, Geol. Iowa, I, 1858, p. 493, pl. 3, fig. 3.—Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 344.

Strophodonta nacrea Hall, Pal. New York, IV, 1867, p. 104, pl. 18, fig. 1;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 20-24.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 146.

Stropheodonta (Pholidostrophia) nacrea Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 287, pl. 15, figs. 20-24; Pt. II, 1895, pl. 84, fig. 11.

Loc. Iowa City, Iowa; western New York; Columbus, Ohio; Falls of Ohio; Rock Island, Illinois; Alpena, Michigan; Ontario, Canada.

Obs. Owen's type specimens preserved in the United States National Museum prove to be identical with Strophomena lepida, which Hall in 1867 said is a synonym for Stropheodonta nacrea.

Plæsiomys Hall and Clarke=Dinorthis.

PLATYSTROPHIA King. Genotype Terebratulites biforata Schlotheim.

Platystrophia King, Mon. Permian Fossils of England, Pal. Soc., 1850, p. 116.—Hall, Geol. Soc. America, I, 1889, pp. 19, 20.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 200.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 454.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 268.

Obs. It is doubtful whether all the various forms of Platystrophia can be regarded as species. This genus is nearly always abundantly represented by one or more forms throughout the American Ordovician and Silurian systems. When individuals of the same region or of widely separated localities are compared with each other it is apparent that the specific characters are very inconstant. Individuals of a stratum, however, are fairly constant in form, size, and plications, and it is this limited constancy that has served in many of the following species.

Platystrophia acuminata James. Lorraine (Ord.).

Orthis (Platystrophia) acuminata James, The Palæontologist, 1, 1878, p. 7.

Loc. Cincinnati, Ohio.

Platystrophia acutilirata (Conrad). Lorraine (Ord.).

Delthyris acutilirata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 260, pl. 14, fig. 15.

Orthis (Platystrophia) acutilirata Meek, Pal. Ohio, I, 1873, p. 119, pl. 10, fig. 5.

Orthis acutilirata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 28.

Platystrophia acutilirata (Conrad)—Continued.

Orthis biforata var. acutilirata White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 487, pl. 2, figs. 5-9;—Tenth Rep. State Geol. Indiana, 1881, p. 119, pl. 2, figs. 5-9.

Platystrophia acutilirata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223.

Loc. Richmond, Indiana; Oxford, Ohio; Louisiana, Missouri (Keyes).

Platystrophia biforata (Schlotheim). Chazy-Niagara (Ord. and Sil.).

Terebratulites biforatus Schlotheim, Petrefactenkunde, 1820, p. 265.

Spirifer sheppardi Castelnau, Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 42, pl. 14, fig. 15.

Delthyris brachynota Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 70, fig. 6.

Orthis and Delthyris Owen, Geol. Expl. Iowa, Wisconsin, Illinois, 1844, pl. 15, figs. 3, 7.

Delthyris lynx Hall (partim; non Eichwald), Pal. New York, I, 1847, p. 133, pl. 32D, fig. 1.

Spirifer biforata var. lynx Hall, Ibidem, II, 1852, p. 65, pl. 22, fig. 1.

Orthis biforatus Billings, Canadian Nat. Geol., I, 1856, p. 206, figs. 6-10.—Nicholson and Hinde, Canadian Jour., XIV, 1874, p. 158.—White, Rep. U. S. Geogr. Geol. Survey west 100th Meridian, IV, 1874, p. 74, pl. 4, fig. 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 35, pl. 29, figs. 18-29.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 312.

Orthis lynx Billings, Geol. Canada, 1863, p. 167, fig. 149.—Miller (partim), Cincinnati Quart. Jour. Sci., II, 1875, p. 25.

Platystrophia regularis Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 67.

Orthis (Platystrophia) biforata Meek, Pal. Ohio, I, 1873, p. 112.—Foerste, Geol. Ohio, VII, 1895, p. 579, pl. 25, figs. 7, 8.

Orthis (Platystrophia) biforata var. lynx Hall, Second Ann. Rep. N. Y. State Geologist, 1883, pl. 35, figs. 11-14 (non figs. 9, 10, 15 of pl. 35 and fig. 30, pl. 34=P. biforata lynx).

Orthis biforata var. lynx forma reversata and daytonensis Foerste, Bull. Denison Univ., I, 1885, pp. 81, 82, pl. 13, figs. 7, 8.

Platystrophia lynx Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 202, 223, pl. 5B, fig. 10.—Keyes, Geol. Survey Missouri, V, 1895, p. 64, pl. 39, fig. 5.

Platystrophia biforata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 455, pl. 33, figs. 51-54.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 177.

Loc. Throughout the horizons mentioned above in North America; also in England, Scotland, Ireland, Gotland, Scandinavia, Oeland, and Russia.

Platystrophia crassa James. Lorraine (Ord.).

Orthis (Platystrophia) dentata?? Meek (non Pander), Pal. Ohio, I, 1873, p. 117, pl. 10, fig. 3.

Orthis (Platystrophia) crassa James, Cincinnati Quart. Jour. Sci., I, 1874, p. 20.

Orthis dentata Miller, Ibidem, II, 1875, p. 27.

Orthis centrosa Miller, North American Geol. Pal., 1889, p. 356.

Platystrophia crassa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223.

Platystrophia biforata var. crassa Winchell and Schuchert, Geol. Survey Minnesota, III, 1893, p. 458, pl. 33, figs. 55, 56.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 178.

Loc. Cincinnati, Ohio; Spring Valley, Minnesota; Lake Winnipeg, Manitoba.

Platystrophia laticosta Meek. Lorraine (Ord.).

Orthis (Platystrophia) laticosta (James) Meek, Pal. Ohio, I, 1873, p. 116, pl. 10, fig. 4.

Orthis (Platystrophia) cypha James, Cincinnati Quart. Jour. Sci., I, 1874, p. 20.

Platystrophia laticosta Meek—Continued.

Orthis laticosta Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 27.

Platystrophia biforata var. laticosta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 223, pl. 5B, figs. 5-9

Loc. Cincinnati, etc., Ohio.

Platystrophia lynx (Eichwald). Lorraine (Ord.).

Terebratula lynx Eichwald, Skizze von Podolis, 1830, p. 202.

Delthyris lynx (partim) Hall, Pal. New York, I, 1847, p. 133, pl. 32D, fig. 1.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 820, fig. 616.

Orthis (Platystrophia) biforata var. lynx Meek, Pal. Ohio, I, 1873, p. 114, pl. 10, fig. 1.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 35, figs. 9, 10, 15.

Orthis lynx (partim) Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 25.

Orthis biforata Nicholson, Pal. Province Ontario, 1875, p. 16, fig. 5.

Orthis (Platystrophia) lynx Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 34, fig. 30.

Platystrophia biforata var. lynx Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 202, 223, pl. 5B, figs. 1-4.

Loc. Cincinnati, Ohio, and elsewhere in the Ohio Valley.

Platystrophia regularis Shaler=Platystrophia biforata.

PLECTAMBONITES Pander. Genotype P. planissima Pander.

Plectambonites Pander, Beitrage zur Geognosie des Russ. Reiches, 1830, p. 90, pl. 3, figs. 8, 16; pl. 28, fig. 19.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 236, 295.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 413.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 290.

Plectambonites arca Shaler=Plectambonites transversalis.

Plectambonites gibbosus Winchell and Schuchert. Trenton (Ord.).

Plectambonites gibbosa W. and S., American Geol., IX, 1892, p. 288;—Minnesota Geol. Survey, III, 1893, p. 416, pl. 32, figs. 13-17.

Loc. Mantorville, Old Concord, and near Cannon Falls, Minnesota.

Plectambonites glaber Shaler. Anticosti (Sil.).

Plectambonites glaber Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 64.

Leptæna glabra Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 294.

Loc. Anticosti.

Plectambonites plicatellus (Ulrich). Utica (Ord.).

Leptæna plicatella Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, 1879, p. 15, pl. 7, fig. 12.

Plectambonites plicatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15A, figs. 34, 35.

Loc. Cincinnati, Ohio; Covington, Kentucky.

Plectambonites productus Hall and Clarke. Niagara (Sil.).

Plectambonites producta Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 360, pl. 84, figs. 23-25.

Loc. Yellow Springs, Ohio.

Plectambonites sericeus (Sowerby). Trenton to Clinton (Ord.-Sil.).

Leptæna sericea J. de C. Sowerby, Murchison's Silurian System, 1839, pl. 19, figs. 1, 2.—Hall, Pal. New York, I, 1847, pp. 110, 287, pl. 31B, fig. 2; pl. 79, fig. 3;—Ibidem, II, 1852, p. 59, pl. 21, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 41, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 599.—Billings, Geol. Canada, 1863, p. 163, fig. 139.—Meek, Pal. Ohio, I, 1873, p. 70, pl. 5, fig. 3.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 57.—Kayser, Palæontographica, Suppl., III, 1876, p. 21, pl. 3, fig. 19.—Hall, Second Ann. Rep.

Plectambonites sericeus (Sowerby)—Continued.

N. Y. State Geol., 1883, pl. 46, figs. 25-29.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 293.—Keyes, Geol. Survey Missouri, V, 1895, p. 75, pl. 39, fig. 9.

Leptæna sericea? White, Wheeler's Expl. Survey west of the 100th Merid., IV, 1875, p. 70, pl. 4, fig. 7.

Strophomena sericea Conrad, Third Ann. Rep. Geol. Survey N. Y., 1840, p. 201.—Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 394.

Strophomena semiovalis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 47.

Leptæna aspera James, Cincinnati Quart. Jour. Sci., I, 1874, p. 151.

Plectambonites sericéa, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15, figs. 25-29.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 414, pl. 32, figs. 10-12.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 174.

Leptæna minnesotensis Sardeson, Minnesota Acad. Nat. Sci., III, 1892, p. 329, pl. 4, figs. 24, 25.

Leptæna precosis Sardeson, Ibidem, 1892, p. 329, pl. 4, figs. 26-28.

Leptæna recedens Sardeson, Ibidem, 1892, p. 330, pl. 4, figs. 29-32.

Leptæna saxea Sardeson, Ibidem, 1892, p. 330, pl. 4, figs. 33-35.

Loc. England; New York; Ohio; Indiana; Kentucky; Missouri; Wisconsin; Minnesota; Manitoba; Talacastra, Argentine Republic.

Plectambonites tenera Shaler=Plectambonites transversalis.

Plectambonites transversalis (Wahlenberg). Clinton-Niagara (Sil.).

Anomites transversalis Wahlenberg, Act. Soc. Upsaliensis, III, 1821, p. 64.

Strophomena elegantula Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 72, fig. 1.

Strophomena transversalis Hall, Ibidem, 1843, p. 105, fig. 4.

Leptæna transversalis Hall, Pal. New York, II, 1852, p. 256, pl. 53, fig. 5.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, figs. 14, 15.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 34-36.

Plectambonites arca and tenera Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 64.

Leptæna transversalis var. elegantula Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 294, pl. 6, fig. 6.

Plectambonites transversalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 298, pl. 15, figs. 34-36.—Foerste, Geol. Ohio, VII, 1895, p. 566, pl. 25, fig. 5; pl. 30, fig. 13; pl. 31, fig. 6.

Loc. Europe; New York; Osgood, Indiana; Wisconsin; Dundas and Hamilton, Ontario; Anticosti; Lake Temiscouata, New Brunswick.

Plectambonites transversalis alabamaensis (Foerste). Clinton (Sil.).

Leptæna transversalis var. alabamensis Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 296, pl. 5, fig. 9.

Loc. Collinsville, Alabama.

Plectambonites transversalis prolongatus (Foerste). Clinton (Sil.).

Leptæna prolongata Foerste, Bull. Denison Univ., I, 1885, p. 79, pl. 13, fig. 5.

Leptæna transversalis var. prolongata Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 297, pl. 5, fig. 13.

Loc. Dayton, Ohio; Wildwood Station, Georgia.

PLECTORTHIS Hall and Clarke. Genotype Orthis plicatella Hall.

Orthis (group of O. plicatella) Hall, Bull. Geol. Soc. America, I, 1889, p. 20.

Plectorthis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 435.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 266.

Plectorthis æquivalvis (Hall). Lorraine (Ord.).

Orthis æquivalvis Hall (non Davidson, 1847), Pal. New York, I, 1847, p. 120, pl. 32, fig. 6.

Plectorthis æquivalvis (Hall)—Continued.

Plectorthis æquivalvis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio; Wisconsin (Whitfield).

Plectorthis (?) aurelia (Billings). Oriskany (Dev.).

Orthis aurelia Billings, Pal. Fossils, II, 1874, p. 34, pl. 3, fig. 3.

Plectorthis ? aurelia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221.

Loc. Indian Cove, Gaspé.

Plectorthis dichotoma Hall. Lorraine (Ord.).

Orthis dichotoma Hall, Pal. New York, I, 1847, p. 125, pl. 32, fig. 13.—Miller, American Pal. Fossils, 1877, p. 117.

Orthis fissicosta Meek (non Hall), Pal. Ohio, I, 1873, p. 106, pl. 8, fig. 6.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 30.

Orthis neglecta James, The Palæontologist, 4, 1879, p. 26.

Plectorthis dichotoma Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, fig. 21.

Loc. Cincinnati, Ohio.

Plectorthis ella Hall. Lorraine (Ord.).

Orthis ella Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 121.

Orthis ? ella Hall, Fifteenth Rep. Ibidem, 1862, pl. 2, figs. 6–8;—Twenty-fourth Rep. Ibidem, 1872, pl. 7, fig. 21.—Meek, Pal. Ohio, I, 1873, p. 105, pl. 8, fig. 9.—Hall and Whitfield, Ibidem, II, 1875, p. 76, pl. 1, fig. 20.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 32.

Plectorthis ? ella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, figs. 22, 23.

Loc. Cincinnati, Ohio.

Plectorthis fissicosta Hall. Lorraine (Ord.).

Orthis fissicosta Hall, Pal. New York, I, 1847, p. 121, pl. 32, fig. 7.

Plectorthis fissicosta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio.

Plectorthis jamesi Hall. Lorraine (Ord.).

Orthis jamesi Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 89.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 33.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 77, pl. 1, figs. 21, 22.

Plectorthis jamesi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio.

Plectorthis kankakiensis (McChesney). Lorraine (Ord.).

Orthis kankakensis McChesney, New Pal. Fossils, 1861, p. 77;—Trans. Chicago Acad. Sci., I, 1868, p. 29, pl. 9, fig. 3.

Plectorthis kankakensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, figs. 24, 25.

Loc. Wilmington, Illinois; Wisconsin (Whitfield).

Plectorthis plicatella Hall. Trenton-Lorraine (Ord.).

Orthis plicatella Hall, Pal. New York, I, 1847, p. 122, pl. 32, fig. 9.—Meek, Pal. Ohio, I, 1873, p. 108, pl. 8, fig. 7.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 30.

?Orthis plicatella Billings, Geol. Canada, 1863, p. 165, fig. 145.

Plectorthis plicatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, figs. 18–20.

Orthis (Plectorthis) plicatella Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 436, pl. 33, figs. 5–7.

Loc. Cincinnati, Ohio; Middleville and Watertown, New York; Burgin, Kentucky; Cannon Falls, Kenyon, etc., Minnesota; Wisconsin.

Plectorthis sectistriata (E. O. Ulrich). Lorraine (Ord.).

Orthis (?) sectostriata Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, 1879, p. 15, pl. 7, fig. 11.

Plectorthis? sectostriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221.

Loc. Cincinnati, Ohio.

Plectorthis triplicatella (Meek). Lorraine (Ord.).

Orthis triplicatella Meek, American Jour. Sci., IV, 1872, p. 281;—Pal. Ohio, I, 1873, p. 109, pl. 8, fig. 8.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p 31.

Plectorthis triplicatella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 221.

Loc. Cincinnati, Ohio.

Plectorthis whitfieldi (N. H. Winchell). Lorraine (Ord.).

Orthis whitfieldi N. H. Winchell, Ninth Ann. Rep. Geol. and Nat. Hist., Survey of Minnesota, 1881, p. 115.

Orthis pectinella Whitfield (partim, non Emmons non Hall), Geol. Wisconsin, IV, 1882, p. 259, pl. 12, fig. 8.

Plectorthis whitfieldi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 221, pl. 5, fig. 26.

Orthis (Plectorthis) whitfieldi Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 437, pl. 33, figs. 8-13.

Loc. Spring Valley and Granger, Minnesota; Delafield, Wisconsin; Lattners, Iowa; Savanna, Illinois.

PLETHORHYNCHA Hall and C. Genotype Rhynchonella speciosa Hall.

Plethorhyncha Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 191;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 827.

Obs. Proposed as a subgenus of Camarotœchia. It, however, does not seem to be worthy even of that rank. The species referred to Plethorhyncha are Camarotœchia barrandei Hall, C. pleiopleura (Conrad), and C. speciosa Hall.

Plicatula striatocostata Cox=Meekella striaticostata.

POLYTŒCHIA Hall and Clarke. Genotype Hemipronites apicalis Whitf.

Polytœchia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 239, figs. 11, 12;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 275.

Polytœchia apicalis (Whitfield). Calciferous (Ord.).

Hemipronites apicalis Whitfield, Bull. American Mus. Nat. Hist., II, 1886, p. 300, pl. 24, figs. 1-5.

Polytœchia apicalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 239, fig. 11, 12, pl. 7A, figs. 26-30.

Loc. Fort Cassin, Vermont.

PORAMBONITES Pander. Genotype Porambonites intermedia Pander.

Porambonites Pander, Beitrage zur Geognosie des Russ. Reiches, 1830, p. 95, pl. 3, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 225.

Obs. Not represented in America.

Porambonites obscurus Hall and Whitfield=Parastrophia obscurus.

Porambonites ottawaensis Billings=Rhynchotrema ottawaensis.

PROBOSCIDELLA Œhlert. Genotype Productus proboscideus de Vern.

Proboscidella Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1277.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 333.

Proboscidella (?) clava (Norwood and Pratten). Upper Carboniferous.

Productus clavus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 10, pl. 1, fig. 4.

Proboscidella clava Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 334.

Loc. Graysville, Illinois.

PRODUCTELLA Hall. Genotype Productus subaculeatus Murchison.

Productella Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 245;—Pal. New York, IV, 1867, p. 153.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 69.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 328;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 298.

Productella arctirostrata Hall. Chemung (Dev.).

Productus arctirostrata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 177.

Productella arctirostrata Pal. New York, IV, 1867, p. 182, pl. 26, figs. 16–23;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 36.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 36.

Loc. Jasper and Cadiz, New York.

Productella arcuata Hall. Kinderhook (L. Carb.).

Productus arcuatus Hall, Geol. Survey of Iowa, I, Pt. II, 1858, p. 518, pl. 7, fig. 4.—Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 3, fig. 18.—Keyes, Geol. Survey Missouri, V, 1895, p. 40.

Productella arcuata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 31, 32.

Loc. Burlington, Iowa; Granville, Newark, etc., Ohio; Hannibal, Missouri.

Obs. See P. cooperensis.

Productella bialveata Hall. Chemung (Dev.).

Productella bialveata Hall, Pal. New York, IV, 1867, p. 183, pl. 26, figs. 24–28.

Loc. Meadville, Pennsylvania.

Productella boydi Hall. Chemung (Dev.).

Productus boydi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 179, figs. 1–3.

Productella boydi Hall, Pal. New York, IV, 1867, p. 169, pl. 24, figs. 10–16;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 24.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 24.

Loc. Phillipsburg, Elmira, etc., New York.

Productella concentrica (Hall). Kinderhook (L. Carb.).

Productus concentricus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 180;—Geol. Survey Iowa, I, Pt. II, 1858, p. 517, pl. 7, fig. 3.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 411;—Ibidem, 1865, p. 114;—Proc. American Philosophical Soc., XII, 1870, p. 249.—Herrick, Bull. Denison Univ., III, 1888, p. 33, pl. 6, fig. 16.

Loc. Burlington, Iowa; Port aux Barques, Michigan; Rockford, Indiana; Sciotoville, etc., Ohio.

Obs. Compare with Productella shumardana.

Productella costatula Hall. Chemung (Dev.).

Productella costatula Hall, Pal. New York, IV, 1867, p. 180, pl. 26, figs. 9, 15;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 18–20, 35.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 18–20, 35.

Loc. Randolph Conewango, New Albion, etc., New York.

Productella costatula strigata Hall. Chemung (Dev.).

Productella costatula var. strigata Hall, Pal. New York, IV, 1867, p. 181.

Loc. Near Cadiz, New York.

Productella dumosa Hall. Hamilton (Dev.).

Productus dumosus Hall, Fourteenth Rep. N. Y. State Cab. Nat. Hist., 1861, p. 99.

Productella dumosa Hall, Pal. New York, IV, 1867, p. 162, pl. 23, figs. 38–40;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 21.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 21.

Loc. Delphi, Bellona, Moscow, Hamilton, etc., New York.

Productella (?) eriensis Nicholson. Corniferous (Dev.).

Productella eriensis Nicholson, Geol. Magazine London, n. ser., I, 1874, p. 118;—Pal. Prov. Ontario, 1874, p. 77, fig. 26.

Loc. Port Colborne and Hagersville, Ontario.

Obs. See Anoplia nucleata Hall.

Productella exanthemata Hall. Corniferous and Hamilton (Dev.).

Productus exanthematus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 174.

Productella exanthemata Hall, Pal. New York, IV, 1867, p. 163, pl. 23, figs. 45, 46;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 17.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 17.

Productus exanthematus ?? Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 412, pl. 10, fig. 3.

Loc. Tinkers Falls and Seneca Lake, New York; Jackson and Union counties, Illinois.

Productella hallana Walcott. Upper Devonian.

Productus dissimilis Hall (non de Koninck, 1846), Geol. Survey Iowa, I, Pt. II, 1858, p. 497, pl. 3, fig. 7.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 91, pl. 13, fig. 3.

Productus ? Meek, Ibidem, 1868, p. 91, pl. 13, fig. 4.

Productus (Productella) hallanus Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 130, pl. 13, fig. 17.

Productus hallanus Tschernyschew, Mémoires du Comité Géologique de St. Pétersbourg, III, 1887, p. 114, pl. 14, fig. 27.—von Toll, Wissensch. Resultate d. Neusibirischen Exped., 1885 u. 1886, 1889, p. 25, pl. 2, fig. 19.

Productus hallianus Williams, Bull. Geol. Soc. America, I, 1890, pl. 12, figs. 8, 9.

Productella dissimilis Whiteaves, Cont. Canadian Pal., I, 1891, p. 216.

Productella hallana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 11, 12.

Loc. Rockford, Iowa; High Point, New York; Eureka district, Nevada; Athabasca River, Canada; Urals of Russia.

Productella hirsuta Hall. Chemung (Dev.).

Strophomena membranacea Vanuxem (non Productus membranaceus von Buch), Geol. N. Y.; Rep. Third Dist., 1842, p. 179, figs. 4, 5.

Productus hirsutus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 175, figs. 1-3.

Productella hirsuta Hall, Pal. New York, IV, 1867, p. 166, pl. 24, figs. 17-29;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 28, 39.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 28, 39, 45.

Loc. Phillipsburg and Rockville, New York; Covington, Pennsylvania.

Productella hirsuta rectispina Hall. Chemung (Dev.).

Productella hirsuta var. rectispina Hall, Pal. New York, IV, 1867, p. 168, pl. 24, figs. 30-37;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 37.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 37.

Loc. Meadville, Pennsylvania.

Productella hirsutiformis (Walcott). Upper Devonian.

Productus hirsutiforme Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 133, pl. 2, fig. 10.

Loc. Eureka and White Pine districts, Nevada.

Productella hystricula Hall=Strophalosia hystricula.

Productella lachrymosa (Conrad). Chemung (Dev.).

Strophomena lachrymosa Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 256, pl. 14, fig. 9.

Productella lachrymosa (Conrad)—Continued.

Productus lachrymosus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 177.
Productella lachrymosa Hall, Pal. New York, IV, 1867, p. 172, pl. 25, figs. 23–28.
Loc. Factoryville, Bath, Ellington, etc., New York.

Productella lachrymosa lima (Conrad). Chemung (Dev.).

Strophomena lima Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 256.
Productella lachrymosa var. lima Hall, Pal. New York, IV, 1867, p. 174, pl. 25, figs. 29–32;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 22, 23.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 217.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 22, 23.
Productus (Productella) lachrymosus var. limus Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 132, pl. 13, fig. 18.
Loc. Randolph, Ellington, etc., New York; Eureka district, Nevada; Mackenzie River, Canada.

Productella lachrymosa stigmata Hall. Chem. and Wav. (Dev. and L. Car.).

Productella lachrymosa var. stigmata Hall, Pal. New York, IV, 1867, p. 174, pl. 25, figs. 33–41.
?Productus ?Meek, Trans. Chicago Acad. Sci., I, 1868, p. 91, pl. 13, fig. 5.
Productus (Productella) lachrymosus var. stigmatus Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 132.—Herrick, Bull. Denison Univ., III, 1888, p. 34, pl. 3, fig. 28.
Loc. Olean, Conewango, and Randolph, New York; Licking County, Ohio; Eureka district, Nevada; Northwest Territory, Canada.

Productella mæcuruensis Rathbun. Middle Devonian.

Productella mæcuruensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 17.
Loc. Province of Para, Brazil.

Productella marquessi Rowley. Hamilton (Dev.).

Productella marquessi Rowley, American Geologist, XIII, 1894, p. 153, figs. 7, 8.
Loc. Callaway County, Missouri.

Productella minneapolis Sardeson=Trematis huronensis.

Productella murchisoniana (de Koninck). Hamilton (Dev.).

Productus murchisonianus de Koninck, Mém. de la Soc. Royale des Sciences de Liége, IV, 1846, p. 245, pl. 16, fig. 3.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 21.
Loc. Devils Back Bone, Illinois.

Productella navicella Hall. Corniferous and Hamilton (Dev.).

Productus navicellus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 172.
Productella navicella Hall, Pal. New York, IV, 1867, p. 156, pl. 23, figs. 1, 3, 9–11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 8, 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 8, 9;—Ibidem, VIII, Pt. II, 1895, pl. 84, fig. 19.
Productus (Productella) navicellus Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 131, pl. 13, fig. 9.
Loc. Schoharie County, Moscow, and Pavilion, New York; Eureka district, Nevada.

Productella onusta Hall. Chemung (Dev.).

Productella onusta Hall, Pal. New York, IV, 1867, p. 184, pl. 26, figs. 29–42;—Second Ann. Rep. N. Y. State Geologist, 1883, pl. 48, figs. 40–46.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 40–43, 46.
Loc. Conewango, Napoli, and New Albion, New York.

Productella speciosa Hall—Continued.

Productus (Productella) speciosus? Herrick, Bull. Denison Univ., III, 1888, p. 34.

Loc. Leon, New Albion, and Ithaca, New York; Licking County, Ohio; Burlington, Iowa; Eureka district, Nevada.

Productella spinulicosta Hall. Corniferous to Hamilton (Dev.).

Productus subaculeatus Norwood and Pratten (non Murchison), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 21.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 36, pl. 3, fig. 7.

Productus subaculeatus? Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 345, pl. 1, fig. 3.

Productus spinulicostus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 173.

Productella spinulicosta Hall, Pal. New York, IV, 1867, p. 160, pl. 23, figs. 6–8, 25–34;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 3–6.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 217, pl. 29, fig. 3; pl. 31, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 3–6.

Productella subaculeata Hall, Pal. New York, IV, 1867, p. 154, pl. 23, figs. 4, 5.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 283.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 1, 2.

Productella subaculeata? Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 1, 2.

Productus (Productella) subaculeata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, pp. 128, 214, pl. 7, fig. 2; pl. 13, figs. 19, 20.

Productus (Productella) subaculeatus var. cataractus Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 198;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 9, 10.

Productella subaculeata var. cataracta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 69, pl. 17, figs. 5–9.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 217.

Loc. New York; Ohio; Falls of Ohio; Illinois; Iowa; Wisconsin; Eureka district, Nevada; Utah; Mackenzie and Hay rivers, and Lake Manitoba, Canada.

Obs. Some authors are disposed to regard as synonyms of this species, besides the above, P. pyxidata, P. shumardana, and P. concentrica, and all of these forms are thought to be identical with P. subaculeata Murchison. For the present it is preferable to retain the name P. spinulicosta for these American Devonian forms. P. pyxidata, P. shumardana, and P. concentrica are here arranged as species, but will probably be shown to be synonymous with P. spinulicosta.

Productella striatula Hall. Chemung (Dev.).

Productella striatula Hall, Pal. New York, IV, 1867, p. 177, pl. 25, figs. 14–21;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 27, 38.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, figs. 27, 38, 44.

Loc. New Albion, Conewango, and Cold Spring, New York.

Productella subaculeata of American authors = Productella spinulicosta.

Productella subaculeata cataracta Hall and Whitfield = Productella spinulicosta.

Productella subalata Hall. Middle Devonian.

Productus subalatus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 174;—Geol. Survey Iowa, I, Pt. II, 1858, p. 500, pl. 3, fig. 10.

Productus callawayensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 640.

Productella subalata Hall, Pal. New York, IV, 1867, p. 165, pl. 23, fig. 49;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, fig. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17, fig. 16.—Keyes, Geol. Survey Missouri, V, 1895, p. 52.

Loc. Rock Island, Illinois; Callaway County, Missouri; Spring Valley, Minnesota.

Productella truncata Hall=Strophalosia truncata.

Productella tullia Hall. Hamilton (Dev.).

Productella tullia Hall, Pal. New York, IV, 1867, p. 164, pl. 23, figs. 41–44.

Loc. Tully and Delphi Falls, New York.

PRODUCTUS Sowerby. Genotype Anomites productus Martin=Productus martini Sowerby=Productus semireticulatus (Martin).

Productus Sowerby, Mineral Conchology, I, 1814, p. 153.—de Koninck, Recher. Animaux Foss., Pt. I, 1847, p. 11.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 245;—Pal. New York, IV, 1867, p. 146.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 321;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 297.

Productus æquicostatus Shumard=Productus cora.

Productus alternatus Norwood and Pratten. Keokuk (L. Carb.).

Productus alternatus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 20, pl. 2, fig. 1.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, fig. 14.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, fig. 14.

Productus vittatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 639.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 15–17.—Keyes, Geol. Survey Missouri, V, 1895, p. 43.

Productus vittata Hall, Second Ann. Rep. N. Y. State Geologist, 1883, pl. 49, figs. 15–17.

Loc. Rocky Run, Hancock County, Illinois; Keokuk, Iowa; Burlington group, Burlington, Iowa.

Obs. Compare with Productus fimbriatus and P. gradatus.

Productus altonensis Norwood and Pratten. St. Louis (L. Carb.).

Productus altonensis Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 7, pl. 1, fig. 1.

Loc. Alton, Illinois.

Productus americanus Swallow=Productus cora.

Productus andii d'Orbigny=Orthis buchi.

Productus arctirostratus Hall=Productella arctirostrata.

Productus arcuatus Hall=Productella arcuata.

Productus asperus McChesney=Productus nebrascensis.

Productus auriculatus Swallow. ?Upper Carboniferous.

Productus auriculatus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 92.

Productus (?auriculatus) Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 24.

Loc. Formation and locality not given. ("Near Kansas City, Missouri," H. and C.)

Productus batesianus Derby. Upper Carboniferous.

Productus batesianus Derby, Bull. Cornell Univ., I, 1874, p. 54, pl. 1, figs. 2, 10–13, 15; pl. 2, fig. 14; pl. 6, figs. 4, 7, 9.

Loc. Bomjardim and Itaituba, Brazil.

Productus biseriatus Hall. St. Louis (L. Carb.).

Productus biseriatus Hall, Trans. Albany Institute, IV, 1858, p. 12.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 46, pl. 6, figs. 8–12.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p, 325, pl. 29, figs. 8–12.—Keyes, Geol. Survey Missouri, V, 1895, p. 43.

Loc. Alton, Illinois; Bloomington and Spergen Hill, Indiana; Crittenden County, Kentucky; Missouri.

Productus blairi Miller. Chouteau (L. Carb.).

Productus blairi Miller, Seventeenth Rep. State Geol. of Indiana, 1891, p. 79, pl. 13, figs. 16, 17.

Loc. Sedalia, Missouri.

Productus boliviaensis d'Orbigny. Upper Carboniferous.

Productus boliviensis d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 52, pl. 4, figs. 5-9.—de Koninck, Mém. de la Soc. Royale des Sci. Liége, IV, 1847, p. 177, pl. 8, fig. 2;—Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 76, pl. 8, fig. 2.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.

Productus cancrini Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302.

Loc. Yarbichambi and Lake Titicaca, Bolivia; near Richmond, Missouri.

Productus boonensis Swallow. Upper Carboniferous.

Productus boonensis Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 217.

Loc. Near the mouth of Platte River; Kansas and Missouri.

Obs. Compare with Productus undiferus de Koninck.

Productus boonensis elevata Swallow. Upper Carboniferous.

Productus boonensis var. elevata Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 217.

Loc. Near the mouth of Platte River, Missouri.

Productus boydi Hall=Productella boydi.

Productus buchianus de Koninck. Upper Carboniferous.

Productus buchianus de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 129, pl. 18, fig. 4.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 20.

Loc. Belgium; Big Creek, Posey County, Indiana.

Productus burlingtonensis Hall. Burlington (L. Carb.).

Productus flemingi var. burlingtonensis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 598, pl. 12, fig. 3.—Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 265, pl. 5, figs. 9-12.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 6-8.—Herrick, Bull. Denison Univ., III, 1888, p. 32, pl. 3, figs. 20 (?22).—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 6-8.

Productus burlingtonensis Keyes, Geol. Survey Missouri, V, 1895, p. 41.

Loc. Burlington, Iowa; Quincy, Illinois; Missouri; Oquirrh Mountains, Utah.

Obs. Compare with P. mesialis.

Productus calhounianus Geinitz (non Swallow)=Productus cora.

Productus calhounianus Swallow=Productus semireticulatus.

Productus calhounianus kansasensis Swallow=Productus semireticulatus kansasensis.

Productus callawayensis Swallow=Productella subalata.

Productus cancrini Geinitz=Productus pertenuis.

Productus cancrini Gabb=P. boliviaensis.

Productus capacii d'Orbigny. Upper Carboniferous.

Productus capacii d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 50, pl. 3, figs. 24-26.

Loc. Yarbichambi, Bolivia.

Productus carbonarius de Koninck. Carboniferous.

Productus carbonarius de Koninck, Description Animaux Fossiles, 1844, p. 181, pl. 12 bis, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.

Loc. Belgium; Fountain Bluff, Illinois.

Productus cestriensis Worthen=Productus fasciculatus.

Productus chandlessii Derby. Upper Carboniferous.

Productus chandlessii Derby, Bull. Cornell Univ., I, 1874, p. 51, pl. 4, figs. 1-4, 7, 9-11, 13, 16; pl. 6, fig. 1;—Bull. Mus. Comp. Zool., III, 1876, p. 280.

Loc. Itaituba, Brazil; Yampopata, Bolivia.

Obs. Compare with Productus boliviaensis d'Orbigny.

Productus clarkianus Derby. Upper Carboniferous.

Productus clarkianus Derby, Bull. Cornell Univ., I, 1874, p. 59, pl. 6, fig. 6; pl. 9, figs. 12, 13.

Loc. Itaituba and Bomjardim, Brazil.

Productus clavus Norwood and Pratten=Proboscidella clava.

Productus concentricus Hall=Productella concentrica.

Productus confragosus Conrad. Upper Carboniferous.

Productus confragosus Conrad, Trans. Geol. Soc. Pennsylvania, I, 1835, p. 268, pl. 12, fig. 5.

Loc. Alleghany Mountains, Pennsylvania.

Obs. Not well established.

Productus cooperensis Swallow. Kinderhook (L. Carb.).

Productus cooperensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 640.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 115.

Productus cooperensis? A. Winchell, Proc. American Philosophical Soc., XII, 1870, p. 249.

Loc. Cooper County, Missouri; Burlington, Iowa; Sciotoville, Ohio.

Obs. Keyes regards this species as a synonym for Productella arcuata.

Productus cora d'Orbigny. Upper Carboniferous.

Productus cora d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 55, pl. 5, figs. 8-10.—de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 50, pl. 4, fig. 4; pl. 5, fig. 2.—Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852, pp. 103, 136, pl. 5, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 6.—Marcou, Geol. North America, 1858, p. 45, pl. 6, fig. 4.—Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 174, pl. 9, figs. 22, 23.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 50.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 281.—Dawson, Acadian Geology, 3d ed., 1878, p. 297, fig. 98.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 677.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 126, pl. 26, figs. 1-3.—Herrick, Bull. Denison Univ., II, 1887, p. 47, pl. 2, fig. 26.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 227;—Geol. Survey Missouri, V, 1895, p. 47, pl. 37, fig. 2.

Productus cfr. cora Toula, Sitzb. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 9.

Productus cora? Derby, Bull. Cornell Univ., I, 1874, p. 49, pl. 2, fig. 17; pl. 6, fig. 17.

Productus lyelli de Verneuil, Lyell's Travels in North America, II, 1845, p. 221.—Dawson, Acadian Geology, 1855, p. 219, fig. g.

Productus sp. Christy, Letters on Geology, 1848, pl. 5, fig. 1.

Productus cora d'Orbigny—Continued.

Productus semireticulatus Hall, Stansbury's Expl. and Survey Valley Great Salt Lake, Utah, 1852, p. 411, pl. 3, figs. 3, 5.

Productus prattenianus Norwood, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 17, fig. 10.—Meek, Final Rep. U. S. Geol. Survey of Nebraska, 1872, p. 163, pl. 2, fig. 5; pl. 5, fig. 13; pl. 8, fig. 10.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 113, pl. 7, fig. 1.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 72, pl. 7, fig. 7.

Productus æquicostatus Shumard, Geol. Rep. Missouri, I, 1855, p. 201, Pl. C, fig. 10.—Schiel, Pacific R. R. Reports, II, 1855, p. 108, pl. 2, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, figs. 22, 23.

Productus pileiformis McChesney, New Pal. Fossils, 1860, p. 40.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 582, pl. 13, figs. 13, 14;—Geol. Ohio, VII, 1895, p. 470, pl. 9, figs. 13, 14.

Productus americanus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 91.

Productus flemingi Geinitz (non de Koninck), Carbon und Dyas in Nebraska, 1866, p. 52, pl. 4, figs. 1–4.

Productus koninckianus Geinitz (non de Verneuil), Ibidem, 1866, p. 53, pl. 4, fig. 5.

Productus calhounianus Geinitz (non Swallow), Ibidem, 1866.

Loc. Throughout the Upper Carboniferous of North America; Itaituba and Barreirinha, Brazil; Yampopata, Cochabamba, and Lake Titicaca, Bolivia; Kashmere.

Obs. See Productus nodosus and P. hildrethianus.

Productus cora mogoyoni Marcou. Upper Carboniferous.

Productus cora var. mogoyoni Marcou, Geol. North America, 1858, p. 45, pl. 6, fig. 5.

Loc. Sierra de Mogoyn, or Sierra Blanca, near the extinct volcano San Francisco, Arizona.

Productus coriformis Swallow. St. Louis (L. Carb.).

Productus coræformis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 94.

Loc. Cooper County, Missouri.

Obs. Keyes regards this species as a synonym for P. lævicostus.

Productus costatoides Swallow. Upper Carboniferous.

Productus costatoides Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 217.—Newberry, Ives's Rep. Colorado River of the West, 1861, p 123.

Loc. Kansas; banks of Colorado River.

Obs. Keyes regards this species as identical with P. longispinus.

Productus costatus (Sowerby ?) de Koninck. Upper Carboniferous.

?Productus costatus Sowerby, Mineral Conchology, VI, 1827, p. 115, pl. 560, fig. 1.

Productus costatus de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 92, pl. 8, fig. 3; pl. 10, fig. 3; pl. 18, fig. 3.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.—Marcou, Geol. North America, 1858, p. 45, pl. 5, fig. 5.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 51.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 159, pl. 6, fig. 6.—White, Wheeler's Expl. and Survey West 100th Meridian, IV, 1875, p. 109, pl. 8, fig. 2;—Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 516, pl. 8, figs. 7, 8;—Tenth Rep. State Geol. Indiana, 1881, p. 148, pl. 8, figs. 7, 8.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 8–13.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 124, pl. 24, figs. 4–6; pl. 25, figs. 3–5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 19, figs. 8–13.—Keyes, Geol. Survey Missouri, V, 1895, p. 51, pl. 36, fig. 1.

Productus costatus (Sowerby?) de Koninck—Continued.
Productus costatus? Derby, Bull. Mus. Comp. Zool., III, 1876, p. 280.
Productus costatus var. Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 712, pl. 28, figs. 3, 4.—Meek, King's U. S. Geol. Expl. 40th, Parl., IV, 1877, pl. 7, fig. 4.
Productus portlockianus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 15, pl. 1, fig. 9.
Productus sp. Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 833, fig. 687.
Productus viminalis White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.
Loc. Europe; throughout the Upper Carboniferous of North America; Yampopata, Bolivia.
Obs. Sowerby's species is of uncertain value. The above synonomy is based upon P. costatus as redefined and illustrated by de Koninck.

Productus curtirostratus A. Winchell. Kinderhook (L. Carb.).
Producta curtirostra A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 114.
Productus curtirostratus Miller, N. American Geol. Pal., 1889, p. 364.
Loc. Burlington, Iowa.

Productus delawarei Marcou. Carboniferous.
Productus delawarii Marcou, Geol. North America, 1858, p. 45, pl. 5, fig. 3.
Loc. Foot of Delaware Mountain, Texas.
Obs. Compare with Productus cora d'Orbigny.

Productus depressus Swallow. Keokuk (L. Carb.).
Productus depressus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 93.
Loc. Fenton, St. Louis County, Missouri.

Productus dissimilis Hall (non de Koninck)=Productella hallana.

Productus dolorosus A. Winchell. Waverly (L. Carb.).
Productus dolorosus A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 114.
Loc. Weymouth, Medina County, Ohio.

Productus dumosus Hall=Productella dumosa.

Productus duplicostatus A. Winchell. Waverly (L. Carb.).
Productus duplicostatus A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 113.—Herrick, Bull. Denison Univ., IV, 1888, p. 21, pl. 11, figs. 26, 29.
Loc. Knox and Licking counties, Ohio; Battlecreek, Michigan.

Productus elegans Norwood and Pratten (non McCoy)=Productus fasciculatus.

Productus exanthematus Hall=Productella exanthemata.

Productus fasciculatus McChesney. Kaskaskia (L. Carb.).
Productus elegans Norwood and Pratten (non McCoy), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 13, fig. 7.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 581, pl. 13, figs. 15-16;—Geol. Ohio, VII, 1895, p. 469, pl. 9, figs. 15, 16.
Productus fasciculatus McChesney, New Pal. Fossils, 1860, p. 38.
Productus cestriencis Worthen, Trans. St. Louis Acad. Sci., I, 1860, p. 570.—Keyes, Geol. Survey Missouri, V, 1895, p. 44.
?Productus elegans Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 268, pl. 5, figs. 3, 4.
Loc. Chester and Kaskaskia, Illinois; Leavenworth and Washington County, Indiana; Missouri; Monongalia County, West Virginia; Caldwell County, Kentucky; Newtonville, Ohio; ?Oquirrh Mountains, Utah,

Productus fentonensis Swallow. Keokuk (L. Carb.).

Productus fentonensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 93.

Loc. Fenton, St. Louis County, Missouri.

Obs. Keyes says this is a synonym for P. magnus.

Productus fimbriatus Sowerby. ?St. Louis. ?Upper Carboniferous.

Productus fimbriatus Sowerby, Mineral Conchology, V, 1824, p. 85, pl. 459, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 19.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 630.

Loc. Alton, Illinois; Posey County, Indiana; Feilden Isthmus, lat. 82° 43′.

Obs. Compare with Productus alternatus Norwood and Pratten.

Productus flemingi Geinitz (non de Koninck)=Productus cora.

Productus flemingi Marcou, and Roemer=Productus longispina.

Productus flemingi burlingtonensis Hall=Productus burlingtonensis.

Productus flexistria McCoy. Kaskaskia (L. Carb.).

Productus flexistria McCoy, Synopsis Carb. Fossils of Ireland, 1844, p. 109, pl. 20, fig. 16.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 6.

Loc. Chester, Kaskaskia, and Fountain Bluff, Illinois; Stephensport, Kentucky.

Productus giganteus (Martin). Upper Carboniferous.

Anomites giganteus Martin, Petrefacta Derbiensia, 1809, p. 6, pl. 15, fig. 1.

Productus giganteus White, Proc. U. S. Nat. Mus., III, 1880, p. 46;—Twelfth Ann. Rep. U. S. Geol. Survey of the Terr., 1883, p. 132, pl. 36, fig. 1.

Loc. Europe; McCloud River, Shasta County, California.

Productus gracilis A. Winchell. Waverly (L. Carb.).

Productus gracilis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 112.—Herrick, Bull. Denison Univ., III, 1888, p. 34, pl. 7, fig. 2.

Productus gracilis? A. Winchell, Proc. American Philosophical Soc., XII, 1870, p. 250.

Loc. Near Cuyahoga Falls, Sciotoville, and Granville, Ohio.

Productus gradatus Swallow. Keokuk (L. Carb.).

Productus gradatus Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 93.

Loc. Keokuk, Iowa; Lewis and St. Louis counties, Missouri.

Obs. Keyes regards this species as identical with P. vittatus=P. alternatus.

Productus granulosus Phillips. Keokuk (L. Carb.).

Productus granulosus Phillips, Geol. Yorkshire, II, 1836, p. 216, pl. 8, fig. 15.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 21.

Loc. Nauvoo, Illinois.

Productus hepar Morton. Upper Carboniferous.

Productus hepar Morton, American Jour. Sci., XXIX, 1836, p. 153, pl. 26, fig. 39.

Loc. Junior Furnace, Scioto County, Ohio.

Obs. Not recognizable.

Productus hildrethanus Norwood and Pratten. Upper Carboniferous.

Productus hildrethianus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 18, pl. 1, fig. 11.

Loc. Charboniere, Missouri.

Obs. Keyes regards this form as a synonym for P. cora.

Productus hirsutiforme Walcott=Productella hirsutiforme.

Productus hirsutus Hall=Productella hirsuta.

Productus horridus (non Sowerby)=Productus longispina.

Productus humboldti d'Orbigny. Upper Carboniferous.

Productus humboldti d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 54, pl. 5, figs. 4-7.—de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 114, pl. 12, fig. 2.—Toula, Sitzb. der k. k. Akad. der Wissensch., XVIII, 1873, p. 16, pl. 2, fig. 3.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 695, pl. 76, figs. 1-3.

Productus humboldti ? de Keyserling, Reise in das Petschora-Land, 1846, p. 201, pl. 4, fig. 3.

Loc. Yarbichambi, Bolivia; south end of Spitzbergen; Nishnei-Irginsk, Russia; India; Kashmere.

Productus inca d'Orbigny=Productus semireticulatus.

Producta incurvata Shepard=Strophomena incurvata.

Productus indianaensis Hall. St. Louis (L. Carb.).

Productus indianensis Hall, Trans. Albany Institute, IV, 1858, p. 13.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 47, pl. 6, figs. 6, 7.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 326, pl. 29, figs. 6, 7.

Loc. Spergen Hill, Indiana.

Productus inflatus McChesney. Upper Carboniferous.

Productus inflatus McChesney, New Pal. Fossils, 1860, p. 40;—Trans. Chicago Acad. Sci., I, 1868, p. 27, pl. 6, fig. 1.

Loc. Leavenworth, Indiana.

Productus ivesi Newberry. Upper Carboniferous.

Productus ivesi Newberry, Ives's Rep. Colorado River of the West, 1861, p. 122, pl. 2, figs. 1-8.

Loc. Colorado River near mouth of Diamond River.

Productus koninckianus Geinitz (non de Verneuil)=Productus cora.

Productus lævicosta White. Kinderhook (L. Carb.).

Productus lævicostus White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 230.—Keyes, Geol. Survey Missouri, V, 1895, p. 41, pl. 38, fig. 1.

Productus lævicostus ? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 266, pl. 5, figs. 7, 8.

Loc. Burlington, Iowa; Louisiana, Missouri; Oquirrh Mountains, Utah.

Obs. Compare with P. coræformis.

Productus lasallensis Worthen. Upper Carboniferous.

Productus lasallensis Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 13.

Loc. Lasalle, Illinois.

Productus latissimus Sowerby. Carboniferous.

Productus latissimus Sowerby, Mineral Conchology, 1822, pl. 330.—Meek, Bull. U. S. Geol. Survey of the Terr., II, 1876, p. 354, pl. 1, fig. 1.

Loc. Europe; Vancouver Island.

Productus leuchtenbergensis de Koninck. Carboniferous.

Productus leuchtenbergensis de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 121, pl. 14, fig. 3.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 19.

Loc. Europe; Masons Landing, Jersey County, Illinois.

Productus longispina Sowerby ? Upper Carboniferous.

? Productus longispinus Sowerby, Mineral Conchology, I, 1814, p. 154, pl. 68, fig. 1.

Productus longispinus Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 2.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 161, pl.

Productus longispina Sowerby?—Continued.

6, fig. 7; pl. 8, fig. 6.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 10.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 118, pl. 8, fig. 5.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 78, pl. 8, fig. 4.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 1-4.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 127, pl. 24, figs. 10, 11.—Herrick, Bull. Denison Univ., II, 1887, p. 48, pl. 2, figs. 25, 27, 28.—Keyes, Geol. Survey Missouri, V, 1895, p. 45, fig. 4.

Productus flemingi Roemer (non de Koninck), Kreidebildung Texas, 1852, p. 89, pl. 11, fig. 8.—Marcou, Geol. North America, 1858, p. 47, pl. 6, fig. 7.

Productus splendens Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11, pl. 1, fig. 5.—Schiel, Pacific R. R. Reports, II, 1855, p. 108, pl. 1, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 19, figs. 1-4.

Productus splendens (?) Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, III, 1859, p. 25.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 124.

Productus wabashensis Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 13, pl. 1, fig. 6.

Productus horridus Geinitz, Carbon und Dyas in Nebraska, 1866, p. 55, pl. 4, fig. 7.

Productus orbignyanus Geinitz (?non de Koninck), Ibidem, 1866, p. 56, pl. 4, figs. 8-11.

Productus (Marginifera) splendens Smith, Proc. American Phil. Soc., XXXV, 1897, p. 29.

Loc. Throughout the Upper Carboniferous of the United States; Bolivia.

Obs. Since considerable uncertainty exists as to Sowerby's species, it may be better to adopt P. orbignyanus de Koninck for the above synonymy. P. costatoides is also regarded by Keyes as a synonym for P. longispinus.

Productus longus Meek. Carboniferous.

Productus sp. undet. Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 67.

Productus longus Meek, Ibidem, 1877, end of description.

Productus ivesi? Meek, Ibidem, 1877, pl. 7, fig. 6.

Loc. White Pine district, Nevada.

Productus lyelli de Verneuil=Productus cora.

Productus magnicostatus Swallow. Upper Carboniferous.

Productus magnicostatus Swallow, Trans. St. Louis. Acad. Sci., I, 1860, p. 641.

Loc. Johnson County, Missouri.

Obs. Keyes regards this species as a synonym for P. semireticulatus.

Productus magnus Meek and Worthen. Keokuk (L. Carb.).

Productus magnus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 142;—Geol. Survey Illinois, III, 1868, p. 528, pl. 20, fig. 7.—Keyes, Geol. Survey Missouri, V, 1895, p. 41.

Loc. Monroe County, Illinois; St. Genevieve County, Missouri.

Obs. Compare with P. fentonensis.

Productus margaritaceus Phillips. Upper Carboniferous.

Producta margaritacea Phillips, Geol. Yorkshire, II, 1836, p. 215, pl. 8, fig. 8.

Productus margaritaceus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 6.

Loc. Near Richmond, Missouri.

Productus marginicinctus Prout. St. Louis (L. Carb.).

Productus marginicinctus Prout, Trans. St. Louis Acad. Sci., I, 1857, p. 43, pl. 2, figs. 1-16.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 674, pl. 24, fig. 3.—Keyes, Geol. Survey Missouri, V, 1895, p. 43.

Loc. St. Louis, Missouri; Milan, Illinois.

Obs. See Productus wortheni Hall.

Productus martini Sowerby=Productus semireticulatus.

Productus mesialis Hall. Keokuk (L. Carb.).

Productus mesialis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 636, pl. 19, fig. 2;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 9, 10.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 9, 10.

Loc. Keokuk, Iowa; Nauvoo, Illinois.

Obs. Keyes regards this species as identical with P. burlingtonensis.

Productus mesolobus Phillips. Carboniferous.

Productus mesoloba Phillips, Geol. Yorkshire, II, 1836, p. 215, pl. 7, figs. 12, 13.

Productus mesolobus Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 630.

Loc. Europe; Feilden Isthmus, lat. 82° 43′.

Productus mexicoanus Shumard. Upper Carboniferous.

Productus mexicanus Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 291.—Kayser, Richthofens China, IV, 1883, p. 182, pl. 28, fig. 7.

Productus mexicanus? White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 120, pl. 8, fig. 6.

Loc. Guadalupe Mountains, New Mexico; Lincoln County, Nevada; Lo-Ping, China.

Productus morbillianus A. Winchell. Burlington (L. Carb.).

Producta morbilliana A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 113.

Loc. Burlington, Iowa; Sciotoville, Ohio.

Productus multistriatus Meek. Carboniferous.

Productus multistriata Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 309.

Productus multistriatus Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 350, pl. 1, fig. 8;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 76, pl. 8, fig. 3.

Loc. Utah and Nevada.

Productus muricatus Norwood and Pratten. Upper Carboniferous.

Productus muricatus Norwood and Pratten (non Phillips), Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 14, pl. 1, fig. 8.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 120, pl. 8, fig. 4.—Herrick, Bull. Denison Univ., II, 1887, p. 49.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 228.

Loc. Pike County, Illinois; near Richmond, Missouri; Des Moines Valley, Iowa; Flint Ridge, Ohio; Lake County, Colorado; northern New Mexico.

Obs. Since Phillips's P. muricatus is regarded as a synonym for P. costatus, there is no need for another specific name for Norwood and Pratten species.

Productus nanus Meek and Worthen. Upper Carboniferous.

Productus nanus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 450;—Geol. Survey Illinois, II, 1866, p. 320, pl. 26, fig. 4.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 227.

Loc. Jefferson County, Iowa; northern New Mexico (White).

Productus navicella Hall=Productella navicella.

Productus nebraskaensis Owen. Upper Carboniferous.

Productus nebrascensis Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852, p. 584, pl. 5, fig. 3.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 24, pl. 1, fig. 7.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 165, pl. 2, fig. 2; pl. 4, fig. 6; pl. 5, fig. 11.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 8.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 116, pl. 8, fig. 3.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 65.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 122, pl. 24, figs. 7-9.—Herrick, Bull. Denison Univ., II, 1887, p. 49, pl. 2,

Productus nebraskaensis Owen—Continued.

fig. 30.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 19, figs. 5-7.—Keyes, Geol. Survey Missouri, V, 1895, p. 48, pl. 37, fig. 3.

Productus nebrascensis? Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 1, fig. 24; pl. 3, fig. 23.

Productus rogersi Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., III, 1854, p. 9, pl. 1, fig. 3.—Hall, Pacific R. R. Reports, III, 1856, p. 104, pl. 2, figs. 14, 15.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 121.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 17, 18.

Productus asperus McChesney, New Pal. Fossils, 1860, p. 34.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 50, figs. 5-7.

Productus wilberanus McChesney, New Pal. Fossils, 1860, p. 36;—Trans. Chicago Acad. Sci., I, 1868, p. 26, pl. 1, fig. 8.

Strophalosia horrescens Geinitz (non Murchison Vern. and Keyser.), Carbon und Dyas in Nebraska, 1866, p. 49.

Loc. Bellevue, Missouri; Illinois; Indiana; Ohio; Nebraska; New Mexico; Nevada; Arizona; Utah.

Obs. Compare with P. norwoodi.

Productus nevadaensis Meek. Upper Carboniferous.

Productus nevadensis Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 64, pl. 8, fig. 2.

Loc. White Pine district, Nevada.

Obs. Compare with Productus punctatus (Martin).

Productus newberryi Hall. Waverly (L. Carb.).

Productus newberryi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 180.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 115.—Herrick, Bull. Denison Univ., IV, 1888, p. 20, pl. 10, figs. 24, 25.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, figs. 1-3.

Productella newberryi Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 1-3.

Loc. Medina County and Newark, Ohio.

Productus newberryi annosus Herrick. Waverly (L. Carb.).

Productus newberryi var. annosus Herrick, Bull. Denison Univ., IV, 1888, p. 20, pl. 3, fig. 17;—Geol. Ohio, VII, 1895, pl. 23, fig. 13.

Loc. Alexandria, Ohio.

Productus nodicostatus Herrick. Waverly (L. Carb.).

Productus nodocostatus Herrick, Bull. Denison Univ., IV, 1888, p. 23.

Loc. Rushville, Ohio.

Productus nodosus Newberry. Upper Carboniferous.

Productus nodosus Newberry, Ives's Rep. Colorado River of the West, 1861, p. 124, pl. 1, fig. 7;—Macombes' Rep. Expl. Exped. Santa Fe to the Great Colorado River of the West, 1876, p. 140, pl. 3, fig. 3.

Loc. Santa Fe, New Mexico.

Obs. Probably a synonym for Productus cora d'Orbigny.

Productus norwoodi Swallow. Upper Carboniferous.

Productus (Strophalosia?) norwoodii Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 182.

Productus norwoodi Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 35.

Loc. Cottonwood Valley, Kansas.

Obs. Compare with Productus pustulosus Phillips and P. scabriculus (Martin). Regarded by Keyes as a synonym for P. nebraskaensis.

Productus occidentalis Newberry. Upper Carboniferous.
Productus occidentalis Newberry, Ives's Rep. Colorado River of the West, 1861, p. 122, pl. 2, figs. 9, 10.
Loc. Banks of Cascade River near the junction of Great and Little Colorado rivers.

Productus orbignyanus Geinitz (non de Koninck)=Productus longispinus.

Productus ovatus Hall. St. Louis (L. Carb.).
Productus ovatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 674, pl. 24, fig. 1;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, fig. 19.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, fig. 19.
Loc. Ottumwa and Keosauqua, Iowa.

Productus papilio Gabb. Upper Carboniferous.
Productus papilio Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302, pl. 42, fig. 12.
Loc. Lake Titicaca, Bolivia.

Productus papulatus Hall=Productella papulata.

Productus parvulus A. Winchell. Kinderhook (L. Carb.).
Producta parvula A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.
Loc. Burlington, Iowa.

Productus parvus Meek and Worthen. Kaskaskia (L. Carb.).
Productus parvus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 450;—Geol. Survey Illinois, II, 1866, p. 297, pl. 23, fig. 4.—White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 83, pl. 5, fig. 6.
Loc. Chester, Illinois; Mountain Spring, Nevada.

Productus (?) pectinoideus Shepard.
Producta pectenoidea Shepard, American Jour. Sci., XXXIV, 1838, p. 150, fig. 4.
Loc. Vermilionville, Lasalle County, Illinois.
Obs. The geological position of this species may be Trenton or Upper Carboniferous. The illustration is unsatisfactory.

Productus pertenuis Meek. Upper Carboniferous.
Productus cancrini Geinitz (non de Verneuil), Carbon und Dyas in Nebraska, 1866, p. 54, pl. 4, fig. 6.
Productus pertenuis Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 164, pl. 1, fig. 14; pl. 8, fig. 9.
Loc. Nebraska City, Nebraska; Leavenworth, Kansas; Kansas City, Missouri.

Productus peruvianus d'Orbigny. Upper Carboniferous.
Productus peruvianus d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 52, pl. 4, fig. 4.
Loc. Yarbichambi, Bolivia.
Obs. Probably a synonym for Productus semireticulatus.

Productus phillipsi Norwood and Pratten. Carboniferous.
Productus phillipsii Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 8, pl. 1, fig. 2.
Loc. Big Canyon, Humboldt River, Utah.

Productus pileiformis McChesney=Productus cora.

Productus pileolus Shumard. Upper Carboniferous.
Productus pileolus Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 291.
Loc. Guadalupe Mountains, Texas.

Productus pocillum Morton. Upper Carboniferous.

Productus pocillum Morton, Amer. Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 2.

Loc. Putnam Hill, Ohio.

Obs. Not recognizable.

Productus popei Shumard. Upper Carboniferous.

Productus popei Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 290, pl. 11, fig. 8.

Loc. New Mexico and Texas.

Productus portlockianus Norwood and Pratten=Productus costatus.

Productus prattenianus Norwood=Productus cora.

Productus punctatus (Martin). Upper Carboniferous.

Anomites punctatus Martin, Petrefacta Derbiensia, 1809, p. 8, pl. 37, fig. 6.

Productus punctatus? Morton, American Jour. Sci., XXIX, 1836, p. 153, pl. 26, fig. 38.

Productus punctatus Shumard, Marcy's Rep. U. S. Expl. Red River, Louisiana, 1853, p. 201, pl. 1, fig. 5; pl. 2, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 19.—Marcou, Geol. North America, 1858, p. 48, pl. 6, fig. 12.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 55.—McChesney, Trans. Chicago Acad. Sci., I, 1868, p. 27, pl. 1, figs. 10, 11.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 169, pl. 2, fig. 6; pl. 4, fig. 5.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 569, pl. 25, fig. 13.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 114, pl. 7, fig. 2;—Eleventh Rep. State Geol. Indiana, 1882, p. 373, pl. 42, figs. 1-3.—Hall, Second Ann. Rep. N. Y. State Geol. 1883, pl. 50, figs. 14-16.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 124, pl. 27, figs. 1-3.—Herrick, Bull. Denison Univ., II, 1887, p. 48, pl. 2, fig. 29.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 21; pl. 19, figs. 14-18.—Keyes, Geol. Survey Missouri, V, 1895, p. 51, pl. 37, fig. 1.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 29 (extract).

Productus semipunctatus Sheppard, American Jour. Sci., XXXIV, 1838, p. 153, fig. 9.

Productus tubulospinus McChesney, New Pal. Fossils, 1860, p. 37.

Productus allied to punctatus Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 630.

Loc. Europe; Ohio; Indiana; Illinois; Missouri; Arkansas; Nebraska; Iowa; Nevada; New Mexico; Feilden Isthmus, lat. 82° 43′.

Productus pustulosus Phillips. Upper Carboniferous.

Producta pustulosa Phillips, Geol. Yorkshire, II, 1836, p. 216, pl. 7, fig. 15.

Productus pustulosus Marcou, Geol. North America, 1858, p. 48, pl. 6, fig. 1.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 55.

Productus pyxidiformis Marcou, Geol. North America, 1858, p. 48, pl. 6, fig. 3.

Productus pustulosus? Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.

Loc. Europe; Leavenworth, Kansas; Tigeras, New Mexico.

Obs. See Productus norwoodi.

Productus pyxidatus Hall=Productella pyxidata.

Productus pyxidiformis de Koninck=Productus pustulosus.

Productus raricostatus Herrick. Waverly (L. Carb.).

Productus raricostatus Herrick, Bull. Denison Univ., IV, 1888, p. 19, pl. 3, fig. 19;—Geol. Ohio, VII, 1895, pl. 22, fig. 9.

Loc. Moots Run, Ohio.

Productus rarispinus Hall=Productella rarispina.

Productus reticulatus Gabb. Upper Carboniferous.

Productus reticulatus Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302, pl. 42, fig. 13.

Loc. Lake Titicaca, Bolivia.

Productus rhomianus Derby. Upper Carboniferous.

Productus rhomianus Derby, Bull. Cornell Univ., I, 1874, p. 56, pl. 3, figs. 20, 41–44, 49.

Loc. Bomjardim and Itaituba, Brazil.

Productus rogersi Norwood and Pratten=Productus nebraskaensis.

Productus rushvillensis Herrick. Waverly (L. Carb.).

Productus rushvillensis Herrick, Bull. Denison Univ., IV, 1888, p. 22, pl. 3, fig. 15;—Geol. Ohio, VII, 1895, pl. 23, fig. 15.

Loc. Rushville, Newark, and Loudonville, Ohio.

Productus scabriculus (Martin). Lower and Upper Carboniferous.

Anomites scabriculus Martin, Petrefacta Derbiensia, 1809, p. 8, pl. 36, fig. 5.

Productus scabriculus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 17.—Marcou, Geol. North America, 1858, p. 47, pl. 5, fig. 6.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 125.

Productus scabriculus? Geinitz, Carbon und Dyas in Nebraska, 1866, p. 54.

Loc. Europe; Pecos Village and Santa Fe, New Mexico; Plattsmouth, Nebraska; Caldwell County, Kentucky; Kashmere.

Productus scitulus Meek and Worthen. St. Louis (L. Carb.).

Productus scitulus Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 451;—Geol. Survey Illinois, II, 1866, p. 280, pl. 20, fig. 5.

Loc. Alton, Illinois.

Productus semipunctatus Sheppard=Productus punctatus.

Productus semireticulatus Hall, 1852 (non Martin)=Productus cora.

Productus semireticulatus (Martin). Lower and Upper Carboniferous.

Anomites semireticulatus Martin, Petrefacta Derbiensia, 1809, p. 7, pl. 32, figs. 1, 2; pl. 33, fig. 4.

Productus inca d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 51, pl. 4, figs. 1-3.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 280.

Productus semireticulatus Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 11.—Hall, Pacific R. R. Reports, III, 1856, p. 103, pl. 2, figs. 16, 17;—Geol. Survey Iowa, I, Pt. II, 1858, p. 637.—Marcou, Geol. North America, 1858, p. 46, pl. 5, fig. 4; pl. 6, fig. 6.—Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 292.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 124.—Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 1.—Davidson, Ibidem, XIX, 1863, p. 174, pl. 9, figs. 20, 21.—Meek, Pal. California, I, 1864, p. 11, pl. 2, fig. 4.—Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 115.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 51.—Toula, Sitzb. der k. k. Akad. der Wissensch. zu Wien, IX, 1869, p. 9.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 160, pl. 5, fig. 7.—Derby, Bull. Cornell Univ., I, 1874, p. 47, pl. 4, fig. 8; pl. 6, fig. 18; pl. 7, figs. 5-7, 15, 16.—White, Wheeler's Expl. and Survey west of the 100th Meridian, IV, 1875, p. 111, pl. 8, fig. 1.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 69, pl. 7, fig. 5.—Hall and Whitfield, Ibidem, 1867, p. 267, pl. 5, figs. 5, 6.—Dawson, Acadian Geol., 3d ed., 1878, p. 296, fig. 97.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 629.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, figs. 11-13; pl. 50, figs. 19-23.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 125, pl. 24, figs. 1-3.—Herrick, Bull. Denison Univ., III, 1888, p. 31, pl. 1, fig. 26; pl. 3, fig. 24; pl. 7, fig. 11; pl. 10,

Productus semireticulatus (Martin)—Continued.

fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 16–18; pl. 18, figs. 11–13; pl. 19, figs. 19–23.—Keyes, Geol. Survey Missouri, V, 1895, p. 50, pl. 36, fig. 4.

Productus calhounianus Swallow, Trans. St. Louis Acad. Sci., I, 1858, pp. 181, 215.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 123.

Productus setigerus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 638, pl. 19, fig. 3.

Productus setigerus var. keokuk Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 639, pl. 19, fig. 4.

Productus martini A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.

Productus magnus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, fig. 15.

Loc. Europe; throughout the Carboniferous of North America; Feilden Isthmus, lat. 82° 43′; Vixixil and Sansiguan, Guatemala; Yarbichambi, Bolivia; Bom-jardim and Itaituba, Brazil; Tibet and Kashmere.

Obs. See Productus peruvianus d'Orbigny and P. magnicostatus.

Productus semireticulatus kansasensis Swallow. Upper Carboniferous.

Productus calhounianus var. kansasensis Swallow, Trans. St. Louis Acad. Sci., I, 1858, p. 216.

Loc. Kansas and Missouri.

Productus semistriatus Meek. Upper Carboniferous.

Productus semistriatus Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 309.—Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 349, pl. 1, fig. 7;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 74, pl. 7, fig. 8.—White, Wheeler's Expl. and Survey west 100th Meridian, 1881, Appendix, p. V.

Loc. Utah and northern New Mexico.

Productus setigerus Hall=Productus semireticulatus.

Productus setigerus var. keokuk Hall=Productus semireticulatus.

Productus shumardianus Hall=Productella shumardana.

Productus speciosus Hall=Productella speciosa.

Productus spinulicostus Hall=Productella spinulicosta.

Productus splendens Norwood and Pratten=Productus longispina.

Productus subaculeatus of American authors=Productella spinulicosta.

Productus subalatus Hall=Productella subalata.

Productus subhorridus Meek. Carboniferous.

Productus subhorridus Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 75, pl. 7, fig. 3.

Loc. Wasatch Mountains, Utah.

Productus sulcatus Castelnau=Leptæna rhomboidalis.

Productus sulcifer de Verneuil=Leptæna rhomboidalis.

Productus swallovi Beecher. Kaskaskia (L. Carb.).

Koninckina americana Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 94.

Productus swallovi Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 214.

Loc. Barretts Station, St. Louis County, Missouri.

Productus symmetricus McChesney. Upper Carboniferous.

Productus symmetricus McChesney, New Pal. Fossils, 1860, p. 35;—Trans. Chicago Acad. Sci., I, 1868, p. 25, pl. 1, fig. 9.—Meek, Final Rep. U. S. Geol. Survey of Nebraska, 1872, p. 167, pl. 5, fig. 6; pl. 8, fig. 13.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 123, pl. 25, figs. 1 and 2.—Hall and

Productus symmetricus McChesney—Continued.
Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 19, 20.—Keyes, Geol. Survey Missouri, V, 1895, p. 48, pl. 36, fig. 2.
Loc. Lasalle and Springfield, Illinois; Iowa; Missouri; Nebraska; Indiana.

Productus tenuicostatus Hall. St. Louis (L. Carb.).
Productus tenuicostatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 675, pl. 24, fig. 2;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 49, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 18, fig. 18.—Keyes, Geol. Survey Missouri, V, 1895, p. 44.
Loc. Milan, Illinois.

Productus truncatus Hall=Strophalosia truncata.
Productus tubulospinus Sheppard=Productus punctatus.

Productus undiferus de Koninck. Upper Carboniferous.
Productus undiferus de Koninck, Mém. de la Soc. Royale des Sciences de Liége, IV, 1846, p. 153, pl. 5, fig. 4; pl. 11, fig. 5.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 9.
Loc. Europe; Caseyville, Illinois; Posey County, Indiana.
Obs. See Productus boonensis Swallow.

Productus villiersi d'Orbigny. Upper Carboniferous.
Productus villiersi d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 53, pl. 4, figs. 12, 13.—de Koninck, Recherches sur les Animaux Fossiles, Pt. I, 1847, p. 109, pl. 11, fig. 1.—Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 17.
Loc. Yarbichambi, Bolivia; Keg Creek, Missouri.

Productus viminalis White. Burlington (L. Carb.).
Productus viminalis White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 29.
Loc. Burlington, Iowa.
Obs. White regards this species as a synonym for Productus costatus Sowerby.

Productus vittatus Hall=Productus alternatus.
Productus wabashensis Norwood and Pratten=Productus longispina.

Productus wallacianus Derby. Upper Carboniferous.
Productus wallacianus Derby, Bull. Cornell Univ., I, 1874, p. 57, pl. 3, figs. 46-48; pl. 6, fig. 5.
Loc. Bomjardim and Itaituba, Brazil.

Productus wilberanus McChesney=Productus nebraskaensis.

Productus wortheni Hall. Keokuk (L. Carb.).
Productus wortheni Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 635, pl. 19, fig. 1.
Loc. Nauvoo, Illinois.
Obs. Compare with Productus marginicinctus Prout.

Productus weyprechti Toula. Upper Carboniferous.
Productus weyprechti Toula, Sitzb. der k. k. Akad. der Wissensch. zu Wien, 1873, p. 138, pl. 1, fig. 4.
Productus weyprechti? Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 631.
Loc. Cape Joseph Henry, lat. 82° 50′.

PROTORHYNCHA Hall and Clarke. Genotype Atrypa dubia Hall.
Protorhyncha Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 180;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 824.

Protorhyncha (?) antiquata (Billings). Lower Cambrian.

Camarella antiquata Billings, Pal. Fossils, I, 1861, p. 10, fig. 13;—Geol. Vermont, II, 1861, p. 949, fig. 353;—Geol. Canada, 1863, p. 284, fig. 290.—Walcott, Bull. U. S. Geol. Survey, 30, 1886, p. 122, pl. 7, fig. 8;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 613, pl. 72, fig. 3.

Camarella ? antiquata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 220.

Loc. Swanton, Vermont.

Protorhyncha dubia Hall. Chazy (Ord.).

Atrypa dubia Hall, Pal. New York, I, 1847, p. 21, pl. 4 bis, fig. 5.

Rhynchonella dubia Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.

Protorhyncha dubia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 180.

Loc. Chazy, New York; Highbridge, Kentucky; Lascassas, Tennessee.

Protorhyncha (?) minor (Walcott). Lower Cambrian.

Camarella (?) minor Walcott, Proc. U. S. Nat. Mus., XII, 1889, p. 36;—Tenth Ann. Rep. U. S. Geol. Survey, 1891, p. 614, pl. 72, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 221.

Loc. Stissingville, New York.

Obs. May be the type of a new genus. Its affinities are rather with the Rhynchonellidæ than with Pentameridæ.

Protorthis Hall and Clarke=Billingsella.

Protosiphon Matthew. Genotype P. kempanus Matthew.

Protosiphon Matthew, Geol. Mag., dec. IV, IV, 1897, p. 70.

Protosiphon kempanus Matthew. Lower Cambrian.

Protosiphon kempanum Matthew, Geol. Mag., dec. IV, IV, 1897, p. 70, figs. 1–4.

Loc. Long Island, Kings County, New Brunswick.

Protozyga Hall and Clarke=Zygospira.

Pseudocrania anomala A. Winchell=Orthothetes anomalus.

PTYCHOSPIRA Hall and C. Genotype Terebratula ferita von Buch.

Ptychospira Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, fig. 102;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 792.

Ptychospira sexplicata (White and Whitfield.) Waverly (L. Carb.).

Retzia sexplicata White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 294.

Ptychospira sexplicata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 112, pl. 50, figs. 13, 14; pl. 83, fig. 28.

Loc. Burlington, Iowa.

PUGNAX Hall and C. Genotype Rhynchonella acuminata (Martin).

Pugnax Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 202;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 828.

Obs. Subgenus of Hypothyris.

Pugnax (?) dawsoniana (Davidson). Upper Carboniferous.

Rhynchonella dawsoniana Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 172, pl. 9, figs. 13, 14.

Rhynchonella ? dawsoniana Dawson, Acadian Geology, 3d ed., 1878, p. 294, fig. 93.

Pugnax (?) dawsonianus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214, pl. 62, figs. 30–33.

Loc. Lennox Passage, Nova Scotia.

Pugnax globulina (Phillips sp.?) (Davidson). Upper Carboniferous.

?Terebratula globulina Phillips, Encyl. Metr., IV, 1834, pl. 3, fig. 3.

Camarophoria? globulina? Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 171, pl. 9, figs. 11, 12.

Camarophoria globulina? Dawson, Acadian Geology, 3d ed., 1878, p. 293, fig. 92.

Pugnax globulina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 214.

Loc. De Bert River, Nova Scotia.

Pugnax grosvenori Hall. St. Louis (L. Carb.).

Rhynchonella grosvenori Hall, Trans. Albany Institute, IV, 1858, p. 10.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 53, pl. 6, figs. 31-34.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 331, pl. 29, figs. 31-34.

Pugnax grosvenori Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 60, figs. 13-17.

Loc. Spergen Hill and Bloomington, Indiana; Alton, Illinois; near Princeton, Kentucky.

Pugnax mutata Hall. Keokuk and St. Louis (L. Carb.).

Rhynchonella mutata Hall, Trans. Albany Institute, IV, 1858, p. 10;—Geol. Survey Iowa, I, Pt. II, 1858, p. 658, pl. 23, fig. 2.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 52, pl. 6, fig. 46.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 332, pl. 29, figs. 43-45.

Pugnax mutatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 18-22.

Loc. Alton and Warsaw, Illinois; Boonville, Missouri.

Pugnax ottumwa (White). St. Louis (L. Carb.).

Rhynchonella ottumwa White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 23;—Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 165, pl. 41, fig. 5.

Pugnax ottumwa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 23-26.

Loc. Ottumwa and Oskaloosa, Iowa; Clark County, Missouri.

Pugnax pugnus (Martin). Upper Devonian.

Conchyliolithus Anomites pugnus Martin, Petrefacta Derbiensia, 1809, tab. 22, figs. 4, 5.

Terebratula pugnus Sowerby, Mineral Conchology, 1825, pl. 425, figs. 1-6.

Rhynchonella pugnus Davidson, Mon. British Carb. Brach., Pal. Soc., 1860, p. 97, pl. 32, figs. 1-15.—Williams, American Jour. Sci., 3d ser., XXV, 1883, p. 99.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 155, pl. 14, fig. 7.—Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 73.—Whiteaves, Cont. Canadian Pal., I, 1891, pp. 230, 290.

?Rhynchonella pugnus Dawson, Acadian Geology, 3d ed., 1878, p. 295.

Pugnax pugnus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 203, pl. 60, figs. 6-10.

Loc. Europe; High Point, New York; Eureka district, Nevada; Mackenzie and Athabasca rivers, Canada; in the Carboniferous of Windsor and East River, Nova Scotia (Dawson); San Saba Valley, Texas (Roemer).

Pugnax pugnus alta (Calvin). Upper Devonian.

Rhynchonella alta Calvin; paper read before the Iowa Acad. Sci., and a named photographic plate distributed.

Rhynchonella pugnus var. alta Williams, Bull. Geol. Soc. America, I, 1890, pl. 12, figs. 5-7.

Pugnax altus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 203, pl. 60, figs. 1-5.

Loc. Solon, Iowa.

Pugnax pugnus missouriensis (Shumard). Waverly (L. Carb.).

Rhynchonella missouriensis Shumard, Geol. Rep. Missouri, 1855, p. 204, pl. 5C, fig. 5a (non figs. 5b, 5c = Pugnax striaticostata).—Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 153, pl. 14, fig. 4.—Keyes, Geol. Survey Missouri, V, 1895, p. 100.

Pugnax missouriensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 33, 34; pl. 62, figs. 44, 45.

Loc. Cooper County, Missouri; Burlington, Iowa; Rockford, Indiana; Scioto-ville and Richfield, Ohio.

Pugnax rockymontana (Marcou). Upper Carboniferous.

Terebratula rockymontana Marcou, Geol. N. America, 1858, p. 50, pl. 6, fig. 13.

Rhynchonella eatoniæformis McChesney, New Pal. Fossils, 1860, p. 49.

Rhynchonella rockymontana White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 131, pl. 9, fig. 1.

Pugnax eatoniiformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 11, 12.

Loc. Pecos Village, New Mexico; Cedar Range, Utah; Graysville, Illinois.

Pugnax striaticostata (Meek and Worthen). Kinderhook (L. Carb.).

Rhynchonella missouriensis Shumard, Geol. Rep. Missouri, 1855, p. 204, Pl. C, figs. 5b, 5c (non 5a = Pugnax pugnus missouriensis).—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 450, pl. 14, fig. 7.

Rhynchonella striatocostata Meek and Worthen, Ibidem, III, 1868, p. 452.

Pugnax striatocostata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204.

Loc. Cooper County, Missouri.

Pugnax swallovana (Shumard). Upper Carboniferous.

Camarophoria swallovana Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 394, pl. 11, fig. 1.

Pugnax swalloviana Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 204, pl. 60, figs. 27–32.

Loc. Guadalupe Mountains of New Mexico and Texas.

Pugnax utah (Marcou). Upper Carboniferous.

Terebratula utah Marcou, Geol. N. America, February, 1858, p. 51, pl. 6, fig. 12.

Rhynchonella (Camarophoria) osagensis Swallow, Trans. St. Louis Acad. Sci., I, June, 1858, p. 219.

Rhynchonella utah, Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 128.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 128, pl. 9, fig. 2;—Thirteenth Rep. State Geol. Indiana, 1884, p. 132, pl. 25, fig. 6.

?Rhynchonella species Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 5.

Camarophoria globulina Geinitz (non Phillips), Carbon und Dyas in Nebraska, 1866, p. 38, pl. 3, fig. 5.

Rhynchonella osagensis Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 179, pl. 1, fig. 9; pl. 6, fig. 2.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 26, fig. 22.

Pugnax utah Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 204, pl. 60, figs. 39–42.

Rhynchonella uta Keyes, Geol. Survey Missouri, V, 1895, p. 103, pl. 41, fig. 7.

Loc. Salt Lake City, Utah; Indiana; Illinois; Iowa; Missouri; Kansas; Arkansas; Nebraska.

Obs. Compare with Pugnax pleurodon.

RAFINESQUINA Hall and C. Genotype Strophomena alternata Emmons.

Strophomena (non Rafinesque) Billings, Canadian Nat. Geol., I, 1856, p. 133;—Canadian Jour., VI, 1861, p. 329;—Pal. Fossils, I, 1862, p. 115.—Hall, Pal. New York, IV, 1867, p. 76.—Meek, Pal. Ohio, I, 1873, p. 73.—N. H. Winchell, Ninth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1881, p. 118.—Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 4.—Herrick, Bull. Denison University, IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 159.

Rafinesquina Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 281.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 400.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 279.

Rafinesquina alternata (Emmons). Trenton to Lorraine (Ord.).

Leptæna alternata Conrad, Second Ann. Rep. N. Y. Geol. Survey, 1838, p. 115 (undefined).—Hall, Pal. New York, I, 1847, pp. 102, 286, pl. 31, fig. 1; pl. 31A, fig. 1; pl. 79, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 818, fig. 600.

Strophomena alternata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 63 (undefined);—Fourth Rep. Ibidem, 1840, p. 201 (undefined);—Fifth Rep. Ibidem, 1841, p. 37 (undefined).—Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 395, fig. 3.—Billings, Canadian Nat. Geol., I, 1856, p. 204, figs. 3, 4;—Canadian Nat. Geol., V, 1860, p. 51;—Pal. Fossils, I, 1862, p. 117;—Geol. Canada, 1863, p. 163, fig. 140.—Meek, Pal. Ohio, I, 1873, p. 88, pl. 7, fig. 1.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 51.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 481, pl. 1, figs. 6, 7;—Tenth Rep. State Geol. Indiana, 1881, p. 113, pl. 1, figs. 6, 7.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 38, figs. 6–11.—Shaler, Fossil Brachiopoda of the Ohio Valley, 1887, p. 4, pls. 2, 3.—Keyes, Geol. Survey Missouri, V, 1895, p. 70, pl. 39, fig. 3.

Orthis huroniensis Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 37, pl. 14, fig. 6.

Orthis plana Castelnau (non Pander), Ibidem, 1843, p. 38, pl. 14, fig. 1.

Strophomena angulata? Owen, Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, pl. 18, figs. 1, 3.

Strophomena anticostiensis Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 62.

Rafinesquina alternata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 282, pl. 8, figs. 6–11, 27, 28; Pt. II, 1895, pl. 84, figs. 17, 18.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 404, pl. 31, figs. 32–34.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 171.

Loc. New York; Ohio; Indiana; Illinois; Missouri; Wisconsin; Minnesota; Canada; Manitoba; Anticosti.

Obs. This species was not defined or figured by Conrad. The first illustration was given by Emmons, and in the following year it was figured and defined by Castelnau as Orthis huroniensis.

Rafinesquina alternata alternistriata Hall. Lorraine (Ord.).

Leptæna alternistriata Hall, Pal. New York, I, 1847, p. 109, pl. 31B, fig. 1.

Strophomena alternistriata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.

Strophomena alternata var. alternistriata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 53.

Rafinesquina alternistriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.

Loc. Cincinnati, Ohio; Maysville, Kentucky; Madison, Indiana.

Obs. Meek regarded this variety as a synonym for S. alternata.

Rafinesquina alternata fracta (Meek). Lorraine (Ord.).
Strophomena alternata var. fracta Meek, Pal. Ohio, I, 1873, p. 91, pl. 7, fig. 3.
Strophomena fracta Miller, Cincinnati Quart. Jour. Sci., I, 1874, p. 13;—Ibidem, II, 1875, p. 54.
Loc. Cincinnati, Ohio.

Rafinesquina alternata loxorhytis Winchell and Schuchert=R. kingi.

Rafinesquina alternata loxorhytis (Meek). Lorraine (Ord.).
Strophomena alternata var. loxorhytis Meek, Pal. Ohio, I, 1873, p. 91.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 53.
Loc. Cincinnati, Ohio.

Rafinesquina alternata nasuta (Conrad). Lorraine (Ord.).
Strophomena nasuta Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 260.—Emmons, Geol. New York; Rep. Third Dist., 1842, p. 403, fig. 3.
Strophomena alternata var. nasuta Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 53.
Loc. Jefferson County, New York; Cincinnati, Ohio.

Rafinesquina (?) atava (Matthew). Calciferous (Ord.).
Strophomena atava Matthew, Trans. Royal Soc. Canada, 1893, p. 102, pl. 7, fig. 8.
Loc. Mary Island, near St. John, New Brunswick.

Rafinesquina aurora (Billings). Calciferous (Ord.).
Strophomena aurora Billings, Pal. Fossils, I, 1865, p. 218, fig. 202.
Loc. Table Head, etc., Newfoundland.

Rafinesquina ceres (Billings). Lorraine and Anticosti (Ord. and Sil.).
Strophomena ceres Billings, Canadian Nat. Geol., V, 1860, p. 54;—Pal. Fossils, I, 1862, p. 119.
Loc. Anticosti.

Rafinesquina deltoidea (Conrad). Trenton and Utica (Ord.).
Strophomena deltoidea Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 64;—Fifth Rep., Ibidem, 1841, p. 37.—Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 46, fig. 2.—Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 389, fig. 2.—Billings, Geol. Canada, 1863, p. 163, fig. 141.—Keyes, Geol. Survey Missouri, V, 1895, p. 69.
Strophomena camerata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 254, pl. 14, fig. 5.
Leptæna camerata Hall, Pal. New York, I, 1847, p. 106, pl. 31A, fig. 2.
Leptæna deltoidea Hall, Ibidem, 1847, p. 106, pl. 31A, fig. 3.
Streptorhynchus (Strophonella) deltoidea Hall, Second Ann. Rep. New York State Geol., 1883, pl. 42, figs. 1, 2, 4 (non fig. 3).
Refinesquina deltoidea Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9A, figs. 1, 2, 4.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 403, pl. 31, figs. 30, 31.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 170.
Loc. Trenton Falls, etc., New York; St. Paul, Cannon Falls, etc., Minnesota; Oshkosh, Wisconsin; Dubuque, Iowa; Pike County, Missouri; Ottawa and Lake Winnipeg, Canada.

Rafinesquina fasciata Hall. Chazy (Ord.).
Leptæna fasciata Hall, Pal. New York, I, 1847, p. 20, pl. 4 bis, fig. 3.
Strophomena fasciata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.
Rafinesquina fasciata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.
Loc. Chazy, Clinton County, New York.
Obs. Should be compared with R. alternata.

Rafinesquina imbrex (Pander). Lorraine (Ord.).
Strophomena imbrex(?) Billings, Pal. Fossils, I, 1862, p. 128, fig. 106.
Loc. Europe; Anticosti.

Rafinesquina incrassata (Hall). Chazy and Black River (Ord.).

Leptæna incrassata Hall, Pal. New York, I, 1847, p. 19, pl. 4 bis, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 817, fig. 591.

Strophomena incrassata Billings, Canadian Nat. Geol., IV, 1859, p. 443.

Loc. Chazy, New York; Mingan Island, Canada.

Rafinesquina kingi (Whitfield). Lorraine (Ord.).

Strophomena kingi Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 72;—Geol. Wisconsin, IV, 1882, p. 261, pl. 12, figs. 15, 16.

Rafinesquina alternata var. loxorhytis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 407, pl. 31, figs. 35-37; pl. 32, figs. 59, 60.

Rafinesquina kingi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.

Loc. Delafield, Wisconsin; near Spring Valley, Minnesota.

Rafinesquina lata Whiteaves. Lorraine (Ord.).

Rafinesquina lata Whiteaves, Canadian Rec. Sci., 1895, p. 392;—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 172, pl. 19, figs. 2-5.

Loc. Red River Valley and Lake Winnipeg, Manitoba.

Rafinesquina mesicosta (Shumard). ? Trenton (Ord.).

Leptæna mesacosta Shumard, Geol. Rep. Missouri, 1855, p. 205, Pl. C, fig. 2.—Keyes, Geol. Survey Missouri, V, 1895, p. 76.

Loc. Cape Girardeau, Missouri.

Rafinesquina minnesotaensis (N. H. Winchell). Trenton (Ord.).

Strophomena deltoidea Owen (non Conrad), Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, pl. 16, fig. 8; pl. 17, fig. 6.

Leptæna deltoidea Owen, Geol. Rep. Wisconsin, Iowa, and Minnesota, 1852, p. 620, tab. 2B, fig. 10 (not the middle figure).

Strophomena incrassata Hall (non 1847), Geol. Wisconsin, I, 1862, p. 42, fig. 16.—Hall (non 1847), Second Ann. Rep. N. Y. State Geol., 1883, pl. 38, figs. 1-5.

Strophomena minnesotensis N. H. Winchell, Ninth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1881, p. 120.

Rafinesquina minnesotensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 401, pl. 31, figs. 25-29.

Loc. Minneapolis, etc., Minnesota; Beloit, Wisconsin; Decorah and McGregor, Iowa; central Kentucky; Lebanon, Tennessee.

Obs. This species is probably not identical with R. incrassata (Hall) of the Chazy terrane.

Rafinesquina minnesotaensis inquassa (Sardeson). Trenton (Ord.).

Strophomena inquassa Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 334, pl. 5, figs. 22-24.

Rafinesquina minnesotensis var. inquassa Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 403, pl. 31, figs. 27, 28.

Loc. Minneapolis and St. Paul, Minnesota; Mineralpoint, Wisconsin.

Rafinesquina nitens (Billings). Lorraine (Ord.).

Strophomena nitens Billings, Canadian Nat. Geol., V, 1860, p. 53, fig. 1;—Pal. Fossils, I, 1862, p. 118, fig. 97;—Geol. Canada, 1863, p. 209, fig. 208.

Rafinesquina nitens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.

Loc. Anticosti.

Rafinesquina (?) obscura Hall. Clinton (Sil.).

Leptæna obscura Hall, Pal. New York, II, 1852, pp. 62, 103, pl. 21, figs. 2, 6.

Strophomena obscura Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Strophomena obscura? Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 306, pl. 6, figs. 15, 16.

Rafinesquina ? obscura Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.

Loc. Near Utica and Kirkland, New York; Cumberland Gap, Tennessee.

Rafinesquina squamula (James). Lorraine (Ord.).

Strophomena squamula James, Cincinnati Quart. Jour Sci., I, 1874, p. 335.

Rafinesquina squamula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283.

Loc. Cincinnati, Ohio.

Rafinesquina tenuilineata (Conrad). Trenton (Ord.).

Strophomena tenuilineata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 259.—Hall, Twelfth Rep. New York State Cab. Nat. Hist., 1859, p. 70.

Leptæna tenuilineata Hall, Pal. New York, I, 1847, p. 115, pl. 31B, fig. 8.

Loc. "Occurs in Trenton limestone."

Rafinesquina ulrichi (James). Utica (Ord.).

Strophomena (?) ulrichi James, The Palæontologist, 1, 1878, p. 6.

Rafinesquina ulrichi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 283, pl. 15A, figs. 37, 38.

Loc. Cincinnati, Ohio.

RENSSELÆRIA Hall. Genotype Terebratula ovoides Eaton.

Rensselæria Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 39;—Pal. New York, III, 1859, p. 454.—Dall, American Jour. Conchology, VI, 1870, p. 105.—Claypole, Proc. American Philosophical Soc., 1883, p. 235.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 255;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 849.

Rensselæria æquiradiata (Conrad). Lower Helderberg (Dev.).

Atrypa æquiradiata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 266, pl. 16, fig. 17.

Meganteris æquiradiata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 99, figs. 1–3.

Rensselæria æquiradiata Hall, Pal. New York, III, 1859, p. 255, pl. 45, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 76, figs. 23–25.

Loc. Cherry Valley, Schoharie, and Carlisle, New York; Arisaig, Nova Scotia (Ami).

Rensselæria cayuga Hall and Clarke. Oriskany (Dev.).

Rensselæria cayuga Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 258, 370, pl. 75, figs. 1, 2.

Loc. Cayuga, Ontario.

Rensselæria condoni McChesney=Megalanteris condoni.

Rensselæria cumberlandiæ Hall. Oriskany (Dev.).

Meganteris cumberlandiæ Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 101.

Rensselæria cumberlandiæ Hall, Pal. New York, III, 1859, p. 464, pl. 108, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 77, figs. 23–25.

Loc. Cumberland, Maryland.

Rensselæria elliptica Hall. Lower Helderberg (Dev.).

Meganteris elliptica Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 98.

Rensselæria elliptica Hall, Pal. New York, III, 1859, p. 256, pl. 45, fig. 4.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 258, pl. 76, figs. 26–28.

Loc. Schoharie County, New York.

Rensselæria elongata Hall=Amphigenia elongata.

Rensselæria intermedia Hall. Oriskany (Dev.).

Rensselæria intermedia Hall, Pal. New York, III, 1859, p. 463, pl. 108, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 77, figs. 26–28.

Loc. Cumberland, Maryland.

Rensselæria johanni Hall=Newberrya johannis.

Rensselæria lævis Hall=Meristella lævis.
Rensselæria lævis Meek=Newberrya lævis.
Rensselæria marylandica Claypole=Newberrya claypolei.

Rensselæria marylandica Hall. Oriskany (Dev.).
Rensselæria marylandica Hall, Pal. New York, III, 1859, p. 461, pl. 108, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 76, figs. 8-20.
Loc. Cumberland, Maryland.

Rensselæria mutabilis Hall. Lower Helderberg (Dev.).
Meganteris mutabilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 97.
Rensselæria mutabilis Hall, Pal. New York, III, 1859, p. 254, pl. 45, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 258, 259, figs. 178, 179; pl. 76, figs. 1-3a, 21, 22.
Loc. Albany and Columbia counties, New York.

Rensselæria ovalis Hall=Megalanteris ovalis.

Rensselæria ovoides (Eaton). Oriskany (Dev.).
Terebratula ovoides Eaton, Geological Text-Book, 1832, p. 45.
Terebratula perovalis Eaton, Ibidem, 1832, p. 45.
Atrypa elongata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 65.—Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 123, fig. 2.—Hall, Ibidem, Fourth Dist., 1843, p. 138, fig. 2;—(Conrad) Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 14.
Pentamerus deshayesii Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 38, pl. 15, figs. 1, 2.
Meganteris ovoides Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 102.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 826, fig. 649.
Rensselæria ovoides Hall, Pal. New York, III, 1859, p. 456, pl. 104, figs. 1-4; pl. 105, figs. 1-6.—Billings, Geol. Canada, 1863, p. 961, fig. 470;—Pal. Fossils, II, 1874, p. 41, pl. 3, figs. 7, 10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 258, pl. 75, figs. 5-9; pl. 76, figs. 16, 18.
Loc. New York; Pennsylvania; Maryland; Virginia; Gaspé, Canada.

Rensselæria ovulum Hall and Clarke. Oriskany (Dev.).
Rensselæria ovulum Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 75, figs. 3, 4.
Loc. Cayuga, Canada.

Rensselæria portlandica Billings=Trigeria portlandica.
Rensselæria suessana Hall=Beachia suessana.
Rensselandia Hall=Newberrya.

RETICULARIA McCoy. Genotype Terebratula ? imbricata Sowerby.
Reticularia McCoy, Carboniferous Fossils of Ireland, 1844, p. 142.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 538.

Reticularia bicostata (Vanuxem). Niagara (Sil.).
Orthis bicostatus Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, pp. 91, 94.
Spirifer bicostatus Hall, Pal. New York, II, 1852, p. 263, pl. 54, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 37, pl. 36, fig. 7.
Spirifera bicostata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, fig. 7.
Loc. Vernon Center, New York; Louisville, Kentucky.

Reticularia bicostata petila (Hall). Niagara (Sil.).
Spirifera bicostata? var. petila Hall, Descrip. n. sp. of Fossils from Waldron, Indiana, 1879, p. 15.
Spirifera bicostata var. petila Hall, Eleventh Rep. State Geol. Indiana, 1882, p. 279, pl. 27, figs. 8, 9;—Trans. Albany Institute, X, 1883, p. 71.

Reticularia bicostata petila (Hall)—Continued.

Spirifer bicostatus var. petilus Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 75, pl. 6, figs. 1-3.

Loc. Waldron, Indiana.

Reticularia canandaiguæ (Hall and Clarke). Hamilton (Dev.).

Spirifer canandaiguæ Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 360, pl. 37, figs. 23-25.

Loc. Centerfield and Canandaigua Lake, New York.

Reticularia clara (Swallow). Kaskaskia (L. Carb.).

Spirifera clara Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.

Loc. St. Genevieve County, Missouri.

Reticularia cooperensis (Swallow). Kinderhook (L. Carb.).

Spirifera cooperensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 643.—Meek and Worthen, Geol. Survey Illinois, II, 1866, p. 155, pl. 14, fig. 5.—Keyes, Geol. Survey Missouri, V, 1895, p. 78.

Spirifer hirtus White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 293.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 37, pl. 38, fig. 14 (? pl. 84, figs. 36, 37).

Spirifera semiplicata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 111.

Spirifer hirtus ? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119;—Proc. American Phil. Soc., XII, 1870, p. 251.

Loc. Chouteau Springs, etc., Missouri; Rockford, Indiana; Burlington, Iowa; Hickman County, Tennessee.

Reticularia fimbriata (Conrad). Oriskany-Ithaca (Dev.).

Delthyris fimbriatus Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 263.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 208, fig. 10.

Spirifer fimbriatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 505, pl. 4, fig. 5.—Billings, Canadian Jour., VI, 1861, p. 257, figs. 68-70;—Geol. Canada, 1863, p. 372, fig. 393.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 20, 21, 33, 37, pl. 36, figs. 17-22; pl. 38, figs. 9, 10.

Spirifera fimbriata Hall, Pal. New York, IV, 1867, p. 214, pl. 33, figs. 1-11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 17-22.—Whiteaves, Cont. Canadian Pal., I, 1892, p. 286.

Spirifer compactus Meek, Trans. Chicago Acad. Sci., I, 1868, p. 102, pl. 14, fig. 11.

Spirifer (Martinia) richardsoni Meek, Trans. Chicago Acad. Sci., I, 1868, p. 104, pl. 14, fig. 2.

Spirifera (M.) richardsoni Whiteaves, Cont. Canadian Pal., I, 1891, p. 226;—Ibidem, 1892, p. 287, pl. 37, fig. 7.

Spirifera conradana Miller, American Pal. Foss., 2d ed., 1883, p. 372.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 110, pl. 7, figs. 11-13.

Spirifera (M.) undifera Walcott, Mon. U. S. Geol. Survey, VIII, 1884, pl. 3, figs. 3, 6; pl. 14, fig. 11.

Loc. New York; Ohio; Falls of Ohio; Illinois; Iowa; Maryland; Virginia; Eureka district, Nevada; Ontario and lakes Manitoba and Winnipegosis; Mackenzie River, Northwest Territory, Canada.

Obs. Mr. Walcott is correct in regarding this species the same as Spirifer undiferus Roemer. Conrad's species, however, was published in 1842, while that of Roemer is two years later, or in 1844. S. richardsoni is a young specimen of S. compacta which Mr. Walcott has shown to be a synonym for S. undiferus. See Reticularia knappiana.

Reticularia franklini (Meek). Hamilton (Dev.).

Spirifer (Martinia) franklini Meek, Trans. Chicago Acad. Sci., I, 1868, p. 107, pl. 14, fig. 12.

Spirifera (M.) glabra var. franklini Whiteaves, Cont. Canadian Pal., I, 1891, p. 225.

Loc. Mackenzie River, Northwest Territory, Canada.

Obs. The type specimen in the U. S. National Museum collection proves to be closely related to Reticularia lævis Hall.

Reticularia guadalupensis (Shumard). Upper Carboniferous.

Spirifera guadalupensis Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 391.

Loc. Guadalupe Mountains, Texas.

Reticularia knappiana (Nettelroth). Corniferous (Dev.).

Spirifera knappiana Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 122, pl. 7, fig. 14.

Loc. Falls of Ohio.

Obs. Probably the same as R. fimbriata.

Reticularia lævis (Hall). Portage (Dev.).

Delthyris lævis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 245, fig. 1.

Spirifera lævis Hall, Pal. New York, IV, 1867, p. 239, pl. 39, figs. 1–12.

Spirifer lævis Williams, American Jour. Sci., 3d ser., XX, 1880, p. 456.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 33, 37, pl. 38, figs. 11–13; pl. 84, fig. 29.—Kindle, Bull. American Pal., 6, 1896, p. 36.

Spirifera (Martinia) glabra var. lævis Williams, Ann. New York Acad. Sci., II, 6, 1881, pl. 14, figs. 1, 2.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 140.

Loc. Ithaca and Cortlandville, New York.

Reticularia modesta (Hall). Lower Helderberg (Dev.).

Spirifer modestus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 61;—Pal. New York, III, 1859, p. 203, pl. 28, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 37, pl. 38, figs. 1, 3.

Loc. Cumberland, Maryland.

Reticularia nevadaensis (Walcott). Upper Devonian.

Spirifera (M.) glabra var. nevadensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 139, pl. 3, fig. 5; pl. 14, fig. 14.

Loc. Eureka district, Nevada.

Reticularia (?) nympha (Billings). Lower Helderberg (Dev.).

Spirifera nympha Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 116, pl. 3, fig. 15.

Loc. Masardis, Maine.

Reticularia perplexa (McChesney). Upper Carboniferous.

Spirifer lineatus Shumard, Geol. Survey Missouri, 1855, p. 216.—Hall, Pacific R. R. Reports, III, 1856, p. 101, pl. 2, figs. 6–8.—Marcou, Geol. N. America, 1858, p. 50, pl. 7, fig. 5.—Newberry, Ives's Rep. Colorado River of the West, 1861, p. 127.—Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 408.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 10, 11, 17, 21, 30, 39, pl. 38, figs. 2, 4, 7, 8.

Spirifer perplexus McChesney, New Pal. Fossils, 1860, p. 43.

Spirifer lineatus? Meek, Geol. Survey California, I, 1864, p. 13, pl. 2, fig. 6.

Spirifer lineatus var. perplexus Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 408.

Spirifera lineata Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, pl. 2, fig. 3.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 230.

Spirifer (Martinia) perplexa Derby, Bull. Cornell Univ., I, 1874, p. 16, pl. 3, figs. 27, 39, 40, 45, 50; pl. 8, fig. 13.

Reticularia perplexa (McChesney)—Continued.

Spirifera (Martinia) lineata ? White, Wheeler's Expl. and Survey west 100th Meridian, III, Appendix, 1881.

Spirifera (Martinia) lineata White, Eleventh Rep. State Geol. Indiana, 1882, p. 372, pl. 42, figs. 4-6;—Thirteenth Rep. State Geol. Indiana, 1884, p. 133, pl. 27, figs. 4-6.—Herrick, Bull. Denison Univ., II, 1887, p. 46, pl. 1, fig. 13.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 603, pl. 16, figs. 3-5;—Geol. Ohio, VII, 1895, p. 488, pl. 12, figs. 3-5.

Spirifera perplexa Keyes, Geol. Survey Missouri, V, 1895, p. 84.

Loc. Ohio; Indiana; Illinois; Missouri; Iowa; Kentucky; California; Texas; Pecos and Tigeras, New Mexico; Shasta County, California; Bomjardim and Itaituba, Brazil.

Obs. This species is not identical with Reticularia lineata Martin, as found in England and Belgium. Reticularia pseudolineata (Hall) is more closely allied to that species than R. perplexa (McChesney).

Reticularia perplexa striatilineata (Swallow). Upper Carboniferous.

Spirifer lineatus var. striatolineatus Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 408.

Loc. Missouri.

Obs. Regarded by Keyes as a synonym for R. perplexa.

Reticularia præmatura (Hall). Chemung (Dev.).

Spirifera præmatura Hall, Proc. American Philosophical Soc., X, 1866, p. 246;—Pal. New York, IV, 1867, p. 250, pl. 33, figs. 31-35;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 23-25.

Martinia prematura Herrick, Geol. Ohio, VII, 1895, pl. 23, fig. 12.

Spirifer præmaturus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 37, pl. 36, figs. 23-25.

Loc. Meadville and Oil Creek, Pennsylvania.

Reticularia pseudolineata (Hall). Burlington-Keokuk (L. Carb.).

Spirifer pseudolineatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 645, pl. 20, fig. 4.—?Herrick, Bull. Geol. Soc. America, II, 1891, p. 45, pl. 1, fig. 18.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 37, pl. 36, figs. 28-30.

Spirifera lineatoides Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 645.

Spirifera pseudolineata Safford, Geol. Tennessee, 1869, p. 360.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 28-30.

Reticularia pseudolineata Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 542.

Spirifera lineatoides and pseudolineata Keyes, Geol. Survey Missouri, V, 1895, pp. 81, 82, pl. 40, fig. 6.

Loc. Keokuk, Iowa; Warsaw, Illinois; Crawfordsville, Indiana; Missouri.

Obs. See R. perplexa (McChesney).

Reticularia setigera (Hall). Kaskaskia (L. Carb.).

Spirifer setigerus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 705, pl. 27, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 21, 37, pl. 36, figs. 26, 27.

Spirifera setigera Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 270, pl. 5, figs. 17, 18.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 26, 27.—Keyes, Geol. Survey Missouri, V, 1895, p. 83.

Reticularia setigera Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 542.

Loc. Kaskaskia and Chester, Illinois; Caldwell and Crittenden counties, Kentucky; Oquirrh Mountains, Utah.

Obs. See R. translata.

Reticularia subundifera (Meek and Worthen). Hamilton (Dev.).

Spirifera subundifera Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 434, pl. 10, fig. 5.

Reticularia subundifera (Meek and Worthen)—Continued.

Spirifera (M.) undifera var. subundifera Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 145.

Loc. Rock Island, Illinois.

Reticularia (?) **temeraria** (Miller). Lower Carboniferous.

Spirifera temeraria Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 314, pl. 7, fig. 9.

Loc. Lake Valley mining district, New Mexico.

Reticularia tenuispinata (Herrick). Waverly (L. Carb.).

Spirifera (Martinia) tenuispinata Herrick, Bull. Denison Univ., IV, 1888, p. 27, pl. 2, fig. 4.

Spirifer tenuispinatus Herrick, Geol. Ohio, VII, 1895, pl. 15, fig. 4.

Loc. Granville, Ohio.

Reticularia translata (Swallow). Kaskaskia (L. Carb.).

Spirifera translata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 85.

Loc. Chester, Illinois; St. Marys, Missouri.

Obs. Regarded by Keyes as a synonym for R. setigera.

RETZIA King. Genotype Terebratula adrieni de Verneuil.

Retzia King, Mon. Permian Fossils, Pal. Soc., 1850, p. 137.—Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 53, figs. 1-3 on p. 55.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 103, figs. 80-100 on pp. 106, 107;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 787.

Obs. It is very probable that all of the species here referred to Retzia will prove to belong to other genera.

Retzia altirostris White=Eumetria altirostris.

Retzia chloe Billings=Parazyga hirsuta.

Retzia (?) **circularis** Miller. Chouteau (L. Carb.).

Retzia circularis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 316, pl. 9, figs. 32-34.

Loc. Sedalia, Missouri.

Retzia compressa Meek=Hustedia mormoni.

Retzia dubia Billings=Trematospira dubia.

Retzia electra Billings=Rhynchospira electra.

Retzia eugenia Billings=Rhynchospira eugenia.

Retzia evax Hall=Homœospira evax.

Retzia formosa Whitfield=Rhynchospira formosa.

Retzia (?) **granulifera** Meek. Lorraine (Ord.).

Retzia (Trematospira) granulifera Meek, Proc. Acad. Nat. Sci. Philadelphia, 1872, p. 318;—Pal. Ohio, I, 1873, p. 128, pl. 11, fig. 6.

Trematospira (?) granulifera Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 61.

Loc. Cincinnati, Ohio.

Obs. This species is probably a rhynchonelloid.

Retzia hippolyte Billings=Trematospira hippolyte.

Retzia (?) **jamesiana** Rathbun. Middle Devonian.

Retzia jamesiana (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Hist., I, 1874, p. 243, pl. 10, figs. 23, 27-38.

Retzia ? jamesiana Derby, Archives do Museu Nacional do Rio de Janeiro, IX, 1890, p. 79.

Retzia cf. jamesiana A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 68, pl. 4, fig. 14.

Loc. Erere and Rio Maecuru, Province of Para, Brazil; Bolivia.

Retzia marcyi Shumard=Eumetria marcyi.
Retzia meekana Shumard=Hustedia meekana.
Retzia mormoni Marcou=Hustedia mormoni.
Retzia osagensis Swallow=Acambona osagensis.
Retzia papillata Shumard=Hustedia papillata.

Retzia (?) plicata Miller. Chouteau (L. Carb.).
Retzia plicata Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 316, pl. 9, figs. 29-31.
Loc. Sedalia, Missouri.

Retzia polypleura A. Winchell. Portage (Dev.).
Retzia polypleura A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.

Retzia (?) popeana Swallow. ? Chouteau (L. Carb.).
Retzia (?) popeana Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 654.
Loc. Locality and formation not given.

Retzia punctulifera Shumard=Hustedia mormoni.
Retzia radialis Walcott (non Phillips)=Hustedia mormoni.
Retzia sexplicata White and Whitfield=Ptychospira sexplicata.
Retzia sobrina Beecher and Clarke=Homœospira sobrina.

Retzia (?) subglobosa Hall. Schoharie (Dev.).
Rhynchospira subglobosa Hall, Pal. New York, IV, 1867, p. 421, pl. 63, figs. 23-25.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, fig. 22.
Retzia subglobosa Miller, N. American Geol. and Pal., 1889, p. 367.
Loc. Schoharie, New York.

Retzia subglobosa McChesney=Hustedia mormoni.
Retzia triangularis Miller=Hustedia triangularis.
Retzia vera Hall=Eumetria marcyi.
Retzia vera costata Hall=Eumetria marcyi costata.
Retzia verneuiliana Hall=Eumetria marcyi.
Retzia ? wardiana Rathbun=Trigeria wardiana.
Retzia woosteri White=Eumetria woosteri.

RHINOBOLUS Hall. Genot. Rhynobolus sp. H.=?Obolus galtensis Bill.
Rhynobolus Hall, Notes on some New or Imperfectly Known Forms among the Brachiopoda, 1871, p. 5;—Ibidem, 1872, p. 5, pl. 13, fig. 10;—Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 247, pl. 13, fig. 10.—Waagen, Palæontologica Indica, Ser. XIII, I, 1885, p. 761.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 44, 46, 164;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 239.

Rhinobolus davidsoni Hall and Clarke. Niagara (Sil.).
Rhinobolus davidsoni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 45, 176, pl. 4B, figs. 10-12.
Loc. Near Grafton, Wisconsin.

Rhinobolus galtensis (Billings). Guelph (Sil.).
Obolus galtensis Billings, Pal. Fossils, I, 1862, p. 168, fig. 153.
Obolellina galtensis Billings, Canadian Nat. Geol., VI, 1871, p. 222;—Ibidem, 1872, p. 328.
Trimerella minor Dall, American Jour. Conch., VII, 1871, p. 83, pl. 11, fig. 6.
?Rhynobolus sp. ? Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 247, pl. 13, fig. 10.

Rhinobolus galtensis (Billings)—Continued.

Trimerella (?) galtensis Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 151, pl. 18, fig. 13; pl. 19, fig. 4.

Rhynobolus galtensis Whiteaves, Pal. Fossils, III, 1884, p. 7, pl. 2, fig. 1; pl. 8, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 45, pl. 4B, figs. 7-9.

Loc. Galt, Elora, Hespelar, and Durham, Ontario.

RHIPIDOMELLA Œhlert. Genotype Terebratula michelini L'Éveillé.

Rhipidomys Œhlert (non Wagnor, 1844), Fischer's Manuel de Conchyliologie, 1887, p. 1288.—Hall, Bull. Geol. Soc. America, I, 1889, p. 21.

Rhipidomella Œhlert, Journal de Conchyliologie, 1891, p. 372.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 209;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 271.

Rhipidomella alsa Hall. Schoharie (Dev.).

Orthis alsus Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 33;—Pal. New York, IV, 1867, p. 36, pl. 4, figs. 2-7.

Rhipidomella alsa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Albany County, New York.

Obs. Probably a synonym for R. peloris Hall.

Rhipidomella assimilis Hall. Lower Helderberg (Dev.).

Orthis assimilis Hall, Pal. New York, III, 1859, p. 175, pl. 15, fig. 1.

Rhipidomella assimilis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.

Loc. Schoharie, New York.

Rhipidomella burlingtonensis Hall. Burlington (L. Carb.).

Orthis michelini var. burlingtonensis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 596, pl. 12, fig. 4.

Rhipidomella burlingtonensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6A, fig. 13; pl. 20, figs. 5, 6.

Orthis burlingtonensis Keyes, Geol. Survey Missouri, V, 1895, p. 63, pl. 38, fig. 7.

Loc. Burlington, Iowa; Quincy, Illinois; Hannibal, Missouri.

Rhipidomella circulus Hall. Clinton (Sil.).

Orthis circulus Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 71, fig. 1;—Pal. New York, II, 1852, p. 56, pl. 20, fig. 6.—Billings, Canadian Nat. Geol., I, 1856, p. 134, pl. 2, fig. 1.

Rhipidomella circulus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 224, pl. 6A, figs. 1, 2.

Loc. Reynales Basin, New York; Hamilton, Ontario.

Rhipidomella clarkensis (Swallow). Keokuk (L. Carb.).

Orthis clarkensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 81.

Rhipidomella clarkensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Clark County, Missouri.

Obs. Keyes regards this species as a synonym for Schizophoria swallovi.

Rhipidomella cleobis Hall. Onondaga (Dev.).

Orthis cleobis Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 35;—Pal. New York, IV, 1867, p. 41, pl. 5, figs. 9, 10.

Rhipidomella cleobis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Williamsville and Clarence, New York.

Rhipidomella cumberlandiæ Hall. Oriskany (Dev.).

Orthis cumberlandiæ Hall, Pal. New York, III, 1859, p. 481, pl. 95A, figs. 20, 21.

Rhipidomella cumberlandiæ Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Cumberland, Maryland.

Rhipidomella (?) cuneata (Owen). Hamilton (Dev.).

Orthis cuneata Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 585, pl. 3A, fig. 10.

Rhipidomella cuneata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. New Buffalo, Iowa

Rhipidomella cyclas Hall. Marcellus and Hamilton (Dev.).

Orthis cyclas Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 78;—Pal. New York, IV, 1867, p. 52, pl. 7, figs. 2, 3.

Rhipidomella cyclas Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. York, Pavilion, Bellona, etc., New York.

Rhipidomella dalyana (Miller). Burlington (L. Carb.).

Orthis dalyana Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 313, pl. 7, fig. 8.

Rhipidomella dalyana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Lake Valley mining district, New Mexico.

Rhipidomella discus Hall. Lower Helderberg (Dev.).

Orthis discus Hall, Pal. New York, III, 1859, p. 165, pl. 10A, figs. 7–12.

Rhipidomella discus Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pp. 210, 225.

Loc. Hudson, Catskill, etc., New York; Square Lake, Maine.

Rhipidomella dubia Hall. St. Louis (L. Carb.).

Orthis dubius Hall, Trans. Albany Institute, IV, 1858, p. 12.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 45, pl. 6, figs. 1–5.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 324, pl. 29, figs. 1–5.

Orthis cooperensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 82.

Rhipidomella dubia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225, pl. 6A, figs. 18–22.

Orthis dubia Keyes, Geol. Survey Missouri, V, 1895, p. 64.

Loc. Spergen Hill and Bloomington, Indiana; Alton, Appanoose, etc., Illinois; Boonville and Barretts Station, Missouri; Keokuk, Iowa; Caldwell County, Kentucky.

Obs. Typical examples of R. cooperensis have been studied in Professor Hall's collection.

Rhipidomella eminens Hall. Lower Helderberg (Dev.).

Orthis eminens Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 42, figs. 1, 2;—Pal. New York, III, 1859, p. 167, pl. 11, figs. 7–14.

Rhipidomella eminens Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225.

Loc. Schoharie, Carlisle, etc., New York.

Rhipidomella goodwini (Nettelroth). Hamilton (Dev.).

Orthis goodwini Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 39, pl. 17, figs. 30–32.

Loc. Falls of Ohio.

Rhipidomella hartti (Rathbun). Middle Devonian.

Orthis hartti Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 23.

Loc. Province of Para, Brazil.

Rhipidomella hybrida (Sowerby). Niagara (Sil.).

Orthis hybrida Sowerby, Murchison's Silurian System, 1839, p. 630, pl. 13, fig. 11.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 7;—Pal. New York, II, 1852, p. 253, pl. 52, fig. 4.—Roemer, Die Silurische Fauna des West. Tennessee, 1860, p. 63, pl. 5, fig. 6.—Meek and Worthen, Geol. Survey Illinois, 1868, p. 371, pl. 7, fig. 7.—Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 149, pl. 21, figs. 18–25;—Eleventh Rep. State Geol. Indiana, 1882, p. 285, pl. 21, figs. 18–25;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36,

Rhipidomella michelini (L'Éveillé)—Continued.

Rhipidomella michelini Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 225, pl. 6A, fig. 12.

Loc. South of Louisville, and near Lebanon, Kentucky; Newark, Granville, etc., Ohio; Shafers, Pennsylvania; Lake Valley mining district, New Mexico.

Obs. It is probable that the American identifications of this species are the same as R. oweni Hall and Clarke.

Rhipidomella missouriensis (Swallow). Chouteau (L. Carb.).

Orthis missouriensis Swallow (non Shumard, 1855), Trans. St. Louis Acad. Sci., I, 1860, p. 639.

Rhipidomella missouriensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6A, figs. 16, 17.

Loc. Cooper and Marion counties, Missouri.

Rhipidomella (?) mitis (Hall). Schoharie (Dev.).

Orthis mitis Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 34;—Pal. New York, IV, 1867, p. 37.

Loc. Albany and Schoharie counties, New York.

Rhipidomella musculosa Hall. Oriskany (Dev.).

Orthis musculosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 46;—Pal. New York, III, 1859, p. 409, pl. 91, figs. 1-3; pl. 95, figs. 1-7.

Rhipidomella musculosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 210, 225, pl. 6A, fig. 5.

Loc. Schoharie and Albany counties, New York; Cumberland, Maryland.

Rhipidomella nevadaensis (Meek). Carboniferous.

Orthis michelini (non L'Éveillé) var. Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 63, pl. 7, fig. 1.

Orthis nevadensis Meek, Ibidem, 1877; end of description.

Rhipidomella nevadensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. White Pine district, Nevada.

Rhipidomella oblata Hall. Lower Helderberg (Dev.).

Orthis oblata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 41, figs. 1-5;—Pal. New York, III, 1859, p. 162, pl. 10, figs. 1-22.—Whitfield, Geol. Wisconsin, IV, 1882, p. 320, pl. 25, figs. 1, 2.

Rhipidomella oblata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225, pl. 6A, figs. 3, 4.

Loc. Schoharie, Carlisle, Hudson, etc., New York; Waunakee, Wisconsin.

Rhipidomella oblata emarginata (Hall). Lower Helderberg (Dev.).

Orthis oblata var. emarginata Hall, Pal. New York, III, 1859, p. 164, pl. 10A, figs. 4-6.

Loc. Cumberland, Maryland.

Rhipidomella occasus Hall. Kinderhook (L. Carb.).

Orthis occasus Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 111.

Rhipidomella occasus Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Rockford, Indiana.

Obs. Compare with R. thiemei White.

Rhipidomella oweni Hall and Clarke. Waverly (L. Carb.).

Orthis (Rhipidomella) oweni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 342, pl. 6, figs. 19-21.

Loc. Buttonmould Knobs, south of Louisville, Kentucky.

Obs. See R. michelini L'Éveillé.

Rhipidomella pecosi (Marcou). Upper Carboniferous.

Orthis pecosi Marcou, Geol. N. America, February 1858, p. 48, pl. 6, fig. 14.—White, Wheeler's Expl. Survey west 100th Meridian, IV, 1875, p. 125, pl. 9, fig. 5.—Kayser, Richthofen's China, IV, 1883, p. 177, pl. 24, fig. 1.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 573, pl. 56, figs. 1-3.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 129, pl. 32, figs. 20-22.—Keyes, Geol. Survey Missouri, V, 1895, p. 64.—Smith, Proc. American Phil. Soc., XXXV, 1897, p. 27 (extract).

Orthis carbonaria Swallow, Trans. St. Louis Acad. Sci., I, June, 1858, p. 218.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 173, pl. 1, fig. 8.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 571, pl. 25, fig. 4.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 37, figs. 1-4.

Orthis sp. undet. Meek, Pal. California, I, 1864, p. 10, pl. 2, fig. 5.

Rhipidomella pecosi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 226, pl. 7, figs. 1-4.

Loc. Throughout the Upper Carboniferous of North America; Lo-Ping, China; Amb, India.

Rhipidomella peloris Hall. Schoharie (Dev.).

Orthis peloris Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 32;—Pal. New York, IV, 1867, p. 34, pl. 4, figs. 1, 8-10.

Rhipidomella peloris Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6A, fig. 6.

Loc. Clarksville and Knox, New York.

Obs. Probably the same as R. alsa Hall.

Rhipidomella penelope Hall. Hamilton (Dev.).

Orthis penelope Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 79, figs. 1, 2;—Pal. New York, IV, 1867, p. 50, pl. 6, fig. 2;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 6-13.

Rhipidomella penelope Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 211, 225, pl. 6, figs. 6-13; pl. 6A, fig. 10 (?11).

Loc. Hamburg, Alexander, Pavilion, York, Moscow, etc., New York.

Rhipidomella penniana (Derby). Upper Carboniferous.

Orthis penniana Derby, Bull. Cornell Univ., I, 1874, p. 26, pl. 5, figs. 13, 15, 17, 19-22; pl. 8, fig. 2.

Rhipidomella penniana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225, pl. 7, figs. 5-10.

Loc. Bomjardim and Itaituba, Brazil.

Rhipidomella pennsylvanica (Simpson). Chemung (Dev.).

Orthis pennsylvanica Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 437, fig. 1.

Loc. Tioga and McKean counties, Pennsylvania.

Rhipidomella rhynchonelliformis (Shaler). Anticosti (Sil.).

Orthis rhynchonelliformis Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 66.—Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 42.

Loc. Anticosti.

Obs. Probably a variety of Rhipidomella uberis (Billings).

Rhipidomella semele Hall. Onondaga (Dev.).

Orthis semele Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 34;—Pal. New York, IV, 1867, p. 40, pl. 5, figs. 7, 8.

Rhipidomella semele Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.

Loc. Erie County, New York; Columbus, Ohio.

Rhipidomella solitaria Hall. Hamilton (Dev.).

Orthis solitaria Hall, Thirteenth Rep. New York State Cab. Nat. Hist., 1860, p. 80;—Pal. New York, IV, 1867, p. 45, pl. 7, fig. 1.
Rhipidomella solitaria Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. York, New York.

Rhipidomella subcirculus (Simpson). Clinton (Sil.).

Orthis subcircula Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 437, fig. 2.
Loc. Mifflin and Huntington counties, Pennsylvania.

Rhipidomella subelliptica (White and Whitfield). Kinderhook (L. Carb.).

Orthis subelliptica White and Whitfield, Proc. Boston Soc. Nat. Hist., VIII, 1862, p. 292.
Rhipidomella subelliptica Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. Burlington, Iowa.

Rhipidomella suborbicularis Hall. Hamilton (Dev.).

Orthis suborbicularis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 486, pl. 2, fig. 1.
Rhipidomella suborbicularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225.
Loc. Rock Island, Illinois.

Rhipidomella thiemei (White). Chemung (Dev.) and Kinderhook (L. Carb.).

Orthis thiemii, White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 231;—Twelfth Rep. Hayden's U. S. Geol. Survey Terr., 1883, p. 164, pl. 41, fig. 4.
Orthis thiemii? Hall, Pal. New York, IV, 1867, p. 63, pl. 8, fig. 2.
Rhipidomella thiemii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6A, figs. 14, 15.
Loc. Burlington, Iowa; In the Chemung group at Leon, Napoli, and New Albion, New York.

Rhipidomella tubulistriata Hall. Lower Helderberg (Dev.).

Orthis tubulostriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 42;—Pal. New York, III, 1859, p. 166, pl. 11, figs. 1-6.
Rhipidomella tubulostriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 210, 225.
Loc. Albany County, New York.

Rhipidomella uberis (Billings). Anticosti (Sil.).

Orthis æquivalvis Shaler (non Hall, 1847), Bull. Mus. Comp. Zool., 4, 1865, p. 66.
Orthis uberis Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 42.
Rhipidomella uberis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 224.
Loc. Anticosti.
Obs. See Rhipidomella rhynchonelliformis (Shaler).

Rhipidomella vanuxemi Hall. Corniferous-Hamilton (Dev.).

Orthis vanuxemi Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 135, figs. 1-7;—Geol. Survey Iowa, I, Pt. II, 1858, p. 487, pl. 2, figs. 2, 3.—Billings, Canadian Jour., V, 1860, p. 269.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 409.—Billings, Geol. Canada, 1863, p. 384, fig. 417.—Hall, Pal. New York, IV, 1867, pp. 40, 47, pl. 5, fig. 6; pl. 6, fig. 3;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 14, 15.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 45, pl. 16, figs. 4-6, 12-14.—Herrick, Geol. Ohio, VII, 1895, pl. 20, fig. 10.

Rhipidomella vanuxemi Hall—Continued.
Rhipidomella vanuxemi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 225, pl. 6, figs. 14, 15; pl. 6A, figs. 7, 8.
Loc. New York; Columbus, Ohio; Falls of Ohio; Rock Island, Illinois; Buffalo, Iowa; Bosanquet, Ontario; Huron group, Port aux Barques, Michigan.

Rhipidomella vanuxemi pulchella (Herrick.) Waverly (L. Carb.).
Orthis vanuxemi var. pulchella Herrick, Bull. Denison Univ., III, 1888, p. 38, pl. 5, fig. 9.
Orthis vanuxemi var. gracilis Herrick, Geol. Ohio, VII, 1895, pl. 21, fig. 9.
Loc. Granville, Ohio.

RHYNCHONELLA Fischer de Waldheim. Genotype R. loxia Fischer de Waldheim.
Rhynchonella Fischer de Waldheim, Notice des Fos. Gouv. Moscou, 1809, p. 35, tab. II, figs. 5, 6.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 65.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 70.—Hall, Pal. New York, IV, 1867, p. 332;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 269.—Dall, American Jour. Conch., VI, 1870, p. 151;—Ibidem, VII, 1871, p. 70.—Billings, Pal. Fossils, II, 1874, p. 35.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 72.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 177, 178;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 822.

Rhynchonella ænigma (d'Orbigny). Jurassic.
Terebratula ænygma d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 62, pl. 22, figs. 10-13.
Terebratula concinna (non Sowerby) Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 23, pl. 8, figs. 4-6.
Rhynchonella ænigma Gottsche, Palæontographica, Suppl., III, 1878, p. 34.
Rhynchonella cfr. ænigma Steinman. Neues Jahrb. f. Min., Beilageband, 1881, p. 253.
Loc. Guasco, Coquimbo, Dona Ana, Chile; Copiapo, Caracoles, and Iquique, Peru.

Rhynchonella æquiplicata Gabb. Triassic.
Rhynchonella æquiplicata Gabb, Geol. Survey California, Pal., I, 1864, p. 35, pl. 6, fig. 37.
Loc. Cinnabar district, Humboldt Mountain, Nevada.

Rhynchonella æquiradiata Miller=Camarotœchia æquiradiata.
Rhynchonella æquivalvis Hall=Lissopleura æquivalvis.
Rhynchonella abrupta Hall=Uncinulus abruptus.

Rhynchonella acadiaensis Davidson. Upper Carboniferous.
Rhynchonella acadiensis Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 172, pl. 9, fig. 16.—Dawson, Acadian Geol., 3d ed., 1878, p. 294, fig. 94.
Loc. Brookfield, Nova Scotia.

Rhynchonella acinus Hall=Camarotœchia acinus.
Rhynchonella acinus convexa Foerste=Camarotœchia acinus convexa.

Rhynchonella acutiplicata Hall. Lower Helderberg (Dev.).
Rhynchonella acutiplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 73, fig. 7;—Pal. New York, III, 1859, p. 232, pl. 33, fig. 3.
Loc. Schoharie, New York.

Rhynchonella (?) acutirostris Hall. Chazy (Ord.).

Atrypa acutirostra Hall, Pal. New York, I, 1847, p. 21, pl. 4 bis, fig. 6.

Rhynchonella acutirostris Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 65.

Loc. Chazy, New York.

Obs. This species is referred to Zygospira by Whitfield.

Rhynchonella ainsliei Winchell=Rhynchotrema ainsliei.

Rhynchonella algeri McChesney. Upper Carboniferous.

Rhynchonella algeri McChesney, New Pal. Fossils, 1860, p. 51.

Loc. Near New Harmony, Indiana.

Rhynchonella allegania Williams. Chemung (Dev.).

Rhychonella allegania Williams, Bull. U. S. Geol. Survey, 41, 1887, p. 87, pl. 4, figs. 1–8.

Loc. Olean and Little Genesee, New York; Bradford, Pennsylvania.

Rhynchonella alta Calvin=Pugnax pugnus alta.

Rhynchonella altilis Hall=Camarotœchia plena.

Rhynchonella altiplicata Hall. Lower Helderberg (Dev.).

Rhynchonella altiplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 72, figs. 1–4;—Pal. New York, III, 1859, p. 231, pl. 33, fig. 2.

Loc. Albany and Schoharie counties, New York.

Rhynchonella alveata Hall=Centronella alveata.

Rhynchonella ambigua Calvin. Middle Devonian.

Rhynchonella ambigua Calvin, Bull. U. S. Geol. and Geogr. Survey Terr., IV, 1878, p. 729.

Loc. Independence, Iowa.

Rhynchonella anduin Gottsche. Jurassic.

Terebratula ænigma (non d'Orb.) Darwin, Geol. Observations South America, 1846, pp. 215, 233, pl. 5, figs. 10–12.—Burmeister and Giebel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 128.

Terebratula subtetræda (non Davidson) Conrad, U. S. Astronomical Exped. Southern Hemisphere, 1855, p. 282, pl. 42, fig. 8.

Rhynchonella anduin Gottsche, Palæontographica, Suppl., III, 1878, p. 34, pl. 4, figs. 4–7.

Loc. Iquique, Portezuelo de Manflas, and Cordillera de Dona Ana, Chile.

Rhynchonella angulata Geinitz (non Linné)=Enteletes hemiplicatus.

Rhynchonella (?) anticostiensis Billings. Lorraine (Ord.).

Rhynchonella anticostiensis Billings, Pal. Fossils, I, 1862, p. 142, fig. 119;—Geol. Canada, 1863, p. 211, fig. 212.

Rhynchonella (?) anticostiensis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 464, fig. 34.

Rhynchonella anticostiensis var. Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 179.

Loc. Anticosti; Wilmington and Savanna, Illinois; Lattners, Iowa; Wisconsin; Manitoba.

Obs. Compare with R. argenturbica White.

Rhynchonella (?) antisiensis (d'Orbigny). Lower Devonian.

Terebratula antisiensis d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 36, pl. 2, figs. 26–28.

? Rhynchonella cf. antisiensis A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 57, pl. 4, figs. 1–7.

Loc. Cochabamba, Tarabuco, Bolivia.

Rhynchonella antonii Gabb. ?Cretaceous.

Rhynchonella antonii Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., IV, 1881, p. 299, pl. 42, fig. 10.

Loc. Cerro de San Antonio, and near Chota, Peru.

Rhynchonella arctirostrata Swallow. St. Louis (L. Carb.).

Rhynchonella arctirostrata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 84.

Loc. Cooper County, Missouri.

Obs. Regarded by Keyes as a synonym for R. subcuneata = Camarophoria subcuneata.

Rhynchonella (?) argentea Billings. Anticosti (Sil.).

Rhynchonella ? argentea Billings, Catalogue Silurian Fossils Anticosti, 1866, p. 43.

Loc. Anticosti.

Rhynchonella argenturbica White = Rhynchotreta inæquivalvis.

Rhynchonella aspasia Billings. Lower Helderberg (Dev.).

Rhynchonella aspasia Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 111, pl. 3, fig. 6.

Loc. Square Lake, Maine.

Rhynchonella barquensis A. Winchell. Marshall (L. Carb.).

Rhynchonella barquensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.

Loc. Port aux Barques, Michigan.

Rhynchonella barrandi Hall = Camarotœchia barrandei.

Rhynchonella (?) belliformis Nettelroth. Niagara (Sil.).

Rhynchonella bellaforma Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 73.

Loc. Louisville, Kentucky.

Rhynchonella belemnitica Quenstedt. Jurassic.

Rhynchonella belemnitica (Quenst.) Moricke, N. Jahrb. f. Mineral., Beilageband, IX, 1894, p. 61.

For locality and observations see R. plicatissima.

Rhynchonella bialveata Hall. Lower Helderberg (Dev.).

Rhynchonella ? bialveata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 73;—Pal. New York, III, 1859, p. 233, pl. 34, figs. 1–4.

Loc. Albany County, New York; Square Lake, Maine.

Rhynchonella (?) bidens Hall. Clinton (Sil.).

Atrypa bidens Hall, Pal. New York, II, 1852, p. 69, pl. 23, fig. 3.

Rhynchonella bidens Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.

Loc. Lockport, New York.

Rhynchonella (?) bidentata (Hisinger). Niagara (Sil.).

Terebratula bidentata Hisinger, Kongl. Svenska Vet.-Akad. Handl., för 1825, 1826, p. 343, pl. 7, fig. 5.

Atrypa bidentata Hall, Pal. New York, II, 1852, p. 276, pl. 57, fig. 3.

Rhynchonella bidentata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist, 1859, p. 77.

Loc. Lockport, New York.

Rhynchonella billingsi Hall = Camarotœchia billingsi.

Rhynchonella booensis Shumard = Leiorhynchus boonense.

Rhynchonella brevirostris Billings = Anastrophia brevirostris.

Rhynchonella camerifera A. Winchell. Marshall (L. Carb.).
Rhynchonella camerifera A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.
Loc. Port aux Barques, Michigan.

Rhynchonella campbellana Hall=Uncinulus campbellanus.

Rhynchonella camura Hall=Trematospira camura.

Rhynchonella capax Hall=Rhynchotrema capax.

Rhynchonella caput-testudinis White=Camarophoria caput-testudinis.

Rhynchonella caracolensis Gottsche. Jurassic.
Rhynchonella caracolensis Gottsche, Palæontographica, Suppl., III, 1878, p. 44, pl. 4, fig. 8.—Steinman, Neues Jahrb. f. Mineral., Beilageband, 1881, p. 253.—Möricke, Ibidem, Beilageband, IX, 1894, p. 61.
Loc. Iquique, Chile; Caracoles, Bolivia.

Rhynchonella carbonaria McChesney. Upper Carboniferous.
Rhynchonella carbonaria McChesney, New Pal. Fossils, 1860, p. 51.
Loc. Near Farmington, Illinois.

Rhynchonella carica Hall=Camarotœchia carica.

Rhynchonella carolina Hall=Camarotœchia carolina.

Rhynchonella castanea Meek=Hypothyris castanea.

Rhynchonella congregata Hall=Camarotœchia congregata.

Rhynchonella contracta Hall=Camarotœchia contracta.

Rhynchonella contracta var. saxatilis Hall=Camarotœchia contracta saxatilis.

Rhynchonella colletti Miller. Niagara (Sil.).
Rhynchonella colletti Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 311, pl. 9, figs. 8, 9.
Loc. Wabash, Indiana.

Rhynchonella cooperensis Shumard. Kinderhook (L. Carb.).
Rhynchonella cooperensis Shumard, Geol. Rep. Missouri, 1855, p. 204, pl. C, fig. 4.
?Camarophoria cooperensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 224, pl. 18, fig. 6.
Loc. Cooper County, Missouri; Eureka district, Nevada.

Rhynchonella (?) corinthia Billings. Calciferous (Ord.).
Rhynchonella corinthia Billings, Pal. Fossils, I, 1865, p. 220.
Loc. Table Head, Newfoundland.

Rhynchonella cuneata Billings, and Hall = Rhynchotreta cuneata americana.

Rhynchonella dawsoniana Davidson=Pugnax dawsoniana.

Rhynchonella (?) decemplicata Sowerby. Clinton (Sil.).
Rhynchonella decemplicata Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 320, pl. 6, figs. 23, 24.
Loc. England; Cumberland Gap, Tennessee.

Rhynchonella dentata Hall=Rhynchotrema dentatum.

Rhynchonella dotis Hall=Camarotœchia dotis.

Rhynchonella dryope Billings. Oriskany (Dev.).
Rhynchonella dryope Billings, Pal. Fossils, II, 1874, p. 37, pl. 3A, fig. 1.
Loc. Grand Greve, Gaspé.

Rhynchonella dubia Hall=Protorhyncha dubia.
Rhynchonella duplicata Hall=Camarotœchia duplicata.
Rhynchonella eatoniæformis McChesney=Pugnax rockymontana.

Rhynchonella emacerata Hall. Clinton (Sil.).
Atrypa emacerata Hall, Pal. New York, II, 1852, p. 71, pl. 23, fig. 6.—Dawson, Acadian Geology, 3d ed., 1878, p. 599.
Rhynchonella emacerata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.
Loc. Sodus and Rochester, New York; Arisaig, Nova Scotia.

Rhynchonella eminens Hall. Lower Helderberg (Dev.).
Rhynchonella eminens Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 78;—Pal. New York, III, 1859, p. 237, pl. 37, figs. 3, 4.
Loc. Albany County, New York.

Rhynchonella emmonsi Hall and Whitfield=Hypothyris emmonsi.
Rhynchonella endlichi Meek=Camarotœchia endlichi.

Rhynchonella ererensis Rathbun. Middle Devonian.
Rhynchonella ererensis Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 32.
Loc. Erere, Province of Para, Brazil.

Rhynchonella eurekaensis Walcott. Lower Carboniferous.
Rhynchonella eurekensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 223, pl. 18, fig. 8.
Loc. Eureka district, Nevada.

Rhynchonella (?) eva Billings. Anticosti (Sil.).
Rhynchonella eva Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 44.
Loc. Anticosti.

Rhynchonella evangelina Hartt. Upper Carboniferous.
Rhynchonella evangelina Hartt, Dawson's Acadian Geology, 3d ed., 1878, p. 299.
Loc. Windsor, Nova Scotia.
Obs. Compare with Pugnax pugnus as identified by Davidson, from the same locality.

Rhynchonella excellens Billings. Oriskany (Dev.).
Rhynchonella excellens Billings, Pal. Fossils, II, 1874, p. 36, figs. 17, 18.
Loc. Indian Cove, Gaspé.

Rhynchonella eximia Hall=Camarotœchia eximia.
Rhynchonella explanata McChesney=Camarophoria explanata.

Rhynchonella fitchana Hall. Oriskany (Dev.).
Rhynchonella fitchana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 85;—Pal. New York, III, 1859, p. 441, pl. 103, fig. 1.
Loc. Carlisle, New York.

Rhynchonella formosa Hall=Rhynchotrema formosum.
Rhynchonella fringilla Billings=Camarotœchia fringilla.

Rhynchonella gainesi Nettelroth. Hamilton (Dev.).
Rhynchonella gainesi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geological Survey, 1889, p. 76, pl. 31, figs. 6–9.
Loc. Jefferson County, Kentucky.

Rhynchonella glacialis Billings=Camarotœchia glacialis.
Rhynchonella glansfagea Hall=Centronella glansfagea.

Rhynchonella gnathophora Meek. Jurassic.

Rhynchonella gnathophora Meek, Geol. Survey California, Pal., I, 1864, p. 39, pl. 8, fig. 1.

Rhynchonella gnathophora? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 284, pl. 7, fig. 6.

Loc. Plumas County, California; Uinta Range, Utah.

Rhynchonella greenana Ulrich=Leiorhynchus greeneanum.

Rhynchonella guadalupæ Shumard. Upper Carboniferous.

Rhynchonella guadalupe Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 295, pl. 11, fig. 6.

Loc. Guadalupe Mountains, New Mexico and Texas.

Rhynchonella halli Gabb. Triassic.

Rhynchonella halli Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., IV, 1860, p. 308, pl. 48, fig. 29.

Loc. Bath County, Virginia.

Rhynchonella heteropsis A. Winchell. Kinderhook (L. Carb.).

Rhynchonella heteropsis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 121.

Loc. Burlington, Iowa; Hamburg, Illinois; Medina County, Ohio.

Rhynchonella horsfordi Hall=Camarotœchia horsfordi.

Rhynchonella hubbardi A. Winchell. Marshall (L. Carb.).

Rhynchonella hubbardi A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407;—Ibidem, 1865, p. 122.

Loc. Marshall and Port aux Barques, Michigan; Summit County, Ohio.

Rhynchonella huronensis A. Winchell. Huron (Dev.).

Rhynchonella huronensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 409.

Loc. Port aux Barques, Michigan.

Rhynchonella huronensis precipua A. Winchell. Huron (Dev.).

Rhynchonella huronensis var. precipua A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 409.

Loc. Port aux Barques, Michigan.

Rhynchonella (?) hydraulica Whitfield. Waterlime (Sil.).

Rhynchonella hydraulica Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 194;—Ibidem, V, 1891, p. 512, pl. 5, fig. 17;—Geol. Ohio, VII, 1895, p. 414, pl. 1, fig. 17.

Loc. Greenfield, Ohio.

Rhynchonella ida Hartt. Upper Carboniferous.

Rhynchonella ida Hartt, Dawson's Acadian Geology, 3d ed., 1878, p. 298.

Loc. Windsor, Nova Scotia.

Rhynchonella illinoisensis Worthen. Upper Carboniferous.

Rhynchonella illinoisense Worthen, Bull. Illinois State Mus. Nat. Hist., 2, 1884, p. 24;—Geol. Survey Illinois, VIII, 1890, p. 104, pl. 11, fig. 3.

Loc. Peoria, Illinois.

Rhynchonella increbescens Hall, 1860 (non 1847)=Rhynchotrema capax.

Rhynchonella increbescens Hall=Rhynchotrema inæquivalve.

Rhynchonella indentata Shumard. Upper Carboniferous.

Rhynchonella indentata Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 393.

Loc. Guadalupe Mountains, New Mexico.

Rhynchonella indianensis Hall=Camarotœchia indianaensis.

Rhynchonella mainensis Billings. Lower Helderberg (Dev.).

Rhynchonella mainensis Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 110, pl. 3, fig. 4.

Loc. Square Lake, Maine.

Rhynchonella manflasensis Möricke. Jurassic.

Rhynchonella manflasensis Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 62, pl. 5, figs. 7a–7c.

Loc. Manflas and Melon, Chile.

Rhynchonella mansoni Salter=Atrypa mansonii.

Rhynchonella marshallensis A. Winchell=Camarotœchia marshallensis.

Rhynchonella maudensis Whiteaves. Cretaceous.

Rhynchonella maudensis Whiteaves, Mesozoic Fossils, Geol. Surv. Canada, I, 1884, p. 252, pl. 33, fig. 8.

Loc. Maud Island.

Rhynchonella medea Billings. Corniferous (Dev.).

Rhynchonella medea Billings, Canadian Jour., n. ser., V, 1860, p. 271;—Geol. Canada, 1863, p. 370, fig. 388.

Loc. Township of Rainham, Ontario.

Rhynchonella medialis Simpson. Waverly (L. Carb.).

Rhynchonella medialis Simpson, Trans. American Philosophical Soc., n. ser., XVI, 1889, p. 444, fig. 9.

Loc. Warren, Pennsylvania.

Rhynchonella (?) metallica White. Upper Carboniferous.

Rhynchonella metallica White, Wheeler's Expl. and Survey west 100th Merid., Prel. Rep., 1874, p. 20;—Ibidem, Final Rep., IV, 1875, p. 129, pl. 10, fig. 10.

Loc. Lincoln County, Nevada.

Obs. Probably an Uncinulus.

Rhynchonella mica Billings=Zygospira mica.

Rhynchonella (?) micropleura A. Winchell. Marshall (L. Carb.).

Rhynchonella (Retzia?) micropleura A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 122.

Loc. Battlecreek, Michigan.

Rhynchonella minnesotensis Sardeson=Rhynchotrema inæquivalvis.

Rhynchonella missouriensis Shumard, fig. 5a (non 5b, 5c)=Pugnax pugnus missouriensis.

Rhynchonella missouriensis Shumard, figs. 5b, 5c (non 5a)=Pugnax striaticostata.

Rhynchonella multistriata Hall. Oriskany (Dev.).

Rhynchonella multistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 85;—Pal. New York, III, 1859, p. 440, pl. 102, fig. 3; pl. 106, fig. 3.

Loc. Helderberg Mountains, New York.

Rhynchonella mutabilis Hall=Uncinulus mutabilis.

Rhynchonella mutata Hall=Pugnax mutata.

Rhynchonella myrina Hall and Whitfield. Jurassic.

Rhynchonella species? Meek and Hayden, Smithsonian Cont. to Knowl., XIV, 172, 1865, p. 71, pl. 4, fig. 3.

Rhynchonella myrina Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 284, pl. 7, figs. 1–5.—Whitfield, Powell's Geol. Geogr. Survey Rocky Mountain Region, 1880, p. 347, pl. 3, figs. 6, 7.

Loc. Uinta Range, Utah; Black Hills, Dakota.

Rhynchonella persinuata A. Winchell. Kinderhook (L. Carb.).

Rhynchonella persinuata A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 121.

Loc. Burlington, Iowa.

Rhynchonella phoca Salter=Atrypa phoca.

Rhynchonella pipira Derby. Upper Carboniferous.

Rhynchonella pipira Derby, Bull. Cornell Univ., I, 1874, p. 24, pl. 3, figs. 18, 23, 25, 26, 31.

Loc. Bomjardim and Itaituba, Brazil.

Rhynchonella pisa Hall and Whitfield. Niagara (Sil.).

Rhynchonella pisa Hall and Whitfield, Pal. Ohio, II, 1875, p. 135, pl. 7, figs. 18–22.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geological Survey, 1889, p. 78, pl. 32, figs. 24–27.

Loc. Highland County, Ohio; Louisville, Kentucky.

Rhynchonella planiconvexa Hall. Lower Helderberg (Dev.).

Rhynchonella planoconvexa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 75;—Pal. New York, III, 1859, p. 235, pl. 34, fig. 22.

Loc. Albany County, New York.

Rhynchonella plena Hall=Camarotœchia plena.

Rhynchonella pleiopleura Hall=Camarotœchia pleiopleura.

Rhynchonella pleurodon (Phillips). Upper Carboniferous.

Terebratula pleurodon Phillips, Geol. Yorkshire, II, 1836, p. 222, pl. 12, figs. 25–30.

Rhynchonella pleurodon Davidson, Mon. British Carb. Brach., 1860, p. 101, pl. 23, figs. 1–15.—Toula, Sitzungsb. der k. k. Akad. zu Wien, LIX, 1869, p. 7, pl. 1, fig. 6.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 632.

Loc. Europe; "Common in the Carboniferous rocks of America," Davidson; Bolivia; Feilden Isthmus, lat. 82° 43′.

Obs. Compare with Pugnax utah (Marcou).

Rhynchonella plicata Hall. Medina (Sil.).

Atrypa plicata Hall, Pal. New York, II, 1852, p. 10, pl. 4, fig. 6.

Rhynchonella plicata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Loc. Lockport, New York.

Rhynchonella plicatella (Linné). Niagara (Sil.).

Atrypa plicatella? Hall, Pal. New York, II, 1852, p. 279, pl. 58, figs. 3, 4.

Rhynchonella plicatella Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Atrypa plicatella Miller, N. American Geol. Pal., 1889, p. 337.

Loc. Europe; Wolcott, New York.

Rhynchonella plicatilis (Sowerby). Cretaceous.

Terebratula plicatella Sowerby, Mineral Conchl., V, 1825, p. 167, tab. 503, fig. 1.

Rhynchonella plicatilis Davidson, British Cretaceous Brach., Pal. Soc., I, 1852, p. 75, pl. 10, figs. 37, 42.—Eichwald, Geog. Paleont. Bemerk. Halb. Mang. Aleutischen Inseln, 1871, p. 200.

Loc. England; Alaska.

Rhynchonella plicatissima Quenstedt. Jurassic.

Rhynchonella plicatissima (Quenst.) Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 61.

Loc. Sierra de la Ternera, Coquimbo, Guasco, and Copiapo, Chile.

Obs. Möricke says that Terebratula ænigma Forbes in great part belong to this species and R. belemnitica.

Rhynchonella plicifera Hall=Camarotœchia plena.

Rhynchonella principalis Hall. Oriskany (Dev.).
Rhynchonella principalis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 84;—Pal. New York, III, 1859, p. 443, pl. 106, fig. 4.
Loc. Auburn, New York.

Rhynchonella prolifica Hall=Camarotœchia prolifica.

Rhynchonella pugnus of authors=Pugnax pugnus.

Rhynchonella pustulosa White=Rhynchopora pustulosa.

Rhynchonella pyramidata Hall=Uncinulus pyramidatus.

Rhynchonella pyrrha Billings. Anticosti (Sil.).
Rhynchonella pyrrha Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 44.
Loc. Anticosti.

Rhynchonella ramsayi Hall. Oriskany (Dev.).
Rhynchonella ramsayi Hall, Pal. New York, III, 1859, p. 446, pl. 101A, figs. 7, 8.
Loc. Cumberland, Maryland.

Rhynchonella (?) raricosta Whitfield. Corniferous (Dev.).
Rhynchonella ? raricosta Whitfield, Annals N. Y. Acad. Sci., II, 1882, p. 201;—Ibidem, V, 1891, p. 522, pl. 6, fig. 6;—Geol. Ohio, VII, 1895, p. 421, pl. 2, fig. 6.
Loc. Columbus, Ohio.

Rhynchonella reticulata Hall=Dictyonella reticulata.

Rhynchonella ricinula Hall. St. Louis (L. Carb.).
Rhynchonella ricinula Hall, Trans Albany Institute, IV, 1858, p. 9.—Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 53, pl. 6, fig. 46.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 330, pl. 29, fig. 46.
Loc. Spergen Hill, Indiana.

Rhynchonella ringens Swallow=Camarophoria ringens.

Rhynchonella robusta Hall. Clinton (Sil.).
Atrypa robusta Hall, Pal. New York, II, 1852, p. 71, pl. 23, fig. 7.
Rhynchonella robusta Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.
Loc. Lockport, New York.

Rhynchonella rockymontana Marcou=Pugnax rockymontana.

Rhynchonella royana Hall. Corniferous (Dev.).
Rhynchonella? (Stenocisma?) royana Hall, Pal. New York, IV, 1867, p. 338, pl. 54, figs. 20–23.
Loc. Near Leroy, New York.

Rhynchonella rudis Hall. Lower Helderberg (Dev.).
Rhynchonella rudis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 75;—Pal. New York, III, 1859, p. 235, pl. 34, figs. 20, 21.
Loc. Hudson, New York.

Rhynchonella rugicosta Nettelroth. Niagara (Sil.).
Rhynchonella rugæcosta Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 78, pl. 32, figs. 48-51.
Loc. Louisville, Kentucky.

Rhynchonella saffordi Hall=Wilsonia saffordi.

Rhynchonella saffordi var. depressa=Wilsonia saffordi depressa.

Rhynchonella sageriana A. Winchell=Camarotœchia sageriana.

Rhynchonella sancta Sardeson=Rhynchotrema inæquivalve laticostatum.

Rhynchonella sappho Hall=Camarotœchia sappho.

Rhynchonella schucherti Stanton. Upper Cretaceous (Knoxville).
Rhynchonella schucherti Stanton, Bull. U. S. Geol. Survey, 133, 1896, p. 31, pl. 1, figs. 1-4.
Loc. Paskenta, California.

Rhynchonella scobina Meek=Camarotœchia neglecta.

Rhynchonella semiplicata (Conrad). Lower Helderberg (Dev.).
Atrypa semiplicata Conrad, Fifth Ann. Rep. Geol. Survey N. Y., 1841, p. 56.
Rhynchonella semiplicata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 65, figs. 1, 2;—Pal. New York, III, 1859, p. 224, pl. 29, fig. 1.
Loc. Schoharie and Carlisle, New York.

Rhynchonella septata Hall. Oriskany (Dev.).
Rhynchonella septata Hall, Pal. New York, III, 1859, p. 443, pl. 103, fig. 2.
Loc. Albany County, New York.

Rhynchonella sordida Hall. Trenton (Ord.).
Atrypa sordida Hall, Pal. New York, I, 1847, p. 148, pl. 33, fig. 16.
Rhynchonella sordida Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.
Loc. Not given.

Rhynchonella speciosa Hall=Camarotœchia speciosa.

Rhynchonella stephani Hall=Camarotœchia stephani.

Rhynchonella (?) **striata** Simpson. Waverly (L. Carb.).
Rhynchonella striata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 444, fig. 10.
Loc. Near Warren, Pennsylvania.
Obs. Compare with Camarophoria ringens and C. caput-testudinis.

Rhynchonella striatocostata Meek and Worthen=Pugnax striaticostata.

Rhynchonella stricklandi Sowerby=Uncinulus stricklandi.

Rhynchonella subacuminata Webster. Chemung (Dev.).
Rhynchonella subacuminata Webster, American Naturalist, XXII, 1888, p. 1015.
Loc. Near Rockford, Iowa.

Rhynchonella subcircularis A. Winchell. Marshall (L. Carb.).
Rhynchonella subcircularis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 408.
Loc. Port aux Barques, Michigan.

Rhynchonella subcuneata Hall=Camarophoria subcuneata.

Rhynchonella subtetrædra (Conrad). ? Cretaceous.
Terebratula subtetrædra Conrad, U. S. Astronomical Exped. Southern Hemisphere, 1855, p. 282, pl. 42, fig. 8.
Loc. Portezuelo de Manplas and Cordillera de Dona Ana at an altitude of 13,432 feet above the ocean.

Rhynchonella subtrigona Meek and Worthen=Camarophoria subtrigona.

Rhynchonella subtrigonalis Hall. Trenton (Ord.).
Atrypa subtrigonalis Hall, Pal. New York, I, 1847, p. 145, pl. 33, fig. 12.
Rhynchonella subtrigonalis Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.
Loc. Turin, New York.
Obs. Compare with Rhynchotrema inæquivalve.

Rhynchonella tuta Miller. Burlington (L. Carb.).
Rhynchonella tuta Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 315, pl. 7, fig. 11.
Loc. Lake Valley mining district, New Mexico.

Rhynchonella unica A. Winchell. Kinderhook (L. Carb.).
Rhynchonella unica A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 122.
Loc. Burlington, Iowa.

Rhynchonella unisulcata Hall=Pentagonia unisulcata.

Rhynchonella utah of authors=Pugnax utah.

Rhynchonella vellicata Hall=Uncinulus vellicatus.

Rhynchonella ventricosa Hall=Camarotœchia ventricosa.

Rhynchonella venustula Hall=Hypothyris cuboides.

Rhynchonella vicina Billings. Anticosti (Sil.).
Rhynchonella vicina Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 44.
Loc. Anticosti.

Rhynchonella (?) **warrenensis** Swallow. Lower Devonian.
Rhynchonella warrenensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 653.
Loc. Callaway County, Missouri.

Rhynchonella wasatchensis White=Seminula wasatchensis.

Rhynchonella whitiana Miller=Camarotœchia whitei.

Rhynchonella whitii Hall (non Winchell)=Camarotœchia whitei.

Rhynchonella whitei A. Winchell. Marshall (L. Carb.).
Rhynchonella whitei A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 407.
Loc. Marshall, Michigan.

Rhynchonella whitneyi Gabb. Cretaceous (Shasta).
Terebratella whitneyi Gabb, Geol. Survey California, Pal., II, 1869, p. 35, pl. 2, fig. 62.
Rhynchonella whitneyi Gabb, Ibidem, 1869, p. 204, pl. 34, fig. 105.—Stanton, Bull. U. S. Geol. Survey, 133, 1896, p. 32, pl. 1, figs. 5–10.
Loc. Napa and Colusa counties, California.

Rhynchonella wilmingtonensis (Lyell and Sowerby). Eocene.
Terebratula wilmingtonensis Lyell and Sowerby, Quart. Jour. Geol. Soc. London, I, 1845, p. 431.
Rhynchonella wilmingtonensis Conrad, American Jour. Conch., I, 1865, p. 35.
Loc. Wilmington, North Carolina.

Rhynchonella wilsoni Sowerby=Wilsonia wilsoni.

Rhynchonella wortheni Hall=Camarophoria wortheni.

RHYNCHOPORA King. Genotype Terebratula geinitziana de Verneuil.
Rhynchopora King, Ann. Mag. Nat. Hist., 2d ser., XVII, 1856, p. 506.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 210;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 832.
Rhynchoporina Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1305.

Rhynchopora pustulosa (White). Kinderhook (L. Carb.).
Rhynchonella pustulosa White, Jour. Boston Soc. Nat. Hist., VIII, 1860, p. 226.—Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 257, pl. 4, figs. 12–14.
Rhynchopora pustulosa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 210, pl. 58, figs. 1–4.
Loc. Burlington, Iowa; Wasatch Range, Utah; Lake Valley mining district, New Mexico (Miller).

RHYNCHOSPIRA Hall. Genotype Waldheimia formosa Hall.

Rhynchospira Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 29;—Pal. New York, III, 1859, pp. 213, 484;—Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 58, figs. 12-17;—Pal. New York, IV, 1867, p. 276.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 108, fig. 101;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 791.

Retzia Billings, Canadian Journal, VI, 1861, p. 147.

Rhynchospira (?) acadiæ (Hall). Arisaig (Sil.).

Trematospira acadiæ Hall, Canadian Nat. Geol., V, 1860, p. 146, fig. 4.—Dawson, Acadian Geology, 3d ed., 1878, p. 597.

Loc. Nova Scotia.

Rhynchospira aprinis Hall=Homœospira apriniformis.

Rhynchospira (?) ashlandensis Herrick. Waverly (L. Carb.).

Rhynchospira ? ashlandensis Herrick, Bull. Denison Univ., IV, 1888, p. 25, pl. 3, fig. 16;—Geol. Ohio, VII, 1895, pl. 23, fig. 16.

Loc. Lyon Falls, Ohio.

Rhynchospira electra (Billings). Lower Helderberg (Dev.).

Retzia electra Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 114, pl. 3, fig. 11.

Rhynchospira electra Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 111, pl. 50, figs. 29-31.

Loc. Square Lake, Maine.

Rhynchospira equiradiata Hall=Camarotœchia æquiradiata.

Rhynchospira (?) eugenia (Billings). Corniferous (Dev.).

Retzia eugenia Billings, Canadian Jour., VI, 1863, p. 147, fig. 58;—Geol. Canada, 1863, p. 373, fig. 395.

Rhynchospira (?) eugenia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 111, pl. 50, figs. 41-43.

Loc. Walpole, Ontario.

Rhynchospira evax Hall=Homœospira evax.

Rhynchospira formosa Hall. Lower Helderberg (Dev.).

Waldheimia formosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 88.

Trematospira (Rhynchospira) formosa Hall, Pal. New York, III, 1859, p. 215, pl. 36, fig. 2; pl. 95A, figs. 7-11.

Rhynchospira formosa Hall, Pal. New York, IV, 1867, p. 278, figs. 1-6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 109, fig. 101, pl. 50, figs. 21-25.

Retzia formosa Miller, N. American Geol. Pal., 1889, p. 366.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 512, pl. 5, figs. 15, 16;—Geol. Ohio, VII, 1895, p. 413, pl. 1, figs. 15-16.

Loc. Helderberg Mountains, New York; Square Lake, Maine; Greenfield, Ohio.

Rhynchospira globosa Hall. Lower Helderberg (Dev.).

Waldheimia globosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 87.

Trematospira (Rhynchospira) globosa Hall, Pal. New York, III, 1859, p. 215, pl. 36, fig. 1.

Rhynchospira globosa Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 111.

Loc. Helderberg Mountains, New York.

Rhynchospira (?) helena (Nettelroth). Niagara (Sil.).

Trematospira helena Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 137, pl. 32, figs. 40-43.

Loc. Louisville, Kentucky.

Rhynchospira lepida Hall=Trigeria lepida.

Rhynchospira nobilis Hall=Cyclorhina nobilis.

Rhynchospira rectirostris Hall. Oriskany (Dev.).

Waldheimia rectirostra Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 89.

Trematospira (Rhynchospira) rectirostra Hall, Pal. New York, III, 1859, p. 217, pl. 95A, fig. 1, and p. 485.

Rhynchospira rectirostra Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 111.

Loc. Cumberland, Maryland.

Rhynchospira scansa Hall and Clarke. Waverly (L. Carb.).

Rhynchospira scansa Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 50, fig. 45.

Loc. McKean County, Pennsylvania.

Rhynchospira (?) sinuata Hall. Arisaig (Sil.).

Rhynchospira sinuata Hall, Canadian Nat. Geol., V, 1860, p. 146.—Dawson, Acadian Geology, 3d ed., 1878, p. 597.

Retzia sinuata Miller, N. American Geol. Pal., 1889, p. 367.

Loc. Arisaig, Nova Scotia.

Rhynchospira subglobosa Hall=Retzia subglobosa.

RHYNCHOTREMA Hall. Genotype Rhynchonella capax Conrad.

Rhynchotrema Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 68, figs. 12-14.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 410.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 458.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 182;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 825.

Rhynchotrema ainsliei N. H. Winchell. Trenton (Ord.).

Rhynchonella ainsliei N. H. Winchell, Fourteenth Ann. Rep. Geol. Nat. Hist. Survey Minnesota, 1886, p. 315, pl. 2, figs. 5, 6.

Rhynchotrema ainsliei Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 459, pl. 34, figs. 1-8.

Loc. Minneapolis, St. Paul, etc., Minnesota; Decorah, Iowa.

Rhynchotrema capax (Conrad). Lorraine (Ord.).

Atrypa capax Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 264, pl. 14, fig. 21.

Atrypa increbescens (partim) Hall, Pal. New York, I, 1847, p. 146, pl. 33, figs. 13i, 13k-13y.—Billings, Canadian Nat. Geol., I, 1856, p. 207, figs. 15, 16.—Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 66. figs. 6, 7, 9-11.

Rhynchonella increbescens (partim) Hall, Geol. Wisconsin, I, 1862, p. 123, pl. 11, fig. 2.

Rhynchonella capax Billings, Geol. Canada, 1863, p. 211, fig. 213.—Meek, Pal. Ohio, I, 1873, p. 123, pl. 11, fig. 2.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 17.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 489, pl. 1, figs. 9-11;—Tenth Rep. State Geol. Indiana, 1881, p. 121, pl. 1, figs. 9-11.—Whitfield, Geol. Wisconsin, IV, 1882, p. 263, pl. 12, figs. 26, 27.—Keyes, Geol. Survey Missouri, V, 1895, p. 99, pl. 41, fig. 12.

Rhynchotrema capax Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 462, pl. 34, figs. 30-34.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 183, 185, pl. 56, figs. 14-18, 20-27; pl. 83, fig. 31.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 178.

Loc. Richmond, Indiana; Oxford, etc., Ohio; Wilmington, Illinois; Cape Girardeau, Missouri; Stockbridge, Ironridge, etc., Wisconsin; Lattners, Iowa; Spring Valley, Minnesota; Anticosti; Lake Winnipeg, Manitoba; Fort Churchill, Hudson Bay.

Rhynchotrema dentatum Hall. Trenton and Lorraine (Ord.).

Atrypa dentata Hall, Pal. New York, I, 1847, p. 148, pl. 33, fig. 14.

Rhynchonella dentata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 65.—Meek, Pal. Ohio, I, 1873, p. 121, pl. 11, fig. 3.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 18.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 490, pl. 1, figs. 12-14;—Tenth Rep. State Geol. Indiana, 1881, p. 122, pl. 1, figs. 12-14.

Rhynchotrema dentata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 185.

?Rhynchonella dentata Keyes, Geol. Survey Missouri, V, 1895, p. 100, pl. 41, fig. 3.

Loc. Turin, New York; Dayton and Oxford, Ohio; Richmond, Indiana; near Nashville, Tennessee.

Rhynchotrema formosum (Hall). Lower Helderberg (Dev.).

Rhynchonella formosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 76, figs. 1-5;—Pal. New York, III, 1859, p. 236, pl. 35, fig. 6.

Stenocisma formosa Hall, Pal. New York, IV, 1867, p. 334.—Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 187, pl. 56, figs. 41-45.

Loc. Schoharie and Albany counties, New York; Lake Temiscouata, New Brunswick, and Arisaig, Nova Scotia (Ami).

Rhynchotrema inæquivalve (Castelnau). Trenton (Ord.).

Spirifer inæquivalvis Castelnau, Essai Système Sil. l'Amérique Septentrionale, 1843, p. 40, pl. 14, fig. 8.

Atrypa increbescens (partim) Hall, Pal. New York, I, 1847, pp. 146, 289, pl. 33, figs. 13a-13h; ?pl. 79, fig. 6.

Rhynchonella increbescens (partim) Billings, Canadian Nat. Geol., I, 1856, p. 207, figs. 11-14.—Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.—Billings, Geol. Canada, 1863, p. 168, fig. 153.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 83, pl. 34, figs. 26-29.

Rhynchonella argenturbica White, Wheeler's Expl. and Survey west 100th Merid., IV, Prel. Rep., 1874, p. 14;—Ibidem, Final Rep., 1875, p. 75, pl. 4, fig. 12.

Trematospira (?) quadriplicata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 60, figs. 6, 7.

Rhynchotreta quadriplicata Miller, N. American Geol. Pal., 1889, p. 370.

Rhynchonella minnesotensis Sardeson, Bull. Minnesota Acad Nat. Sci., III, 1892, p. 333, pl. 4, figs. 21-23.

Rhynchotrema inæquivalvis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 459, pl. 34, figs. 9-25.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 179.

Rhynchotrema increbescens Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 183, 185.

Loc. Drummonds Island (Castelnau); New York; Kentucky; Tennessee; Illinois; Wisconsin; Iowa; Minnesota; Silver City, New Mexico; Ottawa, Canada; Lake Winnipeg, Manitoba.

Obs. Compare Rhynchonella subtrigonalis.

Rhynchotrema inæquivalve laticostatum Win. and Schuch. Trenton (Ord.).

Rhynchotrema inæquivalvis var. laticostata W. and S., American Geol., IX, April 1, 1892, p. 293;—Minnesota Geol. Survey, III, 1893, p. 461, pl. 34, figs. 26-29.

Rhynchonella sancta Sardeson, Bull. Minnesota Acad. Nat. Sci., III, April 9, 1892, p. 333, pl. 4, figs. 19, 20.

Loc. Cannon Falls, Minnesota.

Rhynchotrema ottawaense (Billings). Trenton (Ord.).

Porambonites? ottawaensis Billings, Pal. Fossils, I, 1862, p. 140, fig. 117.

Rhynchotrema ottawaense (Billings)—Continued.

Protorhyncha? and Orthorhynchula? ottawaensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 181, 228.

Loc. Pauquette Rapids, Canada; near Murfreesboro, Tennessee.

Rhynchotrema perlamellosum (Whitfield). Lorraine (Ord.).

Rhynchonella perlamellosa Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 73.—James, The Palæontologist, 2, 1878, p. 15.—Whitfield, Geol. Wisconsin, IV, 1882, p. 265, pl. 12, figs. 23-25.

Loc. Delafield and Iron Ridge, Wisconsin; Oxford, Ohio.

RHYNCHOTRETA Hall. Genotype Rhynchonella cuneata Dalman.

Rhynchotreta Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 166, figs. 1-4;—Eleventh Rep. State Geol. Indiana, 1882, p. 309.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 84.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 185;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 825.

Rhynchotreta cuneata americana Hall. Niagara (Sil.).

Atrypa cuneata Hall (non Dalman), Geol. N. Y.; Rep. Fourth Dist., 1843, Table of Organic Remains, 13, figs. 3, 4;—Pal. New York, II, 1852, p. 276, pl. 57, fig. 4.—Billings, Canadian Nat. Geol., I, 1856, p. 138, pl. 2, fig. 13.

Rhynchonella cuneata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.—Billings, Geol. Canada, 1863, p. 315, fig. 323.

Rhynchotreta cuneata var. americana Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 167, pl. 25, figs. 29-38;—Eleventh Rep. State Geol. Indiana, 1882, p. 310, pl. 25, figs. 29-38.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 85, pl. 32, figs. 58, 59, 62, 63.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 47, pl. 4, figs. 12-22.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 187, pl. 56, figs. 31-38.

Loc. Lockport, etc., New York; Hamilton, Ontario; Waldron and Osgood, Indiana; Louisville, Kentucky; Milwaukee, Wisconsin.

Rhynobolus Hall=Rhinobolus.

RŒMERELLA Hall and Clarke. Genotype Orbicula grandis Vanux.

Rœmerella Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 137, fig. 65;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 257.

Rœmerella grandis (Vanuxem). Hamilton (Dev.).

Orbicula grandis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 152, fig. 4.

Discina grandis Hall, Pal. New York, IV, 1867, p. 17, pl. 1, fig. 18; pl. 2, figs. 32, 33.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 33, pl. 3, fig. 3.

Discina (Orbiculoidea?) grandis Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 187;—Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 33-35.

Rœmerella grandis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 137, fig. 65, pl. 4E, figs. 29-31.

Loc. Cazenovia and Pratts Falls, New York; Columbus, Ohio; Falls of Ohio.

ROMINGERINA Hall and Cl. Genotype Centronella julia A. Winchell.

Romingerina Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 272;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 855.

Romingerina julia (A. Winchell). Waverly (L. Carb.).

Centronella julia A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 405;—Ibidem, 1865, p. 123.—Hall, Pal. New York, IV, 1867, p. 419, pl. 61A, figs. 41-46.—Herrick, Bull. Denison Univ., III, 1888, p. 49, pl. 2, fig. 5.

Romingerina julia (A. Winchell)—Continued.

Romingerina julia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 271, figs. 187, 188, pl. 79, figs. 28–30.

Loc. Port Aux Barques, Michigan; Cuyahoga and Licking counties, Ohio. ?In the Chemung at Rushford, New York (Williams).

SCAPHIOCŒLIA Whitfield. Genotype S. boliviaensis Whitfield.

Scaphiocœlia Whitfield, Trans. American Inst. Min. Engi., XIX, 1891, p. 106.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 275;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 857.

Scaphiocœlia boliviaensis Whitfield. Middle Devonian.

Scaphiocœlia boliviensis Whitfield, Trans. American Inst. Min. Engi., XIX, 1891, p. 106, figs. 1-4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 276, figs. 193–196.

Loc. Sercre or Quechista, Bolivia.

SCENIDIUM Hall. Genotype Orthis insignis Hall.

Skenidium Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 70, figs. 1-5.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 549.

Scenidium Œhlert, Bull. Societe d'Etudes Scientifiques d'Angers, 1887, p. 4, extract.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 241.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 381.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 276.

Scenidium anthonense Sardeson. Trenton (Ord.).

Skenidium halli Safford, Geol. Tennessee, 1869, p. 287 (undefined).

Skenidium anthonensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 333, pl. 4, fig. 7.

Scenidium halli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7A, figs. 33–39.

Scenidium anthonensis Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 381, figs. 20–23.

Loc. Minneapolis, St. Paul, and Cannon Falls, Minnesota; Dixon, Illinois; Lebanon, Tennessee.

Scenidium devonicum Walcott=Dalmanella devonica.

Scenidium halli Safford=S. anthonense.

Scenidium insigne Hall. Lower Helderberg (Dev.).

Orthis insignis Hall, Pal. New York, III, 1859, p. 173.

Skenidium (Orthis) insignis Hall, Ibidem, 1859, pl. 10A, figs. 13–15.

Skenidium insignis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 70, figs. 1–5;—Second Ann. Rep. N. Y. State Geol., 1883, p. 37, figs. 31–35.

Scenidium insigne Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7, figs. 31–35.

Loc. Helderberg Mountains, New York; Perry County, Tennessee.

Scenidium (?) merope (Billings). Trenton and Lorraine (Ord.).

Orthis merope Billings, Pal. Fossils, I, 1862, p. 139, fig. 116.

Scenidium ? merope Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7A, figs. 31, 32.

Loc. Ottawa, Canada; Cincinnati, Ohio; Burgin, Kentucky.

Scenidium pyramidale Hall. Niagara (Sil.).

Orthis pyramidalis Hall, Pal. New York, II, 1852, p. 251, pl. 52, fig. 2.

Skenidium pyramidalis Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 70.

Skenidium pyramidata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 37, figs. 29, 30.

Scenidium pyramidale Hall—Continued.

Scenidium pyramidale Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 242, pl. 7, figs. 29, 30; pl. 7A, figs. 40-42.

Loc. Lockport, New York; Arisaig, Nova Scotia (Ami).

SCHIZAMBON Walcott. Genotype S. typicalis Walcott.

Schizambon Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 69.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 113, 167.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 360.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 253.

Schizambonia Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1266.

Schizambon (?) dodgei Winchell and Schuchert. Trenton (Ord.).

Schizambon (?) dodgii W. and S., Minnesota Geol. Survey, III, 1893, p. 361, pl. 30, figs. 5-7.

Loc. Sandyhill, New York.

Schizambon (?) fissus canadaensis (Ami). Utica (Ord.).

Siphonotreta scotica Whiteaves, American Jour. Sci., 3d ser., XXIV, 1882, p. 278;—Canadian Nat. Geol., X, 1883, p. 396.

Siphonotreta scotica var. canadensis Ami, Ottawa Naturalist, I, 1887, p. 124.

Schizambon (?) fissus var. canadensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 115, pl. 4, figs. 32-36.

Loc. Gloucester, Ontario.

Schizambon (?) lockei Winchell and Schuchert. Lorraine (Ord.).

Schizambon (?) lockii Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 362, pl. 30, figs. 8-10.

Loc. Cincinnati, Ohio.

Schizambon typicalis Walcott. Pogonip or Calciferous (Ord.).

Schizambon typicalis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 70, pl. 1, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 114, fig. 65, pl. 4, figs. 27-30.

Loc. Eureka district, Nevada; Manitou, Colorado.

SCHIZOBOLUS Ulrich.

Genotype Discina truncata Hall=Lingula concentrica Vanuxem.

Schizobolus Ulrich, Cont. American Pal., I, 1886, p. 25, pl. 3, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 87, 165;—Eleventh Ann. Rep. N. Y State Geologist, 1894, p. 246.

Schizobolus concentricus (Vanuxem). Genesee (Dev.).

Lingula concentrica Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 168, fig. 4.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 223, fig. 4.

Discina truncata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 28;—Pal. New York, IV, 1867, p. 23, pl. 1, fig. 15; pl. 2, figs. 36, 37.

Discina (Trematis) truncata Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 187.

Trematis truncata Hall, Twenty-third Rep. Ibidem, 1873, pl. 13, fig. 20.

Schizobolus truncatus Ulrich, Cont. American Pal., I, 1886, p. 25, pl. 3, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 87, pl. 3, figs. 11-14.

Loc. Ogdens Ferry, Cayuga Lake, etc., New York; Falls of Ohio; Madison County, Kentucky.

SCHIZOCRANIA Hall and Whitfield. Genotype Orbicula ? filosa Hall.

Schizocrania Hall and Whitfield, Pal. Ohio, II, 1875, p. 71.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 142, 168.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 369.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 259.

Schizocrania filosa Hall. Trenton-Lorraine (Ord.).

Orbicula? filosa Hall, Pal. New York, I, 1847, p. 99, pl. 30, fig. 9.

Trematis filosa Billings, Geol. Canada, 1863, p. 159, fig. 126.—Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, pl. 13, figs. 21, 22.

Trematis (?) filosa Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 15.

Schizocrania filosa Hall and Whitfield, Pal. Ohio, II, 1875, p. 73, pl. 1, figs. 12-15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 143, pl. 4G, figs. 22-30.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 370, fig. 31; pl. 29, figs. 29-31.

Loc. Middleville, Utica, etc., New York; Ottawa, Canada; Cincinnati, Ohio; Cannon Falls and Minneapolis, Minnesota.

Schizocrania (?) helderbergia Hall. Lower Helderberg (Dev.).

Schizocrania (?) helderbergia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 144, 179, pl. 4G, figs. 34, 35.

Loc. Near Clarksville, New York.

Schizocrania (?) rudis Hall. Trenton (Ord.).

Trematis rudis Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 243, pl. 13, fig. 19.

Schizocrania (?) rudis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 144, pl. 4G, fig. 21.

Loc. Clifton, Tennessee.

Schizocrania schucherti Hall and Clarke. Trenton (Ord.).

Schizocrania schucherti Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 143, 179, pl. 4G, figs. 31-33.

Loc. Covington, Kentucky.

Schizocrania superincreta Barrett. Lower Helderberg (Dev.).

Trematis (Schizocrania) superincreta Barrett, Annals N. Y. Acad. Sci., I, 1878, p. 122.

Schizocrania (?) superincreta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 144.

Loc. Port Jervis, New York.

SCHIZOPHORIA King. Genotype Orthis resupinata (Martin).

Schizophoria King, Mon. Permian Fossils, Pal. Soc., 1850, p. 106.—Hall, Bull. Geol. Soc. America, I, 1889, p. 21.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 211;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 272.

Schizophoria carinata Hall. Chemung (Dev.).

Orthis carinata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 267, fig. 1;—Pal. New York, IV, 1867, p. 58, pl. 8, figs. 30-32;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, fig. 22.

Schizophoria carinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226, pl. 6, fig. 22.

Loc. Painted Post, High Point, etc., New York.

Schizophoria cora (d'Orbigny). Upper Carboniferous.

Orthis cora d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 48.

Terebratula cora d'Orbigny, Ibidem, 1842, pl. 3, figs. 21-23.

Orthis resupinata var. latirostrata Toula, Sitzungsb. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 8. pl. 1, fig. 7.—Derby, Bull. Cornell Univ., I, 1874, p. 63.

Loc. Yarbichambi and Cochabamba, Bolivia.

Schizophoria macfarlani (Meek). Middle and Upper Devonian.

Orthis macfarlani Meek, Trans. Chicago Acad. Sci., I, 1868, p. 88, pl. 12, fig. 1.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 423, pl. 13, fig. 10.—

Schizophoria macfarlani (Meek)—Continued.

Kayser, Richthofen's China, IV, 1883, p. 91, pl. 13, fig. 3.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 114.

Schizophoria macfarlanii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 190, 212, 225, pl. 6A, figs. 28-32.

Loc. Independence, Iowa; Howard and High Point, New York; Mackenzie River, Canada; Lower Devonian, Eureka district, Nevada; Southwestern China.

Schizophoria manitobaensis Whiteaves. Upper Devonian.

Orthis (Schizophoria) manitobensis Whiteaves, Cont. Canadian Pal., I, 1892, p. 283, pl. 37, figs. 3, 4, 5.

Loc. Lake Winnipegosis, Canada.

Schizophoria multistriata Hall. Lower Helderberg (Dev.).

Orthis multistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 45, figs. 1, 2;—Pal. New York, III, 1859, p. 176, pl. 15, fig. 2.

Schizophoria multistriata Hall and Clarke, Ibidem, VIII, Pt. I, 1892, pp. 212, 226, pl. 6A, fig. 25.

Loc. Schoharie and Catskill, New York.

Schizophoria (?) peduncularis Hall. Lower Helderberg (Dev.).

Orthis peduncularis Hall, Pal. New York, III, 1859, p. 174, pl. 13, fig. 16.

Schizophoria ? peduncularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 226.

Loc. Helderberg Mountains, New York.

Schizophoria propinqua Hall. Upper Helderberg (Dev.).

Orthis propinqua Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 110;—Pal. New York, IV, 1867, p. 43, pl. 5, fig. 3;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 30, 31.

Schizophoria propinqua Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6, fig. 30.

Loc. New York; Columbus, Ohio.

Schizophoria resupinata (Martin). Carboniferous.

Orthis resupinata Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 265, pl. 5, figs. 1, 2.

Schizophoria resupinata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 194, 213, 226.

Loc. Oquirrh Mountains, Utah; Lake Valley mining district, New Mexico.

Schizophoria resupinoides (Cox). Upper Carboniferous.

Orthis resupinoides Cox, Owen's Geol. Survey Kentucky, II, 1857, p. 570, pl. 9, fig. 1.—Worthen, Geol. Survey Illinois, VIII, 1890, p. 106, pl. 11, fig. 4.

Orthis resupinoides? White, Wheeler's Expl. and Survey west 100th Meridian, Appendix, 1881, p. xxiii.

Schizophoria resupinoides Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226.

Schizophoria cfr. resupinoides Smith, Proc. American Phil. Soc., XXXV, 1897, p. 28 (extract).

Loc. Hancock County, Kentucky; Manuelitos Creek, New Mexico; ? White and Conway counties, Arkansas.

Obs. Probably identical with Schizophoria resupinata.

Schizophoria senecta Hall and Clarke. Clinton (Sil.).

Orthis (Schizophoria) senecta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 343, pl. 6A, figs. 23, 24.

Loc. Reynales Basin, Niagara County, New York.

Schizophoria striatula (Schlotheim). Middle and Upper Devonian.

Anomia Terebratulites striatulus Schlotheim, Min. Taschenbuch, VIII, 1813, pl. 1, fig. 6.

Orthis striatula Davidson, Brit. Devonian Brach., Pal. Soc., 1865, p. 87, pl. 17, figs. 4-7.—Whiteaves (non Schlotheim), Cont. Canadian Pal., I, 1891, pp. 218, 283.

Orthis impressa Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 267, fig. 2;—Pal. New York, IV, 1867, p. 60, pl. 8, figs. 11-19.—Whitfield, Geol. Wisconsin, IV, 1882, p. 326, pl. 25, figs. 13-15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 115, pl. 13, fig. 13.—Kindle, Bull. American Pal., 6, 1896, p. 36.

Orthis lentiformis? Owen (non Hall), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3, figs. 10, 10a, young specimen. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17918.]

Orthis iowensis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 488, pl. 2, fig. 4.—Billings, Hind's Rep. Expl. Assiniboine and Saskatch., 1859, p. 187, fig. 1.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 90, pl. 12, fig. 2.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 501, pl. 5, figs. 10-12;—Tenth Rep. State Geol. Indiana, 1881, p. 133, pl. 5, figs. 10-12.—Keyes, Geol. Survey Missouri, V, 1895, p. 62, pl. 38, fig. 6.

Orthis iowensis var. furnarius Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 489, pl. 2, fig. 5.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 424, pl. 13, fig. 9.

?Orthis iowensis ? A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 410.

Orthis propinqua Nettelroth (non Hall), Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 43, pl. 16, figs. 1-3, 7-11.

Schizophoria iowensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6A, fig. 29.

Schizophoria impressa Hall and Clarke, Ibidem, 1892, pp. 212, 216, pl. 6, fig. 31; pl. 6A, figs. 26, 27.

Loc. New York; Falls of Ohio; Illinois; Iowa; Milwaukee, Wisconsin; Perry County, Missouri; Eureka district, Nevada; Mackenzie River Valley, Northwest Territory, Canada.

Obs. The writer has compared American forms with O. striatula from the Eifel, Germany, and he agrees with authors in regarding both as one species. Orthis (Schizophoria) macfarlani is often found associated with O. striatula and may be only a variety of it.

Schizophoria swallovi Hall. Burlington (L. Carb.).

Orthis swallovi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 597, pl. 12, fig. 5;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 23, 24.—Keyes, Geol. Survey Missouri, V, 1895, p. 63, pl. 38, fig. 5.

Schizophoria swallovi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 213, 226, pl. 6, figs. 23, 24.

Loc. Burlington, Iowa; Quincy, Illinois; Pike County, Missouri.

Obs. Compare with Rhipidomella clarkensis.

Schizophoria tioga Hall. Portage and Chemung (Dev.).

Orthis interlineata Hall (non Sowerby), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 267, figs. 3, 4.

Orthis tioga Hall, Pal. New York, IV, 1867, p. 59, pl. 8, figs. 20-29;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 17, 18.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 561, pl. 12, fig. 3;—Geol. Ohio, VII, 1895, p. 453, pl. 8, fig. 3.

Schizophoria tioga Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6, figs. 17, 18.

Loc. Factoryville, Elmira, etc., New York; Lake County, Ohio.

Schizophoria tulliensis (Vanuxem). Tully (Dev.).

Orthis tulliensis Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 164, fig. 2.—Hall, Pal. New York, IV, 1867, p. 55, pl. 7, fig. 5.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 115, pl. 2, fig. 12.—Williams, Bull. Geol. Soc. America, I, 1890, p. 492, pl. 12, fig. 16.

Orthis resupinata Hall (non Martin), Geol. N. Y.; Rep. Fourth Dist., 1843, p. 215, fig. 2.

Orthis (Schizophoria) tulliensis Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 36, figs. 25-29.

Schizophoria tulliensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 212, 226, pl. 6, figs. 25-29.

Loc. Tully, Tinkers Falls, and Ovid, New York; Eureka district, Nevada.

SCHIZOTRETA Kutorga. Genotype S. elliptica Kutorga.

Schizotreta Kutorga, Verhand. Kais. Min. Gessel. zu St. Petersburg, VII, 1848, p. 273.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 135, 169.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 365.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 257.

Schizotreta conica (Dwight). Trenton (Ord.).

Orbiculoidea conica Dwight, American Jour. Sci., 3d ser., XIX, 1880, p. 452, pl. 21, figs. 1-11.

Schizotreta conica Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 126, 135, pl. 4E, figs. 6-8; pl. 4F, fig. 7.

Loc. Near Newburg, New York.

Schizotreta minutula Winchell and Schuchert. Lorraine (Ord.).

Schizotreta minutula Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 366, fig. 28.

Loc. Near Granger, Minnesota.

Schizotreta ovalis Hall and Clarke. Trenton (Ord.).

Orbiculoidea (Schizotreta) ovalis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 177, pl. 4E, figs. 4, 5.

Loc. Middleville, New York.

Schizotreta pelopea (Billings). Trenton and Lorraine (Ord.).

Discina pelopea Billings, Pal. Fossils, I, 1862, p. 52, fig. 56;—Geol. Canada, 1863, p. 159, fig. 124.

Discina concordensis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 328, pl. 4, figs. 13, 14.

Schizotreta pelopea, Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 365, pl. 29, figs. 26-28.

Loc. Montreal, Canada; Mantorville, Old Concord, and Spring Valley, Minnesota; Dubuque, Iowa; Neenah, Wisconsin; in the Utica at Ottawa, Canada (Ami).

Schizotreta tenuilamellata (Hall). Niagara (Sil.).

Orbicula tenuilamellata Hall, Pal. New York, II, 1852, p. 250, pl. 53, fig. 3.

Discina forbesi Nicholson (non Davidson), Pal. Prov. Ontario, 1875, p. 62.

Discina solitaria Ringueberg, American Naturalist, 1882, p. 175, figs. a-e.

Discina clara Spencer, Bull. Univ. State Missouri, 1, 1884, p. 56;—Trans. St. Louis Acad Sci., IV, 1886, p. 606, pl. 8, fig. 5.

Schizotreta tenuilamellata Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 357, pl. 17, fig. 11.

Orbiculoidea (Schizotreta?) tenuilamellata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 127, 135, pl. 4E, figs. 9-11; pl. 4F, figs. 2-6.

Loc. Lockport, New York; Hamilton, Ontario, and Arisaig, Nova Scotia (Ami).

SELENELLA Hall and Clarke. Genotype S. gracilis Hall and Clarke.

Selenella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 271;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 855.

Selenella gracilis Hall and Clarke. Corniferous (Dev.).

Selenella gracilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 271, figs. 184–186.

Loc. Ontario.

SEMINULA McCoy emend Hall and Clarke.

Genotype Terebratula pentædra Phillips=Athyris ambigua (Phillips).

Seminula McCoy, Synopsis Carb. Fossils Ireland, 1844, pp. 150, 158.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 93;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 781.

Seminula argentea (Shepard). Upper Carboniferous.

Terebratula argentea Shepard, American Jour. Sci., XXXIV, 1838, p. 152, fig. 8.

Terebratula roissyi d'Orbigny (non L'Éveillé), Voyage dans l'Amérique Méridionale, Pal., 1842, p. 46.

Terebratula antisiensis d'Orbigny, Ibidem, 1842, p. 46 (non p. 36).

Terebratula peruviana d'Orbigny, Ibidem, 1842, pl. 3, figs. 17–19 (non p. 36).

Terebratula subtilita Hall, Stansbury's Exped. Great Salt Lake of Utah, 1852, p. 409, pl. 4, figs. 1, 2.—Shumard, Marcy's Rep. U. S. Expl. Red River of Louisiana, 1853, p. 202, pl. 4, fig. 8.—Schiel, Pacific Railroad Rep., II, 1855, p. 108, pl. 1, fig. 2.—Hall, Ibidem, III, 1856, p. 101, pl. 2, figs. 3–5.—Marcou, Geol. N. America, 1858, p. 52, pl. 6, fig. 9.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 714.

Terebratula (?) subtilita Davidson, Mon. British Carboniferous Brach., Pal. Soc., 1857, p. 18, pl. 1, figs. 21, 22; 1860, p. 86; 1862, p. 217, pl. 17, figs. 8–10.

Spirigera subtilita Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 20.—White, Wheeler's Expl. and Survey west of the 100th Meridian, IV, 1875, p. 141, pl. 10, fig. 6.

Athyris differentis McChesney, New Pal. Fossils, 1860, p. 47.

Athyris subtilita Newberry, Ives's Rep. Colorado River of the West, 1861, p. 126.—Salter, Quart. Jour. Geol. Soc. London, XVII, 1861, p. 64, pl. 4, fig. 4.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 40, pl. 3, figs. 7–9.—Meek, Final Rep. U. S. Geol. Survey, Nebraska, 1872, p. 180, pl. 1, fig. 12; pl. 5, fig. 9; pl. 8, fig. 4.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 570, pl. 25, fig. 14.—Derby, Bull. Cornell Univ., I, 1874, p. 7, pl. 1, figs. 5, 8 (not 7=Spirigerella derbyi); pl. 3, figs. 8, 16, 19; pl. 6, fig. 2; pl. 9, fig. 4.—Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 350, pl. 2, fig. 4;—Bull. U. S. Geol. and Geogr. Survey Terr., II, 4, 1876, pl. 1, fig. 2.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 279.—Newberry, Macomb's Rep. Expl. Exped. from Santa Fe to the Great Colorado River of the West, 1876, p. 138.—Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 83, pl. 8, fig. 6.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 136, pl. 35, figs. 6–9.—de Koninck, Annales du Musée Royal d'Histoire Naturelle de Belgique, XIV, 1887, p. 73, pl. 18, figs. 1–4, 7–10, 12–28; pl. 19, figs. 47–56.—Herrick, Bull. Denison Univ., II, 1887, p. 44, pl. 2, fig. 23.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 231.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 604, pl. 16, figs. 7–9;—Geol. Ohio, VII, 1895, p. 488, pl. 12, figs. 7–9.

Spirifera (Athyris) subtilita Toula, Sitzungsb. der k. k. Akad. der Wissensch. zu Wien, LIX, 1869, p. 6, pl. 1, fig. 5.

Seminula subtilita Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 95, figs. 66, 67, and 58, 59 on p. 86; pl. 47, figs. 17–31.

Athyris argentea Keyes, Geol. Survey Missouri, V, 1895, p. 92, pl. 39, fig. 11.

Loc. Throughout the Upper Carboniferous of North America; Brazil and Bolivia, South America; England; India; Thibet and Kashmere.

Obs. See Seminula charitonensis, S. caput-serpentis, S. hawni, and S. singletonii Swallow.

Seminula caput-serpentis (Swallow). Upper Carboniferous.

Spirigera caputserpentis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 90.

Loc. Missouri and Kansas.

Obs. Regarded by Keyes as a synonym for S. argentea.

Seminula charitonensis (Swallow). Upper Carboniferous.

Spirigera charitonensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 651.

Loc. Chariton and Randolph counties, Missouri.

Obs. Probably a synonym for Seminula argentea.

Seminula claytoni (Hall and Whitfield). Kinderhook (L. Carb.).

Athyris claytoni Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, p. 256, 1877, pl. 4, figs. 15-17.

Loc. Little Cottonwood, Wasatch Range, Utah.

Seminula dawsoni Hall and Clarke. Upper Carboniferous.

Athyris subtilita Davidson (non Hall), Quart. Jour. Geol. Soc. London, XIX, 1863, p. 170, pl. 9, figs. 4, 5.—Dawson, Acadian Geology, 3d ed., 1878, p. 290, fig. 88.

Seminula dawsoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 95, 96, 364, figs. 69-71; pl. 47, figs. 32-34.

Loc. Windsor, Nova Scotia.

Seminula formosa (Swallow). Keokuk (L. Carb.).

Spirigera formosa and euzona Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 91.

Athyris formosa Keyes, Geol. Survey Missouri, V, 1895, p. 91.

Loc. Boonville, Missouri.

Seminula hawni (Swallow). Upper Carboniferous.

Spirigera hawni Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 652.

Loc. Missouri.

Obs. Probably a synonym for Seminula argentea.

Seminula maconensis (Swallow). Upper Carboniferous.

Spirigera maconensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 651.

Loc. Montgomery County, Missouri.

Seminula parva (Swallow). Keokuk (L. Carb.).

Terebratula parva Swallow (non d'Archiac, 1846), Trans. St. Louis Acad. Sci., II, 1863, p. 83.—Keyes, Geol. Survey Missouri, V, 1895, p. 105.

Terebratula cooperensis Miller, N. American Geol. and Pal., 1889, p. 384.

Loc. Keokuk, Iowa; Monroe and Cooper counties, Missouri.

Obs. Specimens of this species in Professor Hall's collection seen by the writer do not show a punctate shell structure, but are distinctly fibrous.

Seminula persinuata (Meek). Carboniferous.

Athyris (?) persinuata Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 81, pl. 9, fig. 4.

Loc. White Pine district, Nevada.

Seminula (?) plattensis (Swallow). Upper Carboniferous.

Spirigera plattensis Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 87.

Loc. Missouri; Kansas; Nebraska.

Seminula (?) rogersi Hall and Clarke. Upper Helderberg (Dev.).

Seminula rogersi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pp. 97, 364, pl. 47, figs. 1-4.

Loc. Pendleton, Indiana.

Seminula singletonii (Swallow). Upper Carboniferous.

Spirigera singletonii Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 87.

Loc. Boone and Audrain counties, Missouri.

Obs. Probably a synonym for Seminula argentea.

Seminula subquadrata Hall. Kaskaskia (L. Carb.).

Athyris subquadrata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 703, pl. 27, fig. 2, woodcut p. 708.—Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 585, pl. 14, figs. 1-3;—Geol. Ohio, VII, 1895, p. 472, pl. 10, figs. 1-3.—Keyes, Geol. Survey Missouri, V, 1895, p. 92.

Athyris subquadrata? Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 271, pl. 5, figs. 19, 20.

Seminula subquadrata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 95, pl. 47, figs. 7-9, 15, 16; pl. 84, figs. 30, 31.

Loc. Chester, Illinois; Crittenden County, Kentucky; Newtonville and Maxville, Ohio; Oquirrh Mountains, Utah.

Obs. See Cleiothyris clintonensis.

Seminula titicacaensis (Gabb). Upper Carboniferous.

Terebratula titicacensis Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 302, pl. 42, fig. 11.

Loc. Lake Titicaca, Bolivia.

Seminula trinucleus Hall. St. Louis (L. Carb.).

Terebratula trinucleus Hall, Trans. Albany Institute, IV, 1858, p. 7;—Geol. Survey Iowa, I, Pt. II, 1858, p. 659, pl. 23, figs. 4, 5.

Athyris trinuclea Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 50, pl. 6, figs. 22-27.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 329, pl. 29, figs. 22-27.

Seminula trinuclea Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 94, 95, fig. 65; pl. 47, figs. 5, 6, 10-14.

Loc. Bloomington and Spergen Hill, Indiana; Alton, Illinois; Boonville, Missouri; Princeton, Kentucky.

Obs. See Cleiothyris reflexa.

Seminula wasatchensis (White). Upper Carboniferous.

Rhynchonella wasatchensis White, Wheeler's Expl. and Survey west of 100th Meridian, Prel. Rep. 1874, p. 19;—Ibidem, Final Rep., 1875, p. 130, pl. 9, fig. 3.

Loc. Wasatch Range, near Provo, Utah.

Obs. Is related to S. subtilita. The great anterior thickening is due to old age.

Sieberella Œhlert, and Hall and Clarke=Gypidula.

Obs. It may prove that Sieberella will be useful as a subgenus of Gypidula.

SIPHONOTRETA de Vern. Genotype Crania unguiculata Eichwald.

Siphonotreta de Verneuil, Géol. de la Russie d'Europe et des Mont. de l'Oural, II, 1845, p. 286.—Dall, Bull. U. S. Nat. Mus., 8, 1877, p. 62.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 110, 167.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 358.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 252.

Siphonotreta (?) micula McCoy. Calciferous (Ord.).

Siphonotreta ? micula Ami, Rep. Progress Geol. Nat. Hist. Survey Canada for 1887-88, 1889, p. 52K.

Loc. Great Britain; near Laevis, Canada.

Siphonotreta (?) minnesotaensis Hall and Clarke. Trenton (Ord.).

Siphonotreta ? minnesotensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 112, 177, pl. 4, figs. 37, 38.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 358, pl. 29, figs. 23, 24.

Loc. Minneapolis, Minnesota.

Siphonotreta scotica Whiteaves=Schizambon ? fissus americanus.

SPHÆROBOLUS Matthew. Genotype Lingulella ? spissa Billings.

Sphærobolus Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 263.

Sphærobolus spissus (Billings). Lower Ordovician.

Lingulella ? spissa Billings, Canadian Nat. Geol., n. ser., VI, 1872, p. 468, fig. 5;—Pal. Fossils, II, 1874, p. 67, fig. 36.

Sphærobolus spissus Matthew, Trans. Royal Soc. Canada, 2d ser., I, 1896, p. 263, pl. 1, fig. 5.

Loc. Bell Island, Newfoundland.

SPIRIFER Sowerby. Genotype Anomites striatus Martin.

Spirifer Sowerby, Mineral Conchology, II, 1815, p. 41.—Billings, Canadian Nat. Geol., I, 1856, p. 134.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowledge, XIV, 172, 1864, p. 17.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 1-40;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 751.

Spirifera Billings, Canadian Journal, VI, 1861, p. 253.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 251;—Pal. New York, IV, 1867, p. 186.—White, Wheeler's Expl. and Survey west of the 100th Merid., 1875, p. 90.—Herrick, Bull. Denison University, IV, 1888, p. 14.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 105.—Hall, Bull. Geol. Soc. America, I, 1890, p. 567;—Ninth Ann. Rep. N. Y. State Geol., 1890, p. 9.

Spirifer acanthopterus (Conrad). ? Hamilton (Dev.).

Delthyris acanthoptera Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 264.

Loc. Oneonta, Otsego County, New York.

Spirifer acuminatus (Conrad). Corniferous and Hamilton (Dev.).

Delthyris acuminata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 65.

Delthyris prora Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 263.

Terebratula acuminatissima Castelnau, Essai Syst. Silurien l'Amérique Septentrionale, 1843, p. 40, pl. 14, fig. 16.

Spirifer cultrijugatus Yandell and Shumard (non Roemer, 1844), Cont. Geol. Kentucky, 1847, p. 10.

Spirifer acuminata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 135.

Spirifera acuminata Hall, Pal. New York, IV, 1867, pp. 198, 234, pl. 29, figs. 9-18; pl. 35, fig. 24.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 105, pl. 8, figs. 1-8.

Spirifer acuminatus White, Second Rep. Indiana Bureau of Statistics and Geol., 1880, p. 503, pl. 4, figs. 1-3;—Tenth Rep. State Geol. Indiana, 1881, p. 135, pl. 4, figs. 1-3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, pl. 39, figs. 39-42.

Loc. Schoharie, Williamsville, Clarence Hollow, Hamilton, Madison, etc., New York; Columbus and Sandusky, Ohio; Falls of Ohio.

Spirifer acuticostatus de Koninck. Upper Carboniferous.

Spirifer acuticostatus de Koninck, Animaux Fos. Carb. Belgique, p. 265, pl. 17, fig. 6.

Spirifera acuticostata Davidson, Quart. Jour. Geol. Soc. London, XIX, 1863, p. 171, pl. 9, figs. 7, 8.—Dawson, Acadian Geol., 3d ed., 1878, p. 292, fig. 91.

Loc. Europe; Brookfield and Shubenacadie, Nova Scotia.

Spirifer agelaius Meek. Lower Carboniferous.

Spirifer triradialis? Meek (non Phillips), Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 470.

Spirifer agelaius Meek, Ibidem, 1873, p. 470, footnote.—White, Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 135, pl. 34, fig. 10.

Loc. Near Virginia City, Montana.

Spirifer alatus Castelnau (non Schlotheim)=Spirifer aliformis.

Spirifer aliformis de Verneuil. Upper Helderberg (Dev.).

Spirifer alatus Castelnau (non Schlotheim), Essai Système Silurien l'Amérique Septentrionale, 1843, p. 42, pl. 12, fig. 4.

Spirifer alæformis de Verneuil, Ibidem, 1843, p. 42, footnote.

Loc. Schoharie, New York.

Obs. Compare with Spirifer arenosus.

Spirifer alba-pinensis Hall and Whitfield. Kinderhook (L. Carb.).

Spirifera albapinensis Hall and Whitfield, King's U. S. Geol. Expl., 40th Parl., IV, 1877, p. 255, pl. 4, figs. 7, 8.

Loc. Wasatch Range, Utah.

Obs. Appears to be a synonym of S. centronatus.

Spirifer aldrichi Etheridge. Devonian.

Spirifer aldrichi Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 634, pl. 29, fig. 2.

Loc. Dana Bay, lat. 82° 42′.

Spirifer alta Hall=Cyrtia alta.

Spirifer amarus Swallow. Hamilton (Dev.).

Spirifer amarus Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 642.

Loc. On page 658 it is given as Callaway County, Missouri, in association with Hamilton terrane fossils. It is probably the same as S. annæ Swallow.

Spirifer angustus Hall. Hamilton and Portage (Dev.).

Spirifer angusta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 164, fig. in text.

Spirifera angusta Hall, Pal. New York, IV, 1867, p. 230, pl. 38A, figs. 23–32.—Whitfield, Geol. Wisconsin, IV, 1882, p. 329, pl. 26, fig. 3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 54, figs. 14–17.

Spirifer angustus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, pl. 24, figs. 14–17.

Loc. Livingston and Genesee counties, and Ithaca, New York; Portage group of New York (Williams); Milwaukee, Wisconsin.

Spirifer annæ Swallow. Hamilton (Dev.).

Spirifer annæ Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 641.

Loc. Callaway County, Missouri.

Obs. See S. amarus.

Spirifer annectans Walcott. Lower Carboniferous.

Spirifera annectans Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 216, pl. 18, fig. 7.

Loc. Eureka district, Nevada.

Spirifer antarcticus Morris and Sharpe. Lower Devonian.

Spirifer antarcticus Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. 11, fig. 2.

Loc. Falkland Islands.

Obs. Compare with S. boliviaensis, S. chuquisaca, and S. orbignyi.

Spirifer arata Hall=Spirifer granulosus.

Spirifer arcticus Houghton. Devonian.

Spirifer arcticus Houghton, Jour. Royal Dublin Soc., I, 1857, p. 183.

Obs. The writer has not seen this journal.

Spirifer arctisegmentum Hall. Upper Helderberg (Dev.).

Spirifer arctisegmenta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 131.

Spirifera arctisegmenta Hall, Pal. New York, IV, 1867, p. 208, pl. 31, figs. 9, 10;—

Spirifer arctisegmentum Hall—Continued.

Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs. 10-12.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 108, pl. 12, figs. 14, 15.

Spirifer arctisegmentus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 36, pl. 34, figs. 10-12.

Loc. Stafford and Genesee counties, New York; Falls of Ohio.

Spirifer arenosus (Conrad). Oriskany and Corniferous (Dev.).

Delthyris arenosa Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 65.—Mather, Geol. N. Y.; Rep. First Dist., 1843, p. 342, fig. 1.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 148, fig. 1.

Delthyris arenaria Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 123, fig. 1; p. 124, fig. 5.

Spirifer arenosa Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 826, fig. 650.—Hall, Pal. New York, III, 1859, p. 425, pl. 98, figs. 1-8; pl. 99, figs. 1-10; pl. 100, figs. 1-8.

Spirifera arenosa Billings, Geol. Canada, 1863, p. 960, fig. 465.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 3-7.

Spirifera unica Hall, Pal. New York, IV, 1867, p. 203, pl. 30, fig. 21; pl. 55, fig. 8.

Spirifer arenosus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 37, pl. 29, figs. 1-4; pl. 30, figs. 3-8.

Loc. Schoharie, Clarence Hollow, etc., New York; Cumberland, Maryland; Virginia; Frankstown, Pennsylvania; Cayuga, Ontario.

Spirifer argentarius Meek=Spirifer pinonensis.

Spirifer arrectus Hall=Spirifer murchisoni.

Spirifer asper Hall. Hamilton (Dev.).

Spirifer aspera Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 508, pl. 4, fig. 7.

Spirifera (Cyrtina) aspera Whitfield, Geol. Wisconsin, IV, 1882, p. 331, pl. 26, figs. 1, 2.

Spirifer asper Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 32, 39, pl. 25, figs. 20-25.

Loc. Independence and Rockford, Iowa; Rock Island, Illinois; Milwaukee, Wisconsin; Canandaigua, New York.

Spirifer asperatus Ringueberg. Niagara (Sil.).

Spirifera asperata Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, 1886, p. 16, pl. 2, fig. 5.

Loc. Lockport, New York.

Spirifer atwateranus Miller=Spirifer iowaensis.

Spirifer audaculus (Conrad). Marcellus and Hamilton (Dev.).

Delthyris audacula Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 262.

Delthyris medialis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 208, fig. 8.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, fig. 669.

Spirifer eatoni Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 157.

Spirifer medialis Hall, Ibidem, 1857, p. 164, fig. 1.

Spirifera medialis Hall, Pal. New York, IV, 1867, p. 227, pl. 38, figs. 1-25,—Second Ann. Rep. N. Y. State Geol., 1883, pl. 54, figs. 1-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 125, pl. 26, figs. 2-5.

Spirifera medialis var. eatoni Hall, Pal. New York, IV, 1867, pl. 38, figs. 12-18.

Spirifera audacula Whitfield, Geol. Wisconsin, IV, 1882, p. 329, pl. 25, figs. 25, 26.

Spirifer audaculus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29-31, 39, pl. 24, figs. 1-13; pl. 29, fig. 5.

Loc. Otsego, Cayuga, Moscow, Darien, etc., New York; Falls of Ohio; Milwaukee, Wisconsin.

Spirifer audaculus macronotus Hall. Hamilton (Dev.).

Delthyris macronota Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 206, fig. 5.

Spirifera macronota Hall, Pal. New York, IV, 1867, p. 231, pl. 38A, figs. 1–22;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 54, figs. 18–27.

Spirifer audaculus var. macronotus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 24, figs. 18–27.

Loc. Bristol, Moscow, Darien, etc., New York.

Spirifer buarquianus Rathbun. Middle Devonian.

Spirifera buarquiana Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 28.

Loc. Rio Maecuru, Province of Para, Brazil.

Spirifer belphegor Clarke. Genesee (Dev.).

Spirifera belphegor Clarke, Bull. U. S. Geol. Survey, 16, 1885, p. 30, pl. 3, fig. 13.

Loc. Ontario County, New York.

Spirifer bicostatus Hall=Reticulara bicostata.

Spirifer bicostatus var. petilus Hall=Reticularia bicostata petila.

Spirifer bidorsalis Winchell. Hamilton (Dev.).

Spirifera bidorsalis A. Winchell, Geol. Rep. Lower Peninsula of Michigan, 1866, p. 93.

Loc. Grand Traverse district, Michigan.

Spirifer biforatus var. lynx Hall=Platystrophia biforata.

Spirifer bifurcatus Hall=Spirifer leidyi.

Spirifer billingsanus Miller. Oriskany (Dev.).

Spirifera superba Billings (non Eichwald), Pal. Fossils, II, 1874, p. 45, pl. 3A, fig. 3.

Spirifera billingsana Miller, N. American Geol. Pal., 1889, p. 372.

Loc. Indian Cove, Gaspé.

Spirifer bilobus Hall=Bilobites bilobus.

Spirifer bimesialis Hall. Upper Devonian.

Spirifer bimesialis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 507, pl. 4, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 34, figs. 23–26.

Spirifera bimesialis Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs. 23–26.

Loc. Independence, Iowa; Naples, New York (Clarke).

Spirifer biplicatus Meek (non Hall)=Spirifer centronatus.

Spirifer biplicatus Hall. Kinderhook (L. Carb.).

Spirifer biplicata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 519, pl. 7, fig. 5.

Spirifera biplicata Herrick, Bull. Denison Univ., III, 1888, p. 45; IV, 1888, p. 25, pl. 2, fig. 8.

Spirifer biplicatus Herrick, Geol. Ohio, VII, 1895, pl. 15, fig. 8.

Loc. Burlington, Iowa; Quincy, Illinois; Richfield, etc., Ohio.

Spirifer boliviaensis d'Orbigny. Devonian.

Spirifer boliviensis d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 37, pl. 2, figs. 8, 9.

Loc. Cochabamba and Chuquisaca, Bolivia.

Obs. Compare with S. antarcticus and S. hawkinsi.

Spirifer boonensis Swallow. Upper Carboniferous.

Spirifer booensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 646.

Loc. Boone, Randolph, and Monroe counties, Missouri.

Obs. Regarded by Keyes as a synonym for S. rockymontanus.

Spirifer byrnesi Nettelroth. Hamilton (Dev.).

Spirifera byrnesi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 109, pl. 10, figs. 1-5?, 31-34, 36-39.

Loc. Falls of Ohio.

Spirifer cameratus Derby (non Morton)=Spirifer condor.

Spirifer cameratus Morton. Upper Carboniferous.

Spirifer cameratus Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 3.—Hall, Pacific Railroad Reports, III, 1856, p. 102, pl. 2, figs. 9, 12;—Geol. Survey Iowa, I, Pt. II, 1858, p. 709, pl. 28, fig. 2.—Geinitz, Carbon und Dyas in Nebraska, 1866, p. 44.—Meek, Final Rep. U. S. Geol. Survey Nebraska, 1872, p. 183, pl. 6, fig. 12; pl. 8, fig. 15.—Meek and Worthen, Geol. Survey Illinois, V, 1873, p. 573, pl. 25, fig. 7.—Toula, Neues Jahrbuch f. Mineral., 1874, p. 240;—Sitzungsb. der Kais. Akad. der Wissen. zu Wien, 1875, p. 543.—White, Wheeler's Expl. Survey west 100th Meridian, IV, 1875, p. 132, pl. 10, fig. 1.—Newberry, Macomb's Rep. Expl. Exped. from Santa Fe to the Great Colorado River of the West, 1876, p. 138.—Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 353, pl. 2, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 32, figs. 9-15.

Spirifer meusebachanus Roemer, Kreidebildung Texas, 1852, p. 88, pl. 11, fig. 7.

Spirifer triplicatus Hall, Stansbury's Expl. Survey of the Valley of Great Salt Lake, Utah, 1852, p. 410, pl. 4, fig. 5.

Spirifer inequicostatus? Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 586, pl. 5, fig. 6. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17954.]

Spirifer fasiger Owen (non Keyserling), Ibidem, 1852, pl. 5, fig. 4.

Spirifer striatus var. triplicatus Marcou, Geol. N. America, 1858, p. 49, pl. 7, fig. 3.

Spirifer species Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 833, fig. 694.

Spirifer camerata Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.

Spirifera camerata Newberry, Ives's Rep. Colorado River of the West, 1861, p. 127.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 517, pl. 8, fig. 3;—Tenth Rep. State Geol. Indiana, 1881, p. 149, pl. 8, fig. 3.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 9-15.—White, Thirteenth Rep. State Geol. Indiana, 1884, p. 132, pl. 35, figs. 3-5.—Herrick, Bull. Denison Univ., II, 1887, p. 45, pl. 2, fig. 22.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 230;—Geol. Survey Missouri, V, 1895, p. 83, pl. 40, fig. 5.

Spirifera camerata var. kansasensis Swallow, Trans. St Louis Acad. Sci., II, 1867, p. 409.

Spirifer (Trigonotreta) camerata Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 91, pl. 9, fig. 2.

Loc. Putnam Hill, Ohio; throughout the Upper Carboniferous of North America; western side of Spitzbergen (Toula).

Obs. S. cameratus is often regarded as identical with S. striatus (Martin). The latter species, however, is closely and finely reticulated with concentric growth lines, while in S. cameratus the plications are crowded with small pustules arranged in radiating lines. See S. condor and S. striatus.

Spirifer cameratus var. kansasensis Swallow=Spirifer cameratus.

Spirifer cameratus percrassus Swallow. Upper Carboniferous.

Spirifer cameratus var. percrassus Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 409.

Loc. Missouri and Kansas.

Obs. Regarded by Keyes as a synonym for S. cameratus.

Spirifer capax Hall=Spirifer euryteines.
Spirifer canandaiguæ Hall and Clarke=Reticularia canandaiguæ.
Spirifer carteri Hall=Syringothyris carteri.
Spirifer carteri Meek (non Hall)=Syringothyris texta.
Spirifer catskillensis Emmons=Spirifer mesistrialis.
Spirifer cedarensis Owen=S. iowaensis.

Spirifer centronatus A. Winchell. Waverly (L. Carb.).

Spirifer centronatus A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 118.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 86, pl. 5, fig. 8.

Spirifera (Trigonotreta) biplicata (Hall??) Meek, Pal. Ohio, II, 1875, p. 290, pl. 14, fig. 5.

Spirifera centronata Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 254, pl. 4, figs. 5, 6.

Loc. Cuyahoga Falls, Ohio; Black Hills, South Dakota; Wasatch Range, Utah; Mountain Spring, Nevada; Yellowstone Park.

Obs. See S. alba-pinensis.

Spirifer chilensis Forbes=Spiriferina rostrata.

Spirifer chuquisaca A. Ulrich. Middle Devonian.

Spirifer chuquisaca A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 65, pl. 4, figs. 19, 20.

Loc. Chahuarani, Tarabuco, etc., Bolivia.

Obs. Compare with S. boliviaensis and S. antarcticus.

Spirifer clarus Swallow=Reticularia clara.

Spirifer clavatulus McChesney. Burlington (L. Carb.).

Spirifera clavatula McChesney, New Pal. Fossils, 1861, p. 84;—Trans. Chicago Acad. Sci., I, 1868, p. 36, pl. 6, fig. 5.

Loc. Burlington, Iowa.

Spirifer clintoni Hall=Spirifer granulosus.
Spirifer clio Hall=Delthyris consobrina.
Spirifer compactus Meek=Reticularia fimbriata.

Spirifer concinnus Hall. Lower Helderberg (Dev.).

Spirifer concinna Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 60, figs. 1-3.

Spirifera concinna Hall, Pal. New York, III, 1859, p. 200, pl. 25, fig. 2; pl. 28, fig. 7;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 1, 2.

Spirifer concinnus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 38, pl. 30, figs. 1, 2.

Loc. Helderberg Mountains, New York.

Spirifer condor d'Orbigny. Upper Carboniferous.

Spirifer condor d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 46, pl. 5, figs. 11-14.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 514.

Spirifer striatus var. multicostatus Toula, Sitzungsb. der kais. Akad. der Wissensch. zu Wien, 1869, p. 3, pl. 1, figs. 2-4.

Spirifera camerata Derby (non Morton), Bull. Cornell Univ., I, 1874, p. 12, pls. 1, 2, 4, 5;—Bull. Mus. Comp. Zool., III, 1875, p. 279.

Loc. Bolivia; Bomjardim and Itaituba, Brazil; Yampopata and the Island of Titicaca, Bolivia; Pichis River, Peru.

Spirifer condor d'Orbigny—Continued.

Obs. "It has for a long time been considered a synonym of S. striatus and later of S. cameratus. It is distinct, however, from the former by the lamellose striæ of growth and from the latter by these as well by the nearly entire absence of bundling of the ribs" (Waagen).

Spirifer conradanus Miller=Reticularia fimbriata.

Spirifer consobrina d'Orbigny=Delthyris consobrina.

Spirifer consors A. Winchell. Hamilton (Dev.).

Spirifer consors A. Winchell, Geol. Rep. Lower Peninsula of Michigan, 1866, p. 93.

Loc. Grand Traverse district, Michigan.

Spirifer cooperensis Waagen=Reticularia cooperensis.

Spirifer corticosus Hall. Hamilton (Dev.).

Spirifer corticosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 160.

Spirifera corticosa Hall, Pal. New York, IV, 1867, p. 236.

Loc. Cumberland, Maryland.

Obs. Compare with S. granulosus.

Spirifer (?) costalis Castelnau. ?Upper Helderberg (Dev.).

Spirifer costalis Castelnau, Essai Systéme Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 14, fig. 7.

Loc. Schoharie, New York.

Spirifer crispatus Hall and Clarke. Niagara (Sil.).

Spirifer crispatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 360, pl. 36, figs. 9, 10.

Loc. "Maryland."

Spirifer crispus (Hisinger). Niagara and Coralline (Sil.).

Terebratula crispa Hisinger, Svenska Vet.-Akad. Handlingar, 1826, tab. 7, fig. 4.

Delthyris staminea Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 3.

Spirifer crispus Hall, American Jour. Sci., XX, 1849, p. 228;—Pal. New York, II, 1852, p. 262, pl. 54, fig. 3; p. 328, pl. 74, fig. 9.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 75, pl. 6, figs. 6, 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 20, 36, pl. 36, figs. 1–6.

Spirifera crispa Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 157, pl. 24, figs. 6–12, 19;—Eleventh Rep. State Geol. Indiana, 1882, p. 295, pl. 24, figs. 6–12, 19;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, figs. 1–6.

Loc. Europe; Lockport, Lewiston, and Schoharie, New York; Hamilton and Arisaig, Nova Scotia (Ami); Ontario; Waldron, Indiana.

Spirifer crispus simplex Hall. Niagara (Sil.).

Spirifera crispa var. Hall, Trans. Albany Institute, IV, 1863, p. 212.

Spirifera crispa var. simplex Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 157, pl. 24, figs. 1–5;—Eleventh Rep. State Geol. Indiana, 1882, p. 296, pl. 24, figs. 1–5.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 111, pl. 17, figs. 36, 37.

Spirifer crispus var. simplex Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 75, pl. 6, figs. 4, 5.

Loc. Waldron, Indiana; Louisville, Kentucky.

Spirifer cultrijugatus Yandell and Shumard=Spirifer acuminatus.

Spirifer cumberlandiæ Hall. Oriskany (Dev.).

Spirifer cumberlandiæ Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 63;—Pal. New York, III, 1859, p. 421, pl. 96, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 33, figs. 16–23.

Spirifer disjunctus sulcifer Hall and Clarke. Chemung (Dev.).

Spirifera disjunctus var. sulcifer Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 361, pl. 30, fig. 16.

Loc. Near Olean, New York.

Spirifer disparilis Hall=Metaplasia disparilis.

Spirifer divaricatus Hall. Corniferous and Hamilton (Dev.).

Spirifer divaricata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 133.

Spirifer venustus Hall, Thirteenth Rep. Ibidem, 1860, p. 82.

Spirifera divaricata Hall, Pal. New York, IV, 1867, p. 213, pl. 32, figs. 1-6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 113, pl. 11, figs. 6-11; pl. 12, figs. 5-11.

Spirifer divaricatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 39, pl. 38, figs. 15-17.

Loc. Schoharie, Stafford, Williamsville, York, etc., New York; Port Colborne, Canada; Falls of Ohio; Lebanon, Kentucky.

Obs. Compare with S. multicostatus Castelnau.

Spirifer dubius Hall=Pentamerella dubia.

Spirifer dubius Nettelroth. ?Niagara (Sil.).

Spirifera dubia Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 115, pl. 33, figs. 23, 24.

Loc. Louisville, Kentucky.

Spirifer duodenarius (Hall). Upper Helderberg (Dev.).

Delthyris duodenaria Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 171, fig. 5.

Spirifera duodenaria Billings, Canadian Jour., n. ser., V, 1861, p. 256, figs. 65-67;—Geol. Canada, 1863, p. 372, fig. 394.—Hall, Pal. New York, IV, 1867, p. 189, pl. 27, figs. 13-16; pl. 28, figs. 24-33;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 8-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 114, pl. 12, figs. 12, 13, 16.

Spirifera duodenaria? Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 25.

Spirifer duodenarius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 37, pl. 33, figs. 8-15.

Loc. New York, Ontario, Columbus, Ohio; Falls of Ohio; Rio Maecuru, Province of Para, Brazil.

Spirifer duplicatus Hall=Spirifer dupliplicatus.

Spirifer duplicicosta Phillips. Carboniferous.

Spirifer duplicicostus Phillips, Geol. Yorkshire, II, 1829, p. 218, pl. 10, fig. 1.

Spirifera duplicicosta Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 628.

Loc. Europe; Feilden Isthmus, lat. 82° 43′.

Spirifer dupliplicatus (Conrad). Hamilton (Dev.).

Delthyris dupliplicata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261, pl. 14, fig. 16.

Spirifera duplicata Hall, Pal. New York, IV, 1867, pp. 223, 236.

Loc. Near Smyrna, New York.

Obs. Compare with S. granulosus Conrad.

Spirifer eatoni Hall=Spirifer audaculus.

Spirifer elizæ Rathbun. Middle Devonian.

Spirifer elizæ (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 239, pl. 8, figs. 15, 21; pl. 9, fig. 22.

Spirifera elizæ Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 28.

Loc. Erere, Province of Para, Brazil.

Spirifer engelmanni Meek and Worthen (non Meek)=Spirifer worthenanus.

Spirifer engelmanni Meek. Middle Devonian.

Spirifera engelmanni Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 308.—Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 346, pl. 1, fig. 1.—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 41, pl. 3, fig. 3.

Loc. Neils Valley, Utah; White Pine district, Nevada.

Spirifer eudora Hall. Niagara (Sil.).

Spirifera eudora Hall, Annual Rep. Geol. Survey Wisconsin, 1861, p. 25;—Geol. Rep. Wisconsin, I, 1863, p. 69, pl. 5; p. 436;—Trans. Albany Inst., IV, 1863, p. 211;—Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 370, pl. 13, figs. 5, 7;—Ibidem, Twenty-eighth Rep., 1879, p. 156, pl. 24, figs. 13-18;—Eleventh Rep. State Geol. Indiana, 1882, p. 294, pl. 24, figs. 13-18;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 51, figs. 19-21, 29.

Spirifer eudora Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 13, 35, pl. 21, figs. 19-21, 29.

Loc. Racine, Wisconsin; Waldron, Indiana; Louisville, Kentucky.

Spirifer euruteines Hall (non Owen)=S. fornacula.

Spirifer euruteines var. fornacula Hall=S. fornacula.

Spirifer euryteines Owen. Hamilton (Dev.).

Delthyris euruteines Owen, Rep. Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, p. 69, pl. 12, fig. 9.

Spirifer euruteines Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 586, pl. 3, figs. 2, 6. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17924.]

Spirifer parryana Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 509, pl. 4, fig. 8.—Keyes, Geol. Surv. Missouri, V, 1895, p. 77, pl. 40, fig. 4.

Spirifer capax Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 520, pl. 7, fig. 7.

Spirifera parryana Billings, Canadian Jour., VI, 1861, p. 261, figs. 77, 78;—Geol. Canada, 1863, p. 386, fig. 422.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 8, 9.—Calvin, Bull. Lab. State Univ. Iowa, 1888, p. 19.

Spirifera fornacula Meek and Worthen (non Hall), Geol. Survey Illinois, III, 1868, p. 433, pl. 13, fig. 8.

Spirifera capax Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 15-17.

? Spirifera parryana Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 137, pl. 14, fig. 10.

Spirifer parryanus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 39, pl. 22, figs. 8, 9, 15-17.

Loc. Pine Creek and elsewhere in Iowa; Eureka district, Nevada; Bosanquet, Ontario, Canada.

Obs. Owen described this species in 1839, but it was not published until 1844. In 1841 Owen sent Professor Hall specimens from the Falls of the Ohio labeled S. euruteines. This species was again refigured in his report of 1852, where he cites the same localities as in 1844 (p. 32 last paragraph), adding Falls of Ohio and Columbus, Ohio. Professor Hall is correct in regarding the Ohio specimens as distinct from those of the Mississippi Valley, but is in error in thinking that figures 6-6b of the 1852 report are drawn from an Ohio Falls specimen. These figures are of the same specimen as of figure 9 of the 1844 report, which is from Pine Creek, Iowa. The type specimens are in the National Museum collection. Owen's figure 2 is the same species as Hall's S. capax, while his figure 6 is a small individual of S. parryana Hall. Professor Calvin has shown these two species to be identical. Therefore it follows that S. euryteines must be restricted to the specimens from the Mississippi Valley. For the specimens from the Falls of the Ohio S. **fornaculus** Hall will be the proper name.

Spirifer extenuatus Hall=Syringothyris extenuata.

Spirifer fasciger Owen (non Keyserling)=Spirifer cameratus.

Spirifer fastigatus Meek and Worthen (non Morton)=Spirifer mortonanus.

Spirifer fastigatus Morton. ?Lower Carboniferous.

Spirifer fastigatus Morton, American Jour. Sci., XXIX, 1836, p. 152, pl. 14, fig. 35.
Loc. Junior Furnace, Scioto County, Ohio.
Obs. Not recognizable.

Spirifer filicosta A. Winchell. Hamilton (Dev.).

Spirifera filicosta A. Winchell, Report Lower Peninsula of Michigan, 1866, p. 94.
Loc. Grand Traverse district, Michigan.

Spirifer (?) **fimbriatus** Morton Upper Carboniferous.

Spirifer fimbriatus Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 1.
Loc. Putnam Hill, Ohio.
Obs. Not recognizable.

Spirifer fimbriatus Hall=Reticularia fimbriata.

Spirifer fischeri Castelnau=Spirifer macropleura.

Spirifer foggi Nettelroth. Niagara (Sil.).

Spirifera foggi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 117, pl. 32, figs. 28–31.
Loc. Louisville, Kentucky.

Spirifer forbesi Norwood and Pratten. Burlington (L. Carb.).

Spirifer forbesi Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 73, pl. 9, fig. 3.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 600, pl. 13, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 37, fig. 18.
Spirifera forbesi Keyes, Geol. Survey Missouri, V, 1895, p. 80, pl. 40, fig. 3.
Loc. Burlington, Iowa; Hannibal, Louisiana, and Sedalia, Missouri.

Spirifer formosus Hall. Hamilton (Dev.).

Spirifer formosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 154.
Spirifera formosa Hall, Pal. New York, IV, 1867, p. 220, pl. 28, figs. 12–16.
Loc. Bakeoven, Illinois.

Spirifer fornacula Meek and Worthen (non Hall)=Spirifer euryteines.

Spirifer fornacula Hall. Hamilton (Mid. Dev.).

Spirifer fornacula Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 154.
Spirifera euruteines Hall (non Owen), Pal. New York, IV, 1867, p. 209, pl. 31, figs. 14–19.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 504, pl. 4, figs. 4, 5;—Tenth Rep. State Geol. Indiana, 1881, p. 136, pl. 4, figs. 4, 5.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 115, pl. 6, figs. 1–7, 9, 11–17.
Spirifera euruteines var. fornacula Hall, Pal. New York, IV, 1867, p. 211, pl. 31, figs. 11–13.—Whitfield, Geol. Wisconsin, IV, 1882, p. 330, pl. 25, fig. 22.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 117, pl. 6, figs. 8, 10, 18–20.
Loc. Jackson County, Illinois; Falls of Ohio; Columbus, Ohio; Milwaukee, Wisconsin (Whitfield).
Obs. See remarks on S. euryteines Owen.

Spirifer fornax Hall. Hamilton (Dev.).

Spirifer fornax Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 155.
Loc. Illinois.

Spirifer franklini Meek=Reticularia franklini.

Spirifer fultonensis Worthen. Upper Carboniferous.

Spirifera fultonensis Worthen, Geol. Survey Illinois, V, 1873, p. 572, pl. 25, fig. 5.
Loc. Canton, Illinois.

Spirifer gaspensis Billings. Oriskany (Dev.).

Spirifera gaspensis Billings, Pal. Fossils, II, 1874, p. 44, pl. 3, fig. 8.
Loc. Gaspé.

Spirifer gibbosus Hall. Niagara (Sil.).

Spirifer gibbosus Hall, Ann. Rep. Geol. Survey Wisconsin, 1861, p. 25.
Spirifera gibbosa Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 370, pl. 13, figs. 6, 8.
Loc. Racine, Wisconsin.
Obs. Probably the same as S. eudora Hall.

Spirifer glabrus Davidson=Martinia glabra.

Spirifer glabrus var. contractus Meek and Worthen=Martinia glabra contracta.

Spirifer glabrus nevadensis Walcott=Reticularia nevadaensis.

Spirifer glanscerasus White=Martinia glanscerasi.

Spirifer granuliferus Hall=Spirifer granulosus.

Spirifer granulosus (Conrad). Hamilton (Dev.).

Delthyris granulosa Conrad, Third Ann. Rep. Geol. Survey N. Y., 1839, p. 65.
Delthyris granulifera Hall, Geology N. Y.; Rep. Fourth Dist., 1843, p. 206, fig. 1.
Delthyris congesta Hall, Ibidem, 1843, p. 206, fig. 2.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, figs. 670, 673.
Spirifer huroniensis Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 12, fig. 6.
Spirifer osteolatus Yandell and Shumard, Cont. Geol. Kentucky, 1847, p. 14.
Spirifer granulifera Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 163.
Spirifer arata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 161.
Spirifer clintoni Hall, Ibidem, 1857, p. 157.
Spirifer oweni Hall, Ibidem, 1857, p. 129.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 22, figs. 1-7.
Spirifera oweni Hall, Pal. New York, IV, 1867, p. 197, pl. 29, figs. 1-8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 1-7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 126, pl. 7, figs. 1-10.
Spirifera granulifera Hall, Pal. New York, IV, 1867, p. 223, pl. 36, figs. 1-13;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 53, figs. 1-15.
Spirifera arata Hall, Pal. New York, IV, 1867, p. 225.
Spirifer granulosus Hall, Pal. New York, VIII, Pt. II, 1893, pp. 29, 30, 31, 39, pl. 23, figs. 1-15; pl. 29, figs. 9-12.
Loc. Schoharie, Moscow, Darien, Canandaigua, etc., New York; Pennsylvania; Cumberland, Maryland; Virginia; Falls of Ohio; Alpena, Michigan.

Spirifer gregarius Clapp. Upper Helderberg (Dev.).

Delthyris gregaria Yandell and Shumard, Cont. Geol. Kentucky, 1847, pp. 9, 10. (Nomina nudum.)
Spirifer gregaria (Clapp MS.) Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 127.
Spirifera gregaria Billings, Canadian Jour., n. ser., VI, 1861, p. 260, figs. 74-76;—Geol. Canada, 1863, p. 372, fig. 391.—Hall, Pal. New York, IV, 1867, p. 195, pl. 28, figs. 1-11.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, pl. 4, figs. 10, 11;—Tenth Rep. State Geol. Indiana, 1881, p. 136, pl. 4, figs. 10, 11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 119, pl. 8, figs. 9-13; pl. 10, figs. 6-10.

Spirifer gregarius Clapp—Continued.

Spirifer gregarius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 29, fig. 7; pl. 37, figs. 11, 12.

Loc. Falls of Ohio; Columbus, Ohio; Genesee and Erie counties, New York; Ontario.

Spirifer grieri Hall. Upper Helderberg (Dev.).

Spirifer grieri Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 127;—Pal. New York, IV, 1867, p. 194, pl. 27, fig. 29; pl. 28, figs. 17-23.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 27, 38, pl. 30, figs. 9-13.

Spirifera grieri Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 9-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 120, pl. 9, figs. 8-14.

Loc. Clarence, Williamsville, etc., New York; Columbus, Ohio; Falls of Ohio.

Spirifer grimesi Hall. Kinderhook and Burlington (L. Carb.).

Spirifer grimesi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 604, pl. 14, figs. 1-5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 23, 25, 38, pl. 31, figs. 8, 16-19.

Spirifer allied to grimesi Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 628, pl. 25, fig. 5.

Spirifera grimesi Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, figs. 8, 16-19.—Keyes, Geol. Survey Missouri, V, 1895, p. 79.

Loc. Burlington, Iowa; Quincy, Illinois; Fielden Isthmus, lat. 82° 43′; Hannibal, Louisiana, Sedalia, etc., Missouri.

Spirifer guadalupensis Shumard=Reticularia guadalupensis.

Spirifer hannibalensis Swallow=Syringothyris carteri.

Spirifer hartti Rathbun. Middle Devonian.

Spirifera hartti Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 29.

Loc. Rio Maecuru, Province of Para, Brazil.

Spirifer hawkinsi Morris and Sharpe. Lower Devonian.

Spirifer hawkinsii Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. 11, fig. 1.

Loc. Falkland Islands.

Spirifer hemicyclus Meek and Worthen. Oriskany (Dev.).

Spirifer hemicyclus Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 399, pl. 8, figs. 6, 7.

Loc. Union and Alexandria counties, Illinois.

Spirifer hemiplicatus Hall=Enteletes hemiplicatus.

Spirifer hesione Billings=Delthyris raricosta.

Spirifer hirtus White and Whitfield=Reticularia cooperensis.

Spirifer hobbsi Nettelroth. Hamilton (Dev.).

Spirifera varicosa var. Hall, Pal. New York, IV, 1867, p. 206, pl. 31, fig. 23.

Spirifera hobbsi Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 121, pl. 10, figs. 21, 22, 26-30, 35, 40.

Loc. Falls of Ohio.

Spirifer homfrayi Gabb=Spiriferina homfrayi.

Spirifer hungerfordi Hall. Chemung (Dev.).

Spirifer hungerfordi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 501, pl. 4, fig. 1.—Tschernyschew, Mémoires du Comité Géologique de St. Petersbourg, III, 3, 1887, p. 62.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 23, 25, 37, pl. 29, fig. 6; pl. 37, figs. 26-30.—Webster, American Naturalist, XXII, 1888, p. 1101.

Loc. Rockford, Iowa.

Spirifer huroniensis Castelnau=Spirifer granulosus.

Spirifer huronensis A. Winchell. Portage (Dev.).

Spirifer huronensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.

Spirifer imbrex Hall. Burlington (L. Carb.).

Spirifer imbrex Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 601, pl. 13, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 31, figs. 11, 12.
Spirifera imbrex Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, figs. 11, 12.
Loc. Burlington, Iowa; Hannibal and Louisiana, Missouri.

Spirifer inæquivalvis Castelnau=Rhynchotrema inæquivalvis.

Spirifer incertus Hall. Burlington (L. Carb.).

Spirifer incerta Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 602, pl. 13, fig. 3.
Loc. Burlington, Iowa.

Spirifer inconstans Hall=Spirifer nobilis.

Spirifer increbescens Hall. Kaskaskia (L. Carb.).

Spirifer increbescens Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 706, pl. 27, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 39, pl. 30, figs. 27–30; pl. 31, figs. 1–3.—Keyes, Geol. Survey Missouri, V, 1895, p. 82.
Spirifera increbescens Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 27–30; pl. 56, figs. 1–3.
Loc. Kaskaskia and Chester, Illinois; Kentucky.
Obs. Not synonymous with S. bisulcatus Sowerby, as stated by Meek and Safford. It has also been referred to S. trigonalis (Martin).

Spirifer increbescens americanus Swallow. Kaskaskia (L. Carb.).

Spirifer increbescens var. americana Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 410.
Loc. Illinois and Missouri.
Obs. Regarded by Keyes as a synonym for S. increbescens.

Spirifer increbescens transversalis Hall. Kaskaskia (L. Carb.).

Spirifer increbescens var. transversalis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 708, pl. 27, fig. 6.
Loc. Kaskaskia and Chester, Illinois.

Spirifer inequicostatus Owen=Spirifer cameratus.

Spirifer insolitus Winchell=Martinia ? insolita.

Spirifer intermedius Hall. Oriskany (Dev.).

Spirifer intermedia Hall (non Brongniart, 1829), Pal. New York, III, 1859, p. 424.
Loc. Cumberland, Maryland.

Spirifer inutilis Hall. Upper Devonian.

Spirifer inutilis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 505, pl. 4, fig. 4.
Spirifera inutilis Whiteaves, Cont. Canadian Pal., I, 1891, p. 223.
Loc. Independence, Iowa; Athabasca River, Canada.

Spirifer iowaensis Owen. Middle Devonian.

Spirifer iowensis Owen, Geol. Survey Iowa, Wisconsin, and Minnesota, 1852, p. 585, pl. 3, fig. 1. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17925.]
Spirifer pennatus Owen (non Atwater), Ibidem, 1852, p. 585, pl. 3, figs. 3, 8. [Ibidem, Cat., 17919, 17920.]
Spirifer ligus Owen, Ibidem, 1852, p. 585, pl. 3, fig. 4, and pl. 3A, fig. 2 [Ibidem, Cat., 17921, 17922].—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, pl. 22, figs. 19–24; pl. 29, fig. 13.—Keyes, Geol. Survey Missouri, V, 1895, p. 77.

Spirifer iowaensis Owen—Continued.

Spirifer cedarensis Owen, Geol. Survey Iowa, Wisconsin, and Minnesota, 1852, p. 586, pl. 3, fig. 5. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17 923.]

Spirifer pennata Hall, Geol. Survey, Iowa, I, Pt. II, 1858, p. 510, pl. 5, fig. 1.

?Spirifera allied to pennata Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 633, pl. 29, fig. 1.

Spirifera atwaterana Miller, Proc. Davenport Acad. Sci., 1878, p. 222.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 107.

Spirifera pennata Whitfield, Geol. Wisconsin, IV, 1882, p. 330, pl. 26, fig. 4.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, figs. 19–24.

Loc. New Buffalo, Independence, etc., Iowa; Rock Island, Illinois; Milwaukee, Wisconsin; Falls of Ohio; south of Cape Joseph Henry, lat. 82° 42′.

Obs. Owen's type specimens of S. iowaensis, S. pennatus, S. ligus, and S. cedarensis are preserved in the National Museum collection. The six specimens of these species show, when compared with a large series of similar shells from Iowa, that they are but variations of a very variable and widely distributed Spirifer of the Devonian of the Mississippi Valley. The width and degree of curvature of the ventral area and the length of the cardinal line are extremely variable features in S. iowaensis. Upon these characters Owen has based his species. The name S. iowaensis has been selected not only because it is very appropriate but also since it is the first one described. S. parryanus is another closely allied species, but can be separated generally by its wider ventral area and in the cardinal lines not being drawn out into more or less mucronate extensions.

Spirifer kelloggi Swallow. Keokuk (L. Carb.).

Spirifera kelloggi Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.—Keyes, Geol. Survey Missouri, V, 1895, p. 81.

Spiriferina kelloggi Safford, Geol. Tennessee, 1869, p. 360.

Loc. Keokuk, Iowa; Tennessee.

Spirifer kennicotti Meek. Middle Devonian.

Spirifer kennicotti Meek, Trans. Chicago Acad. Sci., I, 1868, p. 101, pl. 14, fig. 9.

Loc. Mackenzie River Valley, Northwest Territory, Canada.

Obs. This species is much like S. pennatus Miller, but with the fold and sinus plicated. It is unlike S. disjunctus, to which it has been referred by Whiteaves, in its shallow visceral cavity.

Spirifer kentuckiensis Shumard=Spiriferina cristata.

Spirifer kentuckiensis var. propatula Swallow=Spiriferina cristata.

Spirifer keokuk Hall. Keokuk (L. Carb.).

Spirifer striatus? var. attenuatus? Owen (non Sow.), Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 3A, fig. 8. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17944.]

Spirifer keokuk Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 642, pl. 20, figs. 3 and 2d;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 21–24.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 38, pl. 30, figs. 21–24; pl. 37, figs. 13–15.

Spirifer keokuk var. Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 676, pl. 24, fig. 4.

Spirifer keokuk? Meek, Bull. U. S. Geol. Geogr. Survey Terr., II, 1876, p. 355, pl. 1, fig. 3.

Spirifera keokuk Keyes, Geol. Survey Missouri, V, 1895, p. 81, pl. 40, fig. 2.

Loc. Keokuk, Iowa; Nauvoo and Warsaw, Illinois; Utah; Rushville and Loudonville, Ohio (Herrick).

Obs. See S. littoni.

Spirifer keokuk shelbyensis Swallow. Warsaw (L. Carb.).
Spirifer keokuk var. shelbyensis Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 410.
Loc. Shelby County, Missouri.

Spirifer knappanus Nettelroth=Reticularia knappiana.

Spirifer lateralis Hall. Warsaw (L. Carb.).
Spirifer lateralis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 661, pl. 23, fig. 7.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 32, figs. 1-3; pl. 37, fig. 19.
? Spirifera lateralis Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 1-3.
Loc. Clifton and Warsaw, Illinois.

Spirifer latior Swallow. Chouteau (L. Carb.).
Spirifer latior Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 86.
Loc. Cooper County, Missouri.
Obs. Compare with S. marionensis.

Spirifer lævigatus Swallow=Martinia lævigata.

Spirifer lævis Hall=Reticularia lævis.

Spirifer laminosus Geinitz (non McCoy)=Spiriferina cristata.

Spirifer leidyi Norwood and Pratten. St. Louis (L. Carb.).
Spirifer leidyi Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, III, 1854, p. 72, pl. 9, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 39, pl. 30, figs. 25, 26.
Spirifer bifurcatus Hall, Trans. Albany Institute, IV, 1857, p. 8.
Spirifera bifurcata Whitfield, Bull. American Mus. Nat. Hist., I, 1882, p. 47, pl. 6, figs. 13-15.—Hall, Twelfth Rep. State Geol. Indiana, 1883, p. 326, pl. 29, figs. 13-15.
Spirifera leidyi Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, figs. 25, 26.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 216, pl. 18, fig. 4.—Keyes, Geol. Survey Missouri, V, 1895, p. 82.
Loc. Chester, Illinois; Spergen Hill, Indiana; Princeton, Kentucky; Utah; Eureka district, Nevada.

Spirifer leidyi chesterensis Swallow. Kaskaskia (L. Carb.).
Spirifer leidyi var. chesterensis Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 409.
Loc. "Above the St. Louis limestone," Missouri.
Obs. Regarded by Keyes as a synonym for S. leidyi.

Spirifer leidyi merimacensis Swallow. Warsaw (L. Carb.).
Spirifer leidyi var. merimacensis Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 410.
Loc. Barrets Station, St. Louis County, Missouri.
Obs. Regarded by Keyes as a synonym for S. leidyi.

Spirifer ligus Owen=S. iowaensis.

Spirifer lineatoides Swallow=Reticularia pseudolineata.

Spirifer lineatus of American authors=Reticularia perplexa.

Spirifer lineatus striatolineatus Swallow=Reticularia perplexa striatilineata.

Spirifer linguiferoides Forbes=Spiriferina rostrata.

Spirifer littoni Swallow. St. Louis (L. Carb.).
Spirifer littoni Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 646.
Loc. St. Louis County, Missouri.
Obs. Regarded by Keyes as a synonym for S. keokuk.

Spirifer logani Hall. Keokuk (L. Carb.).

Spirifer logani Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 647, pl. 20, fig. 7; pl. 21, figs. 1, 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 25, 38, pl. 32, figs. 7, 8.

Spirifera logani A. Winchell, Proc. American Phil. Soc., XII, 1870, p. 245.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 7, 8.—Keyes, Geol. Survey Missouri, V, 1895, p. 81.

Loc. Nauvoo, Illinois; Clark County, Missouri; Tennessee.

Spirifer lyelli de Verneuil=Spirifer pennatus.

Spirifer macbridei Calvin. Upper Devonian.

Spirifera macbridei Calvin, American Jour. Sci., 3d ser., XXV, 1883, p. 433.—Calvin, Bull. Lab. Nat. Hist. State Univ. Iowa, II, 1892, p. 166, pl. 12, fig. 3.

Spirifer macbridii Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 39, pl. 25, figs. 9–16 (?17–19).

Loc. Rockford, Iowa.

Spirifer macconathei Nettelroth. Hamilton (Dev.).

Spirifera macconathii Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 123, pl. 11, figs. 1–5.

Loc. Falls of Ohio.

Spirifer macra Meek (non Hall)=Spirifer strigosus.

Spirifer macrus Hall. Upper Helderberg (Dev.).

Spirifer macra Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 134.

Spirifera macra Hall, Pal. New York, IV, 1867, p. 190, pl. 27, figs. 17–28;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs. 1–3.

Spirifer macrus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 34, figs. 1–3.

Loc. Schoharie, Williamsville, etc., New York; Columbus, Ohio.

Spirifer macronotus Hall=S. audaculus macronotus.

Spirifer macropleura (Conrad). Lower Helderberg (Dev.).

Delthyris macropleura Conrad, Fourth Ann. Rep. N. Y. Geol. Survey, 1840, p. 207.—Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 120, fig. 1.—Mather, Ibidem, Rep. First Dist., 1843, p. 343, fig. 1.

Spirifer macropleurus Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 13, fig. 5.

Spirifer fischeri Castelnau, Ibidem, 1843, p. 42, pl. 13, fig. 4.

Spirifer macropleura Hall, Pal. New York, III, 1859, p. 202, pl. 27, fig. 1; pl. 28, fig. 8.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 13, 35, pl. 20, figs. 22–24, 27.

Spirifera macropleura Billings, Geol. Canada, 1863, p. 957, fig. 456;—Proc. Portland Soc. Nat. Hist., 1863, p. 117, pl. 3, fig. 16.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 51, figs. 22–24, 27.

Loc. Schoharie, Carlisle, Catskill, etc., New York; Square Lake, Maine; Cumberland, Maryland; Perry County, Tennessee.

Spirifer macrothyris Hall. Upper Helderberg (Dev.).

Spirifer macrothyris Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 132.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 29, 31, 39, pl. 23, figs. 16–18.

Spirifera macrothyris Hall, Pal. New York, IV, 1867, p. 202, pl. 30, figs. 16–20;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 53, figs. 16–18.

Loc. Williamsville and Clarence Hollow, New York; Cayuga, Ontario; Columbus, Ohio.

Spirifer mexicanus Shumard. Upper Carboniferous.

Spirifera Mexicana Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 292, pl. 11, fig. 4, and p. 390.

Loc. Guadalupe Mountains, New Mexico and Texas.

Spirifer missouriensis Swallow. Chouteau (L. Carb.).

Spirifer missouriensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 643.

Loc. Cooper County, Missouri.

Obs. Regarded by Keyes as a synonym for S. marionensis.

Spirifer modestus Hall=Reticularia modesta.

Spirifer mortonanus Miller. Keokuk (L. Carb.).

Spirifera fastigata Meek and Worthen (non Worthen), Proc. Acad, Nat. Sci. Philadelphia, 1870, p. 36;—Geol. Survey Illinois, VI, 1875, p. 521, pl. 30, fig. 3.

Spirifera mortonana Miller, American Pal. Fossils, 2d ed., 1883, p. 298.

Spirifer mortonanus Hall and Clarke, Pal, New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 38, figs. 18, 19.

Loc. Crawfordsville, Indiana; Kings Mountain and Lebanon, Kentucky.

Spirifer mucronatus Conrad=Spirifer pennatus.

Spirifer multicostatus Castelnau. ?Corniferous (Dev.).

Spirifer multicostatus Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 42, pl. 12, fig. 3.

Loc. Schoharie, New York.

Obs. See S. divaricatus.

Spirifer multigranosus Worthen=Spirifer texasanus.

Spirifer multistriata Hall=Trematospira multistriata.

Spirifer mundulus Rowley. Burlington (L. Carb.).

Spirifera mundula Rowley, American Geologist, XII, 1893, p. 307, pl. 14, figs. 10-12.

Loc. Louisiana, Missouri.

Spirifer murchisoni Castelnau. Oriskany (Dev.).

Spirifer murchisoni Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1343, p. 41, pl. 12, figs. 1, 2.

Spirifer arrecta Hall, Pal. New York, III, 1859, p. 422, pl. 97, figs. 1, 2.

Spirifera arrecta Billings, Geol. Canada, 1863, p. 960, fig. 466.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 24-27.

Spirifer sp. a A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 67, pl. 4, fig. 22.

Spirifer arrectus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 19, 37, pl. 33, figs. 24-27.

Loc. Schoharie and Albany counties, New York; Cumberland, Maryland; Cayuga, Ontario; near Totora, Bolivia.

Obs. Castelnau's figures prove conclusively that he was the first to describe this species.

Spirifer mysticensis Meek. Lower Carboniferous.

Spirifera mysticensis Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 466.—Miller, North American Geol. and Pal., 1889, p. 374.

Loc. Outlet of Mystic Lake, Montana.

Spirifer neglectus Hall. Keokuk (L. Carb.).

Spirifer neglectus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 643, pl. 20, fig. 5.

Spirifera neglecta Meek and Worthen, Geol. Survey Illinois, VI, 1875, p. 523, pl. 30, figs. 1c, 2a.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 217, pl. 18, fig. 10.

Spirifer neglectus Hall—Continued.
? Spirifera neglecta de Koninck, Annales du Musée Royal d'Historie Nat. de Belgique, XIV, 1887, p. 134, pl. 31, figs. 10-15.
Loc. Keokuk, Iowa; Warsaw and Nauvoo, Illinois; Eureka district, Nevada; ? Belgium.

Spirifer newberryi Hall. Waverly (L. Carb.).
Spirifera newberryi Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, figs. 9, 10.
Spirifer newberryi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 362, pl. 31, figs. 9, 10.
Loc. Northern Ohio.

Spirifer niagaraensis (Conrad). Niagara (Sil.).
Delthyris niagarensis Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 1.
Spirifer niagarensis Hall, Pal. New York, II, 1852, p. 264, pl. 54, fig. 5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 14, 35, pl. 21, figs. 1-4, 25; pl. 37, fig. 1.
Spirifera niagarensis Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 8;—Geol. Canada, 1863, p. 317, fig. 329.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 51, figs. 1-4, 25.
Loc. Lockport, Rochester, etc., New York; Osgood, Indiana.

Spirifer niagaraensis oligoptychus Roemer. Niagara (Sil.).
Spirifera niagarensis var. oligoptychus Roemer, Sil. Fauna West. Tennessee, 1860, p. 68, pl. 5, fig. 8.
Spirifer macropleurus Safford, Geol. Tennessee, 1869, p. 321.
Loc. Decatur County, Tennessee.
Obs. Compare with S. eudorus Hall and S. macropleurus Conrad.

Spirifer nictauvensis Dawson. Oriskany (Dev.).
Spirifera nictavensis Dawson, Acadian Geology, 3d ed., 1878, p. 499, fig. 176;—Canadian Nat. Geol., n. ser., IX, 1879, p. 3.
Loc. Near Nictaux, Nova Scotia.

Spirifer nobilis Barrande. Niagara (Sil.).
Spirifer nobilis Barrande, Ueber die Brach. der Sil. Schicht von Böhmen, 1847.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 14, 35, pl. 29, fig. 16; pl. 37, figs. 2, 3.
Spirifer racinensis McChesney, New Pal. Fossils, 1861, p. 84.
Spirifer inconstans Hall, Ann. Rep. Geol. Survey Wisconsin, 1861, p. 26;—Geol. Rep. Wisconsin, I, 1862, p. 69, fig. 6; p. 436.
Spirifera nobilis Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 372, pl. 13, figs. 14-16.
Spirifera racinensis McChesney, New Pal. Fossils, 1868, p. 84.
Loc. Racine, Wisconsin; Chicago, Illinois.

Spirifer norwoodana Hall=Spiriferina norwoodana.
Spirifer norwoodi Meek=Cyrtia norwoodi.

Spirifer nova-mexicanus Miller. Burlington (L. Carb.).
Spirifera novamexicana Miller, Jour. Cincinnati Soc. Nat. Hist., IV, 1881, p. 314, pl. 7, fig. 10.
Loc. Lake Valley mining district, New Mexico.

Spirifer nymphus Billings=Reticularia nympha.
Spirifer obtusus Gabb=Spiriferina obtusa.

Spirifer octocostatus Hall. Lower Helderberg (Dev.).

Spirifer octocostata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 62;—Pal. New York, III, 1859, p. 205, pl. 28, fig. 4.

Loc. Cumberland, Maryland.

Spirifer octoplicatus Hall=Spiriferina cristata.

Spirifer opimus Hall=Spirifer rockymontanus.

Spirifer orbignyi Morris and Sharpe. Lower Devonian.

Spirifer orbignii Morris and Sharpe, Quart. Jour. Geol. Soc. London, II, 1846, p. 276, pl. 11, fig. 3.

Loc. Falkland Islands.

Obs. Probably identical with S. antarcticus.

Spirifer oregonensis Shumard. Upper Carboniferous.

Spirifer oregonensis Shumard, Trans. St. Louis Acad. Sci., II, 1863, p. 108.

Loc. Near Fort Filmore, New Mexico.

Spirifer orestes Hall and Whitfield. Chemung (Dev.).

Spirifera orestes Hall and Whitfield, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1872, p. 237, pl. 11, figs. 16–20.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 55, fig. 20.

Spirifer orestes Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 38, pl. 30, fig. 20.

Loc. Rockford, Iowa; Naples, New York.

Obs. Compare with S. strigosus.

Spirifer osagensis Swallow. Chouteau (L. Carb.).

Spirifer osagensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 641.

Loc. Pettis County, Missouri.

Obs. Regarded by Keyes as a synonym for S. marionensis.

Spirifer ovalis Phillips. Carboniferous.

Spirifer ovalis Phillips, Geol. Yorkshire, II, 1836, p. 219, pl. 10, fig. 5.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 629.

Loc. Europe. Feilden Isthmus, lat. 82° 43′.

Spirifer oweni Hall=Spirifer granulosus.

Spirifer paradoxus (Schlotheim). Corniferous (Dev.).

Terebratula paradoxa Schlotheim, Petrefactenkunde, VII, 1813, p. 249, tab. 2, fig. 6.

Spirifer paradoxus? Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 415, pl. 10, fig. 2.

Loc. Europe; Union and Jackson counties, Illinois.

Spirifer parryana Hall=S. euryteines Owen.

Spirifer peculiaris Shumard. Kinderhook (L. Carb.).

Spirifer? peculiaris Shumard, Geol. Rep. Missouri, 1855, p. 202, Pl. C, fig. 7.

Spirifera (Martinia) peculiaris White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 90, pl. 5, fig. 7.

Loc. Cooper County, Missouri; Mountain Spring, Nevada.

Spirifer pedroanus Rathbun. Middle Devonian.

Spirifera pedroana (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 237, pl. 8, figs. 1–9, 13, 14, 16–20;—Proc. Boston Soc. Nat. Hist., XX, 1879, p. 27.

Loc. Erere and Province of Para, Brazil.

Spirifer pennatus Owen=Spirifer iowaensis.

Spirifer pennatus (Atwater). Marcellus, Hamilton, and Chemung (Dev.).
Terebratula pennata Atwater, American Jour. Sci. Arts, II, 1820, p. 244, pl. 1, figs. 2, 3.
Delthyris mucronata Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 54.—Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 150, fig. 3.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 198, figs. 2, 3; p. 205, fig. 3 (non p. 270, fig. 3=S. pennatus posterus).—(Conrad) Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, pl. 11, fig. 18.
Spirifer sowerbyi Castelnau, Essai Syst. Silurien l'Amérique Septentrionale, 1843, pl. 13, fig. 1 (non Fischer).
Spirifer lyelli de Verneuil, Ibidem, 1843, p. 43.
Spirifer mucronata Billings, Canadian Nat. Geol., I, 1856, p. 474, pl. 7, figs. 9, 10.—Rogers, Geol. Pennsylvania, II, 1858, p. 828, fig. 668.
Spirifera mucronata Billings, Canadian Jour., n. ser., VI, 1861, p. 254, figs. 59–62;—Geol. Canada, 1863, p. 386, fig. 424.—Hall, Pal. New York, IV, 1867, p. 216, pl. 34, figs. 1-32.—Nicholson, Pal. Prov. Ontario, 1874, p. 80.—Whitfield, Geol. Wisconsin, IV, 1882, p. 328, pl. 25, figs. 27, 28.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 59, figs. 13-22.—Calvin, American Geologist, I, 1888, p. 82.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 126, pl. 31, figs. 10, 11.
Spirifer mucronatus var. Williams, Bull. Geol. Soc. America, I, 1890, pl. 12, fig. 13.
Spirifer mucronatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 14, 17, 36, pl. 29, fig. 8; pl. 34, figs. 13-22.
Loc. New York, Pennsylvania, Maryland, Virginia; Bosanquet, Ontario; Milwaukee, Wisconsin.
Obs. Atwater's specimen was found in the drift of Ohio. Mr. Miller is correct in regarding it the same as the well-known S. mucronatus.

Spirifer pennatus posterus Hall and Clarke. Chemung (Dev.).
Delthyris mucronata (partim) Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 270, fig. 3.
Spirifer mucronatus var. posterus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 361, pl. 34, figs. 27-31.
Loc. Tompkins County, New York.

Spirifer pennatus tulliensis Williams. Tully (Dev.).
Spirifer mucronatus var. tulliensis Williams, Bull. Geol. Soc. America, I, 1890, p. 491, pl. 12, fig. 12.
Loc. Tinkers Falls, New York.

Spirifer pentlandi d'Orbigny. Carboniferous.
Spirifer pentlandi d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 48, pl. 5, figs. 15.
Loc. Lake Titicaca, Bolivia.

Spirifer perforata Hall=Trematospira perforata.

Spirifer perextensus Meek and Worthen. Corniferous (Dev.).
Spirifera perextensa Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 414, pl. 10, fig. 1.
Loc. Near Jonesboro, Union County, Illinois.
Obs. Regarded by Keyes as a synonym for S. ligus=S. iowaensis.

Spirifer perlamellosus Hall=Delthyris perlamellosa.
Spirifer perplexus McChesney=Reticularia perplexa.

Spirifer pertenuis Hall. Hamilton (Dev.).

Spirifer pertenuis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 163.
Spirifera perextensa Hall, Pal. New York, IV, 1867. p. 236.
Loc. Cumberland, Maryland (Whitfield).
Obs. Compare with S. macronota Hall.

Spirifer pharovicinus A. Winchell. Huron (Dev.).

Spirifera pharovicina A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 406.
Loc. Port aux Barques, Michigan.

Spirifer pinonensis Meek. Lower to Upper Devonian.

Spirifer (Trigonotreta) pinonensis Meek, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 60;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 45, pl. 1, fig. 9.
Spirifer (Trigonotreta) argentarius Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 42, pl. 4, fig. 4.
Spirifera pinonensis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 138, pl. 4, fig. 1.
Loc. White Pine and Eureka districts, Nevada.

Spirifer planoconvexus Shumard=Ambocœlia planiconvexa.
Spirifer plenus Hall=Syringothyris plena.
Spirifer plicatella of authors=Spirifer radiatus.

Spirifer pluto Clarke. Genesee (Dev.).

Spirifera pluto Clarke, Bull U. S. Geol. Survey, 16, 1885, p. 31, pl. 3, fig. 12.
Loc. Ontario County, New York.
Obs. See Leiorhynchus hecate Clarke.

Spirifer præmatura Hall=Reticularia præmatura.
Spirifer propinquus Hall=Syringothyris texta.
Spirifer prorus Conrad=Spirifer acuminatus.
Spirifer pseudolineatus Hall=Reticularia pseudolineata.
Spirifer pulchrus Meek=Spiriferina pulchra.
Spirifer pyramidalis Hall=Cyrtina pyramidalis.
Spirifer pyxidatus Hall=Metaplasia pyxidata.

Spirifer quichuus d'Orbigny. Devonian.

Spirifer quichua d'Orbigny, Voyage dans l'Amérique Méridionale, Pal., 1842, p. 37, pl. 2, fig. 21.
Loc. Chuquisaca, Bolivia.

Spirifer racinensis McChesney=Spirifer nobilis.

Spirifer radiatus Sowerby. Clinton and Niagara (Sil.).

Spirifer plicatella var. radiata Sowerby, Mineral Conchology, V, 1825, p. 493, figs. 1, 2.
Delthyris bialveata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 261, pl. 14, fig. 17.
Delthyris radiata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 105, fig. 2.
Spirifer radiata Hall, Pal. New York, II, 1852, pp. 66, 265, pl. 22, figs. 2d–25 (non 2a–2c=Cyrtia meta); pl. 54, fig. 6.
Spirifera radiata Billings, Canadian Nat. Geol., I, 1856, p. 135, pl. 2, figs. 2, 3;—Geol. Canada, 1863, p. 317, fig. 328.—Hall and Whitfield, Twenty-seventh Rep. N. Y. State Cab. Nat. Hist., 1875, pl. 9, figs. 17, 18.—Hall, Twenty-eighth Rep. Ibidem, 1879, p. 157, pl. 24, figs. 20–30.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 497, pl. 3, figs. 5, 6;—Tenth Rep. State Geol. Indiana, 1881, p. 129, pl. 3, figs. 5, 6.—Hall, Eleventh

Spirifer radiatus Sowerby—Continued.

Rep. Ibidem, 1882, p. 296, pl. 24, figs. 20-30.—Whitfield, Geol. Wisconsin, IV, 1882, p. 287, pl. 17, figs. 1, 2.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 51, figs. 9-13, 26 (?14-17).—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 130, pl. 29, figs. 13-16.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 313, pl. 5, fig. 6.

Spirifer radiatus Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 77, pl. 6, figs. 9-11.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 13, 35, pl. 21, figs. 5, 9-13, 26 (?14-18).

Spirifer tenuistriatus Shaler (non Hall), Bull. Mus. Com. Zool., 4, 1865, p. 70.

Spirifera plicatella Billings, Catalogue Silurian Fossils of Anticosti, 1866, p. 48.

Spirifera plicatella var. radiata Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 371, pl. 13, figs. 9-11.

Loc. Europe; Lockport, Rochester, etc., New York; Hamilton, Ontario; Squatook Lake, New Brunswick; Waldron and Osgood, Indiana; Louisville, Kentucky; Cumberland Gap, Tennessee; Bridgeport, Illinois; Racine, Wauwatosa, and Milwaukee, Wisconsin.

Spirifer raricostus Hall=Delthyris raricosta.

Spirifer rectiplicatus (Conrad). ?Oriskany (Dev.).

Atrypa rectiplicata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 265.

Loc. "Helderberg Mountains in Middle Silurian limestone."

Obs. May be the same as Metaplasia pyxidata Hall.

Spirifer richardsoni Meek=Reticularia fimbriata.

Spirifer rockymontanus Marcou. Upper Carboniferous.

Spirifer rockymontani Marcou, Geol. North America, March, 1858, p. 50, pl. 7, fig. 4.

Spirifer opima Hall, Geol. Survey Iowa, I, Pt. II, December, 1858, p. 711.

Spirifera subventricosa McChesney, New Pal. Fossils, 1860, p. 44;—Trans. Chicago Acad. Sci., I, 1868, p. 35, pl. 1, fig. 4.

Spirifera opima Derby, Bull. Cornell University, I, 1874, p. 15, pl. 1, fig. 4; pl. 2, fig. 7; pl. 4, fig. 12.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 56, figs. 4-7.—Herrick, Bull. Denison Univ., II, 1887, p. 44, pl. 2, fig. 23.

Spirifera (Trigonotreta) opima Meek, Pal. Ohio, II, 1875, p. 329, pl. 19, figs. 14a-14d (?14e);—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 88, pl. 9, fig. 6.

Spirifera rockymontana White, Wheeler's Expl. and Survey west 100th Merid., IV, 1875, p. 134, pl. 11, fig. 9.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1888, p. 231;—Geol. Survey Missouri, V, 1895, p. 84.

?Spirifera rockymontana? Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 584, pl. 13, fig. 20;—Geol. Ohio, VII, 1895, p. 471, pl. 9, fig. 20.

Spirifer opimus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 27, 39, pl. 31, figs. 4-7.

Loc. Tigeras and Canyon of San Antonio, New Mexico; Oquirrh Range, Utah; Arkansas; Iowa; Missouri; Illinois; Indiana; Ohio; Maryland; West Virginia; Bomjardim and Itaituba, Brazil; ?Chester group at Newtonville, Ohio (Whitfield).

Obs. See S. boonensis.

Spirifer rostellatus Hall. Keokuk (L. Carb.).

Spirifer rostellata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 641, pl. 20, fig. 2.

Spirifer rostellatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 26, pl. 32, fig. 5.

Loc. Skunk River, Iowa.

Spirifer rostellum Hall and Whitfield. Niagara (Sil.).

Spirifera rostellum Hall and Whitfield, Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 182;—Hall, Twenty-seventh Rep. Ibidem, 1875, pl. 9, figs. 11-13.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 129, pl. 29, fig. 25; pl. 27, figs. 17-19.

Spirifera (Cyrtia) rostellum Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 313, pl. 5, fig. 5.

Loc. Louisville, Kentucky; Collinsville, Alabama.

Spirifer rostratus Morton. Upper Carboniferous.

Spirifer rostrata Morton, American Jour. Sci. Arts, 1836, p. 152, pl. 14, fig. 34.

Loc. Junior Furnace, Scioto County, Ohio.

Obs. Poorly defined. May be a species of Athyris.

Spirifer rugicostus Hall=Delthyris rugicosta.

Spirifer saffordi Hall. Lower Helderberg (Dev.).

Spirifer saffordi Hall, Pal. New York, III, 1859, p. 203, pl. 28, fig. 2.

Loc. Decatur County, Tennessee; Hudson, New York.

Spirifer scobina Meek. Carboniferous.

Spirifera scobina Meek, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 310.

Spirifer (Spiriferina?) scobina Meek, Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 351, pl. 2, fig. 5.

Spirifera (Trigonotreta) scobina Meek, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 90, pl. 9, fig. 1.

Loc. Divide between Long and Ruby Valleys, Utah.

Spirifer sculptilis Hall=Delthyris sculptilis.

Spirifer segmentum Hall. Upper Helderberg (Dev.).

Spirifer segmentus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 131.

Spirifera segmenta Hall, Pal. New York, IV, 1867, p. 207, pl. 31, figs. 14-19.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 132, pl. 13, figs. 36-38.

Loc. Falls of Ohio; Columbus, Ohio.

Spirifer semiplicatus Hall=Reticularia cooperensis.

Spirifer setigerus Hall=Reticularia setigera.

Spirifer sheppardi Castelnau=Platystrophia biforata.

Spirifer sillanus A. Winchell. Waverly (L. Carb.).

Spirifera sillana A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119.

Loc. Near Cuyahoga Falls, Ohio.

Spirifer similior Winchell and Marcy. Niagara (Sil.).

Spirifera (Martinia) similior W. and M., Mem. Boston Soc. Nat. Hist., I, 1865, p. 93.

Pentamerus similior Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1868, p. 397.

Loc. Bridgeport, Illinois.

Obs. This shell has spirals.

Spirifer solidirostris White=Spiriferina solidirostris.

Spirifer sowerbyi Castelnau (non Fischer)=Spirifer pennatus.

Spirifer spinosus Norwood and Pratten=Spiriferina spinosa.

Spirifer striatiformis Meek. Waverly (L. Carb.).

Spirifera (Trigonotreta) striatiformis Meek, Pal. Ohio, II, 1875, p. 280, pl. 14, fig. 8.

Spirifer striatiformis Herrick, Bull. Denison Univ., III, 1888, p. 44, pl. 3, fig. 26; pl. 6, figs. 6, 7;—Geol. Ohio, VII, 1895, pl. 15, fig. 9.

Loc. Sciotoville and Licking County, Ohio.

Spirifer submucronatus Hall. Oriskany (Dev.).

Spirifer submucronata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 62;—Pal. New York, III, 1859, p. 419, pl. 96, fig. 7.

Spirifera submucronata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 5–7.

Spirifer submucronatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 33, figs. 5–7.

Loc. Cumberland, Maryland.

Obs. Possibly the young of Spirifer cumberlandia.

Spirifer suborbicularis Hall. Keokuk (L. Carb.).

Spirifer suborbicularis Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 644.

Spirifera suborbicularis Meek and Worthen, Geol. Survey Illinois, VI, 1875, p. 523, pl. 30, fig. 1.

Loc. Keokuk, Iowa; Warsaw and Nauvoo, Illinois.

Spirifer subrotundatus Hall. Kinderhook (L. Carb.).

Spirifer subrotundata Hall (non McCoy, 1855), Geol. Survey Iowa, I, Pt. II, 1858, p. 521, pl. 7, fig. 8.

Spirifera subrotundata Keyes, Geol. Survey Missouri, V, 1895, p. 78.

Loc. Burlington, Iowa; Sciotoville, Ohio (Winchell).

Obs. This specific name was first used by McCoy in 1855 but is usually regarded as a synonym for S. pinguis Sowerby. De Koninck, however, retains McCoy's name as late as 1887.

Spirifer substrigosus Webster. Chemung (Dev.).

Spirifera substrigosa Webster, American Nat., XXII, 1888, p. 1101.

Loc. Near Rockford, Iowa.

Spirifer subsulcatus Hall. Arisaig (Sil.).

Spirifer subsulcata Hall (non Dalman, 1828), Canadian Nat. Geol., V, 1860, p. 145.

Spirifera subsulcata Dawson, Acadian Geology, 3d ed., 1878, p. 597.—Miller, N. American Geol. and Pal., 1889, p. 376.

Loc. Arisaig, Nova Scotia.

Spirifer subumbona Hall=Martinia subumbona.

Spirifer subundifera Meek and Worthen=Reticularia subundifera.

Spirifer subvaricosus Hall and Whitfield. ?Hamilton (Dev.).

Spirifera subvaricosa Hall and Whitfield, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1872, p. 237, pl. 11, figs. 12-15.

Loc. Waterloo, Iowa.

Spirifer subventricosus McChesney=Spirifer rockymontana.

Spirifer sulcatus Hall=Delthyris sulcata.

Spirifer sulcifer Shumard. Upper Carboniferous.

Spirifer sulcifera Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 293, pl. 11, fig. 3.

Loc. Guadalupe Mountains, New Mexico.

Spirifer superbus Billings (non Eichwald)=Spirifer billingsana.

Spirifer taneyensis Swallow. Chouteau (L. Carb.).

Spirifer taneyensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 645.

Spirifera taneyensis Keyes, Geol. Survey Missouri, V, 1895, p. 78.

Loc. Taney County, Missouri.

Spirifer temeraria Miller=Reticularia temeraria.

Spirifer tenuicostatus Hall. Keokuk and Wârsaw (L. Carb.).

Spirifer tenuicostata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 662, pl. 23, fig. 8.

Loc. Keokuk, Iowa; Warsaw and Dallas, Illinois.

Spirifer tenuimarginatus Hall. Keokuk (L. Carb.).

Spirifer tenuimarginata Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 641, pl. 20, fig. 1.

Spirifera tenuimarginata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 57, figs. 4-6.

Spirifer tenuimarginatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 38, pl. 32, figs. 4, 6.

Loc. Warsaw, Illinois.

Spirifer tenuis Hall. Hamilton (Dev.).

Spirifer tenuis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 162.

Spirifera tenuis Hall, Pal. New York, IV, 1867, p. 236.

Loc. Cumberland, Maryland.

Obs. Compare with Spirifer granulosus Conrad.

Spirifer tenuispinatus Herrick=Reticularia tenuispinata.

Spirifer tenuistriatus Shaler (non Hall)=Spirifer radiatus.

Spirifer tenuistriatus Hall. Lower Helderberg (Dev.).

Spirifer tenuistriata Hall, Pal. New York, III, 1859, p. 204, pl. 28, fig. 3.

Spirifera tenuistriata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 61, fig. 8.

Spirifer tenuistriatus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 36, fig. 8.

Loc. Decatur County, Tennessee.

Spirifer texasanus Meek. Upper Carboniferous.

Spirifer (Trigonotreta?) texana Meek, Proc. Acad. Nat. Sci. Philadelphia, 1871, p. 179.

Spirifer (Trigonotreta?) texanus Meek, Macomb's Rep. Expl. Exped. from Santa Fe to the Great Colorado of the West, 1876, p. 139, pl. 3, fig. 5.

Spirifera multigranosa Worthen, Geol. Survey Illinois, VIII, 1890, p. 105, pl. 11, fig. 5.

Spirifer texanus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 26, 38, pl. 37, figs. 16, 17.

Loc. Young and Jack counties, Texas; Springfield, Illinois.

Spirifer textus Hall=Syringothyris texta.

Spirifer translatus Swallow=Reticularia translata.

Spirifer transversus McChesney=Spiriferina transversa.

Spirifer tribulis Hall. Oriskany (Dev.).

Spirifer tribulis Hall, Pal. New York, III, 1859, p. 420, pl. 96, fig. 8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 58, figs. 1-4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 37, pl. 33, figs. 1-4.

Loc. Cumberland, Maryland.

Obs. Possibly the young of Spirifer murchisoni.

Spirifer trigonalis (Martin). Carboniferous.

Anomites trigonalis Martin, Petrefacta Derbiensia, tab. 36, 1809, fig. 1.

Spirifera trigonalis Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 215, pl. 18, fig. 11.

Loc. Europe; Eureka district, Nevada.

Spirifer triplicatus Hall=Spirifer camaratus.

Spirifer triradialis Meek (non Phillips)=Spirifer agelaius.

Spirifer troosti Castelnau. ? Formation.

Spirifer troosti Castelnau, Essai Système Silurien l'Amérique Septentrionale, 1843, p. 41, pl. 12, fig. 5.

Loc. "Kentucky."

Spirifer tullius Hall. Hamilton (Dev.).

Spirifera tullia Hall, Pal. New York, IV, 1867, p. 218, pl. 35, figs. 1-9;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 52, fig. 18.

Spirifera tullia var. Whiteaves, Cont. Canadian Pal., I, 1891, p. 224, pl. 32, fig. 1.

Spirifer tullius Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 14, 35, pl. 22, fig. 18; pl. 37, figs. 6, 7.

Loc. Tully, Apulia, etc., New York; Athabasca River, Canada.

Spirifer tumidus Bayle and Coquand = Spiriferina rostrata.

Spirifer undiferus Roemer = Reticularia undifera.

Spirifer unica Hall = Spirifer arenosus.

Spirifer urbanus Calvin. Hamilton (Dev.).

Spirifera urbana Calvin, Bull. Lab. Univ. of Iowa, 1888, p. 28.—Bull. Lab. Nat. Hist. State Univ. Iowa, II, 1892, p. 166, pl. 12, fig. 1.

Loc. Iowa City and Linn County, Iowa.

Spirifer utahensis Meek = Cyrtia norwoodi.

Spirifer valenteana Rathbun. Middle Devonian.

Spirifera valenteana (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 241, pl. 8, fig. 11.

Loc. Erere, Province of Para, Brazil.

Spirifer vanuxemi Hall. Tentaculite (Sil.).

Orthis plicata Vanuxem (non Sowerby), Geol. New York; Rep. Third Dist., 1842, p. 112, fig. 1.

Orthis? (Delthyris) plicatus Hall, Ibidem, Fourth Dist., 1843, p. 142, fig. 1.

Spirifer vanuxemi Hall, Pal. New York, III, 1859, p. 198, pl. 8, figs. 17-23;—Second Rep. N. Y. State Geol., 1883, pl. 61, fig. 11.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 19, 36, pl. 36, fig. 11.—Whitfield, Geol. Ohio, VII, 1895, p. 411, pl. 1, figs. 4, 5.

Spirifera vanuxemi Whitfield, Annals N. Y. Acad. Sci., V, 1891, p. 509, pl. 5, figs. 4, 5.

Loc. Albany and Schoharie counties, New York; Put in Bay Island, Lake Erie.

Obs. Vanuxem's specific name is restored, since Sowerby's species is an Orthis.

Spirifer varicosus Hall. Corniferous (Dev.).

Spirifer varicosa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 130.

Spirifera varicosa Billings, Canadian Jour., VI, 1861, p. 255, figs. 63, 64;—Geol. Canada, 1863, p. 960, fig. 467.—Hall, Pal. New York, IV, 1867, p. 205, pl. 31, figs. 1-4;—Second Rep. N. Y. State Geol., 1883, pl. 59, figs. 4-8.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 136.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 134, pl. 10, figs. 11-20, 23-25.

Spirifer varicosus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 17, 36, pl. 34, figs. 4-8.

Loc. Williamsville, New York; Woodstock, Canada; Columbus, Ohio; Louisville, Kentucky; Eureka district, Nevada.

Spirifer ventricosa Hall = Nucleospira ventricosa.

Spirifer venustus Hall = Spirifer divaricatus.

Spirifer vernonensis Swallow. Chouteau (L. Carb.).

Spirifer vernonensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 644.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119.

Loc. St. Louis County, Missouri.

Obs. Regarded by Keyes as a synonym for S. marionensis.

Spirifer vernonensis ozarkensis Swallow. Chouteau (L. Carb.).

Spirifer vernonensis var. ozarkensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 644.

Loc. Taney County, Missouri.

Obs. Regarded by Keyes as a synonym for S. marionensis.

Spirifer vogeli von Ammon. Middle Devonian.

Spirifer vogeli von Ammon, Zeits. Gesell. für Erdk., Berlin, XXVIII, 1893, p. 362, fig. 6.

Loc. Taquarassu, Mato Grosso, Brazil.

Spirifer waldronensis Miller and Dyer=Mimulus waldronensis.

Spirifer waverlyensis A. Winchell. Waverly (L. Carb.).

Spirifer waverlyensis A. Winchell, Proc. Amer. Phil. Soc., XII, 1870, p. 251.

Loc. "Newark, Ohio" (A. Winchell's MS.).

Spirifer whitneyi Hall. Chemung (Dev.).

Spirifer whitneyi Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 502, pl. 4, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 24, 57, pl. 30, figs. 18, 19.

Spirifera whitneyi Hall, Pal. New York, IV, 1867, pp. 243, 417;—Second Rep. N. Y. State Geol., 1883, pl. 55, figs. 18, 19.—Tschernyschew, Mém. du Comité Géol. de St. Petersbourg, III, 1887, p. 60.

Loc. Rockford, Iowa; North Saskatchewan, Canada; Russia.

Spirifer williamsi Hall and Clarke. Chemung (Dev.).

Spirifer williamsi Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 361, pl. 37, figs. 20–22.

Loc. Allegany County, New York.

Spirifer winchelli Herrick. Waverly (L. Carb.).

Spirifer winchelli Herrick, Bull. Denison Univ., III, 1888, p. 46, pl. 5, figs. 2, 3; pl. 2, fig. 16;—Geol. Ohio, VII, 1895, pl. 21, figs. 2, 3.

Loc. Granville, Ohio.

Spirifer worthenanus Schuchert. Oriskany (Dev.).

Spirifera engelmanni Meek and Worthen (non Meek, 1860), Geol. Survey Illinois, III, 1868, p. 398, pl. 8, fig. 5.

Spirifera wortheni Meek (non Hall, 1857), King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 42.

Spirifera worthenana Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 54.

Loc. Union County, Illinois.

Spirifer wortheni Meek (non Hall)=Spirifer worthenanus.

Spirifer wortheni Hall. Hamilton (Dev.).

Spirifer wortheni Hall, Tenth Rep., N. Y. State Cab. Nat. Hist., 1857, p. 156.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 27, figs. 19, 20.

Loc. Calhoun County, Illinois.

Spirifer ziczac Hall (non Roemer)=Delthyris consobrina.

SPIRIFERINA d'Orbigny.

Genotype Spirifer walcotti Sowerby=S. rostrata (Schlotheim).

Spiriferina d'Orbigny, Paris Acad. Sci., Comptes Rendus, XXV, 1847, p. 268;—Ann. Sci. Nat., XIII, 1850, p. 334.—White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 24.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 498.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 51;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 764.

Spiriferina aciculifera (Rowley). Kinderhook (L. Carb.).

Spirifera aciculifera Rowley, American Geologist, XII, 1893, p. 307;—Ibidem, 1893, pl. 14, figs. 13, 14.

Loc. Louisiana, Missouri.

Spiriferina (?) **alia** Hall and Whitfield. Triassic.

Spirifera (Spiriferina?) alia Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 281, pl. 6, fig. 17.

Loc. Dun Glen Pass, Pah-Ute Range, Nevada.

Spiriferina billingsi Shumard. Upper Carboniferous.

Spiriferina billingsi Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 294, 391.

Loc. Guadalupe Mountains, New Mexico and Texas.

Spiriferina binacuta A. Winchell. Burlington (L. Carb.).

Spiriferina binacuta A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 120.

Loc. Burlington, Iowa.

Spiriferina borealis Whiteaves. Triassic.

Spiriferina borealis Whiteaves, Cont. Canadian Pal., I, 1888, p. 128, pl. 17, fig. 1, abstract.

Loc. Liard River, Canada.

Spiriferina clarksvillensis A. Winchell. Chouteau (L. Carb.).

Spiriferina clarksvillensis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 119.—Keyes, Geol. Survey Missouri, V, 1895, p. 85.

Loc. Clarksville, Missouri.

Spiriferina cristata Walcott=S. spinosa.

Spiriferina cristata (Schlotheim). Upper Carboniferous.

Terebratulites cristatus Schlotheim, Beit. zur Naturg. der Verst.; Akad. der Wiss. zu München, 1816, pl. 1, fig. 3.

Spirifer octoplicata? Hall (non Sowerby), Stansbury's Exped. Great Salt Lake of Utah, 1852, p. 409, pl. 4, fig. 4.

Spirifer kentuckyensis Shumard, Geol. Survey Missouri, I, 1855, p. 203.—Hall, Pacific Railroad Rep., III, 1856, p. 102, pl. 2, figs. 10, 11.—Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 27.

Spiriferina cristata Davidson, Quart. Jour. Geol. Soc. London, 1863, p. 170, pl. 9, fig. 6.—Dawson, Acadian Geol., 3d ed., 1878, p. 291, fig. 90.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 218, pl. 18, figs. 12, 13.—Smith, Proc. American Phil. Soc., XXV, 1897, p. 32.

Spirifer laminosus Geinitz (non McCoy), Carb. und Dyas in Nebraska, 1866, p. 45, pl. 3, fig. 19.

Spirifer kentuckyensis var. propatulus Swallow, Trans. St. Louis Acad. Sci., II, 1866, p. 489.

?Spiriferina octoplicata Toula, Sitzungsb. der kais. Akad. der Wissensch. zu Wien, LIX, 1869, p. 5.

Spiriferina kentuckyensis Meek, Final Rep. U. S. Geol. Survey of Nebraska, 1872, p. 185, pl. 6, fig. 3; pl. 8, fig. 11.—White, Wheeler's Expl. and Survey west 100th Meridian, IV, 1875, p. 138, pl. 10, fig. 4;—Thirteenth Rep. Indiana State Geol., 1884, p. 135, pl. 35, figs. 13, 14.—Keyes, Proc. Acad. Nat. Sci. Philadelphia, 1890, p. 231.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 52, fig. 41, pl. 29, fig. 17.—Keyes, Geol. Survey Missouri, V, 1895, p. 86.

Spiriferina cristata? Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 629.

Spirifer (Spiriferina) kentuckyensis Hall, Second Rep. N. Y. State Geol., 1883, pl. 61, figs. 14–16.

Spiriferina pulchra Meek—Continued.

Spirifer (Spiriferina) pulcher, Meek. Simpson's Rep. Expl. Great Basin Terr. Utah, 1876, p. 352, pl. 2, fig. 1.

Loc. White Pine district, Nevada; Long and Ruby valleys, Utah.

Spiriferina rostrata Schlotheim. Jurassic.

Spirifer chilensis Forbes, Darwin's Geol. Observations S. America, 1846, p. 267, pl. 5, figs. 15, 16.

Spirifer linguiferoides Forbes, Ibidem, 1846, p. 267, pl. 5, figs. 17, 18.

Spirifer tumidus Bayle and Coquand, Mém. Géol. Soc. France, ser. ii, IV, 1851, p. 19, pl. 7, figs. 11, 12.

Spirifer chilensis and rostratus Burmeister and Geibel, Abh. Naturf. Gesell. Halle, VI, 1862, p. 125.

Spiriferina rostrata (Schl.) Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 59.

Loc. Europe; Sierra de la Ternera, Las Amolanes, Rio Claro, Tres Cruces, Manflas, Cordillera de Guasco, and Juntas, Chile.

Spiriferina solidirostris White. Kinderhook (L. Carb.).

Spirifer solidirostris White, Jour. Boston Soc. Nat. Hist., VII, 1860, p. 232.

Spiriferina solidirostris White, Ibidem, IX, 1862, p. 24.—A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 120.—Herrick, Bull. Denison Univ., III, 1888, p. 47, pl. 2, figs. 9-11; pl. 5, fig. 13;—Geol. Ohio, VII, 1895, pl. 21, fig. 13.

Loc. Burlington, Iowa; Hamburg, Illinois; Newark and Sciotoville, Ohio.

Spiriferina spinosa (Norwood and Pratten). Kaskaskia (L. Carb.).

Spirifer spinosa Norwood and Pratten, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., III, 1856, p. 71, pl. 9, fig. 1.—Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 706, pl. 27, fig. 5.

Spiriferina spinosa? Derby, Bull. Cornell Univ., I, 1874, p. 23, pl. 6, figs. 8, 13, 14.

Spiriferina spinosa Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 60, figs. 26–29.

Spiriferina cristata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 218, pl. 18, figs. 12, 13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 52-54, pl. 35, figs. 26–29.

? Spiriferina spinosa Herrick, Bull. Geol. Soc. America, II, 1891, p. 46, pl. 1, fig. 19.

Loc. Kaskaskia, Alton, and Chester, Illinois; Bloomington, Indiana; Crittenden County, Kentucky; Itaituba, Brazil.

Spiriferina spinosa campestris White=Spiriferina octoplicata.

Spiriferina subelliptica (McChesney). Keokuk (L. Carb.).

Spirifer subelliptica McChesney, New Pal. Fossils, 1860, p. 43.

Spiriferina subelliptica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 54, pl. 35, figs. 21, 22.

Loc. Buttonmould Knob, Kentucky; New Providence, Indiana.

Spiriferina subtexta White. Burlington (L. Carb.).

Spiriferina ? subtexta White, Proc. Boston Soc. Nat. Hist., IX, 1862, p. 25.

Loc. Burlington, Iowa.

Spiriferina transversa (McChesney). Kaskaskia (L. Carb.).

Spirifer transversa McChesney, New Pal. Fossils, 1860, p. 42;—Trans. Chicago Acad. Sci., I, 1868, p. 34, pl. 6, fig. 3.—Hall, Second Rep. N. Y. State Geol., 1883, pl. 60, figs. 19–22.

Spiriferina transversa (McChesney)—Continued.

Spiriferina transversa Derby, Bull. Cornell Univ., I, 1874, p. 21, pl. 2, figs. 4, 5, 6, 13; pl. 13, figs. 12-14, 17; pl. 5, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 46, 64, pl. 35, figs. 19, 20, 23-25.

Loc. Buzzards Roost, Alabama; Litchfield, Kentucky; Bomjardim and Itaituba, Brazil.

Spirigera d'Orbigny=Athyris.

Spirigera eborea A. Winchell=Athyris fultonensis.

Spirigera planosulcata White (non Phillips)=Cleiothyris crassicardinalis.

SPIRIGERELLA Waagen. Genotype S. derbyi Waagen.

Spirigerella Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 450.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 98;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 782.

Spirigerella derbyi Waagen. Upper Carboniferous.

Athyris subtilita (partim) Derby, Bull. Cornell Univ., I, 1874, p. 7, pl. 1, fig. 7 (not the other figures).

Spirigerella derbyi Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 453, pl. 35, figs. 4-7, 9-13; pl. 37, figs. 11-13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 99, fig. 73.

Loc. Bomjardim and Itaituba, Brazil.

Stenochisma Œhlert (non Conrad or Hall)=Camarophoria.

STENOCHISMA Conrad. Genotype Terebratulites schlotheimii Conrad (non von Buch)=Rhynchonella formosa Hall.

Stenocisma Conrad, Second Ann. Rep. N. Y. Geol. Survey, 1839, pp. 58, 59.—Meek and Hayden (partim), Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 172, 1864, p. 16, footnote.—Hall, Pal. New York, IV, 1867, pp. 334, 335.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, pp. 411, 431, 436.—Miller, N. American Geol. and Pal., 1890, p. 337.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 187;—Thirteenth Ann. Rep. N. Y. State Geol., 1895, p. 826.

Obs. The above synonymy is retained for historical purposes. The only species left in the genus by Hall and Clarke is the type species, Rhynchonella formosa, which seems to be nothing more than a Rhynchotrema. This will leave Stenochisma without a species. This name, however, should not displace either Rhynchotrema or Camarotœchia, since it was not defined, and in addition to this was founded by Conrad upon an erroneous identification. Nor can the view of Œhlert be adopted, i. e., that Stenochisma should displace Camarophoria King, because Conrad gave as the type C. schlotheimii. This name did not apply to von Buch's species, but to the shell now known as Rhynchonella formosa Hall.

All the species formerly referred to Stenochisma will be found under Camarotœchia except R. formosa, which is referred to Rhynchotrema.

Stenocisma Hall, 1857 (non Conrad, 1839, Hall, 1867)=Zygospira.

STREPTIS Davidson. Genotype Terebratula grayi Davidson.

Streptis Davidson, Geol. Mag., VIII, 1881, p. 150, pl. v, fig. 13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 274;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 289.

Streptis grayi Davidson. Niagara (Sil.).

Terebratula grayii Davidson, Bull. Soc. Géol. France, 2d ser., V, 1848, p. 331, pl. iii, fig. 33.

Streptis grayi Davidson—Continued.

Atrypa? grayi Davidson, British Sil. Brach., Paleontographical Soc. (1866), 1867, p. 141, pl. xiii, figs. 14–22.

Streptis grayi Williams, American Jour. Sci., 3d ser., XLVIII, 1894, p. 331.

Loc. England; Batesville, Arkansas.

Streptis waldronensis Beecher and Clarke=Mimulus waldronensis.

STREPTORHYNCHUS King.

Genotype Terebratulites pelargonatus Schlotheim.

Streptorhynchus King, Mon. Permian Fossils, Pal. Soc., 1850, p. 107.—Derby (partim), Bull. Cornell Univ., I, 1874, pp. 32, 39.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 267;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 288.

Streptorhynchus æquivalvis Hall=Orthothetes inæqualis.

Streptorhynchus agassizi Rathbun=Orthothetes agassizi.

Streptorhynchus approximata James=Strophomena approximata.

Streptorhynchus arctostriata Walcott=Orthothetes chemungensis arctistriatus.

Streptorhynchus biloba Hall=Derbya biloba.

Streptorhynchus cardinale Whitfield=Strophomena cardinalis.

Streptorhynchus chemungensis Hall=Orthothetes chemungensis.

Streptorhynchus coreanus Derby=Derbya correana.

Streptorhynchus crenistria Keyes (non Phillips)=Derbya crassa.

Streptorhynchus crenistrius American authors=Orthothetes crenistria.

Streptorhynchus elongatus James=Strophomena rugosa.

Streptorhynchus filitextus Hall=Strophomena incurvata.

Streptorhynchus flabellum Whitfield=Orthothetes flabellum.

Streptorhynchus hallianus Derby. Upper Carboniferous.

Streptorhynchus hallianus Derby, Bull. Cornell Univ., I, 1874, p. 35, pl. 5, figs. 1, 2, 5, 8, 12, 14, 16, 18; pl. 8, fig. 3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 268, pl. 11, figs. 6–17.

Loc. Bomjardim and Itaituba, Brazil.

Streptorhynchus hallanum Miller=Strophomena halli.

Streptorhynchus hemiaster Winchell and Marcy=Orthothetes subplanus.

Streptorhynchus hydraulicum Whitfield=Orthothetes hydraulicus.

Streptorhynchus inæqualis Winchell=Orthothetes inæqualis.

Streptorhynchus inflatus White and Whitfield=Orthothetes inflatus.

Streptorhynchus lens White=Orthothetes lens.

Streptorhynchus minor Walcott=Strophomena minor.

Streptorhynchus (?) multistriata (Meek and Hayden).

Upper Carboniferous.

Orthisina umbraculum? Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 26.

Orthisina multistriata Meek and Hayden, Ibidem, 1859, at end of description.

Loc. Fort Riley, Kansas.

Streptorhynchus neglectus James=Strophomena neglecta.

Streptorhynchus occidentalis Newberry=Meekella occidentalis.

Stricklandinia canadaensis Billings. Clinton (Sil.).

Stricklandia canadensis Billings, Canadian Nat. and Geol., IV, 1859, p. 135.
Stricklandinia canadensis Billings, Pal. Fossils, II, 1874, p. 81.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251.
Loc. Near Thorold, Ontario.

Stricklandinia castellana White. Niagara (Sil.).

Stricklandinia castellana White, Proc. Acad. Nat. Sci. Philadelphia, 1876, p. 30.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 3-7.
Loc. Castle Grove, Jones County, Iowa.

Stricklandinia chapmani Hall and Clarke. Niagara (Sil.).

Stricklandinia chapmani Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, fig. 40.
Loc. Hamilton, Ontario.

Stricklandinia davidsoni Billings. Anticosti (Sil.).

Stricklandinia davidsoni Billings, Geol. Mag., V, 1868, p. 59, pl. 4, figs. 1-1*d*;—Pal. Fossils, II, 1874, p. 86, pl. 6, fig. 1.—White, Proc. U. S. Nat. Mus., III, 1880, p. 48.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, fig. 15.
Loc. Anticosti; eastern Canada; Ringgold, Catoosa County, Georgia.

Stricklandinia deformis Meek and Worthen. Niagara (Sil.).

Stricklandinia deformis Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 37;—Geol. Survey Illinois, VI, 1875, p. 502, pl. 24, fig. 5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 8-10.
Loc. Carroll County, Illinois.
Obs. Probably the same as S. melissa.

Stricklandinia elongata Billings=Amphigenia elongata.

Stricklandinia elongata curta Meek and Worthen=Amphigenia curta.

Stricklandinia gaspiensis Billings. Gaspé (Sil.).

Stricklandia gaspiensis Billings, Canadian Nat. and Geol., IV, 1859, p. 134.
Stricklandinia gaspiensis Billings, Pal. Fossils, II, 1874, p. 83, fig. 49;—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, fig. 11.
Loc. Bay of Chaleurs, Canada.

Stricklandinia lens (Sowerby). Silurian.

Atrypa lens Sowerby, Murchison's Silurian System, 1839, pl. 21, fig. 3.
Stricklandinia lens Billings, Catalogue Sil. Foss. Anticosti, 1866, p. 45.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 321, pl. 5, figs. 1-4.
Loc. England; Anticosti; Collinsville, Alabama.

Stricklandinia lirata (Sowerby). Anticosti (Sil.).

Spirifer liratus Sowerby, Murchison's Silurian System, 1839, pl. 22. fig. 6.
Stricklandinia lirata Davidson, Mon. British Sil. Brach., Pal. Soc., 1867, p. 159, pl. 20, figs. 1-13.—Billings, Cat. Sil. Foss. Anticosti, 1866, p. 45.
Loc. Europe; Anticosti.

Stricklandinia (?) louisvillensis Nettelroth. Niagara (Sil.).

Stricklandinia louisvillensis Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 65, pl. 34, figs. 31-34.
Loc. East of Louisville, Kentucky.

Stricklandinia melissa Billings. Anticosti (Sil.).

Stricklandinia melissa Billings, Pal. Fossils, II, 1874, p. 89, pl. 7, fig. 4.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251.
Loc. Anticosti.
Obs. Probably the same as S. deformis.

Stricklandinia multilirata Whitfield. Guelph (Sil.).

Stricklandinia multilirata Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 81;—Geol. Wisconsin, IV, 1882, p. 315, pl. 23, figs. 3-5.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251, pl. 73, figs. 1, 2.

Loc. Sheboygan, Wisconsin.

Stricklandinia salteri Billings. Anticosti (Sil.).

Stricklandinia salteri Billings, Geol. Mag., V, 1868, p. 61, pl. 4, figs. 2-2*a*;—Pal. Fossils, II, 1874, p. 87, pl. 7, fig. 1.—White, Proc. U. S. Nat. Mus., III, 1880, p. 48.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 251.

Loc. Anticosti; Ringgold, Catoosa County, Georgia.

Stricklandinia (?) subquadrata Herrick. Upper Carboniferous.

Stricklandinia ? subquadrata Herrick, Bull. Denison Univ., II, 1887, p. 49, pl. 1, fig. 14.

Loc. Flint ridge, near Newark, Ohio.

Obs. Probably a terebratuloid.

Stricklandinia triplesiana Foerste. Clinton (Sil.).

Stricklandinia triplesiana Foerste, Bull. Denison Univ., I, 1885, p. 89, pl. 14, figs. 13, 14.—Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 323;—Geol. Ohio, VII, 1895, p. 594, pl. 26, figs. 13, 14.

Loc. Dayton, Ohio.

STRINGOCEPHALUS Defrance. Genotype S. burtini Defrance.

Strygocephalus Defrance, Dict. Sci. Nat., LI, 1827, p. 102, pl. 75, fig. 1.

Stringocephalus Sandberger, Leonhard und Bronn's Jahrb. für Min., 1842, p. 386.—Dall, American Jour. Conch., VI, 1870, p. 112.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 282, figs. 203-207.

Stringocephalus burtoni Defrance. Middle Devonian.

Strygocephalus burtoni Defrance, Dict. Sci. Nat., LI, 1827, p. 102, pl. 75, fig. 1.

Stringocephalus burtoni Whiteaves, Trans. Royal Soc. Canada, VIII, 1891, p. 93;—Cont. to Canadian Pal., I, 1891, p. 235, pl. 29, figs. 10-11; p. 290.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 283, fig. 203.

Loc. Europe; Lakes Manitoba and Winnipegosis and the "Ramparts," Mackenzie River, British America. Two loose specimens have been found near Devonian rocks in southern Minnesota.

STROPHALOSIA King. Genotype Orthis excavata Geinitz.

Strophalosia King, Ann. and Mag. Nat. Hist., XIV, 1844, p. 313;—Ibidem, XVII, 1846, p. 92;—Mon. Permian Fossils, Pal. Soc., 1850, p. 93.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 245;—Pal. New York, IV, 1867, p. 146.—Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 240.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 314;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 295.

Strophalosia beecheri Rowley. Kinderhook (L. Carb.).

Strophalosia beecheri Rowley, American Geologist, XII, 1893, p. 308, pl. 14, figs. 18, 19.

Loc. Louisiana, Missouri.

Strophalosia cornelliana Derby. Upper Carboniferous.

Strophalosia cornelliana Derby, Bull. Cornell Univ., I, 1874, p. 45, pl. 3, figs. 28, 30, 32, 33, 35-38; pl. 4, fig. 5; pl. 8, fig. 17; pl. 9, figs. 10, 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15B, figs. 36, 37.

Loc. Bomjardim, Brazil.

Strophalosia cymbula Hall and Clarke. Keokuk (L. Carb.).

Strophalosia cymbula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 17A, figs. 3, 4, 8, 9.

Loc. Near Louisville and Lebanon, Kentucky.

Strophalosia (?) guadalupensis (Shumard). Upper Carboniferous.

Aulosteges guadalupensis Shumard, Trans. St. Louis Acad. Sci., I, 1858, p. 292, pl. 11, fig. 5; p. 390.

Strophalosia ? guadalupensis Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 241.

Loc. Guadalupe Mountains, New Mexico and Texas.

Strophalosia horrescens Geinitz (non Murchison, de Verneuil, and Keyserling)=Productus nebraskaensis.

Strophalosia hystricula Hall. Chemung (Dev.).

Productella hystricula Hall, Pal. New York, IV, 1867, p. 178, pl. 26, figs. 1-8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 48, figs. 29, 30.

Strophalosia hystricula Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, fig. 31; pl. 17, figs. 29, 30.

Loc. Forestville, Conewango, and East Randolph, New York.

Strophalosia keokuk Beecher. Keokuk (L. Carb.).

Strophalosia keokuk Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 244, pl. 9, figs. 18-24.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 17A, figs. 5-7.

Loc. Keokuk, Iowa.

Strophalosia muricata (Hall). Chemung (Dev.).

Chonetes muricata Hall, Pal. New York, IV, 1867, p. 143, pl. 22, figs. 29-43.

Chonetes (Productella?) muricata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 47, figs. 12, 16, 30, 38, 42.

Strophalosia? muricata Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 241.

Strophalosia muricata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 16, figs. 12, 16, 30, 38, 42.

Loc. Ellington, New York, and Meadville, Pennsylvania.

Strophalosia nummulina A. Winchell. Kinderhook (L. Carb.).

Strophalosia? nummularis A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 4.

Strophalosia? nummulina Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 242.

Strophalosia nummularis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316.

Loc. Burlington, Iowa.

Strophalosia radicans (A. Winchell). Hamilton (Dev.).

Crania radicans A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 92.

Strophalosia radicans Beecher, American Jour. Sci., 3d ser., XL, 1890, pp. 240, 243, pl. 9, figs. 14-17.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, figs. 27-30.

Loc. Grand Traverse region, Michigan.

Strophalosia rockfordensis Hall and Clarke. Upper Devonian.

Strophalosia rockfordensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 316, 353, pl. 17A, figs. 1-3; Pt. II, 1895, pl. 84, figs. 20-22.

Loc. Rockford, Iowa.

Strophalosia scintilla Beecher. Chouteau (L. Carb.).

Strophalosia scintilla Beecher, American Jour. Sci., 3d ser., XL, 1890, p. 243, pl. 9, figs. 10-13.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 316, pl. 15B, figs. 32-34.

Loc. Pike County, Missouri.

Strophalosia spondyliformis (White and St. John). Upper Carboniferous.

Aulosteges spondyliformis White and St. John, Trans. Chicago Acad. Sci., I, 1868, p. 118, fig. 2.

Stropheodonta beckei Hall—Continued.

Stropheodonta (Leptostrophia) becki Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 13, figs. 23, 24.

Loc. Albany and Schoharie counties, New York; Kennedy Channel, Arctic region.

Stropheodonta blainvillei (Billings). Lower Devonian.

Strophomena blainvillei Billings, Pal. Fossils, II, 1874, p. 28, pl. 2, fig. 1; pl. 3, fig. 1.

Stropheodonta (Leptostrophia) blainvillii Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Loc. Gaspé, Canada.

Obs. Compare with S. perplana.

Stropheodonta callawayensis Swallow. Hamilton (Dev.).

Strophodonta callawayensis, quadrata, and æquicostata Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 638.

Loc. Callaway County, Missouri.

Obs. See S. navalis.

Stropheodonta callosa Hall. Upper Helderberg (Dev.).

Strophodonta callosa Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 36;—Pal. New York, IV, 1867, p. 82, pl. 11, figs. 4–10; pl. 12, figs. 8, 9.

Chonetes (Strophodonta?) callosa Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 47, fig. 37.

Stropheodonta callosa Hall and Clarke, VIII, Pt. I, 1892, pl. 16, fig. 37.

Loc. Albany County, New York.

Stropheodonta calvini Miller. Chemung (Dev.).

Strophodonta quadrata Calvin (non Swallow, 1860), Bull. U. S. Geol. Geogr. Survey Terr., IV, 1878, p. 728.

Strophodonta calvini Miller, Cat. American Pal. Foss., 2d ed., January, 1883, p. 298.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 122, pl. 13, fig. 6.

Strophodonta exilis Calvin, American Jour. Sci., 3d ser., XXV, June, 1883, p. 443.

Loc. Rockford and Independence, Iowa; Eureka district, Nevada.

Stropheodonta canace Hall and Whitfield. Chemung (Dev.).

Strophodonta canace Hall and Whitfield, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 236, pl. 11, figs. 8–11; abstract of same in 1872;—King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 246, pl. 3, figs. 1–3.

Loc. Rockford, Iowa; White Pine district, Nevada; Naples, New York.

Stropheodonta cincta A. Winchell. Hamilton (Dev.).

Strophodonta cincta A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 93.

Loc. Grand Traverse region, Michigan.

Obs. Insufficiently defined to be recognized.

Stropheodonta concava Hall. Corniferous and Hamilton (Dev.).

Strophomena (Strophodonta) concava Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, pp. 115, 140, fig. 1.

Strophodonta concava Hall, Pal. New York, IV, 1867, p. 96, pl. 16, figs. 1a–1h;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 16–22.

Stropheodonta concava Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, figs. 16–23.

Loc. New York, from Cayuga Lake westward to Lake Erie.

Stropheodonta corrugata (Conrad). Clinton (Sil.).

Strophomena corrugata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 256, pl. 14, fig. 8.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 73, fig. 2 on p. 72;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.—Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 303, pl. 6, fig. 25.

Stropheodonta corrugata (Conrad)—Continued.

Leptæna corrugata Hall, Pal. New York, II, 1852, p. 59, pl. 21, figs. 2a–2c.

Strophodonta corrugata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, fig. 1.

Stropheodonta corrugata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 15, fig. 1; Pt. II, 1895, pl. 84, fig. 14.

Loc. Rochester, Wolcott, etc., New York; Cumberland Gap, Tennessee.

Stropheodonta (?) corrugata pleuristriata (Foerste.) Clinton (Sil.).

Leptæna corrugata (partim) Hall, Pal, New York, II, 1852, p. 59, pl. 21, figs. 2d, 2e.

Strophomena corrugata var. pleuristriata Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 303, pl. 6, figs. 26, 27.

Loc. Cumberland Gap, Tennessee.

Stropheodonta (?) costata Owen. Hamilton (Dev.).

Strophodonta (?) costata Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 585, pl. 3A, fig. 5; pl. 3, figs. 11, 11a.

Loc. Davenport, Iowa.

Stropheodonta crebristriata Hall. Upper Helderberg (Dev.).

Strophomena crebristriata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 254, pl. 14, fig. 3.

Strophodonta crebristriata Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 37;—Pal. New York, IV, 1867, p. 86, pl. 11, figs. 12, 13, 18–21.

Loc. Albany and Schoharie counties, New York.

Stropheodonta demissa (Conrad). Middle and Upper Devonian.

Strophomena demissa Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 258, pl. 14, fig. 14.—Rogers, Geol. Pennsylvania, II, 1858, p. 827, fig. 666.—Billings, Canadian Jour. Sci. Arts, 2d ser., VI, 1861, p. 341, figs. 116–118;—Geol. Canada, 1863, p. 367, figs. 377a–d.

Strophodonta dimosa(?) Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, tab. 3A, fig. 14. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17917.]

Strophomena (Strophodonta) demissa Hall, Tenth Rep N. Y. State Cab. Nat. Hist., 1857, p. 137, fig. 1.—Meek, Trans. Chicago Acad. Sci., I, 1868, p. 87, figs. 6a–c.

Strophomena (Strophodonta) subdemissa Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 145.—Meek (non Hall), Trans. Chicago Acad. Sci., I, 1868, p. 88, pl. 13, fig. 7.

Strophodonta demissa Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 495, pl. 3, fig. 5;—Pal. New York, IV, 1867, p. 81, pl. 11, figs. 14–17; pl. 12, figs. 1-5.—Nicholson, Pal. Prov. Ontario, 1873, p. 65.—White, Second Ann. Rep. Indiana Bureau of Statistics and Geol., 1880, p. 500, pl. 4, figs. 6, 7;—Tenth Rep. Indiana State Geol., 1881, p. 132, pl. 4, figs. 6, 7.—Whitfield, Geol. Wisconsin, IV, 1882, p. 327, pl. 25, fig. 18.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 7-12.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 118, pl. 2, fig. 9.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 143, pl. 18, figs. 10-16; pl. 33, fig. 22.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 219.—Keyes, Geol. Survey Missouri, V, 1895, p. 70, pl. 39, fig. 7.

Stropheodonta demissa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, figs. 7–12.

Loc. New York; Pennsylvania; Ohio; Indiana; Kentucky; Illinois; Iowa; Wisconsin; Ontario; Mackenzie and Athabasca rivers, Canada; Eureka district, Nevada.

Stropheodonta demissa imitata Winchell. Hamilton (Dev.).

Strophodonta imitata A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 93.

Loc. Grand Traverse region, Michigan.

Stropheodonta erratica A. Winchell. Hamilton (Dev.).

Strophodonta erratica and varieties solidicosta and fissicosta A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 93.

Loc. Grand Traverse region, Michigan.

Obs. This species may prove to be only a local variation of S. costata Owen.

Stropheodonta feildeni Etheridge. ? Lower Devonian.

Strophodonta feildeni Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 598, pl. 25, fig. 4.

Loc. Cape Hilgard, lat. 79° 41′.

Obs. Since this species is very closely related to S. magnifica of the Oriskany sandstone the horizon is probably Lower Devonian.

Stropheodonta galatea (Billings). Lower Devonian.

Strophomena galatea Billings, Pal. Fossils, II, 1874, p. 20, fig. 9.

Loc. Indian Cove, Gaspé, Canada.

Stropheodonta (?) geniculata (Shaler). Anticosti (Sil.).

Brachyprion geniculatum Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.

Loc. Near Southwest Point, Anticosti.

Stropheodonta (?) gilpeni (Dawson). Upper Arisaig (Sil.).

Strophomena gilpeni Dawson, Canadian Nat. Geol., n. ser., IX, 1880, p. 341.

Loc. Nova Scotia, Canada.

Stropheodonta hemispherica Hall. Upper Helderberg (Dev.)

Strophomena (Strophodonta) hemispherica Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 113.

Strophodonta hemispherica Hall, Pal. New York, IV, 1867, p. 90, pl. 13, figs. 12, 13;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, fig. 23.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 144, pl. 18, figs. 4-6.

Loc. New York; Ohio; Indiana; Kentucky; Ontario.

Stropheodonta inæquiradiata Hall. Upper Helderberg (Dev.).

Strophomena (Strophodonta) inæquiradiata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 113, figs. 1-3.

Strophomena inæquistriata Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 338, fig. 113;—Geol. Canada, 1863, p. 367, fig. 375;—Pal. Fossils, II, 1874, p. 24, fig. 13; pl. 2, fig. 4; p. 240.

Strophodonta inæquiradiata Hall, Pal. New York, IV, 1867, p. 87, pl. 11, figs. 24-31; pl. 12, fig. 12; pl. 13, figs. 6-11;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 13, 14.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 120, pl. 11, fig. 11.

Stropheodonta inæquiradiata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, figs. 13, 14.

Loc. Albany and Schoharie counties, New York; Columbus, Ohio; Eureka district, Nevada; Gaspé Bay, Canada.

Stropheodonta inæquistriata (Conrad). Corniferous to Hamilton (Dev.).

Strophomena inæquistriata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 254, pl. 14, fig. 2.—Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 200, fig. 4.—Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 338, figs. 113, 114;—Geol. Canada, 1863, p. 367, fig. 375.

Strophomena (Strophodonta) inæquistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 142.

Strophodonta inæquistriata Hall, Pal. New York, IV, 1867, p. 93, pl. 12, figs. 6-8; p. 106, pl. 18, fig. 2;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, figs. 1-6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 145, pl. 17, figs. 10, 11.

Stropheodonta inæquistriata (Conrad)—Continued.

Stropheodonta (Douvillina) inæquistriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 14, figs. 1-6; pl. 15B, fig. 9.

Loc. Caledonia, Moscow, Darien, etc., New York; Ontario, Canada; Milwaukee, Wisconsin; Falls of Ohio.

Stropheodonta indenta (Conrad). Lower Helderberg (Dev.).

Leptæna indenta Conrad, Second Ann. Rep. N. Y. Geol. Survey, 1838, pp. 112, 117.

Strophomena indenta Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 109, pl. 3, fig. 3.

Strophodonta indenta Miller, American Pal. Fossils, 1877, p. 135.

Loc. "Helderberg Mountains," New York; Square Lake, Maine; Gaspé, Canada.

Stropheodonta interstrialis (Phillips). Middle Devonian.

Orthis interstrialis Phillips, Pal. Foss. Cornw. and W. Somerset, 1841, p. 61, pl. 25, fig. 103.

Strophodonta interstrialis Whiteaves, Cont. Canadian Pal., I, 1892, p. 286, pl. 37, fig. 6.

Loc. Europe; Lake Winnipegosis, Canada.

Stropheodonta interstrialis (Vanuxem). Ithaca (Dev.).

Strophomena interstrialis Vanuxem (non Phillips), Geol. N. Y.; Rep. Third Dist. 1842, p. 174, fig. 1.

Strophodonta mucronata Hall, Pal. New York, IV, 1867, p. 111, pl. 15, figs. 13, 14.

Loc. Ithaca, Elmira, Bath, etc., New York.

Obs. My attention was directed to the above synonymy by Professor Williams and as well that of S. mucronata Conrad (non Hall).

Stropheodonta iowaensis Owen. ?Upper Devonian.

Strophodonta iowensis Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 585.

Loc. Pine Creek, near Rockford, Iowa.

Stropheodonta irene (Billings). Upper Helderberg (Dev.).

Strophomena irene Billings, Pal. Fossils, II, 1874, p. 27, pl. 2, fig. 5.

Stropheodonta (Leptostrophia) irene Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Loc. Grand Greve, Gaspé Bay, Canada.

Stropheodonta junia Hall. Hamilton (Dev.).

Strophomena (Strophodonta) textilis Hall (non 1852), Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 141, figs. 1-3.

Strophodonta textilis Hall, Pal. New York, IV, 1867, p. 108, pl. 18, figs. 3, 4.

Strophodonta junia Hall, Ibidem, 1867, corrigenda;—Second Ann. Rep. N. Y. State Geologist, 1883, pl. 46, fig. 16.

Stropheodonta (Leptostrophia) junia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 15, fig. 16.

Loc. York, Moscow, Darien, etc., New York.

Stropheodonta kemperi Swallow. Hamilton (Dev.).

Strophodonta kemperi Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 636.

Loc. Callaway County, Missouri.

Stropheodonta(?) leda (Billings). Anticosti (Sil.).

Strophomena leda Billings, Canadian Nat. and Geol., V, 1860, p. 55, figs. 2, 3;—Pal. Fossils, I, 1862, p. 120, figs. 98, 99;—Geol. Canada, 1863, p. 311, fig. 316.

Brachyprion leda Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.

Stropheodonta leda Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.

Rafinesquina leda Whiteaves, Pal. Foss. III, Pt. III, 1897, p. 172.

Loc. East Point, Anticosti, Lake Winnepeg, Manitoba.

Stropheodonta lincklæni Hall. Oriskany (Dev.).

Strophodonta lincklæni Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 55;—Pal. New York, III, 1859, p. 415, pl. 93, figs. 2, 3.

Loc. Albany and Schoharie counties, New York.

Stropheodonta macra (Winchell and Marcy). Niagara (Sil.).

Strophomena macra W. and M., Mem. Boston Soc. Nat. Hist., I, 1865, p. 91.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 392.

Loc. Probably near Chicago, Illinois.

Stropheodonta macrostriata (Walcott). Lower Devonian.

Chonetes macrostriata Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 126, pl. 2, fig. 13; pl. 13, fig. 14.

Loc. Eureka district, Nevada.

Obs. The type material proves it to be a Stropheodonta.

Stropheodonta magnifica Hall. Oriskany (Dev.).

Strophodonta magnifica Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 54;—Pal. New York, III, 1859, pp. 414, 482, pl. 93, fig. 4; pl. 94, fig. 2; pl. 95, fig. 8; pl. 95A, figs. 15-19;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 27, 28.

Strophomena magnifica Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 348;—Geol. Canada, 1863, p. 961, fig. 468.

Stropheodonta (Leptostrophia) magnifica Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 13, figs. 27, 28.

Loc. Albany and Schoharie counties, New York; Cumberland, Maryland; county of Haldimand, Ontario, Canada.

Stropheodonta magniventer Hall. Oriskany (Dev.).

Strophodonta magniventra Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 54;—Pal. New York, III, 1859, p. 411, pl. 92, figs. 2, 3; pl. 95, fig. 9;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 25, 26.

Strophomena magniventra Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 349;—Geol. Canada, 1863, p. 961, fig. 469;—Pal. Fossils, II, 1874, p. 22, figs. 10-12, and pl. 2, fig. 2.

Stropheodonta (Leptostrophia) magniventra Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 13, figs. 25, 26.

Loc. Albany and Schoharie counties, New York; Cayuga, Ontario, and Gaspé Bay, Canada.

Stropheodonta mucronata (Conrad). Portage and Chemung (Dev.).

Strophomena mucronata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 10.

Strophomena interstrialis Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 5.

Strophodonta cayuta Hall, Pal. New York, IV, 1867, p. 110, pl. 19, figs. 1-5;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 18, 19.

Stropheodonta (Douvillina) cayuta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 15, figs. 18, 19; pl. 15B, figs. 7, 8; Pt. II, 1895, pl. 84, fig. 13.

Loc. Steuben County, New York.

Obs. See S. interstrialis.

Stropheodonta navalis Swallow. Hamilton (Dev.).

Strophodonta navalis, cymbiformis, subcymbiformis, and altidorsata Swallow, Trans. St. Louis Acad. Sci., I, 1860, pp. 635, 636, 637.

Strophodonta cymbiformis Keyes, Geol. Survey Missouri, V, 1895, p. 74.

Loc. Callaway County, Missouri.

Obs. The ten species of Stropheodonta described in this transaction by Swallow are all from one locality and appear to be nothing more than peculiar variations of S. demissa Conrad. No other locality is known where a species

Stropheodonta navalis Swallow—Continued.

of Brachiopoda has taken on as many variations as has S. demissa in the vicinity of Fulton, Missouri. Mr. D. K. Greger has furnished the writer over one hundred examples of this species and no two are exactly alike. Swallow's ten species are here reduced to three and one variety: S. navalis and var. boonensis, S. kemperi, and S. callawayensis.

Keyes (Geol. Survey Missouri, V, 1895) regards S. navalis, callawayensis, quadrata, and æquicostata as synonyms for S. demissa, while S. cymbiformis, subcymbiformis, kemperi, inflexa, and boonensis are regarded by him as but one species, S. cymbiformis. S. altidorsata is regarded as "insufficiently described."

Stropheodonta navalis boonensis Swallow. Hamilton (Dev.).

Strophodonta booensis and inflexa Swallow Trans. St. Louis Acad. Sci., I, 1860, pp. 637, 638.

Loc. Callaway County, Missouri.

Stropheodonta nearpassi Barrett. Coralline limestone (Sil.).

Leptæna——Hall, Pal. New York, II, 1852, pl. 74, fig. 3.

Strophodonta nearpassi Barrett, American Jour. Sci., 3d ser., XV, 1878, p. 372.

Loc. Near Port Jervis, New York.

Stropheodonta parva Owen. Hamilton (Dev.).

Strophodonta parva Owen, Geol. Survey Wisconsin, Iowa, and Minnesota, 1852, p. 584, pl. 3A, fig. 9.

Loc. New Buffalo, Iowa.

Obs. This may prove to be young S. demissa.

Stropheodonta parva Hall. Upper Helderberg (Dev.).

Strophodonta parva Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 37;—Pal. New York, IV, 1867, p. 85, pl. 11, figs. 5, 11.

Loc. Albany and Schoharie counties, New York.

Stropheodonta patersoni Hall. Oriskany to Corniferous (Dev.).

Strophomena (Strophodonta) patersoni Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 114, figs. 1-5.

Strophomena ? patersoni Billings, Canadian Jour. Sci. Arts, 2d ser., VI, 1861, p. 340, fig. 115.

Strophomena patersoni Billings, Geol. Canada, 1863, p. 367, fig. 374.—Nicholson, Pal. Prov. Ontario, 1873, p. 67.

Strophodonta patersoni Hall, Pal. New York, IV, 1867, p. 89, pl. 12, figs. 9-11; pl. 13, figs. 1-5;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 45, fig. 15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 119.

Stropheodonta patersoni Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 14, fig. 15.

Loc. Schoharie, Stafford, Williamsville, etc., New York; Columbus, Ohio; Bake-oven, Illinois; Eureka district, Nevada; county of Haldimand, Ontario, Canada.

Stropheodonta perplana (Conrad). Upper Helderberg-Chemung (Dev.).

Strophomena perplana Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 257, pl. 14, fig. 11.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 827, fig. 665.—Billings, Canadian Jour. Sci. Arts, 2d ser., VI, 1861, p. 343;—Proc. Portland Soc. Nat. Hist., 1863, p. 109.—Nicholson, Pal. Prov. Ontario, 1873, p. 64.

Strophomena delthyris Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842 p. 258, pl. 14, fig. 19.

Strophomena pluristriata Conrad, Ibidem, 1842, p. 259.

Strophomena crenistria Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 171, fig. 4.

Stropheodonta perplana (Conrad)—Continued.

Strophomena (Strophodonta) crenistria Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 111.

Strophomena (Strophodonta) fragilis Hall, Ibidem, 1857, p. 143.

Strophodonta fragilis Hall, Geol. Iowa, I, Pt. II, 1858, p. 496, pl. 3, fig. 6.

Strophodonta perplana Hall, Pal. New York, IV, 1867, pp. 92, 98, pl. 11, fig. 22; pl. 12, figs. 13-15; pl. 17, fig. 1.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 25.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, figs. 2-15.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 120, pl. 13, fig. 11.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 147, pl. 18, fig. 17.—Beecher, American Jour. Sci., 3d ser., XLI, 1891, p. 357, pl. 17, fig. 17.—Whiteaves, Cont. Canadian Pal., I, 1891, p. 220.

Stropheodonta (Leptostrophia) perplana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288, pl. 15, figs. 2-13.

Loc. New York; Pennsylvania; Maryland; Ohio; Indiana; Kentucky; Illinois; Iowa; Wisconsin; Eureka district, Nevada; Square Lake, Maine; Ontario and Peace River, Canada; Rio Maecuru and Rio Curua, Province of Para, Brazil.

Stropheodonta perplana nervosa Hall. Portage and Chemung (Dev.).

Strophomena nervosa Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 266, fig. 1.

Strophodonta perplana var. nervosa Hall, Pal. New York, IV, 1867, p. 113, pl. 19, figs. 13-16;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 46, fig. 17.

Stropheodonta perplana var. nervosa Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, figs. 14, 15, 17.

Loc. Ithaca, Bath, Campbelltown, etc., New York.

Stropheodonta perplana tulliensis Williams. Tully (Dev.).

Strophodonta perplana var. tulliensis Williams, Bull. Geol. Soc. America, I, 1890, p. 493, pl. 12, figs. 1-4.

Loc. Cuyler, New York.

Stropheodonta planulata Hall. Lower Helderberg (Dev.).

Strophodonta planulata Hall, Pal. New York, III, 1859, p. 184, pl. 16, figs. 9-12.

Loc. Schoharie, Dryhill, and Litchfield, New York.

Stropheodonta plicata Hall. Hamilton (Dev.).

Strophodonta plicata Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 90;—Pal. New York, IV, 1867, p. 114.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 149.

Loc. Iowa City and Independence, Iowa; Thedford, Ontario; Falls of Ohio.

Stropheodonta prisca Hall. Clinton (Sil.).

Stropheodonta prisca Hall, Pal. New York, II, 1852, p. 63, pl. 21, fig. 9.

Loc. Kirkland, Oneida County, New York.

Stropheodonta profunda Hall. Clinton and Niagara (Sil.).

Leptæna profunda Hall, Pal. New York, II, 1852, p. 61, pl. 21, figs. 4, 5.

Strophomena profunda Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Strophomena niagarensis Winchell and Marcy, Mem. Boston Soc. Nat. Hist., I, 1865, p. 92, pl. 2, fig. 9.

Strophodonta profunda Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, pp. 369, 392, pl. 13, figs. 3, 4;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 151, pl. 23, figs. 9, 10;—Eleventh Rep. Indiana State Geol., 1882, p. 289, pl. 23, figs. 9, 10; pl. 27, fig. 18;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 1-5 (? figs. 19, 20).—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 148, pl. 29, fig. 26; pl. 17, figs. 20, 21.

Stropheodonta profunda Hall—Continued.
Stropheodonta (Brachyprion) profunda Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 13, figs. 1-5 (? 19, 20); pl. 20, figs. 29-31; Pt. II, 1895, pl. 84, fig. 12.
Loc. Lockport, New York; Waldron, Indiana; Bridgeport, Illinois; Racine, Wisconsin; Louisville, Kentucky.

Stropheodonta textilis Hall. Coralline (Sil.).
Stropheodonta textilis Hall, Pal. New York, II, 1852, p. 327, pl. 74, fig. 6.
Stropheodonta (Leptostrophia) textilis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.
Loc. Schoharie, New York.

Stropheodonta tullia (Billings). Upper Helderberg (Dev.).
Strophomena tullia Billings, Pal. Fossils, II, 1874, p. 29, pl. 2, fig. 6.
Stropheodonta (Leptostrophia) tullia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 288.
Loc. Mount Joli and Split Rock, Percé, Canada.

Stropheodonta variabilis Calvin. Chemung (Dev.).
Strophodonta variabilis Calvin, Bull. U. S. Geol. Geogr. Survey Terr., IV, 1878, p. 727.
Stropheodonta variabilis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 289, pl. 15B, figs. 4-6.
Loc. Independence, Iowa; Naples, New York.

Stropheodonta varistriata (Conrad). Lower Helderberg (Dev.).
Strophomena varistriata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 255, pl. 14, fig. 6.—Billings, Pal. Fossils, II, 1874, p. 26, pl 2, fig. 3.
Strophomena rectilateris Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 255, pl. 14, fig. 7.
Strophomena impressa Conrad, Ibidem, 1842, p. 255.
Strophodonta varistriata Hall, Pal. New York, III, 1859, p. 180, pl. 8, figs. 1-16; pl. 16, figs. 1-8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 6-16 (? figs. 21, 22).
Stropheodonta (Brachyprion) varistriata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 13, figs. 6-16, 21, 22.
Loc. Albany and Schoharie counties, New York; Dalhousie, New Brunswick, and Gaspé, Canada.

Stropheodonta varistriata arata Hall. Lower Helderberg (Dev.).
Strophodonta varistriata var. arata Hall, Pal. New York, III, 1859, p. 183, pl. 18, fig. 1;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 44, figs. 17, 18.
Stropheodonta varistriata var. arata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 13, figs. 17, 18.
Loc. Hudson and Albany counties, New York; Arisaig, Nova Scotia (Ami).

Stropheodonta vascularia Hall. Oriskany (Dev.).
Strophodonta vascularia Hall, Pal. New York, III, 1859, p. 412, pl. 92, fig. 4; pl. 95, fig. 10 (? pl. 93, fig. 2).
Loc. Albany County, New York.

Stropheodonta (?) ventricosa (Shaler). Anticosti (Sil.).
Brachyprion ventricosa Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.
Loc. Southwest Point, Anticosti.

Strophodonta æquicostata Swallow=S. callawayensis.
Strophodonta altidorsata Swallow=S. navalis.
Strophodonta ampla Hall=Strophonella ampla.

Strophodonta boonensis Swallow=S. navalis boonensis.
Strophodonta cælata Hall=Strophonella cælata.
Strophodonta cavumbona Hall=Strophonella cavumbona.
Strophodonta cayuta Hall=Stopheodonta mucronata.
Strophodonta cymbiformis Swallow=S. navalis.
Strophodonta exilis Calvin=Stropheodonta calvini.
Strophodonta fragilis Hall=S. perplana.
Strophodonta geniculata Hall=Strophonella geniculata.
Strophodonta headleyana Hall=Strophonella headleyana.
Strophodonta hybrida Hall and Whitfield=Strophonella reversa.
Strophodonta imitata A. Winchell=S. demissa imitata.
Strophodonta inflexa Swallow=S. navalis boonensis.
Strophodonta intermedia Hall=Hipparionyx proximus.
Strophodonta leavenworthana Hall=Strophonella leavenworthana.
Strophodonta mucronata Hall=S. interstrialis.
Strophodonta nacrea Hall=Pholidostrophia iowaensis.
Strophodonta punctulifera Hall=Strophonella punctulifera.
Strophodonta quadrata Swallow=S. callawayensis.
Strophodonta quadrata Calvin (non Swallow)=S. calvini.
Strophodonta reversa Hall=Strophonella reversa.
Strophodonta striata Hall=Strophonella striata.
Strophodonta subcymbiformis Swallow=S. navalis.
Strophodonta subdemissa Hall=S. demissa.
Strophodonta textilis Hall, 1857 (not 1852)=S. junia.

STROPHOMENA (Rafinesque) Blainville. Genotype S. rugosa Blainv.

Strophomena Blainville, Manuel de Malacologie et Conchyliologie, I, 1825, p. 513, pl. 53, fig. 2.—Defrance, Dictionnaire des Sciences Naturelles, LI, 1827, p. 151 and atlas.—King, Mon. Permian Fossils, Pal. Soc., 1850, p. 103.—Meek (partim), Pal. Ohio, I, 1873, p. 73.—Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1281.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 245.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 384.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 283.

Strophomenes Rafinesque, Desc. Remarkable Objects in the Cabinet of Professor Rafinesque, 1831, p. 4.

Hemipronites Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl. XIV, 172, 1864, p. 24.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 41.

Obs. This genus is characteristic of the Ordovician, and probably does not extend into the Silurian, where Orthothetes replaces Strophomena. A number of Silurian species are still left under Strophomena since their generic characters are unknown.

Strophomena acanthoptera Whiteaves=Stropheodonta acanthoptera.
Strophomena acutiradiata Hall=Chonetes acutiradiatus.
Strophomena alternata Emmons=Rafinesquina alternata.
Strophomena alternata fracta Meek=Rafinesquina alternata fracta.
Strophomena alternata loxorhytis Meek=Rafinesquina alternata loxorhytis.
Strophomena alternistriata Hall=Rafinesquina alternata alternistriata.

Strophomena (?) alterniradiata Shaler. Anticosti (Sil.).
Strophomena alterniradiata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 63.
Loc. Southwest Point, Anticosti.

Strophomena ampla Hall=Strophonella ampla.

Strophomena anologa Davidson, 1863=Leptæna rhomboidalis.

Strophomena angulata Owen=Rafinesquina alternata.

Strophomena anticostiensis Shaler=Rafinesquina alternata.

Strophomena (?) antiquata Sowerby. Anticosti (Sil.).
Strophomena antiquata Sowerby, Murchison's Silurian System, 1839.—Billings, Pal. Fossils, I, 1862, p. 129, fig. 107.
Loc. Europe; Anticosti; forks of the Chatts River, Gaspé.
Obs. This identification is doubtful.

Strophomena approximata (James). Lorraine (Ord.).
Streptorhynchus approximata James, The Paleontologist, 5, 1881, p. 43; 2, 1878, p. 15.
Loc. Dearborn County, Indiana.
Obs. Not defined so as to be recognizable.

Strophomena arctostriata Hall=Orthothetes chemungensis arctostriatus.

Strophomena (?) arcuata Shaler. Anticosti (Sil.).
Strophomena arcuata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 62.
Loc. Ellis Bay, Anticosti.

Strophomena (?) arethusa Billings. Lorraine (Ord.).
Strophomena arethusa Billings, Pal. Fossils, I, 1862, p. 132.
Loc. Observation Cape, Anticosti.

Strophomena atava Matthew=Rafinesquina atava.

Strophomena aurora Billings=Rafinesquina aurora.

Strophomena bifurcata Hall=Orthothetes chemungensis.

Strophomena billingsi Winchell and Schuchert. Trenton (Ord.).
Strophomena recta Billings (non Conrad), Pal. Fossils, I, 1862, p. 130, fig. 108.
Strophomena billingsi W. and S., Minnesota Geol. Survey, III, 1893, p. 397, fig. 32.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 170.
Loc. Ottawa, Canada; St. Paul, Cannon Falls, and Fountain, Minnesota; East Selkirk, Manitoba.

Strophomena (?) bipartita Hall. Coralline (Sil.).
Leptæna bipartita Hall, Pal. New York, II, 1852, p. 326, pl. 74, figs. 4, 5.
Strophomena bipartita Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.
Loc. Schoharie, New York.

Strophomena blainvillii Billings=Stropheodonta blainvillei.

Strophomena camerata Conrad=Rafinesquina deltoidea.

Strophomena cardinalis (Whitfield). Lorraine (Ord.).
Streptorhynchus cardinale Whitfield, Geol. Wisconsin, IV, 1882, p. 261, pl. 12, figs. 9, 10.
Strophomena cardinale Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 252.
Loc. Delafield, Wisconsin.

Strophomena carinata Conrad, 1838=Tropidoleptus carinatus.

Strophomena carinata Conrad, 1842 (non 1838)=Chonetes coronatus.

Strophomena ceres Billings=Rafinesquina ceres.

Strophomena chemungensis Conrad=Orthothetes chemungensis.

Strophomena concava Hall=Stropheodonta concava.

Strophomena conradi Hall (1859)=Strophonella conradi.

Strophomena conradi Hall and Clarke. Trenton (Ord.).

Strophomena conradi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 344, pl. 9A, fig. 3; pl. 20, figs. 32, 33.

Loc. Jacksonburg, New York.

Strophomena convexa Owen=S. incurvata.

Strophomena cornuta Hall=Chonetes cornutus.

Strophomena corrugata Conrad=Stropheodonta corrugata.

Strophomena crebristriata Conrad=Stropheodonta crebristriata.

Strophomena crenistria Hall=Stropheodonta perplana.

Strophomena (?) declivis James. Lorraine (Ord.).

Strophomena declivis James, Cincinnati Quart. Jour. Sci., I, 1874, p. 240.

Loc. Boyds Station, Kentucky.

Strophomena deflecta Conrad=Dinorthis deflecta.

Strophomena delthyris Conrad=Stropheodonta perplana.

Strophomena deltoidea Conrad=Rafinesquina deltoidea and R. minnesotaensis.

Strophomena demissa Conrad=Stropheodonta demissa.

Strophomena depressa Vanuxem=Leptæna rhomboidalis.

Strophomena depressa ventricosa Hall=Leptæna rhomboidalis ventricosa.

Strophomena (?) doneti Salter. Silurian.

Strophomena doneti Salter, Jour. of a Voyage in Baffins Bay and Barrow Straits, 1852.

Loc. Wellington Channel.

Strophomena elegantula Hall=Plectambonites transversalis.

Strophomena (?) elliptica Conrad. Niagara (Sil.).

Strophomena elliptica Conrad, Third Ann. Rep. Geol. Survey New York, 1839, p. 64.

Loc. Rochester, New York.

Strophomena (?) elongata Conrad. Lower Helderberg (Dev.).

Strophomena elongata Conrad, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 259.

Loc. Schoharie, New York.

Strophomena emaciata Winchell and Schuchert. Trenton (Ord.).

Strophomena emaciata W. and S., American Geol., IX, 1892, p. 287;—Minnesota Geol. Survey, III, 1893, p. 399, pl. 31, figs. 22–24.

Loc. Near Cannon Falls, Minnesota.

Strophomena euglyphya Conrad, and Roemer=Strophonella punctulifera.

Strophomena fasciata Hall=Rafinesquina fasciata.

Strophomena filitexta Meek, White, and Hall=S. neglecta or S. incurvata.

Strophomenes flexilis Rafinesque. "Limestone of Ohio."

Same paper as for S. levigata, 1831, p. 4.

Obs. Not defined so as to be recognizable.

Strophomena fluctuosa Billings. Lorraine (Ord.).

Strophomena fluctuosa Billings, Canadian Nat. Geol., V, 1860, p. 57, fig. 6;—Pal. Fossils, I, 1862, p. 123, fig. 102;—Geol. Canada, 1863, p. 209, fig. 207.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 11A, figs. 4, 5.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 395, pl. 31, figs. 14–17.

Loc. Charleton Point, Anticosti; Spring Valley, etc., Minnesota.

Strophomena fontinalis White=Dinorthis fontinalis.

Strophomena fragilis Hall=Stropheodonta perplana.

Strophomena galatea Billings=Stropheodonta galatea.

Strophomena gibbosa James=Leptæna rhomboidalis.

Strophomena (?) gibbosa Conrad. Upper Helderberg (Dev.).

Strophomena gibbosa Conrad, Fifth Ann. Rep. Geol. Survey New York, 1841, p. 54.

Loc. Helderberg Mountains, New York.

Strophomena gilpeni Dawson=Stropheodonta gilpeni.

Strophomena halli Sardeson=Leptæna charlottæ.

Strophomena hallie Miller. Utica (Ord.).

Streptorhynchus (?) hallie Miller, Cincinnati Quart. Jour. Sci., I, 1874, p. 148, figs. 14–16.

Streptorhynchus hallanum Miller, North American Geol. and Pal., 1889, p. 378.

Strophomena hallie Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 252.

Loc. Cincinnati, Ohio.

Strophomena hanoverensis Foerste=Strophonella striata.

Strophomena hecuba Billings. Lorraine (Ord.).

Strophomena hecuba Billings, Canadian Nat. Geol., V, 1860, p. 60, fig. 7;—Pal. Fossils, I, 1862, p. 126, fig. 104;—Geol. Canada, 1863, p. 209, fig. 206.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 252.

Loc. Anticosti.

Strophomena hemispherica Hall=Stropheodonta hemispherica.

Strophomena (?) imbecilis Billings. ?Calciferous (Ord.).

Strophomena imbecilis Billings, Pal. Fossils, I, 1865, p. 219.

Loc. Near Portland Creek, Newfoundland.

Strophomena imbrex Billings=Rafinesquina imbrex.

Strophomena impressa Conrad=Stropheodonta varistriata.

Strophomena inæquiradiata Hall=Stropheodonta inæquiradiata.

Strophomena incrassata=Rafinesquina incrassata and R. minnesotaensis.

Strophomena incurvata (Shepard). Trenton (Ord.).

Producta incurvata Shepard, American Jour. Sci., XXXIV, 1838, p. 144, figs. 1, 2.

Orthis incurvata Castelnau, Essai sur le Système Silurien de l'Amérique Septentrionale, 1843, p. 38.

Strophomena convexa Owen, Geol. Expl. Iowa, Wisconsin, and Illinois, 1844, p. 70, pl. XVII, fig. 2.

Leptæna filitexta Hall, Pal. New York, I, 1847, p. 111, pl. 31B, fig. 3.

Strophomena filitexta Billings, Canadian Nat. Geol., I, 1856, p. 203, figs. 1, 2.—Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.—Billings, Geol. Canada, 1863, p. 164, fig. 142.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 9, figs. 1–7; pl. 9A, figs. 11–14 (non figs. 10, 15=S. neglecta).

Streptorhynchus filitexta Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 1–7; pl. 42, figs. 11–14 (non figs. 10, 15=S. neglecta).

Strophomena incurvata (Shepard)—Continued.

Strophomena incurvata Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 385, pl. 30, figs. 36-40.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 167.

Loc. New York; Kentucky; Tennessee; Missouri; Wisconsin; Iowa; Minnesota; Manitoba; Canada.

Strophomena inquassa Sardeson = Rafinesquina minnesotaensis inquassa.

Strophomena interstrialis Hall = Stropheodonta mucronata.

Strophomena interstrialis Vanuxem, and Hall = Stropheodonta interstrialis.

Strophomena irene Billings = Stropheodonta irene.

Strophomena ithacensis Vanuxem = Atrypa reticularis.

Strophomena (?) **julia** Billings. Anticosti (Sil.).

Strophomena julia Billings, Pal. Fossils, I, 1862, p. 127, fig. 105.

Leptæna julia Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 65.

Loc. Anticosti.

Strophomena kingi Whitfield = Rafinesquina kingi.

Strophomena lævis Emmons. Birdseye (Ord.).

Strophomena lævis Emmons, Geol. New York; Rep. Second Dist., 1842, p. 385, fig. 972.

Loc. Great Bend, Jefferson County, New York.

Strophomena lachrymosa Conrad = Productella lachrymosa.

Strophomena leda Billings = Stropheodonta leda.

Strophomena lepida Hall = Pholidostrophia iowaensis.

Strophomenes levigata Rafinesque. "Kentucky limestone."

Enumeration and Account of Some Remarkable Natural Objects in the Cabinet of Professor Rafinesque, 1831, p. 4.

Obs. Not defined so as to be recognizable.

Strophomena lima Conrad = Productella lachrymosa lima.

Strophomena lineata Conrad = Chonetes lineatus.

Strophomena macra Winchell and Marcy = Stropheodonta macra.

Strophomena magnifica Billings = Stropheodonta magnifica.

Strophomena magniventra Billings = Stropheodonta magniventer.

Strophomena membranacea Vanuxem = Productella hirsuta.

Strophomena minnesotensis Winchell = Rafinesquina minnesotaensis.

Strophomena (?) **minor** (Walcott). Pogonip (Ord.).

Streptorhynchus minor Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 75, pl. 11, fig. 9.

Loc. Eureka district, Nevada.

Strophomena (?) **modesta** Conrad. ? Clinton (Sil.).

Strophomena modesta Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 64.

Loc. Rochester, New York.

Obs. Compare with Plectambonites sericea and P. elegantula.

Strophomena mucronata Hall (non Conrad) = Chonetes mucronatus.

Strophomena mucronata Conrad (non Hall) = Stropheodonta mucronata.

Strophomena nacrea Hall = Pholidostrophia iowaensis.

Strophomena (?) **nassula** Conrad. Carboniferous.

Strophomena nassula Conrad, Proc. Acad. Nat. Sci. Philadelphia, III, 1846, p. 23.

Loc. Jersey Shore, Lycoming County, Pennsylvania.

Strophomena nasuta Conrad=Rafinesquina alternata nasuta.

Strophomena neglecta (James). Lorraine (Ord.).

Strophomena filitexta Meek (non Hall), Pal. Ohio, I, 1873, p. 83, pl. 6, fig. 5.
? Strophomena filitexta White, U. S. Geol. and Geogr. Survey west 100th Merid., IV, 1875, p. 69, pl. 4, fig. 8.
Hemipronites filitextus Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 43.
Streptorhynchus neglecta James, The Paleontologist, 5, 1881, p. 41.
Streptorhynchus filitextus (partim) Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 42, figs. 10, 15 (non figs. 11-14); pl. 39, figs. 1-7.
Strophomena filitexta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9A, figs. 10, 15 (non figs. 11-14); pl. 11A, fig. 3.
Strophomena neglecta Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 388.
Loc. Oxford, Clarksville, Waynesville, etc., Ohio; Richmond, Versailles, etc., Indiana; Savanna, Illinois; ? Silver City, New Mexico.

Strophomena neglecta acuta Winchell and Schuchert. Lorraine (Ord.).

Strophomena neglecta var. acuta W. and S., Minnesota Geol. Survey, III, 1893, p. 388, pl. 31, figs. 6, 7.
Loc. Spring Valley, Minnesota.

Strophomena ? nemea Hall and Whitfield=Dalmanella pogonipensis.

Strophomena nervosa Hall=Stropheodonta perplana nervosa.

Strophomena niagarensis Winchell and Marcy=Stropheodonta profunda.

Strophomena nitens Billings=Rafinesquina nitens.

Strophomena nutans Meek. Lorraine (Ord.).

Strophomena (Hemipronites) nutans (James) Meek, Pal. Ohio, I, 1873, p. 77, pl. 6, fig. 1.
Hemipronites nutans Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 46.
Streptorhynchus nutans Miller, N. American Geol. Pal., 1889, p. 378.
Strophomena nutans Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 8, fig. 11; pl. 9A, figs. 5-7; pl. 11A, figs. 6, 7.
Loc. Oxford, Clarksville, etc., Ohio; Richmond, Versailles, etc., Indiana.

Strophomena obscura Hall=Rafinesquina obscura.

Strophomena (?) orthididea Hall. Clinton (Sil.).

Leptæna orthididea Hall, Pal. New York, II, 1852, p. 62, pl. 21, fig. 7.
Strophomena orthididea Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.
Loc. Kirkland, Oneida County, New York.

Strophomena patenta Hall=Strophonella patenta.

Strophomena patersoni Hall=Stropheodonta patersoni.

Strophomena pecten Roemer, and Billings=Orthothetes subplanus.

Strophomena pectinacea Hall=Orthothetes chemungensis.

Strophomena perplana Conrad=Stropheodonta perplana.

Strophomena philomela Billings. Anticosti (Sil.).

Strophomena philomela Billings, Canadian Nat. Geol., V, 1860, p. 56, figs. 4, 5;—Pal. Fossils, I, 1862, p. 122, figs. 100, 101;—Geol. Canada, 1863, p. 311, fig. 317.
Loc. Anticosti.

Strophomena planiconvexa Hall. Lorraine (Ord.).

Leptæna planoconvexa Hall, Pal. New York, I, 1847, p. 114, pl. 31B, fig. 7.

Strophomena planiconvexa Hall—Continued.

Strophomena planoconvexa Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 70.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 9, figs. 19, 20.

Strophomena ~~(Hemipronites)~~ planoconvexa Meek, Pal. Ohio, I, 1873, p. 82, pl. 6, fig. 2.

Hemipronites planoconvexa Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 48.

Streptorhynchus planoconvexus Miller, American Pal. Fossils, 1877, p. 134.—Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 19, 20.

Loc. Cincinnati, Ohio.

Strophomena planidorsata Winchell and Schuchert. Lorraine (Ord.).

Strophomena planodorsata W. and S., American Geol., IX, 1892, p. 286;—Minnesota Geol. Survey, III, 1893, p. 393, pl. 31, figs. 8-10.

Loc. Spring Valley, Minnesota; Iron Ridge, Wisconsin; Wilmington, Illinois.

Strophomena planumbona Hall=S. rugosa.

Strophomena plicata Meek=S. rugosa subtenta.

Strophomena plicifera Hall=Dalmanella plicifera.

Strophomena pleuristriata Conrad=Stropheodonta perplana.

Strophomena profunda Hall=Stropheodonta profunda.

Strophomena punctulifera Vanuxem=Strophonella punctulifera.

Strophomena pustulosa Hall (non Phillips)=Strophalosia truncata.

Strophomena radiata Vanuxem=Strophonella radiata.

Strophomena recta Conrad=Dinorthis deflecta.

Strophomena recta Billings=S. billingsi.

Strophomena rectilateraria Meek and Worthen=Strophonella cavumbona.

Strophomena rectilateris Conrad=Stropheodonta varistriata.

Strophomena (?) reticulata Shaler. Niagara (Sil.).

Strophomena reticulata Shaler, Bull. Mus. Comp. Zool., 4, 1865, p. 62.

Loc. Anticosti.

Strophomena rhomboidalis=Leptæna rhomboidalis.

Strophomena rugosa Hall (non Blainville)=Leptæna rhomboidalis.

Strophomena rugosa (Rafinesque MS.) Blainville. Lorraine (Ord.).

Strophomena rugosa (Rafinesque) Blainville, Malacologie et Conchyliologie, I, 1825, p. 513, pl. 53, figs. 2, 2a.—King, Mon. Permian Fossils, Pal. Soc., 1850, p. 103.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 247, figs. 13, 14.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 390, pl. 31, figs. 4, 5.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 168.

Strophomenes rugosa Defrance, Dictionaire des Sciences Naturelles, I, 1827, p. 151 and atlas.

Leptæna planumbona Hall, Pal. New York, I, 1847, p. 112, pl. 31, fig. 4.

Leptæna (n. sp.?) Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, pl. 2B, fig. 21. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17876.]

Strophomena planumbona Hall, Geol. Wisconsin, I, 1862, p. 54, fig. 7.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 483, pl. 2, figs. 13, 14;—Tenth Rep. Indiana State Geol., 1881, p. 115, pl. 2, figs. 13, 14.—Shaler (partim), Mem. Kentucky Geol. Survey, 1887, p. 13, pls. 4, 5.—Keyes, Geol. Survey Missouri, V, 1895, p. 73.

Strophomena (Hemipronites) planumbona Meek, Pal. Ohio, I, 1873, p. 79, pl. 6, fig. 3.

Strophomena squamula James=Rafinesquina squamula.
Strophomena striata Hall=Strophonella striata.
Strophomena subplana Conrad=Orthothetes subplanus.
Strophomena subtenta Conrad=S. rugosa subtenta.

Strophomena sulcata (Verneuil). Lorraine (Ord.).

Leptæna sulcata Verneuil, Bull. Geol. Soc. France, 2d ser., V, 1848, p. 350.
Strophomena sinuata Emmons, American Geol., I, 1855, p. 199, fig. 61.
Strophomena (Hemipronites?) sulcata Meek, Pal. Ohio, I, 1873, p. 85, pl. 5, fig. 4.
Hemipronites sulcata Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 48, fig. 5.
Streptorhynchus sulcatus Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 8, 9.
Strophomena sulcata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 9, figs. 8, 9; pl. 11A, fig. 8.
Loc. Oxford, Clarksville, etc., Ohio; Richmond, Indiana.

Strophomena syrtalis Conrad=Chonetes coronatus.

Strophomena (?) talacastrensis Kayser. Ordovician.

Strophomena talacastrensis Kayser, Palæontographica, Suppl., III, 1876, p. 20, pl. 3, fig. 20.
Loc. Talacastra, Cordillere San Juan, Argentine Republic.

Strophomena tenuilineata Conrad=Rafinesquina tenuilineata.
Strophomena tenuistriata=Leptæna rhomboidalis.
Strophomena textilis Hall=Stropheodonta junia.

Strophomena thalia Billings. Trenton (Ord.).

Strophomena thalia Billings, Canadian Nat. Geol., V, 1860, p. 59;—Pal. Fossils, I, 1862, p. 125, fig. 103;—Geol. Canada, 1863, p. 164, fig. 143.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251.
Loc. Ottawa, Canada.

Strophomena transversalis Hall=Plectambonites transversalis.

Strophomena trentonensis Winchell and Schuchert. Trenton (Ord.).

Leptæna subtenta (partim) Hall, Pal. New York, I, 1847, p. 115.
Streptorhynchus subtenta Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, fig. 18.
Strophomena subtenta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 9, fig. 18.
Strophomena trentonensis W. and S., Minnesota Geol. Survey, III, 1893, p. 389, pl. 30, fig. 41.
Loc. Cannon Falls, Minneapolis, and Fountain, Minnesota; Janesville and Beloit, Wisconsin; Frankfort, Kentucky; Nashville, Tennessee; Trenton Falls, New York.

Strophomena trilobata (Owen). Trenton (Ord.).

Leptæna trilobata Owen, Geol. Survey Wisconsin, Iowa, Minnesota, 1852, p. 584, pl. 2, figs. 17, 18. [See specimens in U. S. Nat. Mus., Cat. Invert. Foss., 17875.]
Strophomena trilobata Miller, American Pal. Fossils, 1877, p. 138.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 395, pl. 31, figs. 12, 13.—Whiteaves, Pal. Foss., III, Pt. III, 1897, pp. 169, 241.
Loc. Turkey River, Iowa; Goodhue County, Minnesota; Lake Winnipeg, Manitoba.

Strophomena tullia Billings=Stropheodonta tullia.
Strophomena ulrichi James=Rafinesquina ulrichi.
Strophomena unicostata Meek and Worthen=Rafinesquina unicostata.

Strophomena undulatus Vanuxem=Leptæna rhomboidalis.

Strophomena undulosa Conrad=Leptæna undulosa.

Strophomena varistriata Conrad=Stropheodonta varistriata.

Strophomena vetusta James. Lorraine (Ord.).

Streptorhynchus (Strophomena) vetusta James, Cincinnati Quart. Jour. Sci., I, 1874, p. 241.

Streptorhynchus vetusta Mickelborough and Wetherby, Jour. Cincinnati Soc. Nat. Hist., I, 1878, p. 76.—James, The Paleontologist, 2, 1878, p. 15.

Loc. Upper part of Cincinnati group in Ohio and Indiana.

Strophomena winchelli Hall and Clarke. Trenton (Ord.).

Streptorhynchus (Strophonella?) deltoidea Hall (non Leptæna deltoidea 1847), Second Ann. Rep. N. Y. State Geol., 1883, pl. 39, figs. 10, 12–14 (non fig. 11=S. nutans).

Strophomena winchelli Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 344, pl. 9, figs. 10, 12–14; pl. 20, fig. 26.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 394, pl. 31, fig. 11.

Loc. Janesville, Clifton, and Oshkosh, Wisconsin.

Strophomena wisconsinensis Whitfield. Lorraine (Ord.).

Strophomena wisconsinensis Whitfield, Geol. Wisconsin, IV, 1882, p. 263, pl. 12, figs. 11–13.

Strophomena winconsinensis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 251, pl. 11A, figs. 1, 2.

Loc. Delafield, Wisconsin.

Strophomena woolworthana Hall=Orthothetes woolworthana.

STROPHONELLA Hall. Genotype Strophomena semifasciata Hall.

Strophonella Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 153;—Eleventh Rep. Indiana State Geologist, 1882, p. 291.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 290;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 282.

Strophonella ampla Hall. Upper Helderberg (Dev.).

Strophomena (Strophodonta) ampla Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 111, figs. 1, 2.

Strophomena ampla Billings, Canadian Jour. Sci. Arts, VI, 1861, p. 345, figs. 119, 120;—Geol. Canada, 1863, p. 367, figs. 376, 378.

Strophodonta ampla Hall, Pal. New York, IV, 1867, p. 93, pl. 14, fig. 1.

Strophonella ampla Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 13–15.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293, pl. 12, figs. 13–15.

Loc. Albany and Schoharie counties, Cherry Valley, Williamsville, etc., New York; Columbus, Ohio; Ontario, Canada.

Obs. Compare with S. schohariensis (Castelnau).

Strophonella cælata Hall. Chemung (Dev.).

Strophodonta cælata Hall, Pal. New York, IV, 1867, p. 112, pl. 19, figs. 6, 7.

Strophonella cælata Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, fig. 21.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293, pl. 12, fig. 21; pl. 15B, fig. 10.

Loc. Near Elmira, New York.

Strophonella cavumbona Hall. Lower Helderberg (Dev.).

Strophodonta cavumbona Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 51;—Pal. New York, III, 1859, p. 187, pl. 21, figs. 1–3.

Strophomena (Strophodonta) cavumbona Meek and Worthen, Geol. Surv. Illinois, III, 1868, p. 374, pl. 7, fig. 10.

Strophonella cavumbona Hall—Continued.

Strophomena rectilateraria Meek and Worthen, Ibidem, 1868, p. 375.

Strophonella cavumbona Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 291, 292.

Loc. Schoharie, Hudson, and Catskill, New York; Perry County, Missouri.

Obs. Probably synonymous with S. punctulifera.

Strophonella costatula Hall and Clarke. Niagara (Sil.).

Strophonella costatula Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 359, pl. 84, figs. 15, 16.

Loc. Louisville, Kentucky.

Strophonella (?) **conradi** Hall. Lower Helderberg (Dev.).

Strophomena conradi Hall, Pal. New York, III, 1859, p. 194, pl. 16, figs. 13, 14.

Strophonella? conradi Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292.

Loc. Schoharie, New York.

Strophonella crassa Rowley. Hamilton (Dev.).

Strophonella crassa Rowley, American Geologist, XIII, 1894, p. 153, figs. 4–6.

Loc. Callaway County, Missouri.

Strophonella geniculata (Hall). Lower Helderberg (Dev.).

Strophodonta geniculata Hall, Pal. New York, III, 1859, p. 483, pl. 23, fig. 6.

Loc. Cumberland, Maryland.

Strophonella headleyana Hall. Lower Helderberg (Dev.).

Strophomena (Strophodonta) headleyana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 49, figs. 1, 2.

Strophodonta headleyana Hall, Pal. New York, III, 1859, p. 185, pl. 20, figs. 1–3.—Meek, American Jour. Sci., 2d ser., XL, 1865, p. 33.

Strophonella headleyana Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292.

Loc. Schoharie, Hudson, etc., New York; Kennedy Channel and Cape Frazire, Arctic regions.

Strophonella leavenworthana Hall. Lower Helderberg (Dev.).

Strophomena (Strophodonta) leavenworthana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 53.

Strophodonta leavenworthana Hall, Pal. New York, III, 1859, p. 189, pl. 21, figs. 5–7; pl. 23, figs. 1–3.

Strophonella leavenworthana Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 6–9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292, pl. 12, figs. 6–9.

Loc. Albany and Schoharie counties, New York.

Strophonella (?) **patenta** Hall. Clinton (Sil.).

Leptæna patenta Hall, Pal. New York, II, 1852, p. 60, pl. 21, fig. 3.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 823, fig. 631.

Strophomena patenta Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 115, pl. 5, fig. 10.—Foerste, Bull. Denison Univ., II, 1887, p. 105, pl. 8, figs. 34–37;—Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 300, pl. 5, fig. 22.

Streptorhynchus patenta Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 42, figs. 16–18.

Strophomena ? (Strophonella?) patenta Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 291, 292, pl. 9A, figs. 16–18.

Strophomena (Strophonella) patenta Foerste, Geol. Ohio, VII, 1895, p. 569, pl. 27, figs. 35–37.

Loc. Reynales Basin, Medina, etc., New York; Dayton, Ohio; Hanover, Indiana; Collinsville, Alabama.

Strophonella punctulifera (Conrad). Lower Helderberg. (Dev.).

Leptæna punctulifera Conrad, Second Rep. N. Y. Geol. Survey, 1838, pp. 112, 117.

Strophomena euglypha Conrad, Fifth Rep. N. Y. Geol. Survey, 1841, p. 36.—Roemer, Sil. Fauna d. West. Tennessee, 1860, p. 66, pl. 5, fig. 3.—Etheridge, Quart. Jour. Geol. Soc. London, XXXIV, 1878, p. 597.

Strophomena punctulifera Vanuxem, Geol. N. Y.; Rep. Third. Dist., 1842, p. 122, fig. 5.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 825, fig. 648.—Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 108, pl. 3, fig. 2;—Geol. Canada, 1863, p. 957, fig. 448;—Pal. Fossils, II, 1874, p. 31, pl. 3, fig. 2.

Strophomena (Strophodonta) punctulifera Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 50, fig. 1.

Strophodonta punctulifera Hall, Pal. New York, III, 1859, p. 188, pl. 21, fig. 4; pl. 23, figs. 4–7.—Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 121, pl. 13, fig. 10.

Strophonella punctulifera Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154;—Second. Ann. Rep. N.Y. State Geol., 1883, pl. 43, figs. 10–12.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292, pl. 12, figs. 10–12.

Loc. Albany and Schoharie counties, New York; Square Lake, Maine; Pennsylvania; Decatur County, Tennessee; Dalhousie, New Brunswick, and Gaspé, Canada; Eureka district, Nevada; Cape Hilgard and Cape Louis Napoleon, Arctic regions.

Obs. See S. cavumbona Hall.

Strophonella (?) **radiata** (Vanuxem). Lower Helderberg (Dev.).

Strophomena radiata Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 122, fig. 6.—Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 50, fig. 1;—Pal. New York, III, 1859, p. 193, pl. 21, figs. 8, 9; pl. 18, fig. 3.

Streptorhynchus radiatus Miller, American Pal. Fossils, 1877, p. 134.

Strophonella radiata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292.

Loc. Hudson, Albany, and Schoharie counties, New York.

Strophonella reversa Hall. Chemung (Dev.).

Strophodonta reversa Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 494, pl. 3, fig. 4.

Strophodonta hybrida Hall and Whitfield, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 239.

Strophonella reversa Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 293, pl. 12, figs. 16–20.

Strophonella? (Strophodonta) reversa Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 16–20.

Loc. Rockford, Iowa; Naples, New York.

Strophonella schohariensis (Castelnau). ? Upper Helderberg (Dev.).

Orthis schohariensis Castelnau Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 36, pl. 14, fig. 5.

Loc. Schoharie, New York.

Obs. Compare with S. ampla.

Strophonella semifasciata Hall. Niagara (Sil.).

Strophomena (Strophodonta?) semifasciata Hall, Trans. Albany Inst., IV, 1863, p. 210.

Strophonella semifasciata Hall, Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 154, pl. 22, figs. 1–3; pl. 23, figs. 7, 8;—Eleventh Rep. Indiana State Geol., 1882, p. 292, pl. 22, figs. 1–3; pl. 23, figs. 7, 8;—Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 4, 5.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 12, figs. 4, 5.

Loc. Waldron, Indiana; Wisconsin.

Strophonella striata Hall. Niagara (Sil.).

Strophomena striata Hall, Geol. N. Y.; Rep. Fourth Dist., 1843, p. 104, fig. 3;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 82.

Strophodonta striata Hall, Twenty-eighth Rep., Ibidem, 1879, p. 152, pl. 23, figs. 1-6;—Eleventh Rep. Indiana State Geol., 1882, p. 290, pl. 23, figs. 1-6.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 149.

Leptæna striata Hall, Pal. New York, II, 1852, p. 259, pl. 53, fig. 7.

Strophodonta (Strophonella?) striata Hall, Second Ann. Rep. N. Y. State Geol., 1883, pl. 43, figs. 1-3.

Strophonella striata Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 25, pl. 3, figs. 1-8.

Strophomena hanoverensis Foerste, Proc. Boston Soc. Nat. Hist., XXIV, 1890, p. 301, pl. 6, fig. 1.

Strophonella (Amphistrophia) striata Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 292, pl. 12, figs. 1-3.

Strophomena (Orthothetes) hanoverensis Foerste, Geol. Ohio, VII, 1895, p. 567, pl. 27, fig. 34; pl. 31, fig. 1.

Loc. Lockport, New York; Waldron and Hanover, Indiana; Louisville, Kentucky.

Syntrielasma Meek and Worthen = Enteletes.

SYNTROPHIA Hall and Clarke. Genotype Triplesia lateralis Whitfield.

Syntrophia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270;—Ibidem, Pt. II, 1893, p. 216;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 836.

Syntrophia arachne (Billings). Upper Cambrian.

Stricklandia? arachne Billings, Pal. Fossils, I, 1862, p. 85, fig. 77.

Syntrophia arachne Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 216.

Loc. Point Levis, Canada.

Syntrophia arethusa (Billings). Upper Cambrian.

Stricklandinia? arethusa Billings, Pal. Fossils, I, 1862, p. 85, fig. 78.

Syntrophia arethusa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 216.

Loc. Point Levis, Canada.

Syntrophia (?) armanda (Billings). Upper Cambrian.

Orthis? armanda Billings, Pal. Fossils, I, 1865, p. 303, fig. 293.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 217.

Loc. Phillipsburg, Canada.

Obs. This species may prove to be a Billingsella. In the interior of the ventral valve "the dental plates seem to form an imperfect triangular chamber" (Billings). If there is present a true spondylium and the foramen is "apparently open" O. armanda will prove to be more nearly related to Syntrophia than to any other genus. If, however, there is present only an imperfect triangular chamber and the foramen closed by a deltidium, then the species is probably a Billingsella.

Syntrophia barabuensis (A. Winchell). Upper Cambrian.

Orthis barabuensis A. Winchell, American Jour. Sci., 2d ser., XXXVII, 1864, p. 228.

Leptæna barabuensis Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 60;—Geol. Wisconsin, IV, 1882, pp. 171, 195, pl. 1, figs. 6, 7; pl. 3, fig. 6.

Syntrophia barabuensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 216.

Loc. Near Baraboo, Wisconsin.

Syntrophia calcifera (Billings). Upper Cambrian.

Camarella calcifera Billings, Canadian Nat. Geol., VI, 1861, p. 318, fig. 3;—Geol. Canada, 1863, p. 231, fig. 247;—Pal. Fossils, I, 1865, p. 220.—Meek, Sixth Ann. Rep. U. S. Geol. Survey Terr., 1873, p. 464.

Syntrophia calcifera (Billings)—Continued.
  Triplesia calcifera Walcott, Mon. U. S. Geol. Survey, VIII, 1884, p. 75, pl. 11, figs. 7, 8.
  Triplecia? calcifera Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270.
  Syntrophia (?) calcifera Hall and Clarke, Ibidem, VIII, Pt. II, 1893, p. 218, pl. 62, fig. 24.
  Loc. Point Levis and Phillipsburg, Canada; Cow Head, Newfoundland; near Malade City, Utah; Eureka district, Nevada; Carter County, Missouri (Keyes).

Syntrophia lateralis (Whitfield). Calciferous (Ord.).
  Triplesia lateralis Whitfield, Bull. American Mus. Nat. Hist., 1886, p. 303, pl. 24, figs. 9-11.
  Syntrophia lateralis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270;—Ibidem, VIII, Pt. II, 1893, p. 216, pl. 62, figs. 1-10.
  Loc. Fort Cassin, Vermont.

Syntrophia primordialis (Whitfield). Upper Cambrian.
  Triplesia primordialis Whitfield, Ann. Rep. Geol. Survey Wisconsin, 1877, p. 51;—Geol. Wisconsin, IV, 1882, p. 172, pl. 10, figs. 1, 2.
  Triplecia primordialis Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 271.
  Syntrophia primordialis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 218.
  Loc. Adams County, Wisconsin.

SYRINGOTHYRIS A. Winchell. Genotype Spirifer carteri Hall.
  Syringothyris A. Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 6.—Meek, Ibidem, 1865, p. 275;—Pal. Ohio, II, 1875, p. 288.—White, Wheeler's Expl. Survey west 100th Merid., IV, 1875, p. 90.—Herrick, Bull. Denison Univ., IV, 1888, p. 14.—Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 28.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 47;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 760.

Syringothyris alta Schuchert=Cyrtia alta.

Syringothyris angulata Simpson. Waverly (L. Carb.).
  Syringothyris angulata Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 440, fig. 5.—Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 32.
  Loc. Warren, Pennsylvania.

Syringothyris carteri (Hall). Waverly and Burlington (L. Carb.).
  Spirifer carteri Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 170.—Meek (partim), Pal. Ohio, II, 1875, p. 285 (not his figures=S. texta Hall).
  Spirifer (Crytia?) hannibalensis Swallow, Trans. St. Louis Acad. Sci., I, 1860, p. 647.
  Syringothyris typa Winchell, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 7;—Proc. Am. Phil. Soc., XII, 1870, p. 252.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 8, 48, 50, pl. 26, figs. 6, 7, 10; pl. 27, figs. 1-3.
  Spirifer cuspidatus Meek, Proc. Acad. Nat. Sci., Philadelphia, 1865, p. 275;—Am. Jour. Sci., 2d ser., XLIII, 1867, p. 407.
  Spirifer cuspidatus ? Meek, U. S. Geol. Expl., 40th Parl., IV, 1877, p. 87.
  Syringothyris cuspidatus Walcott (non Martin), Mon. U. S. Geol. Survey, VIII, 1884, p. 219, pl. 3, fig. 11.—Herrick (partim), Bull. Denison Univ., III, 1888, p. 41, pl. 1, fig. 7; pl. 2, fig. 17 (non pl. 5, figs. 4-7=S. herricki).
  Syringothyris carteri Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 30.—Keyes, Geol. Survey Missouri, V, 1895, p. 87, pl. 40, fig. 10.
  Syringothyris typa Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 48, fig. 40.
  Syringothyris hannibalensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 25, figs. 33-35.
  Loc. Licking County and Bedford, Ohio; Burlington, Iowa; Marion and Pike, counties, Missouri; White Pine and Eureka districts, Nevada; near Clendenin, Montana.

Syringothyris cuspidatus Walcott, and Herrick=S. carteri.

Syringothyris extenuata (Hall). Waverly (L. Carb.).

Spirifer extenuatus Hall, Geol. Survey Iowa, I, Pt. II, 1858, p. 520, pl. 7, fig. 6.—White, Wheeler's Expl. and Surv. west 100th Merid., 1875, p. 88, pl. 5, fig. 9.

Syringothyris halli A. Winchell, Proc. Acad. Nat. Sci. Philadelyhia, 1863, p. 8.

Syringothyris extenuata Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 33.—Keyes, Geol. Survey Missouri, V, 1895, p. 86.

Loc. Burlington, Iowa; Clarksville, Missouri; Battlecreek, Michigan; Mountain Spring, Nevada.

Syringothyris gigas (Troost). Subcarboniferous.

Cyrtia gigas Troost, Sixth Geol. Report Tennessee, 1841, p. 12.

Syringothyris gigas Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 33.

Loc. Harpeth River, Tennessee.

Syringothyris halli Winchell=S. carteri extenuata.

Syringothyris herricki Schuchert. Waverly (L. Carb.).

Syringothyris cuspidatus Herrick (partim), Bull. Denison Univ., III, 1888, pl. 5, figs. 4-7 (not pls. 1, 2).

Syringothyris herricki Schuchert, Ninth Ann. Rep. N. Y. State Geologist, 1890, p. 36.—Herrick, Geol. Ohio, VII, 1895, pl. 21, figs. 4-7.

Loc. Granville, Ohio.

Syringothyris missouri Hall and Clarke. Chouteau (L. Carb.).

Syringothyris missouri Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, p. 363, pl. 39, figs. 29-31.

Loc. Chouteau Springs, Missouri.

Syringothyris (?) plena (Hall). Burlington (L. Carb.).

Spirifer plena Hall, Geol. Survey Iowa, I, 1858, p. 603, pl. 13, fig. 4.

Syringothyris ? plena Schuchert, Ninth Ann. Rep. N. Y. State Geologist, 1890, p. 37.

Spirifer plenus Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 31, 39, 48, pl. 37, figs. 32, 33.

Syringothyris plena Keyes, Geol. Survey Missouri, V, 1895, p. 88, pl. 40, fig. 8.

Loc. Burlington, Iowa; Hannibal, Missouri; Quincy, Illinois.

Syringothyris randalli Simpson. Waverly (L. Carb.).

Syringothyris randalli Simpson, Trans. American Phil. Soc., n. ser., XVI, 1889, p. 441, fig. 6.—Schuchert, Ninth Ann. Rep. N. Y. State Geologist, 1890, p. 36.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 50, pl. 27, figs. 13-16.

Loc. Near Warren and Union City, Pennsylvania.

Syringothyris texta (Hall). Waverly to Keokuk (L. Carb.).

Spirifer cuspidatus Yandell and Shumard, Cont. Geol. Kentucky, 1847, pp. 19, 21.

Spirifer textus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 169.—White, Second Ann. Rep. Indiana Bureau Statistics and Geol., 1880, p. 512, pl. 7, figs. 1, 2;—Tenth Rep. Indiana State Geol., 1881, p. 144, pl. 7, figs. 1, 2.

Spirifer subcuspidatus Hall, Geol. Survey Iowa, I, 1858, p. 646, pl. 20, fig. 5;—Pal. New York, IV, 1867, p. 249.

Spirifer propinquus Hall, Geol. Survey Iowa, I, 1858, p. 647.—Meek and Worthen, Geol. Survey Illinois, 1868, III, p. 530, pl. 19, fig. 8.

Spirifer carteri Meek (partim), Pal. Ohio, II, 1875, pl. 14, fig. 7.

Spirifer cuspidatiformis Miller, North American Geol. Pal., 1889, p. 372.

Syringothyris texta Schuchert, Ninth Ann. Rep. N. Y. State Geol., 1890, p. 34.—Keyes, Geol. Survey Missouri, V, 1895, p. 88.

Syringothyris subcuspidatus and texta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 50, pl. 26, figs. 8, 11 (?9, 12); pl. 27, figs. 4-12, 18.

Loc. New Albany and New Providence, Indiana; near Louisville, Kentucky; Sciotoville, Ohio; Keokuk, Iowa; Warsaw and Nauvoo, Illinois.

Syringothyris typa Winchell=S. carteri.

TEREBRATELLA d'Orbigny.

Genotype Terebratula chilensis Brod.=Terebratula dorsata Gmelin.

Terebratella d'Orbigny, Pal. Franc. Ter. Cret., IV, 1847, p. 110.—Dall, American Jour. Conch., VI, 1870, p. 115.—Beecher, Trans. Connecticut Acad., IX, 1893, p. 377.

Terebratella californica Stanton. Upper Cretaceous (Knoxville).

Terebratella californica Stanton, Bull. U. S. Geol. Survey, 133, 1896, p. 33, pl. 1, figs. 12, 13.

Loc. Cottonwood Creek, Tehama County, California.

Terebratella (?) dubitanda (Cooper). ?Upper Cretaceous.

Megerlia dubitanda Cooper, Bull. California State Mining Bureau, 4, 1894, p. 50, pl. 3, figs. 48, 49.

Loc. Lajolla and Point Loma, California.

Terebratella (?) imbricata (Cooper). ?Upper Cretaceous.

Megerlia imbricata Cooper, Bull. California State Mining Bureau, 4, 1894, p. 51, pl. 3, figs. 50, 51.

Loc. Lajolla, California.

Terebratella obesa Gabb. Cretaceous (Chico).

Terebratella obesa Gabb, Geol. Survey California, Pal., I, 1864, p. 205, pl. 26, fig. 194.

?Terebratella obesa Whiteaves, Mesozoic Fossils, Geol. Survey Canada, I, 1884, p. 245.

Loc. Texas Flat, Placer County, California; Queen Charlotte Island.

Terebratella plicata (Say). Cretaceous.

Terebratula plicata Say, American Jour. Sci., II, 1820, p. 43;—Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 73, pl. 3, figs. 5, 6.

Terebratula sayi Morton, Syn. Cret. United States, 1834, p. 71, pl. 3, figs. 3, 4;—American Jour. Sci., XLVIII, 1845, p. 283.

Terebratella plicata d'Orbigny, Prod. Pal., 1849, p. 259.—Gabb, Proc. American Phil. Soc., VIII, 1861, p. 193.—Credner, Zeitscr. d. Deuschen Geol. Gessel., 1870, p. 224.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 12, pl. 1, figs. 5-9.

Loc. New Jersey.

Terebratella vanuxemi (Lyell and Forbes). Cretaceous.

Terebratula vanuxemiana Lyell and Forbes, Proc. Geol. Soc. London, 1844, p. 308, with figures.

Terebratula vanuxemi Lyell and Forbes, Quart. Jour. Geol. Soc. London, I, 1845, p. 62, with figures.

Terebratella vanuxemiana d'Orbigny, Prod. Pal., 1849, p. 259.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19;—Proc. American Phil. Soc., VIII, 1861, p. 194.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 14, pl. 1, figs. 1-4.

Terebratella vanuxemi Hollick, Trans. N. Y. Acad. Sci., XI, 1892, p. 98, pl. 1, fig. 6.

Loc. New Jersey; Tottenville, Staten Island.

Terebratella whitneyi Gabb=Rhynchonella whitneyi.

TEREBRATULA Llhwyd. Genotype T. perovalis Sowerby.

Terebratula Llhwyd, Lithophylacii Britannici Ichnographia, 1696.—Hall, Pal. New York, IV, 1867, p. 386.—Dall, American Jour. Conch., VI, 1870, p. 101.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 153.

Terebratula ænigma d'Orbigny=Rhynchonella ænigma.

Terebratula ænigma Darwin=Rhynchonella anduin.

Terebratula acuminatissima Castelnau=Spirifer acuminatus.

Terebratula andii d'Orbigny=Enteletes andii.

Terebratula antissiensis d'Orbigny=Rhynchonella antissiensis.

Terebratula atlantica Morton=Terebratulina atlantica.

Terebratula arcuata Swallow (non Roemer)=Dielasma shumardanum.

Terebratula augusta Hall and Whitfield. Triassic-Jurassic.

Terebratula augusta Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 285, pl. 7, figs. 7-10.—White, Bull. U. S. Geol. Survey Terr., IV, 1880, p. 108;—Twelfth Ann. Rep. U. S. Geol. Survey Terr., 1883, p. 109.

Loc. Shoshone Springs, Nevada; Triassic, southwestern Idaho.

Terebratula bicanaliculata Schlotheim. Jurassic.

Terebratula bicanaliculata Schl., Mém. Soc. Géol. France, 2d ser, IV, 1851, p. 31, pl. 8, figs. 17-19.

Terebratula cornuta Burmeister and Geibel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 127.

Loc. Europe; Dona Ana, Chile.

Terebratula bisacula McChesney. Kaskaskia (L. Carb.).

Terebratula bisacula McChesney, Descriptions New Fossils, 1861, p. 82.

Loc. Chester and Golconda, Illinois.

Terebratula borealis Castelnau=Clitambonites borealis.

Terebratula bovidens Morton=Dielasma bovidens.

Terebratula brevilobata Swallow. Warsaw (L. Carb.).

Terebratula brevilobata Swallow, Trans. St. Louis Acad. Sci., II, 1863, p. 84.

Loc. Ste. Genevieve County, Missouri.

Terebratula burlingtonensis White=Dielasma burlingtonensis.

Terebratula camila Morton=T. harlani.

Terebratula canipes Ravenel. Jackson (Eocene).

Terebratula canipes Ravenel, Proc. Acad. Nat. Sci. Philadelphia, II, 1844, p. 97.—Conrad, American Jour. Conch., I, 1865, p. 15.

Loc. South Carolina.

Terebratula carneoidea Guppy. Eocene.

Terebratula carneoidea Guppy, Quart. Jour. Geol. Soc. London, XXII, 1866, p. 296, pl. 19, fig. 2.

Loc. San Fernando, Trinidad.

Obs. May be the same as living Terebratula cubensis Pourtales (Dall)=Liothyris sphenoidea. (Philippi). The latter also occurs fossil in the Pliocene of Calabria and Sicily (Davidson).

Terebratula chiliensis d'Orbigny. Quarternary.

Terebratula chilensis d'Orbigny, Voyage dans l'Amérique Mérid., Pal., 1842, p. 163.

Loc. Coquimbo, Chile.

Terebratula choctawensis Shumard=Kingina wacoensis.

Terebratula concinna Bayle and Coquand=Rhynchonella ænigma.

Terebratula cooperensis Miller=Seminula parva.

Terebratula copiapensis Möricke. Jurassic.

Terebratula copiapensis Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 63, pl. 2, figs. 5a-5c.

Loc. Quebrada de Maricunga, Chile.

Terebratula demissirostris Conrad. Eocene.
Terebratula demissirostra Conrad, Kerr's Geol. North Carolina, App. A, 1875, p. 18, pl. 3, fig. 1.
Loc. Wilmington, North Carolina.

Terebratula derbyana Rathbun. Middle Devonian.
Terebratula derbyana (Hartt MS.) Rathbun, Bull. Buffalo Soc. Nat. Hist., I, 1874, p. 236, pl. 10, figs. 15, 17, 22, 24, 25.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 35.
Loc. Erere, Province of Para, Brazil.

Terebratula domeykana Bayle and Coquand. Jurassic.
Terebratula domeykana Bayle and Coquand, Mém. Soc. Géol. France, 2d ser., IV, 1851, p. 30, pl. 8, figs. 1-3.—Burmeister and Geibel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 126.—Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 64.
Loc. Sierra de la Ternera, Dona Ana, and Juntas, Chile.

Terebratula dorenbergi Felix. Upper Jurassic.
Terebratula dorenbergi Felix, Palæontographica, XXXVII, 1891, p. 176, pl. 27, figs. 8-8b.
Loc. Cerro de Titania, Oaxaco, Mexico.

Terebratula elia Hall. Middle Devonian.
Terebratula elia Hall, Pal. New York, IV, 1867, p. 390, pl. 60, figs. 26-28.
Loc. Waterloo, Iowa.

Terebratula elongata of American authors=Dielasma bovidens.

Terebratula emarginata Sowerby. Jurassic.
Terebratula emarginata (Sowerby) Bayle and Coquand, Mém. Soc. Géol. France, 2d ser., IV, 1851, p. 32, pl. 8, figs. 7-9.
Loc Europe; Dona Ana, Chile.

Terebratula ficoides Bayle and Coquand. Jurassic.
Terebratula ficoides Bayle and Coquand, Mém. Soc. Géol. France, 2d ser., IV, 1851, p. 30, pl. 8, figs. 20-22.
Loc. Dona Ana, Chile.

Terebratula floridana Morton=Terebratulina floridana.
Terebratula formosa Hall=Dielasma formosum.
Terebratula fragilis Morton=Terebratula harlani.
Terebratula gaudryi d'Orbigny=Enteletes gaudryi.
Terebratula geniculosa McChesney=Dielasma bovidens.
Terebratula glossa Conrad=Terebratulina atlantica.
Terebratula gorbyi Miller=Dielasma gorbyi.

Terebratula gottschei Steinman. Jurassic.
Terebratula gottschii Steinman, Neues Jahrb. f. Min., Beilageband, 1881, p. 252, pl. 14, figs. 7, 8.
Loc. Caracoles, Bolivia.

Terebratula gracilis Swallow (non Von Buch)=T. swallovana.
Terebratula guadalupæ Roemer=Terebratulina guadalupæ.
Terebratula halliana Gabb=Terebratulina atlantica.

Terebratula harlani Morton. Upper Cretaceous.
Terebratula harlani Morton, American Jour. Sci., XVIII, 1829, p. 250, pl. 3, fig. 16;—Ibidem, XVII, 1829, p. 283;—Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 73, pl. 3, figs. 1-4, 7, 8;—Syn. Cret. U. S., 1834, p. 70, pl. 3, fig. 1; pl. 9,

Terebratula harlani Morton—Continued.

figs. 2, 8, 9.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18;—Proc. American Phil. Soc., VIII, 1861, p. 196.—Credner, Zeit. d. Deutschen Geol. Gessel, 1870, p. 221.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 6, pl. 1, figs. 15-23.

Terebratula fragilis Morton (non Schloth.), Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 75, pl. 3, figs. 3, 4;—American Jour. Sci., XVIII, 1829, p. 250, pl. 3, fig. 17;—Ibidem, XVII, p. 283;—Syn. Cret. U. S., 1834, p. 70, pl. 3, fig. 2.

Terebratula perovalis Morton (non Sowerby), Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, p. 77, pl. 3, figs. 7, 8.

Terebratula camilla Morton, Syn. Cret. U. S., 1834, p. 70, in text.

Terebratula harlani var. discoidea Morton, Syn. Cret. U. S., 1833.

Terebratula harlani var. rectilatera Morton, Ibidem.

Terebratula subfragilis d'Orbigny, Prod. Pal., II, 1849, p. 258.

Terebratula atlantica (non Morton) Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 18.

Loc. New Jersey; Delaware and South Carolina.

Terebratula harmonia Hall=Eunella harmonia.

Terebratula hastata of American authors=Dielasma bovidens.

Terebratula helena Whitfield. Upper Cretaceous.

Terebratula helena Whitfield, Ludlow's Rep. Black Hills Dakota, 1875, p. 103, figs. 5-10.

Loc. North of Belle Fourche, South Dakota.

Terebratula hochstetteri Toula=Dielasma hochstetteri.

Terebratula hohmanni Möricke. Jurassic.

Terebratula hohmanni Möricke, Neues Jahr. f. Mineral., Beilageband, IX, 1894, p. 64, pl. 6, figs. 4a, 4b.

Loc. Quebrada de Maricunga, Chile.

Terebratula humboldtensis Gabb. Triassic.

Terebratula humboldtensis Gabb, Geol. Survey California, Pal., I, 1864, p. 34, pl. 6, fig. 35.—Hall and Whitfield, King's U. S. Geol. Expl. 40th Parl., IV, 1877, p. 282, pl. 6, figs. 22-24.—Whiteaves, Cont. Canadian Pal., I, 1889, p. 129.

Loc. Star Canyon, Humboldt County, and Dun Glen Pass, Pah-Ute Range, Nevada; Nicola Lake, Canada.

Terebratula ignaciana d'Orbigny. Jurassic.

Terebratula ignaciana d'Orbigny, Voyage dans l'Amérique Mérid., Pal., 1842, p. 63, pl. 22, figs. 14, 15.—Darwin, Geological Observations on South America, 1846, p. 216.

Loc. Cordillere du Chili, South America.

Terebratula inca Forbes=T. perovalis.

Terebratula inconstans Herrick=Cryptonella inconstans.

Terebratula inornata McChesney. "Keokuk to Coal Measures."

Terebratula inornata McChesney, New Pal. Fossils, 1860, p. 48.

Loc. Sangamon County, Illinois.

Terebratula itaitubensis Derby=Dielasma itaitubense.

Terebratula jucunda Hall. Middle Devonian.

Terebratula jucunda Hall, Pal. New York, IV, 1867, p. 390, pl. 60, figs. 29-31.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 154.

Loc. Waterloo, Iowa; Jefferson and Clark counties, Indiana.

Terebratula lachryma Morton=Terebratulina lachryma.

Terebratula lacunosa Schl. Jurassic.
Terebratula lacunosa (Schl.) Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 29, pl. 3, figs. 10, 11.
Loc. Europe; Dona Ana, Chile.

Terebratula lapillus Morton. Coal Measures.
Terebratula lapillus Morton, American Jour. Sci., XXIX, 1836, p. 153, pl. 26, fig. 36.
Loc. Junior Furnace, Scioto County, Ohio.
Obs. Not determinable.

Terebratula lecta Guppy. Eocene.
Terebratula lecta Guppy, Quart. Jour. Geol. Soc. London, XXII, 1866, p. 296, pl. 19, fig. 3.
Loc. San Fernando, Trinidad.

Terebratula lens Hall=Cryptonella lens.

Terebratula leonensis Conrad=Kingena leonensis.

Terebratula liardensis Whiteaves. Triassic.
Terebratula liardensis Whiteaves, Cont. Canadian Pal., I, 1889, p. 130, pl. 17, fig. 2. (Abstract of same pub. 1888.)
Loc. Liard River, Canada.

Terebratula lincklæni Hall=Eunella lincklæni.

Terebratula marcyi Shumard=Eumetria marcyi.

Terebratula meridionalis Conrad. Oolite or Cretaceous.
Terebratula meridionalis Conrad, U. S. Astronomical Exped. to the Southern Hemisphere, 1855, p. 282, pl. 42, fig. 10.
Loc. Cordillera de Dona Ana, Chile.

Terebratula mesogona Castelnau. Formation.?
Terebratula mesogona Castelnau (non Phillips), Essai Syst. Sil. l'Amérique Septentrionale, 1843, p. 40, pl. 13, fig. 3.
Loc. Vicinity of Quebec, Canada.
Obs. Undeterminable.

Terebratula mexicana Hall. ?Upper Carboniferous.
Terebratula mexicana Hall, Emory's Rep. U. S. and Mexican Bound. Survey, I, 1857, pl. 20, fig. 2.
Loc. Not given.
Obs. Undefined. Compare with Seminula argentea.

Terebratula millipunctata Hall=Dielasma bovidens.

Terebratula mormoni Marcou=Hustedia mormoni.

Terebratula navicella Hall=Centronella navicella.

Terebratula nitens Conrad. Miocene.
Terebratula nitens Dana, Wilkes's U. S. Exped., X, 1849, p. 726, pl. 19, fig. 1. (Conrad's earlier description I have not found.)
Rhynchonella nitans Conrad, American Jour. Conch., 1865, p. 154.

Terebratula nuciformis Morton. Coal Measures.
Terebratula nuciformis Morton, American Jour. Sci., XXIX, 1836, p. 150, pl. 2, fig. 5.
Loc. Putnam Hill east of Flint Ridge, Ohio.
Obs. Not defined so as to be recognizable.

Terebratula nucula Sowerby=Rhynchonella nucula.

Terebratula occidentalis Miller=Dielasma occidentale.

Terebratula ovoides Eaton=Rensselæria ovoides.

Terebratula ontario Hall. Hamilton (Dev.).

Terebratula ontario Hall, Pal. New York, IV, 1867, p. 418, pl. 60, figs. 45–48.

Loc. Canandaigua Lake, New York.

Terebratula ornithocephala Bayle and Coquand=T. subovoides.

Terebratula parva Swallow=Seminula parva.

Terebratula patagonica Sowerby. Tertiary.

Terebratula patagonica Sowerby, Darwin's Geol. Observations on South America, 1846, p. 252, pl. 2, fig. 25.

Loc. St. Josef and St. Julian, Patagonia.

Terebratula pennata Atwater=Spirifer pennatus.

Terebratula (Zeilleria) perforata Piette. Jurassic.

Terebratula (Zeilleria) perforata (Piette) Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 65.

Loc. Europe; Sierre de la Ternera, Chile.

Terebratula perinflata Shumard. Upper Carboniferous.

Terebratula perinflata Shumard, Trans. St. Louis Acad. Sci., I, 1859, p. 392.

Loc. Guadalupe Mountains, Texas.

Terebratula perovalis Eaton (non Sowerby)=Rensselæria ovoides.

Terebratula perovalis Morton (non Sowerby)=T. harlani.

Terebratula perovalis Sowerby. Jurassic.

Terebratula inca Forbes, Darwin's Geol. Observations S. America, 1846, p. 268, pl. 5, figs. 19–20.

Terebratula perovalis Bayle and Coquand, Mém. Soc. Géol. France, ser. ii, IV, 1851, p. 22, pl. 8, figs. 15, 16.—Gottsche, Palæontographica, Suppl., III, 1878, p. 33, pl. 4, fig. 9.—Steinman, Neues Jahrb. f. Min., Beilageband, I, 1881, p. 252.—Möricke, Ibidem, Beilageband, IX, 1894, p. 65, pl. 3, figs. 6a–6c.

Loc. Europe; Manflas, Tres Cruces, Iquique, and Espinazito, Chile; Caracoles, Bolivia.

Terebratula peruviana d'Orbigny=Seminula argentea.

Terebratula planirostra Hall=Cryptonella planirostris.

Terebratula planosulcata Meek and Worthen=Cleiothyris roissyi.

Terebratula plicata Say=Terebratella plicata.

Terebratula poeyana Lea. ?Jurassic.

Terebratula poeyana Lea, Trans. American Phil. Soc., n. ser., VII, 1841, p. 260, pl. 10, fig. 13.

Loc. Habana, Cuba.

Terebratula prisca=Atrypa reticularis.

Terebratula punctata Sowerby. Liassic.

Terebratula punctata Sowerby, Mineral Conch., I, 1812, p. 46, tab. 15, fig. 4.—Davidson, British Oolitic and Liassic Brach., Pal. Soc., 1852, p. 45.—Burmeister and Geibel, Abh. Naturf. Gessel. Halle, VI, 1862, p. 127.

Terebratula cfr. punctata Behrendsen, Zeit. der. Deutschen Geol. Gessel., XLIII, 1891, p. 395.

Terebratula (Waldheimia) punctata (Sowerby) Möricke, Neues Jahrb. f. Mineral., Beilageband, IX, 1894, p. 66.

Loc. Europe; Portezuelo Ancho, Argentine Republic; Manflas, Juntas, Chile.

Terebratula raimondiana Gabb. ?Cretaceous.

Terebratula raimondiana Gabb, Jour. Acad. Nat. Sci. Philadelphia, 2d ser., VIII, 1881, p. 298, pl. 42, fig. 9.

Loc. Near Ollon, Peru.

Terebratula repellini d'Orbigny. Jurassic.

Terebratula repellini Anguilera, Datos para la Geologia de Mexico, 1893, p. 18.

Loc. Europe; Mexico.

Terebratula robusta Whiteaves. Jurassic (?Cretaceous).

Terebratula robusta Whiteaves, Cont. Canadian Pal., I, 1889, p. 163, pl. 22, figs. 1, 2.

Loc. Rocky Mountains, near Devils Lake, Canada.

Obs. The horizon of this locality is probably Jurassic (Stanton).

Terebratula semisimplex White. Triassic.

Terebratula semisimplex White, Bull. U. S. Geol. Survey Terr., V, 1879, p. 108.

Loc. Southeastern Idaho.

Terebratula subexcavata Conrad. Oolite or Cretaceous.

Terebratula subexcavata Conrad, U. S. Astronomical Exped. to the Southern Hemisphere, 1855, p. 282, pl. 41, fig. 4.

Loc. Cordillera de Dona Ana, Chile.

Terebratula subovoides Roemer. Lias (Jurassic).

Terebratula ornithocephala (non Sowerby) Bayle and Coquand, Mém. Soc. Géol. France, 2d ser, IV, 1851, p. 18, pl. 8, figs. 12-14.

Terebratula subovoides Behrendsen, Zeit. der Deutschen Geol. Gessel., XLIII, 1891, p. 395.—Möricke, Neues Jahrb., f. Mineral., Beilageband, IX, 1894, p. 66.

Loc. Europe; Valle lenas amorillas, Rio Salado, Argentine Republic; Mine Amolanas, Manflas, and Tres Cruces, Chile.

Terebratula subnumismalis Davidson?. Lias (Jurassic).

Terebratula subnumismalis Davidson, British Oolitic and Liassic Brach., Pal. Soc., 1852, p. 36, pl. 51, fig. 10.

Terebratula cfr. subnumismalis Behrendsen, Zeit. der. Deutschen Geol. Gessel., XLIII, 1891, p. 396.

Loc. Europe; Rio Salado, Argentine Republic.

Terebratula subretziforma McChesney. Kaskaskia (L. Carb.).

Terebratula subretziaforma McChesney, Descrip. New Fossils, 1861, p. 82.

Loc. Fountain Bluff, Illinois.

Terebratula swallovana Miller. Kaskaskia (L. Carb.).

Terebratula gracilis Swallow (non von Buch), Trans. St. Louis Acad. Sci., II, 1863, p. 83.

Terebratula swallovana Miller, American Pal. Foss., 2d ed., 1883, p. 299.

Loc. St. Marys, Missouri; Chester, Illinois.

Terebratula tayloriana Lea=Rhynchonella tayloriana.

Terebratula tetrædra Sowerby=Rhynchonella tetrædra.

Terebratula titicacensis Gabb=Seminula titicacaensis.

Terebratula traversensis A. Winchell. Hamilton (Dev.).

Terebratula traversensis A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 95.

Loc. Grand Traverse region, Michigan.

Terebratula trinitatensis Guppy. Eocene.

Terebratula trinitatensis Guppy, Quart. Jour. Geol. Soc. London, XXII, 1866, p. 296, pl. 19, fig. 1.

Loc. Sanfernando, Trinidad.

Terebratula trinucleus Hall=Seminula trinucleus.

Terebratula turgida Hall=Dielasma turgidum.

Terebratula turpis Verneuil=Clitambonites borealis.

Terebratula utah Marcou (non Hall and Whitfield)=Pugnax utah.

Terebratula (?) **utah** Hall and Whitfield. Lower Carboniferous.

Terebratula utah Hall and Whitfield, King's Geol. Expl. 40th Parl., IV, 1877, p. 258, pl. 4, fig. 18.

Loc. Cottonwood Divide, Wasatch Range, Utah.

Obs. Not well established. Based upon a single dorsal valve. May be a Dielasma.

Terebratula valenciennii Castelnau=Meristella nasuta.

Terebratula wacoensis Roemer=Kingena wacoensis.

Terebratula wilmingtonensis Lyell and Sowerby=Rhynchonella wilmingtonensis.

Terebratula (?) **cfr. zieteni** Loriol. Jurassic.

Terebratula cfr. zieteni Aguilera, Bol. Com. Geológica de Mexico, I, 1895, p. 1, pl. 2, figs. 6, 7.

Loc. Rancho Alamitos, Sierra de Catorce, Mexico.

TEREBRATULINA d'Orb. Genotype Anomia caputserpentis Linné.

Terebratulina d'Orbigny, Ann. Des. Sci. Nat., VIII, 1848, p. 67.—Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geol., 1895, p. 872.

Terebratulina atlantica (Morton). Upper Cretaceous.

Terebratula atlantica Morton, Jour. Acad. Nat. Sci. Philadelphia, VIII, 1842, p. 214.

Terebratula halliana Gabb, Proc. Acad. Nat. Sci. Philadelphia, V, 1861, p. 19.

Terebratulina halliana Gabb, Proc. American Phil. Soc., VIII, 1861, p. 200.

Terebratula glossa Conrad, American Jour. Conch., V, 1869, p. 42, pl. 1, fig. 22.

Terebratulina atlantica Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 9, pl. 1, figs. 10-13.—Hollick, Trans. N. Y. Acad. Sci., XI, 1892, p. 98, pl. 1, fig. 8.

Loc. New Jersey; Tottenville, Staten Island.

Terebratulina filosa Conrad. ?Cretaceous.

Terebratulina filosa Conrad, American Jour. Conch., II, 1866, pp. 77, 105, pl. 9, figs. 4, 5.

Loc. Uniontown, Alabama.

Terebratulina floridana (Morton). Cretaceous.

Terebratula floridana Morton, Syn. Cret. U. S., 1834, p. 72, pl. 16, fig. 17.

Terebratulina floridana d'Orbigny, Prod. Pal., II, 1849, p. 258.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 11.

Loc. Prairie Bluff, Alabama.

Terebratulina gracilis (Schlotheim). Eocene.

Terebratula gracilis Schlotheim, Die Petrefactenkunde, 1820, p. 270.

Terebratulina gracilis Conrad, American Jour. Conch., I, 1865, p. 15.

Loc. Europe; Alabama.

Terebratulina guadalupæ (Roemer). Upper Cretaceous.

Terebratula gaudalupæ Roemer, Texas, 1849, p. 408;—Kreidebildung von Texas, 1852, p. 82, pl. 6, fig. 3.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19.

Loc. New Braunfels, Austin, and 200 miles north in Dallas County, Texas (Hill).

Terebratulina halliana Gabb=T. atlantica.

Terebratulina lachryma (Morton). (Cretaceous?) Eocene?.

Terebratula lachryma Morton, Syn. Cret. U. S., 1834, p. 72, pl. 10, fig. 11; pl. 16, fig. 6.

Terebratulina lachryma d'Orbigny, Prod. Pal., 1849, p. 396.—Gabb, Proc. Acad. Nat. Sci. Philadelphia, 1861, p. 19;—Proc. American Phil. Soc., VIII, 1861 p. 200.—Conrad, American Jour. Conch., I, 1865, p. 15.—Whitfield, Mon. U. S. Geol. Survey, IX, 1885, p. 12, pl. 1, fig. 14.

Loc. New Jersey; Claiborne, Alabama.

TORYNIFER Hall and Clarke. Genotype T. criticus Hall and Clarke.

Torynifer Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, explanation to pl. 84.

Torynifer criticus Hall and Clarke. St. Louis (L. Carb.).

Torynifer criticus Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 84, figs. 34, 35.

TREMATIS Sharpe.

Genotype **Orbicula** terminalis Sharpe (non Emmons)=T. millipunctata Hall.

Trematis Sharpe, Quart. Jour. Geol. Soc. London, IV, 1847, p. 66.—Dall, Bull. Mus. Comp. Zool., III, 1871, p. 37;—Bull. U. S. Nat. Mus., 8, 1877, p. 73.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 138, 168.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 367.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 258.

Trematis crassipuncta Ulrich. Lorraine (Ord.).

Trematis crassipuncta Ulrich, American Geologist, IV, 1889, p. 22; III, p. 378, fig. 7.

Loc. Cincinnati, Ohio.

Trematis (?) dyeri Miller. Lorraine (Ord.).

Trematis dyeri Miller, Cincinnati Quart. Jour. Sci., I, 1874, p. 347, fig. 39.

Trematis (?) dyeri Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142.

Loc. Cincinnati, Ohio.

Trematis filosa Billings=Schizocrania filosa.

Trematis fragilis Ulrich. Trenton (Ord.).

Trematis fragilis Ulrich, American Geologist, IV, 1889, p. 21; III, p. 378, fig. 6.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142, pl. 4G, fig. 14.

Loc. Near Covington, Kentucky.

Trematis huronensis Billings. Black River (Ord.).

Trematis huronensis Billings, Pal. Fossils, I, 1862, p. 53, fig. 59 on p. 52;—Geol. Canada, 1863, p. 159, fig. 130.

Productella minneapolis Sardeson, Bull. Minnesota Acad. Nat. Sci., III, 1892, p. 332, pl. 4, figs. 11, 12.

Trematis huronensis? Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 368, fig. 29.

Loc. Pallideau Islands, Lake Huron; Minneapolis, Minnesota.

Trematis millepunctata Hall. Utica and Lorraine (Ord.).

Trematis millepunctata Hall, Description n. sp. Crinoidea and other Fossils, 1866, p. 14;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 221, pl. 7, figs. 22–25.—Hall and Whitfield, Pal. Ohio, II, 1875, p. 70, pl. 1, figs. 4–7.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 16.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 4–10.

Loc. Cincinnati, Ohio.

Obs. See T. quincuncialis and T. reticularis.

Trematis montrealensis Billings. Trenton (Ord.).

Trematis montrealensis Billings, Pal. Fossils, I, 1862, p. 52, fig. 57;—Geol. Canada, 1863, p. 159, fig. 128.

Loc. Montreal, Canada.

Trematis oblata Ulrich. Utica and Lorraine (Ord.).

Trematis punctostriata Hall and Whitfield (non Hall, 1873), Pal. Ohio, II, 1875, p. 70, pl. 1, figs. 8, 9.

Trematis oblata Ulrich, American Geologist, IV, 1889, p. 23; III, p. 378, fig. 9.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142, pl. 4G, fig. 20.

Loc. Cincinnati, Ohio.

Trematis ottawaensis Billings. Trenton and Lorraine (Ord.).

Trematis ottawaensis Billings, Pal. Fossils, I, 1862, p. 53, fig. 58 on p. 52;—Geol. Canada, 1863, p. 159, fig. 129;—Cat. Sil. Fossils Anticosti, 1866, p. 11.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 15–17.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 369, fig. 30.

Loc. Ottawa, Canada; Anticosti; Trenton Falls, New York; Frankfort, Kentucky; St. Paul, Minnesota.

Trematis? pannulus White=Iphidea pannulus.

Trematis punctostriata Hall and Whitfield=T. oblata.

Trematis punctistriata Hall. Lorraine (Ord.).

Trematis punctostriata Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, p. 243, pl. 13, figs. 17, 18.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 142, pl. 4G, figs. 11–13 (?3).

Loc. Clifton, Tennessee.

Trematis (?) pustulosa Hall. Lorraine (Ord.).

Trematis? pustulosa Hall, Descrip. n. sp. Crinoidea and other Fossils, 1866, p. 15;—Twenty-fourth Rep. N. Y. State Cab. Nat. Hist., 1872, p. 222.

Loc. Near Horicon, Wisconsin.

Trematis quincuncialis Miller and Dyer. Lorraine (Ord.).

Trematis quincuncialis Miller and Dyer, Cont. to Pal., II, 1878, p. 8, pl. 3, fig. 9.

Loc. Lebanon, Ohio.

Obs. Seems to be only a variety of T. millepunctata occurring at a higher horizon.

Trematis reticularis (Miller). Lorraine (Ord.).

Crania reticularis Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 280, fig. 1.

Loc. Brookville, Indiana.

Obs. The type specimens have been examined and appear to be young T. millepunctata.

Trematis rudis Hall=Schizocrania rudis.

Trematis terminalis Emmons. Trenton (Ord.).

Orbicula terminalis Emmons, Geol. New York; Rep. Second Dist., 1842, p. 395, fig. 4.—Hall, Pal. New York, I, 1847, p. 100, pl. 30, fig. 11.

Trematis terminalis Emmons, American Geologist, Pt. II, 1855, p. 201, fig. 63.—Billings, Geol. Canada, 1863, p. 159, fig. 127.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 1, 2.

?Trematis terminalis Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 14.

Loc. Middleville, Trenton Falls, Watertown, and elsewhere in New York.

Trematis truncata Hall=Schizobolus concentricus.

Trematis umbonata Ulrich. Lorraine (Ord.).

Trematis umbonata Ulrich, American Geologist, IV, 1889, p. 23; III, 1889, fig. 8 on p. 378.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 139, pl. 4G, figs. 18, 19.

Loc. Covington, Kentucky; Cincinnati, Ohio.

TREMATOBOLUS Matthew. Genotype T. insignis Matthew.

Trematobolus Matthew, Canadian Rec. Science, 1893, p. 276.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geol., 1894, p. 252.

Trematobolus insignis Matthew. Middle Cambrian.

Trematobolus insignis Matthew, Canadian Record Science, 1893, p. 276, fig. 1;—Trans. Royal Soc. Canada, Vol. XI, 1894, p. 88, pl. 16, fig. 4a-d;—Trans. N. Y. Acad. Sci., XIV, 1895, p. 122, pl. 4, fig. 2.

Loc. St. Martins, New Brunswick.

TREMATOSPIRA Hall. Genotype Spirifer? perforatus Hall.

Trematospira Hall, Pal. New York, III, 1859, p. 207;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 27;—Pal. New York, IV, 1867, p. 271.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 135.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 124;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 798.

?Trematospira Hall, Sixteenth Rep. N. Y. State Cab. Nat. Hist., 1863, p. 54.

Trematospira acadiæ Hall and Clarke=Rhynchospira acadiæ.

Trematospira camura Hall. Niagara (Sil.).

Atrypa camura Hall, Pal. New York, II, 1852, p. 273, pl. 56, fig. 3.

Trematospira camura Hall, Pal. New York, III, 1859, p. 212, pl. 28A, fig. 1.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126, pl. 49, figs. 2-4.

Rhynchonella camura Billings, Geol. Canada, 1863, p. 315, fig. 322.

Loc. Lockport, New York.

Trematospira costata Hall. Lower Helderberg (Dev.).

Trematospira costata Hall, Pal. New York, III, 1859, p. 210, pl. 28A, 1859, fig. 4;—Ibidem, IV, 1867, p. 276, figs. 5, 6.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, figs. 19, 20.

Loc. Albany and Schoharie counties, New York.

Trematospira deweyi Hall=Parazyga deweyi.

Trematospira disparilis Hall=Atrypina disparilis.

Trematospira dubia (Billings). Lower Helderberg (Dev.).
Retzia dubia Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 113, pl. 3, fig. 10.
Trematospira dubia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126, pl. 49, figs. 15, 16.
Loc. Square Lake, Maine.

Trematospira equistriata Hall and Clarke. Lower Helderberg (Dev.).
Trematospira equistriata Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, fig. 47.
Loc. Cumberland, Maryland.

Trematospira gibbosa Hall. Hamilton (Dev.).
Trematospira gibbosa Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 82;—Pal. New York, IV, 1867, p. 272, pl. 45, figs. 7-15.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, figs. 23-27.
Loc. Bellona, York, and Darien, New York.

Trematospira helena Nettelroth=Rhynchospira helena.

Trematospira hippolyte (Billings). Lower Helderberg (Dev.).
Retzia hippolyte Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 112, pl. 13, fig. 9.
Trematospira hippolyte Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126, pl. 49, figs. 7, 8.
Loc. Square Lake, Maine.

Trematospira hirsuta Hall=Parazyga hirsuta.

Trematospira imbricata Hall=Atrypina imbricata.

Trematospira (?) liniuscula A. Winchell. Hamilton (Dev.).
Trematospira ? liniuscula A. Winchell, Rep. Lower Peninsula Michigan, 1866, p. 94.
Loc. Grand Traverse region, Michigan.

Trematospira matthewsoni McChesney=Atrypa marginalis.

Trematospira maria (Billings). Lower Helderberg (Dev.).
Retzia maria Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 112, pl. 3, fig. 8.
Trematospira maria Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126, pl. 49, fig. 21.
Loc. Square Lake, Maine.

Trematospira multistriata Hall. Lower Helderberg (Dev.).
Spirifer multistriata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 59, figs. 1-6.
Trematospira multistriata Hall, Pal. New York, III, 1859, p. 209, pl. 24, fig. 3; pl. 28A, fig. 5;—Ibidem, IV, 1867, p. 276, figs. 1-3.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 126, fig. 110, pl. 49, figs. 9-14.
Retzia multistriata Billings, Geol. Canada, 1863, p. 958, fig. 458.
Loc. Schoharie, New York.

Trematospira nobilis Hall=Cyclorhina nobilis.

Trematospira perforata Hall. Lower Helderberg (Dev.).
Spirifer ? perforata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 60.
Trematospira perforata Hall, Pal. New York, III, 1859, p. 208, pl. 28A, fig. 3;—Ibidem, IV, 1867, p. 276.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, figs. 5, 6.
Loc. Albany and Schoharie counties and Hudson, New York.

Trematospira simplex Hall. Lower Helderberg (Dev.).
Trematospira simplex Hall, Pal. New York, III, 1859, p. 211, pl. 28A, fig. 2.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 49, figs. 17, 18.
Loc. Decatur County, Tennessee.

Trematospira quadriplicata Miller=Rhynchotrema inæquivalve.

Trematospira tennesseensis Hall and Clarke. Lower Helderberg (Dev.).
Trematospira tennesseensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, figs. 21–23.
Loc. Perry County, Tennessee.

TRIGERIA (Bayle partim) Hall and Clarke.
Genotype Terebratula guerangeri de Verneuil.
Trigeria Bayle (partim), Explic. Carte Géol. de France, Atlas, 1875, pl. 13.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, pp. 272, 273, fig. 189;—Thirteenth Rep. N. Y. State Geologist, 1895, p. 856.

Trigeria gaudryi (Œhlert). Oriskany (Dev.).
Centronella gaudryi Œhlert, Bull. Soc. Geol. France, 3d ser., V, 1877, p. 593, pl. 10, fig. 8;—Bull. de la Soc. d'Etudes Scientif. d'Angers, separate 1883, p. 2, pl. —. figs. 10–17.
Trigeria gaudryi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 273, fig. 189, pl. 76, figs. 6, 7.
Loc. France; Cumberland, Maryland.

Trigeria (?) lepida Hall. Hamilton (Dev.).
Rhynchospira lepida Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 83;—Pal. New York, IV, 1867, p. 276, pl. 45, figs. 1–6.
Retzia lepida Miller, N. American Geol. Pal., 1889, p. 366.
Trigeria ? lepida Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274, pl. 50, figs. 36–40.
Loc. Canandaigua Lake and Bellona, New York.

Trigeria (?) margarida (Derby). Middle Devonian.
Centronella (?) margarida Derby, Archivos do Museu Nacional Rio de Janeiro, IX, 1890, p. 84, with figures in text.
Trigeria ? margarida Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274.
Loc. Head of Paraguay; Matto Grosso, Brazil.

Trigeria (?) portlandica (Billings). Lower Helderberg (Dev.).
Rensselæria portlandica Billings, Proc. Portland Soc. Nat. Hist., I, 1863, p. 115, pl. 3, fig. 12.
Trigeria ? portlandica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 273, pl. 76, figs. 4, 5.
Loc. Square Lake, Maine.

Trigeria (?) wardiana (Rathbun). Middle Devonian.
Retzia wardiana (Hartt) Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 245, pl. 10, figs. 2–5, 8, 9, 11, 12, 14, 16.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 31.
Retzia ? wardiana Derby, Archivos do Museu Nacional do Rio de Janerio, IX, 1890, p. 78.
Trigeria ? wardiana Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 274.
Loc. Province of Para, Brazil.

TRIMERELLA Billings. Genotype T. grandis Billings.
Trimerella Billings, Pal. Fossils, I, 1862, p. 166.—Dall, American Jour. Conch., VI, 1870, p. 160;—Ibidem, VII, 1871, p. 79.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 143.—Dall, Bull. U. S. National Mus., 8, 1877, p. 74.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pp. 33, 46, 163;—Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 236.
Gotlandia Dall, American Jour. Conch., VI, 1870, p. 160.

Trimerella acuminata Billings. Guelph (Sil.).

Trimerella acuminata Billings, Pal. Fossils, I, 1862, pp. 167, 168, fig. 152;—American Jour. Sci., 3d ser., I, 1871, p. 471;—Ann. Mag. Nat. Hist., 4th ser., VIII, 1871, p. 140.—Dall, American Jour. Conch., VII, 1871, p. 82.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 146, pl. 15, figs. 4-7; pl. 16, figs. 1, 2.—Nicholson, Pal. Prov. Ontario, 1875, p. 68, fig. 36.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4B, fig. 6.

Loc. Galt, New Hope, and Hespelar, Ontario; near Hillsboro, Ohio; Port Byron, Illinois; Gotland and Farö.

Trimerella billingsi Dall. Guelph (Sil.).

Trimerella billingsi Dall, American Jour. Conch., VII, 1871, p. 82, pl. 11, figs. 1-3.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 150, pl. 16, figs. 8, 9.

Loc. New Hope, Ontario, Canada.

Trimerella dalli Davidson and King. Guelph (Sil.).

Trimerella dalli Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 154, pl. 15, figs. 1-3.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4A, fig. 10.

Loc. Hespelar, Elora, and New Hope, Ontario, Canada.

Trimerella galtensis Hall=Rhinobolus galtensis.

Trimerella grandis Billings. Guelph (Sil.).

Trimerella grandis Billings, Pal. Fossils, I, 1862, pp. 166, 167, fig. 151.—Dall, American Jour. Conch., II, 1870, p. 160;—Ibidem, VII, 1871, p. 82.—Hall, Twenty-third Rep. N. Y. State Cab. Nat. Hist., 1873, pl. 13, figs. 11-16.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, pl. 13, figs. 2, 3.—Nicholson, Pal. Prov. Ontario, 1875, p. 67, fig. 37.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4A, figs. 1, 2; pl. 4B, figs. 2-5.

Loc. Galt, New Hope, and Elora, Hespelar, Ontario, Canada; near Hillsboro, Ohio; Wisconsin.

Trimerella minor Dall=Rhinobolus galtensis.

Trimerella ohioensis Meek. Niagara (Sil.).

Trimerella ohioensis Meek, American Jour. Sci., 3d ser., I, 1871, p. 305.—Dall, American Jour. Conch., VII, 1871, p. 83.—Davidson and King, Geol. Mag., IX, 1872.—Meek, Pal. Ohio, I, 1873, p. 183, pl. 16, fig. 1.—Davidson and King, Quart. Jour. Geol. Soc. London, XXX, 1874, p. 153, pl. 16, figs. 3-7; pl. 19, figs. 1-2.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, pl. 4A, figs. 3-9.

Loc. Genoa, Ottawa County, Ohio; Port Byron, Illinois; Ontario, Canada.

TRIPLECIA Hall. Genotype Atrypa extans Emmons.

Triplesia Hall, Pal. New York, III, 1859, p. 522;—Twelfth Rep. N. Y. State Cab Nat. Hist., 1859, p. 44.—Waagen, Palæontologica Indica, Ser. XIII, I, 1884, p. 576.

Triplecia Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 269.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 408.—Hall and Clarke, Eleventh Ann. Rep. N. Y. State Geologist, 1894, p. 289.

Dicraniscus Meek, American Jour. Sci., 3d ser., IV, 1872, p. 279.—Pal. Ohio, I, 1873, p. 576.

Triplecia cuspidata Hall. Trenton (Ord.).

Atrypa cuspidata Hall, Pal. New York, I, 1847, p. 133, pl. 33*, fig. 1, and p. 318.

Triplesia cuspidata Hall, Pal. New York, III, 1859, p. 522.—Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270.

Loc. Lowville, Lewis County, New York.

Triplecia extans (Emmons). Trenton (Ord.).
Atrypa extans Emmons, Geol. N. Y.; Rep. Second Dist., 1842, p. 395, fig. 6.—Hall, Pal. New York, I, 1847, p. 137, pl. 33, fig. 1.
Triplesia extans, Hall, Ibidem, III, 1859, p. 523, figs. 1–3.
Triplecia extans Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270, pl. 11C, figs. 1–7.
Loc. Watertown, Lowville, and Boonville, New York.

Triplecia niagaraensis Hall and Clarke. Niagara (Sil.).
Triplecia niagarensis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, figs. 16–20.
Loc. Near Milwaukee, Wisconsin.

Triplecia nucleus Hall. Trenton (Ord.).
Atrypa nucleus Hall, Pal. New York, I, 1847, p. 138, pl. 33, fig. 2.
Triplesia nucleus Hall, Ibidem, III, 1859, p. 522.
Triplecia nucleus, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270, pl. 11C, figs. 8, 9.
Loc. Middleville, New York.

Triplecia ortoni Meek. Clinton (Sil.).
Dicraniscus ortoni Meek, American Jour. Sci., 3d ser., IV, 1872, p. 280.
Triplesia ortoni Meek, Pal. Ohio, I, 1873, p. 178, pl. 15, fig. 1.
Triplecia ortoni, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 270; pl. 11C, figs. 12–20.—Foerste, Geol. Ohio, VII, 1895, p. 585.
Loc. Dayton, Ohio; Newson, Tennessee.

Triplecia (?) radiata Whitfield. Calciferous (Ord.).
Triplesia radiata Whitfield, Bull. American Mus. Nat. Hist., II, 1889, p. 43, pl. 7, figs. 5–8.
Triplecia radiata, Hall and Clarke, Pal. New York, VIII, Pt. I, 1892, p. 271.
Loc. Beekmantown, New York.

Triplecia ulrichi Winchell and Schuchert. Lorraine (Ord.).
Triplecia ulrichi W. and S., Minnesota Geol. Survey, III, 1893, p. 409, fig. 34.
Loc. Wykoff and Spring Valley, Minnesota.

Triplesia ambigua Hall=Camarella ambigua.
Triplesia calcifera Walcott=Syntrophia calcifera.
Triplesia congesta Hall=Hyattella congesta.
Triplesia lateralis Whitfield=Syntrophia lateralis.
Triplesia primordialis Whitfield=Syntrophia primordialis.
Triplesia putillus Hall=Mimulus waldronensis.
Triplesia quadricostata Hall=Hyattella congesta.

TROPIDOLEPTUS Hall. Genotype Strophomena carinata Conrad.
Tropidoleptus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 152 (undefined);—Twelfth Rep. Ibidem, 1859, p. 31 (undefined); Twentieth Rep.—Ibidem, 1867, pp. 165, 279;—Pal. New York, IV, 1867, p. 404.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 46.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 302;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 870.

Tropidoleptus carinatus (Conrad). Marcellus and Hamilton (Dev.).
Strophomena carinata Conrad, Third Ann. Rep. N. Y. Geol. Survey, 1839, p. 64.
Leptæna laticosta (Hall) de Verneuil, Bull. Soc. Geol. France, 2d ser., IV, 1847, p. 703.
Tropidoleptus carinatus Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 151, figs. 1, 2;—Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 31, figs.

Tropidoleptus carinatus (Conrad)—Continued.

1-4.—Rogers, Geol. Pennsylvania, II, Pt. II, 1858, p. 828, fig. 672.—Hall, Pal. New York, IV, 1867, p. 407, pl. 62, figs. 2, 3.—Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 427, pl. 13, fig. 2.—Rathbun, Bull. Buffalo Soc. Nat. Sci., I, 1874, p. 254, pl. 9, figs. 1, 9, 10, 26.—Derby, Bull. Mus. Comp. Zool., III, 1876, p. 282.—Rathbun, Proc. Boston Soc. Nat. Hist., XX, 1879, p. 35.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 146, pl. 17, figs. 14, 15.—A. Ulrich, N. Jahrb. f. Mineral., Beilageband, VIII, 1892, p. 73, pl. 4, figs. 32-34.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 304, figs. 227, 228, pl. 82, figs. 26-36.

Loc. New York; Falls of Ohio; Columbus, Ohio; Pennsylvania; Jackson County, Illinois; Erere, Province of Para, Brazil; Island of Coati, Lake Titicaca (Agassiz), and Rio Sicasica (Ulrich), Bolivia, South America; South Africa (Ulrich); France; Germany and England.

Tropidoleptus occidens Hall. Hamilton (Dev.).

Tropidoleptus occidens Hall, Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 91;—Pal. New York, IV, 1867, p. 408, pl. 61A, figs. 50-52.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 82, figs. 37, 38.

Loc. Iowa City, Iowa.

UNCINULUS Bayle. Genotype Rhynchonella subwilsoni d'Orbigny.

Uncinulus Bayle, Explic. de la Carte Géolog. France, IV, Atlas, 1878, pl. 11, figs. 17-20.—Waagen, Palæontologica Indica, Ser. XIII, I, 1883, p. 424.—Œhlert, Fischer's Manuel de Conchyliologie, 1887, p. 1306.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 195;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 828.

Uncinulus abruptus Hall. Lower Helderberg (Dev.).

Rhynchonella abrupta Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 68, fig. 1;—Pal. New York, III, 1859, p. 228, pl. 31, fig. 3.

Uncinulus abruptus Hall and Clarke, VIII, Pt. II, 1893, p. 199, pl. 58, figs. 15-21.

Loc. Albany and Schoharie counties, New York.

Uncinulus campbellanus (Hall). Lower Helderberg (Dev.).

Rhynchonella campbellana Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 79;—Pal. New York, III, 1859, p. 239, pl. 43, fig. 2.

Loc. Albany County, New York.

Uncinulus mutabilis Hall. Lower Helderberg (Dev.).

Rhynchonella mutabilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 66, figs. 1-7;—Pal. New York, III, 1859, p. 225, pl. 29, fig. 4; pl. 30, figs. 1, 2.

Uncinulus mutabilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 199, pl. 58, figs. 22-25.

Loc. Schoharie and Carlisle, New York.

Uncinulus nobilis Hall. Lower Helderberg (Dev.).

Rhynchonella nobilis Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 80, figs. 1-3.—Rogers, Geol. Pennsylvania, II, 1858, p. 825, fig. 645.—Hall, Pal. New York, III, 1859, p. 240, pl. 43, fig. 3.

Uncinulus nobilis Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 58, fig. 26.

Loc. Albany and Schoharie counties, New York; Pennsylvania.

Uncinulus nucleolatus Hall. Lower Helderberg (Dev.).

Rhynchonella nucleolata Hall, Tenth Rep. N. Y. State Cab. Nat. Hist., 1857, p. 68;—Pal. New York, III, 1859, p. 227, pl. 31, figs. 1f, 2.—Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 110, pl. 3, fig. 5.

Waldheimia compacta White and St. John=Cryptacanthia compacta.
Waldheimia coutinhoana Derby=Harttina coutinhoana.
Waldheimia deweyi Hall=Parazyga deweyi.
Waldheimia formosa Hall=Rhynchospira formosa.
Waldheimia globosa Hall=Rhynchospira globosa.
Waldheimia imbricata Cooper=Terebratella? imbricata.

Waldheimia kennedyi Dall. Miocene.
Waldheimia kennedyi Dall, Proc. California Acad. Sci., 1874 (extract, p. 4).
Loc. Cerros Island, Lower California.

Waldheimia rectirostra Hall=Rhynchospira rectirostris.
Whitfieldia Davidson=Meristina.

WHITFIELDELLA Hall and Clarke. Genotype Atrypa nitida Hall.
Whitfieldella Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 58;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 766.

Whitfieldella (?) billingsana (Meek and Worthen). Niagara (Sil.).
Centronella billingsiana Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 352, figs. a, b, c; pl. 6, fig. 5.
Loc. Alexander County, Illinois.

Whitfieldella (?) bisulcata (Vanuxem). Lower Helderberg (Dev.).
Atrypa bisulcata Vanuxem, Geol. N. Y.; Rep. Third Dist., 1842, p. 112.
Merista bisulcata Hall, Pal. New York, III, 1859, p. 253.
Loc. Litchfield, New York.

Whitfieldella cylindrica Hall. Clinton-Niagara (Sil.).
Atrypa cylindrica Hall, Pal. New York, II, 1852, p. 76, pl. 24, fig. 2.
Atrypa crassirostra Hall, Pal. New York, 1852, p. 269, pl. 55, fig. 4.
Merista cylindrica Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.
Athyris cylindrica Billings, Geol. Canada, 1863, p. 317, fig. 333;—Geol. Canada, 1863, p. 317, fig. 332.
Meristella (?Meristina) cylindrica Meek, Pal. Ohio, I, 1873, p. 180, pl. 15, fig. 2.
Whitfieldella cylindrica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, pl. 40, figs. 16-22.
Loc. Lockport, New York; Hillsboro, Ohio; Hamilton, Ontario; Anticosti.

Whitfieldella (?) harpalyce (Billings). Lower Helderberg (Dev.).
Athyris harpalyce Billings, Proc. Portland Soc. Nat. Hist., 1863, p. 116, pl. 3, fig. 14.
Whitfieldella (?) harpalyce Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60.
Loc. Square Lake, Maine.

Whitfieldella hyale (Billings). Guelph (Sil.).
Charionella ? hyale, Billings, Pal. Fossils, I, 1862, p. 166, fig. 150.
Whitfieldella hyale Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60.
Charionella hyale Hall and Clarke, Ibidem, pl. 42, figs. 20, 21.
Loc. Galt and Elora, Ontario; Wisconsin (Whitfield).

Whitfieldella intermedia Hall. Clinton-Niagara (Sil.).
Atrypa intermedia Hall, Pal. New York, II, 1852, p. 77, pl. 24, figs. 3, 4, ?6.—Rogers, Geol. Pennsylvania, II, 1858, Pt. II, p. 823, fig. 634.
Merista intermedia Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 77.
Athyris intermedia Nicholson and Hinde, Canadian Jour. Sci., XIV, 1874, p. 157.—Nicholson, Pal. Prov. Ontario, 1875, p. 61, fig. 32A.

Whitfieldella intermedia Hall—Continued.

Whitfieldella intermedia Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, pl. 40, figs. 1, 2.

Loc. Lockport, New York; Thorold, Ontario; Pennsylvania.

Whitfieldella (?) julia (Billings). Anticosti (Sil.).

Athyris julia Billings, Pal. Fossils, I, 1862, p. 146, fig. 124.

Meristella julia Miller, N. American Geol. Pal., 1889, p. 354.

Loc. Anticosti.

Whitfieldella (?) naviformis Hall. Clinton-Niagara (Sil.).

Atrypa naviformis Hall, Geol. New York; Rep. Fourth Dist., 1843, p. 71, fig. 3;—Pal. New York, II, 1852, p. 76, pl. 24, fig. 1.—Nicholson and Hinde, Canadian Jour. Sci., n. ser., XVI, 1874, pp. 144, 157.

Meristella naviformis Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Athyris naviformis Billings, Geol. Canada, 1863, p. 317, fig. 320.—Nicholson, Pal. Prov. Ontario, 1875, p. 62, fig. 32E.

Whitfieldella naviformis Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60, pl. 40, fig. 3.

Loc. Rochester, Sodus, etc., New York; Dundas, Ontario; Anticosti.

Whitfieldella nitida Hall. Niagara (Sil.).

Atrypa nitida Hall, Geol. New York; Rep. Fourth Dist., Tables of Organic Remains, 13, 1843, fig. 5;—Pal. New York, II, 1852, p. 268, pl. 55, fig. 1.—Billings, Canadian Nat. Geol., I, 1856, p. 137, pl. 2, fig. 9.

Merista nitida Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Athyris nitida Hall, Geol. Canada, 1863, p. 317, fig. 334.

Meristella nitida Hall, Trans. Albany Institute, IV, 1863, p. 226.

Meristina nitida Hall, Pal. New York, IV, 1867, p. 299;—Twenty-eighth Rep. N. Y. State Mus. Nat. Hist., 1879, p. 169, pl. 25, figs. 1-7;—Eleventh Rep. State Geol. Indiana, 1882, p. 300, pl. 25, figs. 1-7.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 102, pl. 33, figs. 10, 11.—Beecher and Clarke, Mem. N. Y. State Mus., I, 1889, p. 70, pl. 7, figs. 6-10.

Whitfieldella nitida Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 59, figs. 43, 44; pl. 40, figs. 4-13.

Loc. Lockport, etc., New York; Hamilton, Ontario; Waldron, Indiana; Louisville, Kentucky; Anticosti.

Whitfieldella nitida oblata Hall. Niagara (Sil.).

Atrypa nitida var. oblata Hall, Pal. New York, II, 1852, p. 269, pl. 55, fig. 2.

Merista nitida var. oblata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Loc. Lockport, etc., New York.

Whitfieldella (?) nucleolata (Hall.) Coralline (Sil.).

Atrypa nucleolata Hall, Pal. New York, II, 1852, p. 328, pl. 74, fig. 10.

Merista nucleolata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Meristella nucleolata Whitfield, Geol. Wisconsin, IV, 1882, p. 321, pl. 25, fig. 5.

Loc. Schoharie, New York; near Milwaukee, Wisconsin.

Whitfieldella oblata Hall. Medina (Sil.).

Atrypa oblata Hall, Pal. New York, II, 1852, p. 9, pl. 4, figs. 4, 5.

Merista oblata Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 78.

Whitfieldella (?) oblata Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 60.

Loc. Lockport, New York.

Whitfieldella sulcata (Vanuxem). Waterlime (Sil.).

Atrypa sulcata Vanuxem, Geol. New York; Rep. Third Dist., 1842, p. 112, fig. 5.—Hall, Ibidem, Rep. Fourth Dist., 1843, p. 142, fig. 5.

Merista sulcata Miller, American Pal. Fossils, 1877, p. 115.

Loc. Near Vienna village, New York.

WILSONIA Kayser. Genotype Terebratula wilsoni Sowerby.

Wilsonia Kayser, Zeitschr. d. deutsch. geolog. Gesselsch., XXIII, 1871, p. 502.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 195;—Thirteenth Ann. Rep. N. Y. State Geologist, 1895, p. 827.

Uncinulina Bayle, Explic. de la Carte Géolog. France, IV, 1878, Atlas, pl. 13, figs. 13–16.

Obs. A subgenus of Camarotœchia.

Wilsonia kokomoensis (Miller). Waterlime (Sil.).

Rhynchonella kokomoensis Miller, Eighteenth Ann. Rep. Geol. Survey Indiana, 1894, p. 312, pl. 9, figs. 22–24.

Loc. Kokomo, Indiana.

Wilsonia saffordi Hall. Niagara and Lower Helderberg (Sil. and Dev.).

Rhynchonella saffordi Hall, Canadian Nat. Geol., V, 1860, p. 146.—Hall and Whitfield, Twenty-seventh Rep. N. Y. State Cab. Nat. Hist., 1875, pl. 9, figs. 27–29.—Dawson, Acadian Geol., 3d ed., 1878, p. 598.—Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 79, pl. 27, figs. 22–24; pl. 33, figs. 4–6.

Wilsonia saffordi Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 198, pl. 58, figs. 5–14.

Loc. In the Arisaig group of Nova Scotia; Perry County, Tennessee; Louisville, Kentucky.

Wilsonia saffordi depressa (Nettelroth). Niagara (Sil.).

Rhynchonella saffordi var. depressa Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 80, pl. 33, fig. 1–3.

Loc. Louisville, Kentucky.

Wilsonia wilsoni (Sowerby). Niagara (Sil.).

Terebratula wilsoni Sowerby, Mineral Conchology, 1818, p. 118, fig. 3.

Rhynchonella wilsoni Roemer, Sil. Fauna d. West. Tennessee, 1860, p. 71, pl. 5, fig. 13.

Wilsonia wilsoni Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 198.

Loc. Europe; Decatur County, Tennessee; Louisville, Kentucky; Lake Temiscouata, New Brunswick.

YORKIA Walcott. Genotype Y. wanneri Walcott.

Yorkia Walcott, Proc. U. S. Nat. Mus., XIX, 1897, p. 714.

Yorkia wanneri Walcott. Lower Cambrian.

Yorkia wanneri Walcott, Proc. U. S. Nat. Mus., XIX, 1897, p. 715, pl. 60, figs. 1–1e.

Loc. Emigsville, Pennsylvania.

Yorkia (?) **washingtonensis** Walcott. Lower Cambrian.

Yorkia (?) washingtonensis Walcott, Proc. U. S. Nat. Mus., XIX, 1897, p. 715, pl. 60, fig. 3.

Loc. Salem, Washington County, New York.

ZYGOSPIRA Hall. Genotype Atrypa modesta Hall.

Stenocisma Hall (non Conrad), Pal. New York, I, 1847, p. 142.—Meek and Hayden, Pal. Upper Missouri, Smithsonian Cont. to Knowl., XIV, 1864, p. 16.

Zygospira Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, p. 154, figs. 1, 2.—Billings, Canadian Nat. Geol., VII, 1862, p. 393.—Hall, Twentieth Rep. N. Y. State Cab. Nat. Hist., 1867, p. 267.—Meek, Geol. Survey, Illinois, III, 1868, p. 377.—Davidson, Suppl. British Silurian Brachiopoda, Pal. Soc., 1882, p. 122.—Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 465.—Beecher and Schuchert, Biol. Soc. Washington, VIII, 1893, pp. 71–82.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 154.

Anazyga Davidson, Suppl. British Silurian Brachiopoda, Pal. Soc., 1882, p. 128.

ZYGOSPIRA Hall—Continued.

Hallina Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 471.

Protozyga Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 151.

Protozyga, Hallina and Zygospira Hall and Clarke, Thirteenth Ann. Rep. N. Y. State Geologist, 1895, pp. 809, 810, 812.

Zygospira æquila Sardeson=Z. nicoletti.

Zygospira anticostiensis Davidson=Catazyga erratica.

Zygospira cincinnatiensis Meek. Lorraine (Ord.).

Zygospira cincinnatiensis (James) Meek, Pal. Ohio, I, 1873, p. 126, pl. 11, fig. 5.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 59.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 54, figs. 13, 14.

Loc. Cincinnati, Ohio.

Zygospira concentrica Ulrich. Lorraine (Ord.).

Zygospira concentrica Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, 1879, p. 14, pl. 7, fig. 10.

Loc. Cincinnati, Ohio.

Zygospira deflecta Hall. Trenton (Ord.).

Atrypa deflecta Hall, Pal. New York, I, 1847, p. 140, pl. 33, fig. 4.

Zygospira deflecta Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157.

Loc. Lewis County, New York; Ottawa, Canada.

Zygospira exigua (Hall). Trenton (Ord.).

Atrypa exigua Hall, Pal. New York, I, 1847, p. 141, pl. 33, fig. 6.

Genus? exigua Hall, Twelfth Rep. N. Y. State Cab. Nat. Hist., 1859, p. 66.

Protozyga exigua Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 149, figs. 137, 138, pl. 54, figs. 47, 48.

Loc. Lowville, Watertown, and Martinsburg, New York.

Zygospira erratica Davidson=Catazyga erratica.

Zygospira headi Hall=Catazyga headi.

Zygospira kentuckiensis James. Lorraine (Ord.).

Zygospira modesta var. kentuckiensis James, The Paleontologist, 1878, p. 7.

Zygospira kentuckiensis Nettelroth, Kentucky Fossil Shells, Mem. Kentucky Geol. Survey, 1889, p. 138, pl. 34, figs. 21-25.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 54, figs. 11, 15, 16.

Loc. Oldham and Jefferson counties, Kentucky.

Zygospira (?) mica (Billings). Anticosti (Sil.).

Rhynchonella mica Billings, Cat. Sil. Foss. Anticosti, 1866, p. 44.

Zygospira ? mica Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157.

Loc. Division 4 of the Anticosti group, Anticosti.

Zygospira (?) minima Hall. Niagara (Sil.).

Zygospira minima Hall, Descrip. n. sp. Foss. Waldron, Indiana, 1879, p. 14;—Eleventh Rep. Indiana State Geologist, 1882, p. 305, pl. 27, fig. 7;—Trans. Albany Institute, X, 1883, p. 70.

Loc. Waldron, Indiana.

Zygospira modesta Hall. Utica and Lorraine (Ord.).

Atrypa modesta (Say) Hall, Pal. New York, I, 1847, p. 141, pl. 15, fig. 15;—Thirteenth Rep. N. Y. State Cab. Nat. Hist., 1860, p. 69.

Zygospira modesta Hall, Fifteenth Rep. N. Y. State Cab. Nat. Hist., 1862, p. 154;—Twentieth Rep. Ibidem, 1867, p. 267, figs. 1, 2.—Meek, Pal. Ohio, I, 1873, p. 125, pl. 11, fig. 4.—Miller, Cincinnati Quart. Jour. Sci., II, 1875, p. 58.—Davidson, Suppl. British Sil. Brachiopoda, Pal. Soc., 1882, p. 122.—Winchell

Zygospira modesta Hall—Continued.

and Schuchert, Minnesota Geol. Survey, III, 1893, p. 467, pl. 34, figs. 42-44.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 155, figs. 146-149, pl. 54, figs. 7-10, 12.—Keyes, Geol. Survey Missouri, V, 1895, p. 98.

Rhynchonella? modesta Billings, Geol. Canada, 1863, p. 211, fig. 211.

Loc. Cincinnati, Ohio; Turin, etc., New York; Lattners, Iowa; Spring Valley, Minnesota; Wisconsin; St. Louis County, Missouri; Ottawa, Canada (Ami).

Zygospira nicoletti Winchell and Schuchert. Trenton (Ord.).

Hallina nicoletti W. and S., American Geol., IX, April 1, 1892, p. 293;—Minnesota Geol. Survey, III, 1893, p. 474, pl. 34, figs. 59-62.

Zygospira aquila Sardeson, Bull. Minnesota Geol. Survey, III, April 9, 1892, p. 335, pl. 4, figs. 15-18.

Zygospira nicolleti Beecher and Schuchert, Biol. Soc. Washington, VIII, Pt. II, 1893, p. 71, pl. 10, fig. 23; pl. 11, figs. 11, 12.

Loc. Minneapolis, Rochester, and Fountain, Minnesota; Decorah, Iowa; Beloit, Wisconsin; Auburn, Missouri.

Zygospira paupera Billings. Anticosti (Sil.).

Zygospira paupera Billings, Cat. Sil. Fossils Anticosti, 1866, p. 46.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157.

Loc. Division 3 of Anticosti group, Anticosti.

Zygospira putilla Hall and Clarke. ? Lorraine (Ord.).

Zygospira putilla Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 157, fig. 150, p. 365, pl. 54, figs. 35-37; pl. 83, figs. 29, 30.

Loc. Pike County, Missouri.

Zygospira recurvirostris (Hall). Trenton (Ord.).

Atrypa recurvirostris Hall, Pal. New York, I, 1847, p. 140, pl. 33, fig. 5.

Rhynchonella recurvirostris Billings, Geol. Canada, 1863, p. 168, fig. 152.

Anazyga recurvirostra Davidson, Suppl. British Sil. Brachiopoda, Pal. Soc., 1892, p. 129.

Zygospira recurvirostra Winchell and Schuchert, Minnesota Geol. Survey, III, 1893, p. 466, pl. 34, figs. 38-41.—Beecher and Schuchert, Biol. Soc. Washington, VIII, 1893, p. 71, pl. 10, figs. 7-21; pl. 11, figs. 1-10.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 54, figs. 1-6.—Whiteaves, Pal. Foss., III, Pt. III, 1897, p. 180.

Loc. New York; Kentucky; Iowa; Minnesota; Wisconsin; Ottawa, Canada; Lake Winnipeg, Manitoba. According to Billings it occurs also in the Lorraine group of Anticosti.

Zygospira saffordi Winchell and Schuchert. Trenton (Ord.).

Hallina saffordi W. and S., American Geol., IX, 1892, p. 292;—Minnesota Geol. Survey, III, 1893, p. 473, pl. 34, figs. 55-58.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1895, pl. 83, figs. 36-38.

Zygospira saffordi Beecher and Schuchert, Biol. Soc. Washington, VIII, 1893, p. 71, pl. 10, fig. 22; pl. 11, figs. 13, 13a.—Hall and Clarke, Pal. New York, VIII, Pt. II, 1893, p. 151, figs. 139-141.

Loc. Lebanon, Tennessee; Highbridge, Kentucky.

Zygospira (?) subconcava Meek and Worthen. Lower Helderberg (Dev.).

Zygospira subconcava Meek and Worthen, Geol. Survey Illinois, III, 1868, p. 380, pl. 7, fig. 1.

Loc. Perry County, Missouri.

Zygospira uphami W. and S. = Catazyga uphami.

ADVERTISEMENT.

[Bulletin 87.]

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"The publications of the Geological Survey shall consist of the annual report of operations, geological and economic maps illustrating the resources and classification of the lands, and reports upon general and economic geology and paleontology. The annual report of operations of the Geological Survey shall accompany the annual report of the Secretary of the Interior. All special memoirs and reports of said Survey shall be issued in uniform quarto series if deemed necessary by the Director, but otherwise in ordinary octavos. Three thousand copies of each shall be published for scientific exchanges and for sale at the price of publication; and all literary and cartographic materials received in exchange shall be the property of the United States and form a part of the library of the organization; and the money resulting from the sale of such publications shall be covered into the Treasury of the United States."

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I. First Annual Report of the United States Geological Survey, by Clarence King. 1880. 8°. 79 pp. 1 map.—A preliminary report describing plan of organization and publications.

II. Second Annual Report of the United States Geological Survey, 1880-'81, by J. W. Powell. 1882. 8°. lv, 588 pp. 62 pl. 1 map.

III. Third Annual Report of the United States Geological Survey, 1881-'82, by J. W. Powell. 1883. 8°. xviii, 564 pp. 67 pl. and maps.

IV. Fourth Annual Report of the United States Geological Survey, 1882-'83, by J. W. Powell. 1884. 8°. xxxii, 473 pp. 85 pl. and maps.

V. Fifth Annual Report of the United States Geological Survey, 1883-'84, by J. W. Powell. 1885. 8°. xxxvi, 469 pp. 58 pl. and maps.

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VII. Seventh Annual Report of the United States Geological Survey, 1885-'86, by J. W. Powell. 1888. 8°. xx, 656 pp. 71 pl. and maps.

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IX. Ninth Annual Report of the United States Geological Survey, 1887-'88, by J. W. Powell. 1889. 8°. xiii, 717 pp. 88 pl. and maps.

X. Tenth Annual Report of the United States Geological Survey, 1888-'89, by J. W. Powell. 1890. 8°. 2 pt. xv, 774 pp. 98 pl. and maps; viii, 123 pp.

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XV. Fifteenth Annual Report of the United States Geological Survey, 1893-'94, by J. W. Powell. 1895. 8°. xiv, 755 pp. 48 pl.

XVI. Sixteenth Annual Report of the United States Geological Survey, 1894-'95, by Charles D. Walcott. 1895. (Part I, 1896.) 8°. 4 pt. xxii, 910 pp. 117 pl. and maps: xix, 598 pp. 43 pl. and maps; xv, 646 pp. 23 pl.; xix, 735 pp. 6 pl.

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I. Lake Bonneville, by Grove Karl Gilbert. 1890. 4°. xx, 438 pp. 51 pl. 1 map. Price $1.50.

II. Tertiary History of the Grand Cañon District, with atlas, by Clarence E. Dutton, Capt. U. S. A. 1882. 4°. xiv, 264 pp. 42 pl. and atlas of 24 sheets folio. Price $10.00.

III. Geology of the Comstock Lode and the Washoe District, with atlas, by George F. Becker. 1882. 4°. xv, 422 pp. 7 pl. and atlas of 21 sheets folio. Price $11.00.

IV. Comstock Mining and Miners, by Eliot Lord. 1883. 4°. xiv, 451 pp. 3 pl. Price $1.50.

V. The Copper-Bearing Rocks of Lake Superior, by Roland Duer Irving. 1883. 4°. xvi, 464 pp. 15l. 29 pl. and maps. Price $1.85.

VI. Contributions to the Knowledge of the Older Mesozoic Flora of Virginia, by William Morris Fontaine. 1883. 4°. xi, 144 pp. 54 l. 54 pl. Price $1.05.

VII. Silver-Lead Deposits of Eureka, Nevada, by Joseph Story Curtis. 1884. 4°. xiii, 200 pp. 16 pl. Price $1.20.

VIII. Paleontology of the Eureka District, by Charles Doolittle Walcott. 1884. 4°. xiii, 298 pp. 24 l. 24 pl. Price $1.10.

IX. Brachiopoda and Lamellibranchiata of the Raritan Clays and Greensand Marls of New Jersey, by Robert P. Whitfield. 1885. 4°. xx, 338 pp. 35 pl. 1 map. Price $1.15.

X. Dinocerata. A Monograph of an Extinct Order of Gigantic Mammals, by Othniel Charles Marsh. 1886. 4°. xviii, 243 pp. 56 l. 56 pl. Price $2.70.

XI. Geological History of Lake Lahontan, a Quaternary Lake of Northwestern Nevada, by Israel Cook Russell. 1885. 4°. xiv, 288 pp. 46 pl. and maps. Price $1.75.

XII. Geology and Mining Industry of Leadville, Colorado, with atlas, by Samuel Franklin Emmons. 1886. 4°. xxix, 770 pp. 45 pl. and atlas of 35 sheets folio. Price $8.40.

XIII. Geology of the Quicksilver Deposits of the Pacific Slope, with atlas, by George F. Becker. 1888. 4°. xix, 486 pp. 7 pl. and atlas of 14 sheets folio. Price $2.00.

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XX. Geology of the Eureka District, Nevada, with atlas, by Arnold Hague. 1892. 4°. xvii, 419 pp. 8 pl. Price $5.25.

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XXIII. Geology of the Green Mountains in Massachusetts, by Raphael Pumpelly, J. E. Wolff, and T. Nelson Dale. 1894. 4°. xiv, 206 pp. 23 pl. Price $1.30.

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XXXII. Geology of the Yellowstone National Park, Part II, Descriptive Geology, Petrography, and Paleontology, by Arnold Hague, J. P. Iddings, W. Harvey Weed, Charles D. Walcott, G. H. Girty, T. W. Stanton, and F. H. Knowlton.

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24. List of Marine Mollusca, comprising the Quaternary Fossils and Recent Forms from American Localities between Cape Hatteras and Cape Roque, including the Bermudas, by William Healy Dall. 1885. 8°. 336 pp. Price 25 cents.
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By act of Congress approved June 11, 1896, the following provision was made:

"*Provided*, That hereafter the reports of the Geological Survey in relation to the gauging of streams and to the methods of utilizing the water resources may be printed in octavo form, not to exceed one hundred pages in length and five thousand copies in number; one thousand copies of which shall be for the official use of the Geological Survey, one thousand five hundred copies shall be delivered to the Senate, and two thousand five hundred copies shall be delivered to the House of Representatives, for distribution."

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In compliance with this legislation, the report Mineral Resources of the United States for the Calendar Year 1894 forms Parts III and IV of the Sixteenth Annual Report of the Survey, and Mineral Resources of the United States for the Calendar Year 1895 forms Part III of the Seventeenth Annual Report of the Survey.

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