Paleozoic Species of *Bairdia* and Related Genera

GEOLOGICAL SURVEY PROFESSIONAL PAPER 330-A

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By I. G. SOHN

REVISION OF SOME PALEOZOIC OSTRACODE GENERA

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A monographic subjective revision of genera and species, including identification keys and stratigraphic ranges

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1960

UNITED STATES DEPARTMENT OF THE INTERIOR

FRED A. SEATON, *Secretary*

GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price $1 (paper cover)

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ABSTRACT

Paleozoic species of the genus *Bairdia* have been critically examined and revised by use of punched cards. These species are referred to the following genera: *Bairdia* McCoy, *Cryptobairdia* n. gen., *Rectobairdia* n. gen., *Bairdiacypris* Bradfield, *Fabalicypris* Cooper, *Orthobairdia* n. gen., *Pustulobairdia* n. gen., *Ceratobairdia* Sohn, *Bairdiolites* Croneis and Gale, *Rishona* n. gen., and *Bekena* Gibson. Other species are referred to *Basslerella*? Kellett, *Camdenidea* Swain, *Cavellina*? Coryell, *Haworthina* Kellett, and *Steusloffina* Teichert. The stratigraphic range of *Bairdia*, as redefined, is restricted to rocks of Middle Devonian to Permian age. It is suggested that the post-Paleozoic species referred to this genus belong to other genera, several of which are listed, and some of which are still undescribed. Homonyms of Paleozoic species are renamed as follows: *Bairdia egorovi* (*B. symmetrica* Egorov, 1953), *B. elongatella* (*B. plebia elongata* Kirkby, 1859), *B. girtyi* (*B. attenuata* Girty), *Cryptobairdia contractella* (*B. hisingeri contracta* Jones and Kirkby, 1895), *Orthobairdia kirki* (*B. compressa* Geis, 1932), *Rectobairdia posneri* (*Bairdia angulata* Posner, 1951).

The following genera are discussed: *Silenites* Coryell and Booth, *Tubulibairdia* Swartz, *Phanassymetria* Roth, *Pachydomella* Ulrich, *Spinobairdia* Morris and Hill, and *Bairdiocypris* Kegel. The new family Rishoniidae is erected for *Rishona* n. gen. and *Samarella* Polenova, 1952. *Reversocypris* Přibyl, 1955, is here tentatively considered a junior subjective synonym of *Samarella*. A new family to be named by Berdan and Sohn is discussed and illustrated by means of polished sections and radiographs.

A key to the more important genera and nine dichotomous keys to the species in these genera are presented. Some of these species are here considered nomina dubia. Misidentifications that belong to new species, except for *Bairdia hassi* n. sp., and *B. pseudoglennensis* n. sp., are not named; they are indicated by letters. Lectotypes for *Orthobairdia cestriensis* (Ulrich), 1891, *Bekena pecki* (Morey), 1935, *Cryptobairdia recta* (Harlton), 1929, *Bairdia crassa* Harlton, 1929, and *Bairdia girtyi* Sohn, n. name are described and illustrated. *Rishona bassleri* n. sp. is described and illustrated.

INTRODUCTION

This paper is part of an inventory of the available knowledge of upper Paleozoic ostracode genera. Published data and available types and collections from stratigraphic and paleontologic type localities deposited at the U.S. Geological Survey and the U.S. National Museum, as well as types deposited in other institutions, are used. The project is under the direction of P. E. Cloud, Jr.

Because *Bairdia* is a smooth genus to which the largest number of Paleozoic species were assigned, it was chosen as a pilot study in order to develop methods of attacking the problem. *Bairdia* McCoy, 1844, has the added distinction of being the second valid Paleozoic ostracode genus to be described—the first was *Entomoconchus* McCoy, 1839. The few additional Paleozoic species described prior to 1844 were either not recognized as ostracodes or were assigned to post-Paleozoic, mostly living, genera.

ACKNOWLEDGMENTS

I am indebted to P. E. Cloud, Jr., for suggestions and encouragement during the progress of this project. G. A. Cooper, U.S. National Museum, made available for study all the specimens on deposit in the U.S. National Museum. C. L. Cooper, U.S. Geological Survey, made available his illustrated card catalog of Paleozoic Ostracoda that is current to about 1946. The following individuals very generously loaned types on deposit at their institutions: C. W. Collison, Illinois Geological Survey; Maxim K. Elias, University of Nebraska; John Imbrie, Columbia University; R. V. Kesling, University of Michigan; M. B. Marple, Ohio State University; Norman D. Newell, American Museum of Natural History; R. E. Peck, University of Missouri; and J. J. Galloway and T. G. Perry, University of Indiana. H. H. Bradfield donated the duplicates of his types and C. W. Tomlinson arranged for the collecting of topotype samples at Bradfield's locality 68. A. R. Loeblich, Jr., loaned his collections from the Henryhouse and Haragan formations of Oklahoma. The unpublished index of Ostracoda compiled by H. N. Coryell was consulted. I am grateful to my colleagues in the U.S. National Museum with whom I discussed many of the problems encountered, and to Michael Fleischer for donating several hundred punched cards that were converted for use with the species in *Bairdia*. J. M. Berdan aided with numerous discussions and by making available lower Paleozoic specimens. Drs. Karl Krömmelbein, Germany, and Vladimir Pokorný, Czechoslovakia, donated European specimens.

METHODS OF STUDY

This study is subjective rather than objective in approach, and as such is liable to the introduction of errors in judgment. An effort has been made to study as many specimens of each species as could be obtained. Only those references to each species that are documented by illustrations have been considered, and each species was evaluated on the basis of available specimens, descriptions, discussions, and illustrations. As work progressed, it was noted that erroneous conceptions of several species were made on the basis of published data alone. Most misconceptions were due to the fact that the species was based either on steinkerns or on broken or partly abraded specimens.

Criteria for recognizing internal casts of ostracode carapaces are discussed and illustrated on page 7. Because the genus *Bairdia* was originally described in Europe, specimens of most of the foreign species are not available for examination in the United States. Evaluations of these species are based solely on published data. They are included in this study because the American species cannot be evaluated without the consideration of the foreign representatives in each of the genera studied.

A bibliography of upper Paleozoic ostracodes in North America through 1955 is included with the "Bibliography."

In the following grouping of publications on upper Paleozoic ostracodes, the references to the "Bibliography" are arranged according to the stratigraphic age of the material discussed. The same reference may appear in several of the geologic divisions because a publication may deal with collections from more than one stratigraphic level.

Publications dealing with upper Paleozoic ostracodes in North America, arranged according to geologic period

Permian

Coryell and Rogatz, 1932; Delo, 1930; Girty, 1908; Girty, 1909b; Girty, 1910b; Hamilton, 1942; Harlton, 1927; Harris and Lalicker, 1932; Harris and Worell, 1936; Holland, 1934; Kellett, 1929; Kellett, 1933; Kellett, 1934; Kellett, 1935; Scott, 1944b; Sohn, 1950b; Sohn, 1954; Ulrich and Bassler, 1906; Upson, 1933.

Upper Pennsylvanian

Bradfield, 1935; Cooper, 1946; Cordell, 1952; Coryell, 1928a; Coryell, 1928b; Coryell and Billings, 1932; Coryell and Booth, 1933; Coryell and Osorio, 1932; Delo, 1930; Delo, 1931; Harlton, 1927; Harlton, 1928; Harlton, 1929b; Harris and Lalicker, 1932; Johnson, 1936; Kellett, 1929; Kellett, 1933; Kellett, 1934; Kellett, 1935; Kellett, 1947; Lalicker, 1935; Moore, 1929; Payne, 1937; Roth, 1928; Roth, 1929a; Scott and Borger, 1941; Tasch, 1953; Ulrich and Bassler, 1906.

Middle Pennsylvanian

Bradfield, 1935; Brill, 1942; Cooper, 1945; Cooper, 1946; Coryell, 1928a; Coryell, 1928b; Coryell and Sample, 1932; Harlton, 1928; Kellett, 1947; Kellett, 1948; Kellett, 1952; Knight, 1928; McLaughlin, 1952; Marple, 1952; Moore, 1929; Roth, 1929a; Roth and Skinner, 1930; Scott, 1944a; Scott, 1944b; Scott and Summerson, 1943; Warthin, 1930; Wilson, 1933.

Lower Pennsylvanian

Bradfield, 1935; Branson, 1944; Cooper, 1945; Cooper, 1946; Harlton, 1928; Harlton, 1929a; Harlton, 1933; Roth, 1928; Roth, 1929a; Roth, 1929b; Roth and Skinner, 1930; Scott, 1944a.

Upper Mississippian

Bell, 1929; Branson, 1944; Brayer, 1952; Cooper, 1941; Cooper, 1947; Coryell and Johnson, 1937; Coryell and Rozanski, 1942; Coryell and Sohn, 1938; Croneis and Bristol, 1939; Croneis and Funkhouser, 1939; Croneis and Gale, 1939; Croneis and Gutke, 1939; Croneis and Thurman, 1939; Easton, 1943; Geis, 1932; Girty, 1909a; Girty, 1910a; Girty, 1911; Girty, 1915a; Harlton, 1929a; Morey, 1935b; Roth, 1929a; Roth, 1929b; Roundy, 1926; Scott, 1942; Sohn, 1953; Ulrich, 1891; White and St. John, 1867; Whitfield, 1882.

Lower Mississippian

Bassler, 1932; Bassler, 1935; Benson, 1955; Branson, 1944; Echols and Gouty, 1956; Girty, 1915b; Herrick, 1891; ?Morey, 1935a; Morey, 1936.

The number of publications that deal with North American Paleozoic ostracodes in each of the preceding divisions of the Upper Paleozoic is given in the following tabulation. This tabulation is limited by two factors: 1, not all the papers included in the totals contain the genera discussed in this paper; and 2, references to ostracodes outside of North America are omitted.

Number of publications on ostracodes in each of the divisions of the upper Paleozoic in North America

Permian	19
Upper Pennsylvanian	28
Middle Pennsylvanian	22
Lower Pennsylvanian	12
Upper Mississippian	29
Lower Mississippian	9

These data are important as an aid in establishing the stratigraphic range of each of the genera and species studied. The faunal composition of the Lower Mississippian is not so well known as that of the Upper Pennsylvanian. Consequently the absence of a record for a species or genus in rocks of Late Pennsylvanian age has more weight than the same absence in rocks of Early Mississippian age. The above data are to be used in interpreting the stratigraphic ranges of the genera illustrated in figures 5–13. On the other hand, the data also indicate areas where an abundance of geographic localities are due to "monographic bursts" (Cooper and Williams, 1952, p. 330). The study, by several individuals, of fossils in the same stratigraphic division results in the increase of the number of localities for a given species or genus. The same taxon may be equally abundant in the adjoining stratigraphic unit, but because the fossils were not studied, the taxon may appear absent from that unit.

Figure 1 shows graphically the disposition of all the Paleozoic species previously assigned to *Bairdia*. Each taxon is given a unit of one in the decade during which it was first proposed. The 435 units on the graph do not represent all the citations to *Bairdia* because only original assignments are counted. For example, *Bairdia oklahomaensis* Harlton, 1927 (= *Orthobairdia*) was identified by nine subsequent investigators; on this graph it has the weight of one. Incorrect identifications are considered as units, and each first citation is given the weight of one unit. This unit is referred on the graph to its proper grouping. This grouping may be a new species in any of the genera here indicated, a synonym of a species in one of these genera, a nomen dubium, or the group that consists of undetermined genera and genera not discussed in this revision.

A Russian publication, Posner (1951), became available after this study was completed. The 13 species of *Bairdia* from Russia are incorporated in the report, but not in figure 1.

Although dealing with the species that were referred to a single genus, this graph reflects the history of the study of upper Paleozoic Ostracoda. The genus *Bairdia* was described in 1844, but in 1830 Münster described three species in *Cythere* that were later referred to *Bairdia;* consequently, the history of the genus commences with the 1826–1835 decade. Each peak on the graph reflects the interest of one or more individuals who dominated the field at that time, but whose studies were supplemented by the work of other investigators. The first peak, 1846–95, can be attributed to the enthusiasm of Prof. T. Rupert Jones, of England, who collaborated with several investigators including James W. Kirkby on upper Paleozoic forms, with H. B. Holl on lower Paleozoic forms, and with G. S. Brady, C. D. Sherborn, and others on post-Paleozoic forms. The small peak in the decade 1906–16 reflects the efforts of E. O. Ulrich, U.S. Geological Survey, whose work in collaboration with R. S. Bassler was mainly on lower Paleozoic forms, and G. H. Girty, also of the U.S. Geological Survey.

The last three decades reflect in part the influence of Bassler and Kellett's Bibliographic index of Paleozoic Ostracoda, published in 1934. Four teachers, only one of whom published a short paper on ostracodes (Moore, 1929), influenced the study of ostracodes in the United States. They are J. J. Galloway, of Columbia and Indiana Universities; the late E. B. Branson, University of Missouri; R. C. Moore, University of Kansas; and W. H. Shideler, Miami University, Ohio. They encouraged the study of ostracodes for dissertations. These were augmented beginning in 1928 by the works of H. N. Coryell and his students at Columbia University, Carey Croneis and his students at Chicago University, H. W. Scott and his students at the University of Illinois, Mrs. Betty Kellett Nadeau, Washington University, St. Louis, Mo., F. M. Swartz and his students at the Pennsylvania State University, Robert Roth, B. H. Harlton, and C. L. Cooper.

The graph (fig. 1) should be compared with the cumulative curves showing the rate of production of new genera, species, and papers on Paleozoic ostracodes up to 1940 (Cooper, 1942, p. 765). Levinson's hystograms (1957, figs. 1–4) that show the number of papers, number of new genera, the stratigraphic distribution of new genera from 1950–56, and the number of species of ostracodes 1953–56 indicate the current rate of study. The Catalogue of Ostracoda, 12 volumes of which have already been issued by Ellis and Messina, American Museum of Natural History, N. Y., will probably assist the study of Ostracoda in the same manner that the Catalogue of Foraminifera has assisted in the study of Foraminifera.

PUNCHED CARDS

More than 200 species of Paleozoic age have been assigned to the genus *Bairdia*. This plus the fact that many of the species have been repeatedly cited posed a problem of handling this voluminous information. The application of punched card technique (Casey and Perry, 1951) to the analysis of this group proved to be practical.

A punched card system is a mechanical device for the rapid extraction of any common factor from a mass of data. This is accomplished by the use of specially prepared cards that have holes about 3mm in diameter punched about 2mm from the edge on all four sides. The upper right hand corner of each card is truncated for uniform orientation. The size of the card and the distance between the holes depend on the particular purpose for which the card is designed. Each hole is assigned a given value, and information is coded on the card by notching away the paper between the hole and the edge.

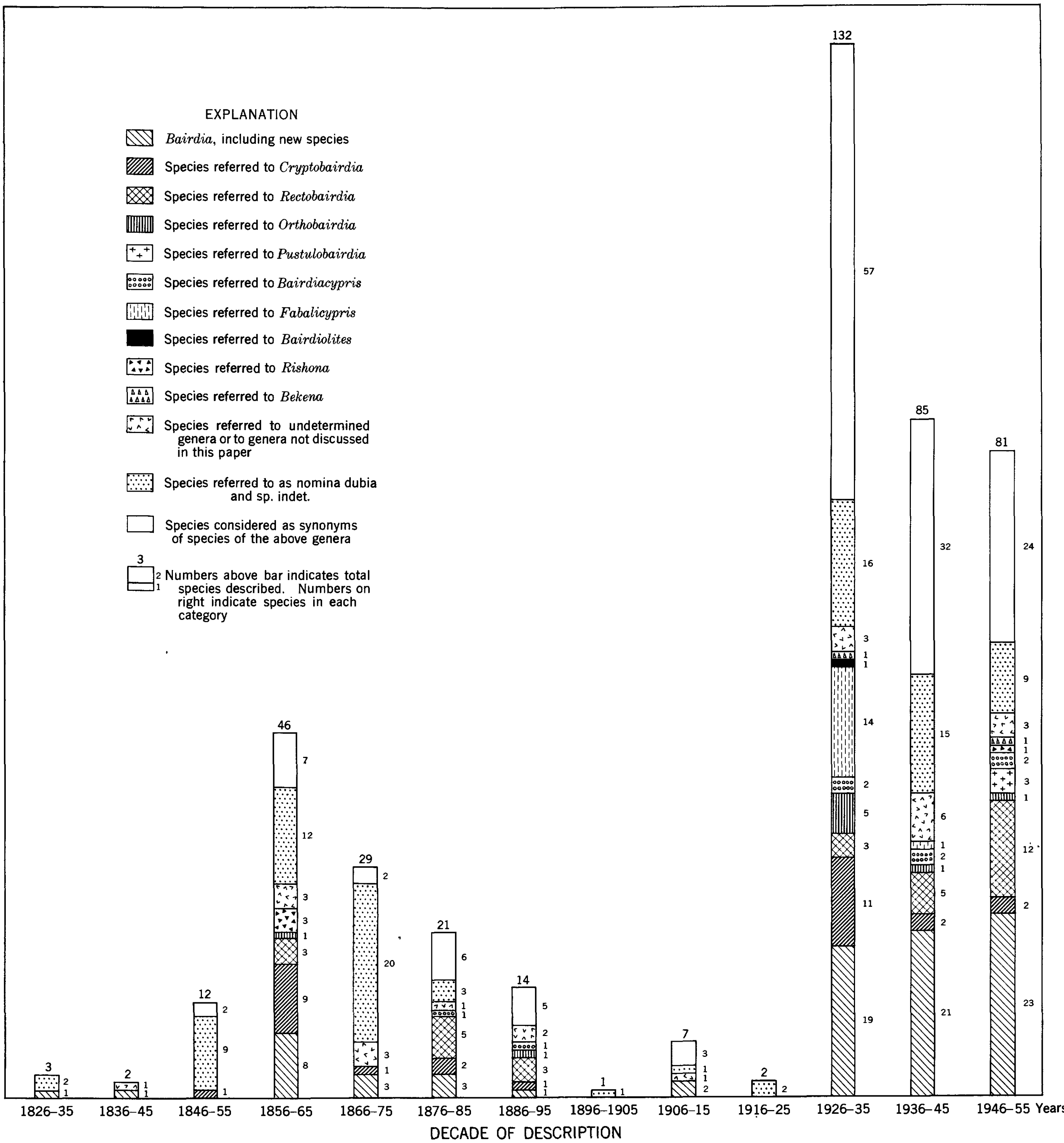

FIGURE 1.—Number and disposition of original assignments of species or citations previously referred to *Bairdia*.

After the cards have been punched, every factor can be rapidly extracted by inserting a sorting needle into the proper hole and removing all the cards on which that factor was not punched out. Instructions for efficient use are given in manuals prepared by manufacturers of card punching and sorting equipment and in Casey and Perry (1951).

The following 64 features were coded:

1. Dorsal outline parallel
2. Dorsal outline convex
3. Anterior outline thick
4. Anterior outline thin
5. Dorsal margin straight
6. Dorsal margin curved
7. Anterior margin pointed
8. Anterior margin rounded
9. Anterior point or break in curvature above midheight
10. Anterior point or break in curvature at approximate midheight
11. Anterior point or break in curvature below midheight
12. Dorsoposterior margin equals about one-half the greatest length
13. Dorsoposterior margin equals about one-third the greatest length
14. Dorsoposterior margin equals about one-fourth the greatest length
15. Dorsoposterior margin straight
16. Dorsoposterior margin convex
17. Dorsoposterior margin concave
18. Posterior point above midheight
19. Posterior point approximately at midheight
20. Posterior point below midheight
21. Posterior point in ventral quarter of greatest height
22. Available data for right valve
23. Available data for left valve
24. Available data for carapace
25. Greatest length 1 mm or longer
26. Greatest length 0.75–1.0 mm
27. Greatest length less than 0.75 mm
28. Greatest length unknown
29. Ventral margin straight
30. Ventral margin curved
31. Bottom flat
32. Bottom curved
33. Surface smooth
34. Surface ornamented (punctate, spine, wing, ridge, swelling)
35. Specimen is probably an internal cast
36. Greatest width anterior to midlength
37. Greatest width at approximate midlength
38. Greatest width posterior to midlength
39. Localities in North America
40. Localities in Europe
41. Localities in Asia
42. Localities in Africa
43. Localities in Australia
44. Localities in South America
45. Overlap reversed (right over left)
46. Ordovician
47. Silurian
48. Devonian undifferentiated
49. Lower Devonian
50. Middle Devonian
51. Upper Devonian
52. Mississippian undifferentiated
53. Kinderhook provincial series or equivalent
54. Osage provincial series or equivalent
55. Meramec provincial series or equivalent
56. Chester provincial series or equivalent
57. Pennsylvanian undifferentiated
58. Morrow provincial series or equivalent
59. Atoka provincial series or equivalent
60. Des Moines provincial series or equivalent
61. Missouri provincial series or equivalent
62. Virgil provincial series or equivalent
63. Permian
64. Post-Paleozoic

Experiments with various combinations of characters determined which combinations divide the species most readily into natural groups. The features that proved most serviceable were used to combine groups of species into genera. Keys were constructed for the species in each genus. The subject of keys and their construction and use are adequately discussed by Mayr, Linsley, and Usinger (1953, p. 162–168); Brues, Melander, and Carpenter (1954, p. 6–7); and Metcalf (1954, p. 38). The last named is recommended as a very lucid as well as amusing exposition of the subject.

An indented key was constructed to differentiate the genera considered in this study, and dichotomous bracket keys were constructed for most of the genera. Each type of key has its own advantages. The indented key is preferred where a small number of units is involved because related taxa are near each other, and therefore may show phylogenetic relationships. It is impractical for large keys because opposing couplets would be separated by a great deal of printed matter, and also because each identation would reduce the number of words that could be written in each line.

Dichotomous bracket keys are more difficult to construct and do not have related taxa near each other, but additions can easily be made. Whenever an additional species had to be incorporated into the key, it was readily accomplished by following the key to the one species having all the characters in common with this additional species. The next available number was substituted for the name of the species, and a new doublet differentiating the two taxa was added at the end of the key. This type of key is more conservative of space, and, as constructed here, has the added advantage that it can easily be read backward from the species to the first dichotomy.

Keys may be difficult to use because of the subjectivity that enters into their composition. Although the keys to the species in this paper were made as accurate as possible with the information available for each species, errors are undoubtedly incorporated.

Should a specimen key out to an obviously incorrect species, it is possible to backtrack through the antecedent doublets given in parentheses, and the place where the wrong choice was made located. The user of the keys is warned that he travels at his own risk.

Except for an occasional observation interjected into the synonymy, most of the species are not formally defined. All the synonyms of the species recognized as valid in this revision are enclosed by parentheses in the keys.

Where the illustration and the description differ, more weight is given to the illustration. For example, Cooper (1946, p. 42) states that his specimens of *Bairdia blakei* Harlton have convex ventral margins. His photograph (pl. 1, fig. 18) is of a specimen with a straight ventral margin. This specimen is here relegated to *Bairdia* sp. R, which is defined in the key as having a straight ventral margin. The outlines of carapaces can be influenced by the orientation of the specimens during photography.

Each reference is followed by stratigraphic data as given in the original publication. Consequently the formational names used do not necessarily conform with the usage of the U.S. Geological Survey. Wilmarth (1938) was used as a guide in citing the geologic ranges of species in formations of the United States. The locality data is as complete as given in the original publication, and these data vary in precision. Data for foreign localities on the whole are less precise than those for American localities. So far as British localities are concerned, more precise information is available for many of the classical localities (Palaeontographical Society London, 1954). The British localities were not converted into the available more precise information because of the danger of introducing mistakes by one unfamiliar with British geography.

DEFINITION OF TERMS

Kesling (1951b) defined most of the terminology used in describing ostracodes.

The group of ostracodes revised in this paper are, with the exception of *Ceratobairdia*, *Pustulobairdia*, and *Spinobairdia*, smooth shelled. Smooth-shelled species are discriminated on the basis of the shape of the various elements that make up the lateral and dorsal outlines of the carapace. Figure 2 defines these elements.

In addition to the elements illustrated in figure 2, the following terms are used in the keys:

Ala. A ventrally located lateral winglike extension of the valve.

Commissure. Line of junction of two valves as seen from the outside (Bradfield, 1935, p. 86).

Lip. A curved part of the overlapping valve along the ventral margin that extends over the smaller valve, so that the ventral commissure is not subparallel to the ventral edge of the left valve.

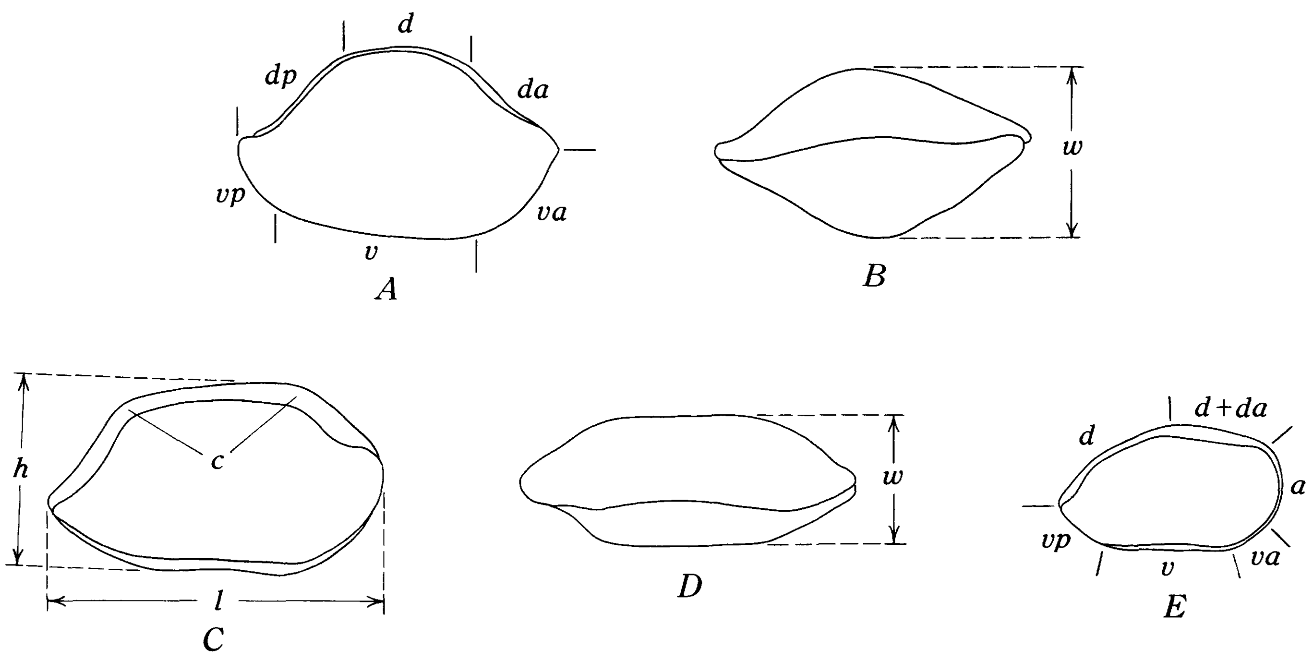

FIGURE 2.—Elements of the lateral and dorsal outlines of the *Bairdia* group. *l*, greatest length; *h*, greatest height; *w*, greatest width; *a*, anterior margin; *c*, dorsal commissure; *d*, dorsal margin; *da*, dorsoanterior margin; *dp*, dorsoposterior margin; *v*, ventral margin; *va*, ventroanterior margin; *vp*, ventroposterior margin. *A*, lateral outline of *Bairdia grahamensis* Harlton, 1928 (pl. 1, fig. 16); *B*, dorsal outline of *Bairdia grahamensis* Harlton, 1928 (pl. 1, fig. 15); *C*, lateral outline of *Orthobairdia cestriensis* (Ulrich), 1891 (pl. 3, fig. 24); *D*, dorsal outline of *Orthobairdia cestriensis* Ulrich, 1891 (pl. 3, fig. 25); *E*, lateral outline of *Cryptobairdia forakerensis* (Kellett), 1934, (pl. 2, fig. 2).

Pustule. A pimplelike protuberance on the surface of the valve.

Ridge. An elongate protuberance on the surface of the valve that is steep on both sides.

Shoulder. A ridge that is steep on only one side, the other side merging with the valve surface.

Tubules. Coarse tubular pores which open on the internal surface of the valves but do not reach the exterior (Swartz, 1936, p. 581).

Although the adjectives used to describe these elements are self explanatory, a great deal of subjectivity entered in the determination of borderline features. A ventral margin that may be "gently curved" to one person may be "straight" to another person, or even to the same person at a different time.

INTERNAL CASTS

The descriptions of many species of fossil ostracodes are based on specimens that are internal casts (steinkerns). Examination of primary types and subsequently figured specimens of upper Paleozoic ostracodes described in 6 publications discloses that in a total of approximately 500 citations, 85 species, including 9 type species, are based on internal casts; and an additional 34, including 1 type species, are probably based on internal casts. Genera based on such species are valid, but unless they are recognized as internal casts, these genera can become receptacles for unrelated and frequently unidentifiable species. This fact hinders phylogenetic and stratigraphic studies.

In order to determine criteria for distinguishing between actual carapaces and internal casts, the calcareous shells of filled carapaces of several genera were dissolved in dilute acid and the resulting casts examined. Polished sections of carapaces and of the artificially created internal casts also were studied. The following are some criteria for recognition derived from this preliminary study:

1. On a pair of closed valves, the hinge line and the ventral and end margins have a fine groove where the two valves meet. Internal casts either are smooth along their perimeters or have one or more grooves or a ridge that reflect structures on the interior of the valves (pl. 6, figs. 7, 12, 13).

2. The infilling of the vestibule will project as a thin lamina on steinkerns (Sylvester-Bradley, 1950, p. 756, footnote 1) (pl. 6, figs. 7, 11).

3. Polished surfaces and thin sections through a carapace usually show both the outer and the inner sides of the shell wall (pl. 2, figs. 29, 30; pl. 3, fig. 28; pl. 5, figs. 12, 26). If the shell is not discernible, the specimen is probably an internal cast.

4. Muscle scars, either as elevations or depressions, on the outside of the fossil may reflect internal structures.

5. Glassy surface textures usually indicate internal casts or specimens from which one or more layers of shell have been peeled.

Many specimens of frilled, ridged, and spinose ostracodes have internal casts with replicas of those structures (compare pl. 6, fig. 7 with fig. 9). Other specimens that have surface ornaments leave smooth casts that differ markedly from the carapace (pl. 6, figs. 1, 4, 5). The identity of many of these species might be demonstrated by the application of the artificial cast technique to topotype material.

DISCRIMINATION OF SPECIES

Kellett (1934, p. 123) listed the following morphologic criteria of specific value in *Bairdia;* these are here adopted also for the related genera:

1. Position of the anterior and posterior ends in relation to the midheight of the valve.
2. General shape in outline.
3. Shape of the extremities.
4. Amount and character of the dorsal overlap and overreach.

To these might be added the following:

5. Amount and character of ventral overlap.
6. Position of greatest width.

INDIVIDUAL VARIATION

Individuals of the same species should differ from each other because of sexual dimorphism (Sohn, 1950a, 1950b), stages of growth, and stages of evolution.

Sexual dimorphism.—To date it has not been possible to establish the sex of Paleozoic species of *Bairdia*, although many ostracode genera exhibit sexual dimorphism. Both males and females were probably present in the group. Whether sexual dimorphism was exhibited in the width of the shell, or by any other variation, is not known. This relationship is presumably hidden in different specific or generic names.

Growth stages.—Kellett (1934, pl. 15, figs. 1a–h), Bradfield (1935, pl. 7, figs. 1a–6a), and Marple (1952, pl. 133, figs. 6–11) illustrated ontogenetic series of species of *Bairdia*, and Sohn (1954, text fig. 1) illustrated stages of growth in *B.? pruniseminata* Sohn, the type species of *Pustulobairdia* n. gen. The lateral outlines of the individual specimens vary but little. According to Kellett (1934, p. 123) immature molts have more pointed ends. It appears reasonable to assume that specimens less than 1 millimeter in greatest length are young stages of growth; consequently, species based on specimens smaller than 1 millimeter are subject to suspicion, and many such names are considered as not valid in this revision.

Stages of evolution.—Living organisms are dynamic; they are continually changing both in space (geographic speciation) and in time (geologic speciation). Although the concept of an ideal species embraces similar individuals within the previously discussed limits of variation, it must be recognized that because of evolution, there are individuals and populations that are transitional between the species and its ancestral or descendant stocks. These cannot be assigned with any degree of certainty to one or another species.

A similar relationship exists between species within a group of genera. Were the entire record of a given family known, there would presumably be characters in a single species that might fall within the range of variation of two or more genera. The assignment of these transitional species to a given genus would be strictly subjective, in spite of the hypothetical availability of all pertinent data. The admittedly fragmental information available in this study adds to the difficulty. Genera are defined with the understanding that certain species may be transitional between two or more genera and their proper assignment may or may not ever be possible.

MUSCLE SCARS

Kellett (1934, p. 122) described the muscle scar of *Bairdia* as "* * * circular or approximately so, and composed of a slightly raised central dot surrounded in an irregular manner by other more or less regularly shaped elevations * * *." This description is essentially correct for the specimens that she observed (1934, pl. 14, fig. 2). Comparison of Kellett's illustrations with those in other publications (Scott, 1944a, text figs. 1, 2, 4, 6, 7; Sylvester-Bradley, 1950, figs. 3–5; Sohn, 1956, figs. 1, 3, 4) indicates a considerable variation of this general motif. This fact suggests that the *Bairdia* plexus may be polyphyletic in origin. Sylvester-Bradley (1950, p. 753) quite correctly pointed out that many of the older publications are not accurate in the illustration of muscle scars. According to Sohn (1954, p. 4) the number, shape, and arrangement of individual scars forming the adductor muscle scar pattern are suspect as reliable taxonomic criteria in *Bairdia.* Sohn (1956, p. 114) inferred the presence of accessory muscle scars in the Pennsylvanian species *Bairdia whitesidei* Bradfield, 1935 (pl. 1, figs. 30, 31).

SURFACE TEXTURE

The genus *Bairdia* has generally been considered to have a smooth or glassy outer surface, but this is very likely due to the manner of preservation. Certain specimens have a granulose outer surface (pl. 3, fig. 27); others show distinct normal pore canals that would give pitted texture to the outer surface (pl. 2, figs. 7, 16). It may be significant that no radial pore canals are recorded in Paleozoic species of the *Bairdia* group.

Pokorný (1955) described a very minute reticulated structure inside the calcified layer of the outer lamella of the Pliocene *Candona lobata* (Zalanyi), 1929, group. He recalled Müller's (1894, p. 96–98) description of areolation caused by a layer of chitinous rods which lie in the calcified layer of the outer lamella approximately at an equal distance from both its surfaces. This structure may well be represented by the phenomenon exhibited in fortuitous preservation of Paleozoic ostracodes here illustrated (pl. 6, figs. 10, 11). These illustrations demonstrate that the shell of at least one group, the Kirkbyidae, consisted of several layers, one of which is preserved as a honeycomblike structure with the walls perpendicular to the shell surface. This structure has not been discerned in thin sections and polished surfaces of Kirkbyidae (Sohn, 1954) or other groups including *Bairdia* and related genera that were made during the time of this study. It is possible that the surface texture of certain specimens of *Bairdia* are related to such internal structures.

PALEONTOLOGICAL NOMENCLATURE

The International Rules of Zoological Nomenclature govern systematic zoology and systematic paleontology. The history, meaning, and application of these rules have been discussed by Mayr, Linsley and Usinger (1953, p. 201–299), who state (p. 201) "Nomenclature thus is the 'language' of zoology, and the rules of nomenclature are its grammar." The main purpose of these rules is to achieve clarity in the recording of families, genera and species. This is accomplished by the following principles:

1. There cannot be two genera or families in the animal kingdom that have the same name.
2. There cannot be two species with the same name in one genus.
3. The valid name of a genus or species is that name under which it was first designated in conformance with the Rules (art. 25).
4. The availability of a name is determined by the date of publication and is governed by two conditions: Synonymy and homonymy.

SYNONYMY

In zoological nomenclature two or more names that refer to the same species, genus, or family are synonyms of each other, and the first published valid name of the two has priority. Synonyms may be objective or subjective.

Objective synonyms are defined on the generic level as two or more names of genera that are based on the same type species (art. 30): on the specific level, it is defined as two or more different names of species that are based on the same specimen. Objective synonymy is not subject to revision; it is indisputable.

Subjective synonyms are defined on the generic level as two or more names of genera that are considered by a specialist to belong to the same genus: on the specific level it is defined as two or more different names of species that are considered by a specialist to belong to the same species. Subjective synonymy is liable to difference of opinion.

HOMONYMY

In zoological nomenclature two or more different species, genera, or families having identical names are homonyms of each other. On the specific level, homonymy may be either primary or secondary (objective or subjective).

Primary homonymy is defined as the same specific names used initially for two distinct species in the same genus. The first published valid name has seniority, and any later published names are junior primary homonyms and must be replaced by new available names, even if the species are transferred to different genera.

Secondary homonymy is defined as the same specific names originally described in two or more different genera, which later were assigned to a single genus. Because the assignment of a species to one or another genus is a matter of judgment, there may be differences of opinion as to the validity of such assignments. The first published valid name has seniority. The renaming of junior secondary homonyms depends upon certain recommendations and provisions published in the bulletin of the International Commission on Zoological Nomenclature. The revised rules are to be published at some future date to serve as a standard. Until that time, the old rules, except where modified by the Copenhagen decisions, are followed.

Only those rules of zoological nomenclature that apply to the subject matter in this revision are illustrated by the following examples from the text.

1. *Bairdia curta* McCoy, 1844 (p. 25).

The name of the founder of a new species (or genus) follows the species (or genus) without any punctuation, and the date of publication, when used, is separated from the founder's name by a comma.

2. *Fabalicypris shideleri* (Delo), 1930 (p. 63).

Parentheses around the author's name indicate that the species was originally assigned to a genus other than the one to which it is now assigned. Delo named the species *shideleri* and assigned it to *Bairdia;* the species was later transferred to *Bairdiacypris*, and in this paper the species is referred to *Fabalicypris.*

3. *Bairdia caudata* Kirkby, 1859 (p. 24).

This is ambiguous because the citation does not indicate that the taxon was originally described as *Bairdia plebia caudata* Kirkby, 1859. Because article 11 of the International Rules of Zoological Nomenclature states that specific and subspecific names are of equal value from the nomenclatorial standpoint, the above citation is proper.

In this paper varietal and subspecific names are considered as equal. According to article 11, a varietal name is governed by the rules of priority just as though it were a specific name. (See also the next item.)

4. *Cryptobairdia compressa* (Kirkby), 1858 (p. 49).

This species was originally described as *Bairdia plebia compressa* Kirkby, 1858. Because it is transferred to a different genus, Kirkby's name is placed in parentheses. *Bairdia compressa* Geis, 1932, is a junior primary homonym, and it requires a different name regardless of the fact that Geis' species is here referred to *Orthobairdia.*

5. *Bairdia crassa* Harlton. Bradfield, 1935 (p. 24).

This refers to the species that Bradfield identified as *Bairdia crassa* Harlton, 1929, and not to the species identified by Harlton or by any other investigator. This procedure is not covered by the rules. Some investigators would place a comma or a semicolon between Harlton and Bradfield; others use a different size of type to distinguish between the two names.

6. *Bairdia acuminata* Cooper, 1946 (p. 22).

This name is preoccupied by *Bairdia acuminata* (Alth). Reuss, 1854, and apparently should require a new name because the specific name *acuminata* was used by Alth (1850, p. 198) as *Cytherina acuminata*, as indicated by the parentheses around Alth. Reuss (1854, p. 139) transferred the species to *Bairdia. Bairdia acuminata* Cooper, 1946, is a junior secondary homonym, but because Alth's species is not a true *Bairdia* and, in fact, is referred to *Cytherideis* by Coryell (written communication), Cooper's name is valid.

7. *Bairdia angustata* Cooper, 1957 (p. 22).

Jones (1849, p. 26) referred the Cretaceous species *Cythere angusta* Münster, 1830, to *Bairdia;* therefore *Bairdia angusta* Cooper, 1946, is a junior secondary homonym. Because *C. angusta* is not a true *Bairdia*, Cooper's name is valid. (See item 6.) *Bairdia angusta* Sars, 1866 (Recent), was recognized by Müller (1912, p. 123) as a junior secondary homonym, and although he transferred the species to *Macrocypris*, he renamed it *M. sarsi* Müller, 1912. Even though *Bairdia angusta* Sars is now removed from *Bairdia* and bears a different name, Cooper's name is still a junior primary homonym of *Bairdia angusta* Sars; consequently, Cooper's species was renamed.

8. *Orthobairdia subreniformis* (Kirkby), 1859 (p. 68).
In 1859 Kirkby decided that *Bairdia* was a subgenus of *Cythere* and rejected *Bairdia reniformis* Kirkby, 1859, as a junior secondary homonym of *Cythere reniformis* Baird, 1835, renaming the species *Cythere subreniformis* Kirkby, 1859. This species is now referred to *Orthobairdia* n. gen., and although *reniformis* has priority both in *Bairdia* and in *Orthobairdia*, Kirkby's rejection stands. According to the recommendation of the International Commission on Zoological Nomenclature (1950, p. 121), a specific name that was rejected prior to 1951 on the ground that it was a junior secondary homonym is never to be used again for the same species.

9. *Bairdia elongatella* Sohn, n. name (p. 25).
Cythere elongata Münster, 1830, was referred to *Bairdia elongata* (Münster), 1830, by Jones and Kirkby (1865, p. 408). Consequently, this name makes a junior secondary homonym of *Bairdia plebia* var. *elongata* Kirkby, 1858. Although Münster's name is here considered a nomen dubium, Kirkby's variety, given in this paper a specific rank, requires a new name. This is permitted by a recommendation of the International Commission on Zoological Nomenclature (1950, p. 397) that a senior homonym must not be ignored solely because it is a nomen dubium; therefore, the junior homonym is rejected.

10. *Bairdia kellettae* Glebovskaya, 1939 (p. 28).
Bairdia kelletti Glebovskaya was published in 1939, but in a paper published by the same author in 1938, a different specimen was illustrated as *Bairdia* cf. *B. kelletti* Glebovskaya. Although the specimen illustrated in 1938 has priority of publication, the name *kelletti* properly belongs with the specimen published in 1939. The earlier published specimen is accompanied by a "cf.," and a provisional identification is not a valid description of a species.

The name *kelletti*, as stated in the original description, is in honor of Betty Kellett (Mrs. Nadeau), and the proper ending should be *kellettae* (art. 14). This correction is mandatory under the Rules of Zoological Nomenclature, and was made by Branson, the first revisor. It is considered as though it were so published in the original description.

11. *Bairdia hypsoconcha* Gibson, 1955 (p. 28).
Bairdia subtilla Gibson, 1955, is here questionably referred to *B. hypsoconcha*. Should subsequent study indicate that *B. subtilla* is a valid species, it would require a new name, because it is a junior primary homonym of *Bairdia subtila* Cooper, 1941. The Rules of Zoological Nomenclature state (art. 35) that specific names of the same origin and meaning shall be considered homonyms if they are distinguished from each other only by a single or double consonant. Neither Cooper nor Gibson indicated the origin and meaning of their specific names, but the fact that Gibson stated (1955, p. 16) that his *B. subtilla* bears a close relationship to *B. subtila* Cooper suggested that he intended the same meaning.

NEW NAMES FOR HOMONYMS

The following new names are proposed in this paper to replace junior homonyms:

Bairdia egorovi for *B. symmetrica* Egorov, 1953 [not Cooper, 1946].
B. elongatella for *B. plebia* var. *elongata* Kirkby, 1858 [not (Münster), 1830].
B. girtyi for *B. attenuata* Girty, 1910 [not Brady, 1880].
Orthobairdia kirki for *Bairdia compressa* Geis, 1932 [not *B. plebia* var. *compressa* Kirkby, 1858].
Cryptobairdia contractella for *Bairdia hisingeri* var. *contracta* Jones and Kirby, 1895 [not Jones, 1857].
Rectobairdia posneri for *B. angulata* Posner, 1951 [not Brady, 1870a].

HOMONYMS NOT RENAMED

The following junior homonyms are not renamed in this paper because they are here considered either as junior synonyms or as nomina dubia or were not seen:

Cythere (Bairdia) acuta Jones, 1850 [not *Cythere acuta* Cornuel, 1844] = nomen nudum.
Bairdia marginata Harlton, 1929 [not Richter, 1867] = *B. grahamensis* Harlton, 1928.
B. moorei Knight, 1928 [not (Jones). Issler, 1908] = *B. beedei* Ulrich and Bassler, 1906.
Cytherina ovata Eichwald, 1857 [not *B. ovata* Bosquet, 1854] was not seen.
Bairdia sinuosa Cooper, 1941 [not Morey, 1936] = ?*Orthobairdia cestriensis* (Ulrich), 1891.
B. spinosa Polenova, 1952 [not Cooper, 1946] = *Rectobairdia tikhyi* (Polenova), 1952.
B. tumida Upson, 1933 [not Kummerow, 1928] = *B. crassa* ?Harlton, 1929.

The following names are junior homonyms of species that are either living or from post-Paleozoic rocks. They are not renamed because the younger species were not included in this study. The possibility of available synonyms makes it desirable not to rename them at present.

Bairdia affinis Terquem, 1885 [not Morris, 1845].
B. affinis Brady, 1886 [not Terquem, 1885, and not Morris, 1845].
B. arcuata gracilis Bosquet, 1854 [not *Bairdia gracilis* McCoy, 1844].
B. brevis Lienenklaus, 1900 [not Jones and Kirkby, 1879].
B. elongata Lienenklaus, 1900 [not (Münster), 1830 and not Kummerow, 1924].
B. laevigata Egger, 1910 [not (Eichwald), 1857].
B. rhomboidea Jones and Sherborn, 1889 [not Kirkby, 1858].
B. subcylindrica Sandberger, 1866 [not (Münster), 1830].

COLLECTION LOCALITIES

The following are the fossiliferous localities at which collections were made of the fossils discussed here.

U.S. Geological Survey localities

5550A green.[1] Limestone at bottom of the Fayetteville shale or top of the cherty limestone, NW¼NW¼ sec. 27, T. 17 N., R. 29 W., Fayetteville quadrangle, Washington County, Ark. Collected by F. W. Simonds, date unknown.

5553 green. Fayetteville shale, Webber Mountain, NW¼NW¼ sec. 4, T. 17 N., R. 29 W., Fayetteville quadrangle, Washington County, Ark. Collected by R. D. Mesler, 1906.

7698 green. Salem limestone, quarries at Stineville, Monroe County, Ind. Collected by Elliott Marshall for G. H. Girty.

5882 blue. Florena shale, first railroad cut west of Strong City, Cottonwood Falls quadrangle, Kans. Collected by G. H. Girty and P. V. Roundy, Sept. 26, 1925.

6599 blue. Union Dairy member of Hoxbar formation, Carter County, Okla. (See Sohn, 1954, p. 3 for description.)

6728 blue. Labette shale, St. Louis County, Mo. Topotype collection of Knight's 1928 loc. 38. (See Sohn, 1954, p. 3, for description.)

10890 blue. Helms shale, 5 ft below limestone bed 9, sec. "C" West Texas Geol. Soc. Field Trip May–June, 1946. Saddle on top of hill 2½ miles west of Powwow Tanks, approximately ⅓–½ mile north of US Highway 62, El Paso quadrangle, El Paso County, Tex. Collected by C. C. Branson, November 1949.

12844 blue. Shetlerville member of Renault formation, Downeys Bluff section, shale in cliff above pump house, NW¼ SW¼ sec. 5, T. 13 S., R. 8 E., Hardin County, Ill. Collected by D. B. Saxby and I. G. Sohn, May 18, 1954.

12845 blue. Devils Kitchen member of Deese formation (Tomlinson, 1930), Bradfield's loc. 68, about 150 ft southeast of NW. cor. sec. 4, T. 6 S., R. 2 E., Love County, Okla. Collected by C. A. Miller, March 1951.

12846 blue. Devils Kitchen member of Deese formation, slightly to the east of the above locality. Collected by C. A. Miller, March 1951.

12857 blue. Salem limestone, quarries at Stineville, Monroe County, Ind. Collected by Elliott Marshal for G. H. Girty.

U.S. National Museum locality

472c. Henryhouse formation, from 10 ft of silty yellowish-gray calcareous shale, 61 ft above base of section, Chimneyhill Creek and bluff to north, center E½SE¼ sec. 5, and NW¼SW¼ sec. 4, T. 2 N., R. 6 E., 7 miles south of Ada, Pontotoc County, Okla. Section measured and collected by W. E. Ham, A. R. Loeblich, Jr., and H. A. Lowenstam, May 7, 1947.

SYSTEMATIC DESCRIPTIONS

KEY TO THE GENERA

The features used in the following key are shown in the illustrations cited in parentheses.

[1] Both "green" and 'blue" have been used after U.S. Geological Survey locality numbers, referring to the color of the labels that identify the master catalog from which these localities are quoted, but currently only "blue" labels are used in the catalog of upper Paleozoic localities.

1a. Left valve does not overlap on both dorsal and ventral margins; right valve overlaps on dorsal; left valve overlaps on ventral (pl. 4, fig. 20).
- 2a. Dorsal margin straight or nearly straight — *Samarella* (p. 80)
- 2b. Dorsal margin curved — *Rishona* (p. 79)

1b. Left valve overlaps on both dorsal and ventral margins (pl. 1, fig. 12).
- 2a. Carapace smooth, without spines, strong ridges, alae or pustules.
  - 3a. Sides in dorsal outline curved (pl. 1, fig. 28).
    - 4a. Dorsal margin of larger valve convex in lateral outline (pl. 1, fig. 29, text fig. 2a).
      - 5a. Posterior pointed or bluntly pointed (pl. 1, figs. 12, 29).
        - 6a. Dorsoanterior margin distinct (pl. 1, fig. 27) — *Bairdia* (p. 12)
        - 6b. Dorsoanterior margin not distinct (pl. 2, fig. 2) — *Cryptobairdia* (p. 47)
      - 5b. Posterior round (pl. 6, fig. 31).
        - 6a. Greatest width equal to or greater than greatest height (pl. 5, figs. 10, 11).
          - 7a. Cross section round.
            - 8a. Without shoulders or grooves — *Tubulibairdia* (p. 74)
            - 8b. With horizontal shoulder and groove on dorsal half of larger valve (text fig. 15) — *Pachydomella* (p. 76)
          - 7b. Cross section angular, larger valve with horizontal ridge below midheight, smaller valve with or without horizontal ridge below midheight (text fig. 14) — *Phanassymetria* (p. 76)
        - 6b. Greatest width less than greatest height.
          - 7a. Ventral margin concave (pl. 4, fig. 2) — *Silenites* (p. 72)
          - 7b. Ventral margin straight, convex or sinuous.
            - 8a. Ends in dorsal outline evenly convex — *Bairdiocypris* (p. 83)
            - 8b. Ends in dorsal outline concave (pl. 6, figs. 23, 30) — *Bekena* (p. 81)
    - 4b. Dorsal margin of larger valve straight or very gently curved so that it is flattened in lateral outline (pl. 2, fig. 4).
      - 5a. Posterior pointed (pl. 2, fig. 3) — *Rectobairdia* (p. 52)
      - 5b. Posterior blunt (pl. 3, fig. 4).
        - 6a. Ventral overlap smooth (pl. 3, fig. 3) — *Bairdiacypris* (p. 57)
        - 6b. Ventral overlap with anterior steplike offset (pl. 3, figs. 6, 9) — *Fabalicypris* (p. 60)
  - 3b. Sides in dorsal outline straight (pl. 3, fig. 25) — *Orthobairdia* (p. 65)
- 2b. Carapace with spines, strong ridges, alae or pustules.
  - 3a. Surface with pustules, without spines, ridges or alae — *Pustulobairdia* (p. 69)
  - 3b. Surface without pustules.
    - 4a. Surface with spines and alae.
      - 5a. One spine on lateral surfaces of each valve, ventrolateral alae absent (pl. 6, fig. 19) — *Spinobairdia* (p. 81)
      - 5b. One or more spines along dorsal margin of larger valve, ventrolateral alae on both valves (pl. 3, fig. 32) — *Ceratobairdia* (p. 69)
    - 4b. Surface with two curved ridges subparallel to end margins — *Bairdiolites* (p. 69)

Family BAIRDIIDAE Sars, 1887

Genus BAIRDIA McCoy, 1844

Brairdia McCoy, 1842 [nomen nudum], *in* Griffith, Richard, 1842, Notice respecting the fossils of the Mountain Limestone of Ireland: p. 22.

Bairdia McCoy, 1844, A synopsis of the characters of the Carboniferous limestone fossils of Ireland: p. 164.

Type species.—Subsequently designated by Ulrich and Bassler, 1923, p. 320, *Bairdia curta* McCoy, 1844. A synopsis of the characters of the Carboniferous limestone fossils of Ireland, p. 164, pl. 23, figs. 6a, b. Mountain limestone, Carboniferous, Ireland.

Diagnosis.—Smooth asymmetrical ostracodes; end margins acuminate, posterior more pointed. Dorsal margin convex; ventral margin curved to straight; dorsoanterior and dorsoposterior margins straight to curved. Dorsal outline subelliptical, ends always narrow. Left valve larger, overlaps along dorsum, posterodorsal margin, and venter where "lip" may be present. Duplicature broad, adductor muscle scar slightly anterior and below center of valve, circular, consists of rosette of individual scars.

Discussion.—As previously pointed out (Sohn, 1954, p. 4; Howe, 1955, p. 13) over 600 species from Ordovician to Recent in age have been assigned to this genus. Only Paleozoic representatives of this group are discussed in this paper. Criteria for discrimination of species as well as hinge structure and growth series were admirably discussed by Kellett (1934, p. 121–123). Two distinct groups have been described—one with convex sides in dorsal outline and the other with parallel sides in dorsal outline. Both types may be present in the same collection. The possibility that this difference reflects sexual dimorphism is ruled out by the presence of small individuals of both types. These, because of size, probably represent instars younger than the adult–1, at which stage secondary sexual characters are developed in living ostracodes (Kesling, 1951a, p. 235).

The type species, *B. curta* McCoy, 1844, is believed to have convex sides in dorsal outline. So far as is known, none of the post-Paleozoic species assigned to *Bairdia* has parallel sides in dorsal outline. This parallel-sided group is defined as a new genus, *Orthobairdia*, in this paper.

Jones (1849, p. 22) considered *Bairdia* as a subgenus of *Cythere* and continued to regard it as such up to 1879 when he (Jones and Kirkby, 1879, p. 566) elevated it to generic status. Warthin (1930, p. 68, 73) considered *Bairdianella* Harlton, 1929 (type species by original designation *B. elegans* Harlton, 1929b, p. 160, pl. 4, fig. 5) and *Bairdia* s. s. as subgenera of *Bairdia*. *Bairdianella* is based on a steinkern and is not recognized in this study.

Pokorný (1950, p. 34, 97) described the subgenus *Varicobairdia*, (type species by original designation *Bairdia* (*Varicobairdia*) *kettneri* Pokorný, 1950, (p. 546 (34), 610 (98), pl. 2, figs. 6a–d) for species with thickened anterior and posterior ends. *Varicobairdia* is a valid genus in the Ropolonellidae, and is illustrated (pl. 1, figs. 1–3) but not treated in this paper.

Lithology.—Shale, limestone, and sandstone.

Habitat.—Restricted to marine sediments. Depth range unknown; according to Craig (1954, p. 111), the Paleozoic genus *Bairdia* was a mud dweller.

STRATIGRAPHIC RANGE

The recorded stratigraphic range of the genus *Bairdia* is from Ordovician to Recent (Scott, 1944, p. 159); from the Carboniferous to Recent, and perhaps even from the lower Paleozoic (Sylvester-Bradley, 1950, p. 756); from Ordovician(?) to Recent (Howe, 1955, p. 13). Sohn (1954, p. 4) suggested that many of the post-Paleozoic species assigned to *Bairdia* belong to several distinct genera. A revision of the post-Paleozoic species assigned to this genus is outside the scope of this paper and would require a more complex study than the one undertaken. One of the difficulties inherent in such a study is the correlation of the neontological criteria, based partly on the soft parts of the animal and partly on the shell morphology. The paleonthological criteria are based wholly on shell morphology.

The principle that fossil arthropods cannot be assigned to biologically established families and genera of living arthropods (Tasch, 1956, p. 1251) may be expanded to include the reverse. Living ostracodes cannot be directly assigned with any degree of certainty to genera based on fossil species. This degree of certainty of such assignments is inversely proportional to the geologic age of the type species.

The fact that the type species, *Bairdia curta* McCoy, 1844, is of Paleozoic age adds to the complexity of the problem. Müller (1894, p. 267, 268) discussed living species of *Bairdia* and stated that the posterior half of the ventral margin of one or both valves is denticulate. He stated (1894, p. 268) that this criterion holds only for those species that he investigated. He noted that Brady (1880) illustrated many species that are not denticulated and suggested that the denticulations either had broken away or had been overlooked by Brady. None of the Paleozoic species of *Bairdia* s. l. has a denticulated ventroposterior margin. Brady (1880, p. 49) stated that out of 23 species discussed in his paper, only one, *Bairdia villosa* Brady, 1880, contained appendages. The shape of this species (Brady, 1880, pl. 8, figs. 4a–f) excludes it from *Bairdia* s. s.

The living species of *Bairdia* as conceived by Müller and subsequent workers and the post-Paleozoic fossil species referred to *Bairdia* are very likely not congeneric with the Paleozoic species of *Bairdia* McCoy, 1844, and require one or more new genera for their reception. *Nesidea* Costa, 1849, has been used for post-Paleozoic and living species of *Bairdia* by several students, including Kuiper (1918, p. 14), Doeglas (1931, p. 35), Méhes (1936, p. 15), and Tressler (1949, p. 342; 1954, p. 433). Costa defined the type species, *N. hirta* Costa, 1849, as having no eyes and as having six sets of legs (1849, p. 183, pl. 4, fig. 2). The absence of eyes eliminates this species from the Podocopa; the six sets of legs and the shape of the shell suggest that *N. hirta* Costa, 1849, is not an ostracode. Costa's original figure is reproduced as fig. 3.

It is impossible to obtain topotype material from which *Nesidea hirta* was described because the type locality, Grotto of the Lazaretto of Nisida, has in the last hunderd years been completely filled in, and is now dry land.[1]

Additional genera can and should be erected for post-Paleozoic species currently referred to *Bairdia.* Criteria for separating the groups are carapace shape, hingement, denticulate margins, presence of ventroterminal loculae, such as illustrated for Cretaceous species by Van Veen (1934, pls. 7, 8) and the Paleozoic genus *Ceratobairdia* by Sohn (1954, pl. 2, fig. 19), combined with the soft anatomy of living species.

Ceratobairdia and the new genera in this paper are based on species previously assigned to *Bairdia.* The following additional genera have type species that were originally described as *Bairdia*:

Genera based on species described as Bairdia

Bythocypris Brady, 1880, *Bairdia bosquetiana* Brady, 1866 (Recent).

Cyamocytheridea Oertli, 1956, *Bairdia punctatella* Bosquet, 1852 (Oligocene-Miocene).

Haworthina Kellett, 1935, *Bairdia bulleta* Harris and Lalicker, 1932 (Permian).

Hungarella Méhes, 1911, *Bairdia? problematica* Méhes, 1911 (Triassic?).

Monsmirabilia Apostolescu, 1955a, *Bairdia perforata* Bosquet, 1850 (Eocene), [now *M. subovata* Apostolescu, 1955b].

Pontocyprella Mandelstam fide Liubimova and Chaborova, 1955, *Bairdia harrisiana* Jones, 1849 (Cretaceous).

Potamocypris Brady, 1870, *Bairdia fulva* Brady, 1868 (Recent).

Protoargilloecia Mandelstam fide Liubimova and Chaborova, 1955, *Bairdia siliqua* var. *minor* Jones and Hinde, 1890 (Jurassic).

Although the recorded stratigraphic range of this genus is Ordovician to Recent, this study reveals that only 2 American and 10 foreign species of pre-Middle Devonian age were assigned to *Bairdia.* All these species are here removed from *Bairdia* as follows:

Bairdia anticostiensis Jones, 1890 = *Krausella anticostiensis* (Jones), 1890, fide Bassler and Kellett (1934, p. 165); (see "Species assigned to genera not described in this paper").

B.? browniana Jones, 1874, Geol. Mag., dec. 2, v. 1, p. 511, text fig. 1. Silurian, Scotland. According to Jones' original description this species is based on an internal cast, the description and illustration of which suggest that it is not a *Bairdia.* Its proper generic relation is not determinable, and it is referred here as a nomen dubium.

B.? cuneata (Steusloff), 1894. Kummerow, 1924, Preuss. Geol. Landesanstalt, Jahrb. 44, p. 435, pl. 21 figs. 17a–c. Ordovician, Germany. Referred to *Steusloffina* Teichert, 1937; by Teichert (1937, p. 120).

B. elongata Kummerow, 1924 [not (Münster), 1830; not Lienenklaus, 1900], Preuss. Geol. Landesanstalt, Jahrb. 44, p. 435, pl. 21, fig. 16. Silurian, Germany. Rounded posterior excludes this species from *Bairdia.* This is a junior homonyn that requires a new name.

B. griffithiana Jones and Holl, 1868, Annals Mag. Nat. History, ser. 4, v. 2, p. 58, pl. 7, figs. 10a, b. Ordovician, Ireland. Probably a cast of an indeterminate genus. The illustration (fig. 10a) suggests a ventrolateral ridge or rim (?), on the lateral outline which excludes this species from *Bairdia.*

B.? micra Öpik, 1937, Tartu Univ. Soc. Rebus Nat. Invest., Annales, v. 43, p. 119, pl. 3, figs. 27–29. Ordovician, Estonia. The shape is like a Recent *Candona,* which removes it from *Bairdia,* its generic placement is unknown.

B. murchisoniana Jones and Holl, 1868, Annals Mag. Nat. History, ser. 4, v. 2, p. 58, pl. 7, figs. 9a, b. Ordovician, Ireland. Probably a cast of an indeterminable genus. The illustration (fig. 9a) suggests ventrolateral ridge or rim. The rounded posterior removes this species from *Bairdia.*

B. phillipsiana Jones and Holl, 1869, Annals Mag. Nat. History, ser. 4, v. 3, p. 213, pl. 14, figs. 7a–c. Silurian, England and Germany. Jones and Kirkby (1886, p. 250) refer this species to *Bythocypris* Brady, the illustrations suggest that this species belongs to the same undescribed genus as the species with curved hinge lines referred to *Bairdiocypris* Kegel.

B. planoconvexa Coryell and Williamson, 1936, Am. Mus. Novitates no. 870, p. 7, pl. fig. 13. Silurian, Indiana. The holotype (AMNH 24502) is a steinkern of an unidentifiable species of possibly *Camdenidea* Swain, 1953 (pl. 6, figs. 14–16).

B. protracta Eichwald, 1860, Leth. Ross., p. 1338, pl. 52, fig. 19. Silurian, Russia. The illustration shows the right valve overlapping the left along the dorsum and the left overlapping the right along the venter; this suggests that this species probably belongs to *Rishona* n. gen.

B. salteriana Jones and Holl, 1868, Annals Mag. Nat. History, ser. 4, v. 2, p. 58, pl. 7, figs. 11a, b. Ordovician, Ireland and Wales. Lateral outline excludes this species from *Bairdia.*

B. tumida Kummerow, 1928, Preuss. geol. Landesanstalt, Jahrb. 1927, v. 48, p. 42, pl. 2, figs. 18a, b. Silurian, Germany.

[1] Letter from Dr. L. H. Kleinholtz, Naples, Italy, June 17, 1952, to Dr. Waldo L. Schmitt, U.S. Natl. Mus.

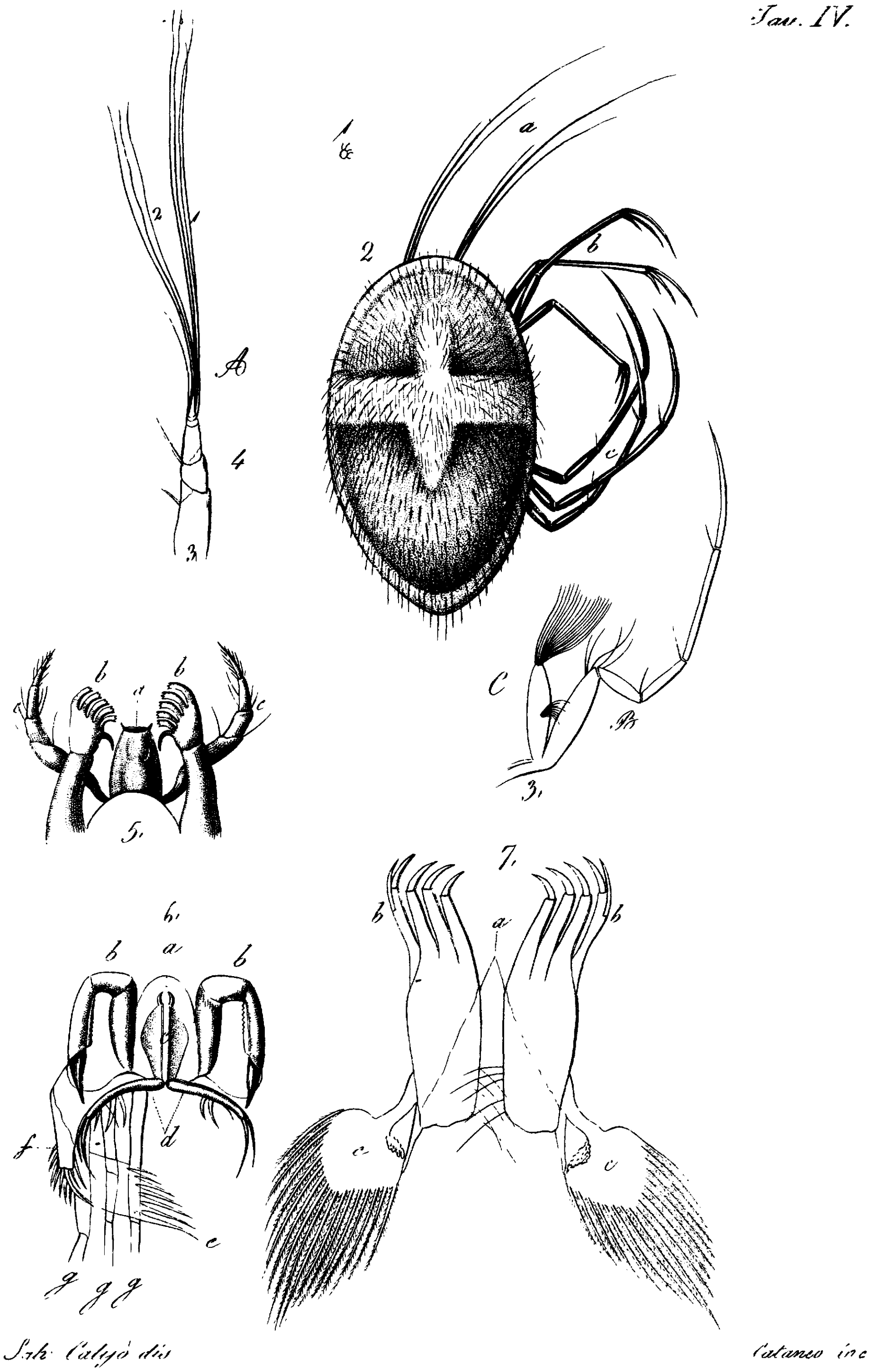

FIGURE 3.—*Nesidea* Costa, 1849, reproduction of Costa (1849, pl. 4) original plate, figs. 8–10 removed. Miss Iris Tomasulo, librarian, U.S. Geological Survey, assisted in translating the explanation.

1. *Nesidea* of natural size, simple outline.
2. The same, very much enlarged, as seen through the microscope, with the parts that naturally remain outside the carapace. *a*, the antenna; *b*, the three right anterior legs; *c*, three right posterior legs.
3. One of the posterior legs enlarged. *B*, femor to which attach the succeeding segments; *C*, hip with its internal muscle fibers.
4. Antenna, external view, same enlargement. *3*, its basal articulation; *1* and *2*, bundles of hairs.
5. Mouth apparatus. *a*, sucking part; *b*, median antennae or pediform palps; *c*, first pair of masticatory appendages.
6. Ventral view seen under the microscope. *a*, opening of the genetive organs; *c*, horny plate rising along the median line; *b*, single-spined pediform appendages; *d*, minor other two spined appendages.
7. *b*, external masticatory feet; *c*, with the branchial plates; *a*, extention of said plates.

Fig. 18b is a lateral view of an *Aparchites*-like ostracode; fig. 18a, stated to be a dorsal view, is unrecognizable.

Figure 4 shows the stratigraphic range of *Bairdia* and its allies.

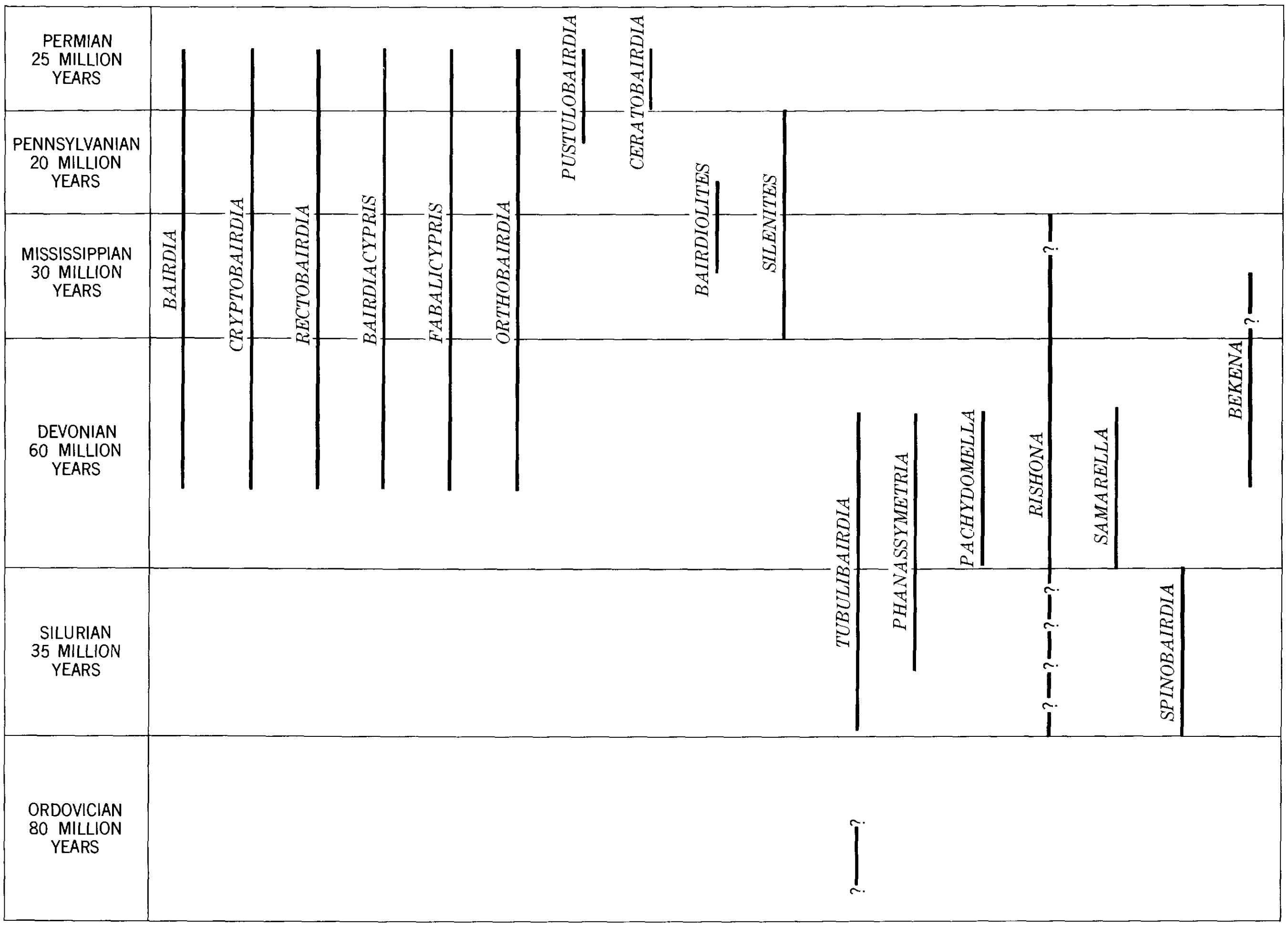

FIGURE 4.—Stratigraphic range of *Bairdia* and the additional genera that are revised in this paper.

This chart indicates that *Bairdia* s. s. is restricted to Paleozoic rocks of Middle Devonian and younger age. As here defined, the presence of this genus in rocks younger than Paleozoic is questioned.

The time interval for each system is constructed in proportion to the estimated approximate length in millions of years as given in the following table.

Major divisions of geologic time (after U.S. Geological Survey)

[Terms designating time are in parentheses. Informal time terms early, middle, and late may be used for the eras, and for periods where there is no formal subdivision into Early, Middle, and Late, and for epochs. Informal rock terms lower, middle, and upper may be used where there is no formal subdivision of a system or of a series]

Era	System or Period		Series or Epoch	Estimated ages of time boundaries in millions of years [1]
Cenozoic	Quaternary		Recent	
			Pleistocene	1
	Tertiary		Pliocene	10
			Miocene	25
			Oligocene	40
			Eocene	60
			Paleocene	
Mesozoic	Cretaceous		Upper (Late) Lower (Early)	125
	Jurassic		Upper (Late) Middle (Middle) Lower (Early)	150
	Triassic		Upper (Late) Middle (Middle) Lower (Early)	180
Paleozoic	Permian [2]		Provincial series recognized in west Texas and southeastern New Mexico	205
	Carboniferous systems	Pennsylvanian [3]	Upper (Late) Middle (Middle) Lower (Early)	
		Mississippian [4]	Upper (Late) Lower (Early)	255
	Devonian		Upper (Late) Middle (Middle) Lower (Early)	315
	Silurian		Upper (Late) Middle (Middle) Lower (Early)	350
	Ordovician		Upper (Late) Middle (Middle) Lower (Early)	430
	Cambrian		Upper (Late) Middle (Middle) Lower (Early)	510
Precambrian			Informal subdivisions such as upper, middle, and lower, or upper and lower, or younger and older may be used locally.	3, 000

[1] Age values given are the Holmes "B" time scale points (Holmes, A., 1947, The construction of a geological time scale: Geol. Soc. Glascow, Trans. v. 21, pt. 1, p. 145). Dates are rounded to the nearest 5 million years. The errors are unknown, but more recent age determinations by various physical methods are in general agreement with these values.

[2] Wolfcamp, Leonard, Guadalupe, and Ochoa provincial series recognized in west Texas and southeastern New Mexico. Formal series subdivisions of the Permian are not recognized elsewhere.

[3] Morrow, Atoka, Des Moines, Missouri, and Virgil provincial series recognized in the Midcontinent region.

[4] Kinderhook, Osage, Meramec, and Chester provincial series recognized in the upper Mississippi Valley region.

This table is significant in the evaluation of the use of ostracodes in the determination of geologic age and in correlation of the upper Paleozoic. For example, the Mississippian system can be estimated to represent 30 million years. This system is divisible into four provincial series. The U.S. Geological Survey now places the Kinderhook and Osage series in the Lower Mississippian and places the Meramec and Chester series in the Upper Mississippian. Let us assume as a starting point that the Upper Mississippian lasted twice as long in time as the Lower Mississippian; this factor would give a magnitude of about 20 million years for the Upper Mississippian. Let us further assume that the Chester series was about twice as long in time as the Meramec series; this would give a duration of about 15 million years for the entire Chester provincial series. The Chester series is composed of 16 formations (Cooper, 1941, p. 7). Although it is recognized that some of these formations may have taken a longer time to be deposited than others, for convenience the same length of time is assigned to each. The time length of each formation would equal approximately a million years.

Teichert (1956, p. 968) estimated the period of time required for the complete replacement by evolution of a marine molluscan fauna in a given area to be from 12 to 20 million years. This approximation is roughly in agreement with what is known of the time span of several living species of ostracodes. Swain (1955) identified 9 species of living ostracodes, 8 of which were previously recorded from the upper Miocene and 1 from the middle Miocene. Although it is pointed out that it is hazardous to assign living species to fossil forms, the fact that the shells of the living individuals cannot be differentiated from shells of individuals that lived 12–20 million years ago is important. This is particularly significant because Swain dealt with shells that have more surface sculpture than *Bairdia* and related genera.

The above estimates suggest that any faunal differences in ostracodes between formations in the Chester series or in the Pennsylvanian system are probably due to ecologic rather than evolutionary factors. Age determination and correlation of adjacent stratigraphic intervals that were of less than 12–20 million years in duration are not feasible. The stratigraphic distribution of species shown in figures 5–13 should be interpreted in the light of this discussion.

It is of interest to compare the number of species in each of the genera treated that are restricted to the stratigraphic divisions, with the number that cross stratigraphic divisions. The following table shows these data.

Number of species restricted to stratigraphic divisions and number crossing stratigraphic boundaries

Stratigraphic divisions	Number of species in genera shown									
	Bairdia	*Cryptobairdia*	*Rectobairdia*	*Bairdiacypris*	*Fabalicypris*	*Orthobairdia*	*Pustulobairdia*	*Ceratobairdia*	*Bairdiolites*	*Silenites*
Permian	14	11	3	----	3	1	2	2	----	----
Permian-Pennsylvanian	7	----	1	----	1	1	----	----	----	----
Upper Pennsylvanian	13	6	2	4	4	----	1	----	----	1
Middle Pennsylvanian	3	1	1	2	9	1	----	----	----	2
Middle and Upper Pennsylvanian	2	2	----	1	1	1	----	----	----	1
Lower Pennsylvanian	----	----	----	----	----	----	----	----	1	----
Pennsylvanian	2	----	----	----	----	1	----	----	----	----
Pennsylvanian–Mississippian	1	----	----	----	----	----	----	----	----	----
Upper Mississippian	14	2	2	4	3	3	----	----	14	3
Lower Mississippian	3	----	3	2	----	----	----	----	----	1
Mississippian and Carboniferous (undifferentiated)	12	5	9	3	3	----	----	----	----	----
Upper Devonian	10	----	2	1	----	----	----	----	----	----
Middle Devonian	4	1	7	1	1	1	----	----	----	----
Middle and Upper Devonian	----	----	1	----	----	----	----	----	----	----

A total of 169 species is restricted to the stratigraphic divisions, and 56 species cross stratigraphic divisions. The fact that approximately 75 percent of all the species are restricted to the above stratigraphic divisions suggests that they are available for age determination and stratigraphic correlation for intervals of the above time-stratigraphic units. This conclusion is, of course, provisional because of the unknown factor of inadequate sampling. Additional collecting, particularly in rocks that have not been thoroughly studied, may show that some of the species here recorded as restricted actually cross stratigraphic boundaries.

SUMMARY OF BAIRDIA

The genus *Bairdia* is restricted in this paper to Paleozoic species that are smooth and that have curved dorsal margins, pointed posteriors, acuminate anteriors, and distinct dorsoanterior margins. A total of 70 species are recognized. Two of these are new, and an additional 21 of these are probably new species, but are here designated by letters rather than trivial names. All the species are discriminated by means of a dichotomous bracket key. The stratigraphic range and frequency of occurrence of these species are shown in figure 5.

Although the stratigraphic range of *Bairdia* is shown in figure 4, the range chart indicates neither the number nor the frequency of occurrence of each species. Figure 5, on the other hand, is designed to show the numerical distribution of the species in stratigraphic units, as well as the number of localities in each unit.

The data in this study can be used to construct similar charts showing the distribution and frequency of occurrence of species within each of the major

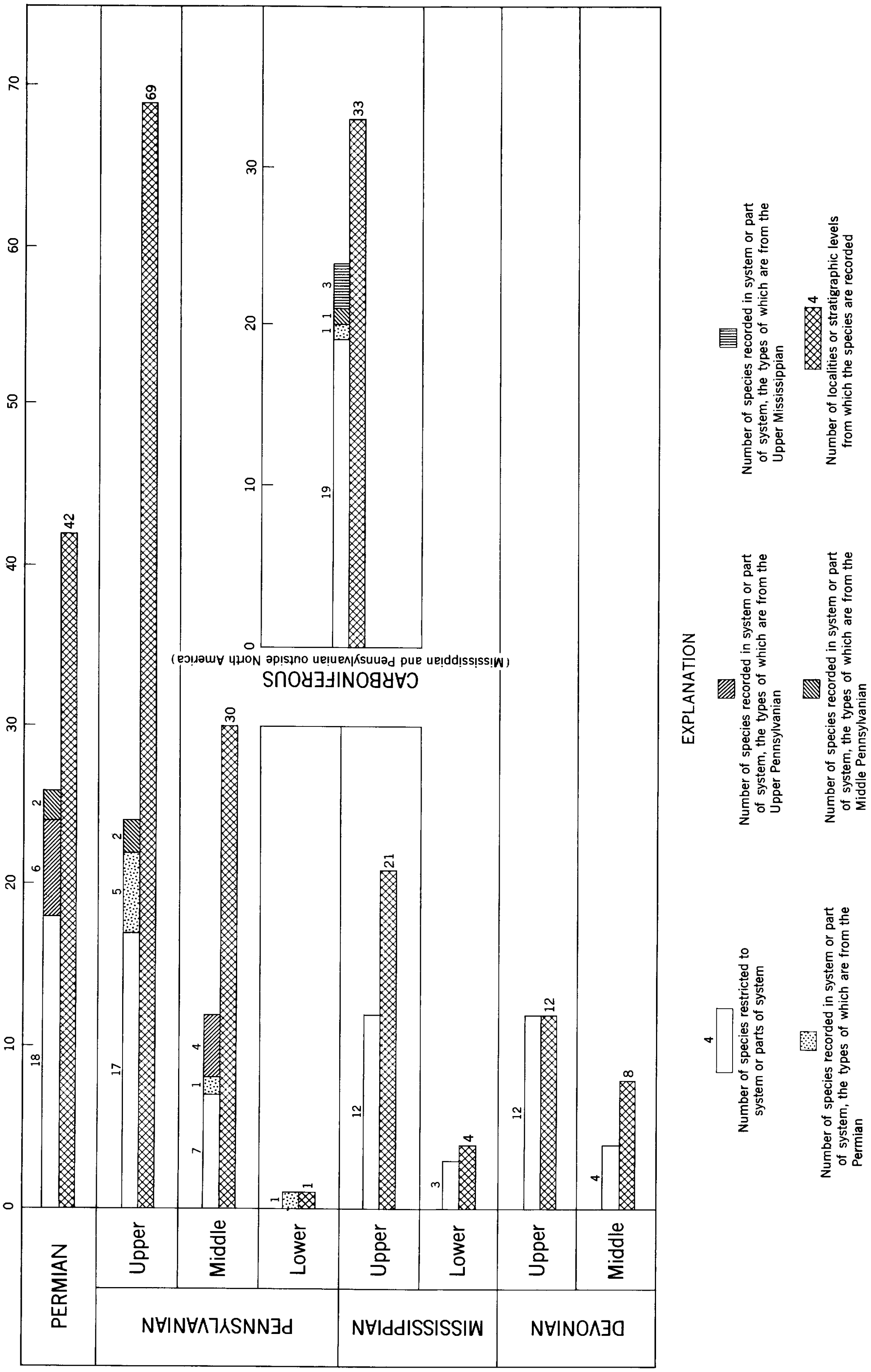

FIGURE 5.—Stratigraphic range and frequency distribution of species in *Bairdia*.

systems or parts of systems. The stratigraphic range and frequency of occurrence of *Bairdia* in the Upper Pennsylvanian are shown in figure 6.

For the purpose of this chart, the standard section of the midcontinent was taken from Cooper (1946, p. 16). Stratigraphic data for six species could not be determined closer than the series; these species are shown as "Virgil (undifferentiated)" and "Missouri (undifferentiated)." The holotype of *Bairdia pompilioides* Harlton, 1928, is described from the Hoxbar formation, and is indicated on the chart as "Upper Pennsylvanian (undifferentiated)." Specimens of this species have been identified in the following units: Burlingame limestone member of the Bern limestone (Virgil series), and Weston, Stanton, Iola, Winterset formations (Missouri series), as well as Missouri (undifferentiated).

KEY TO BAIRDIA S. S.

In the following keys, names in parentheses are synonyms.

1. Dorsoposterior margin of larger valve equals one-third or more of greatest length — 2
1a. Dorsoposterior margin of larger valve equals one-quarter of greatest length — 43
2 (1). Dorsoposterior margin of larger valve equals approximately one-third of greatest length — 3
2a. Dorsoposterior margin of larger valve equals between one-third and one-half of the greatest length — 33
3 (2). Anterior pointed — 4
3a. Anterior round — 17
4 (3). Ventral margin straight — 5
4a. Ventral margin curved — 11
5 (4). Anterior point approximately at midheight — 6
5a. Anterior point above midheight — 8
6 (5). Dorsoanterior margin concave — 7
6a. Dorsoanterior margin straight or slightly convex — *summa* (p. 32)
7 (6). Posterior sharply pointed — *curta* (p. 25)
7a. Posterior blunt — sp. A (p. 33)
8 (5a). Greatest length less than twice greatest height — *radlerae* (p. 31)
8a. Greatest length twice or more the greatest height — 9
9 (8a). Greatest length approximately twice greatest height — 95
9a. Greatest length more than twice the greatest height — 10
10 (9a). Posterior sharply pointed — *caudata* (p. 24)
10a. Posterior blunt — sp. B (p. 33)
11 (4a). Ventral margin concave — 12
11a. Ventral margin convex — 16
12 (11). Ventroposterior margin convex — 78
12a. Ventroposterior margin straight — 13
13 (12a). Dorsum incised — *sohni* (p. 32)
13a. Dorsum not incised — 14
14 (13a). Greatest width about half of the greatest height — sp. C (p. 33)
14a. Greatest width more than half the greatest height — 15
15 (14a). Posterior blunt — *seideradensis* (p. 32)
15. Posterior pointed — *quasisymmetrica* (p. 31)
16 (11a). Greatest length less than twice the greatest height — 92
16a. Greatest length more than twice the greatest height — *gibbera* (p. 26)
17 (3a). Ventral margin straight — 18
17a. Ventral margin curved — 24
18 (17). Anterior break in curvature above midheight — 19
18a. Anterior break in curvature approximately at midheight, ventroposterior margin curved — *kansasensis* (p. 28)
19 (18). Dorsoanterior margin curved — 20
19a. Dorsoanterior margin straight — 22
20 (19). Greatest width in the posterior quarter of the greatest length — sp. D (p. 33)
20a. Greatest width median — 21
21 (20a). Posterior pointed, dorsal overlap of uneven width — sp. L (p. 34)
21a. Posterior blunt, dorsal overlap of constant width — *acuminata* (p. 22)
22 (19a). Postdorsal area of right valve inflated — *crassa* (p. 24), (*tumida*?)
22a. Postdorsal area of right valve not inflated — 23
23 (22a). Ventroanterior margin gently convex, truncated, anterior pointed — sp. E. (p. 33)
23a. Ventroanterior margin convex, not truncated, anterior round — 77
24 (17a). Ventral margin concave — 25
24a. Ventral margin convex — 29
25 (24). Junction of anterior and dorsoanterior margins above midheight — 26
25a. Junction of anterior and dorsoanterior margins at approximate midheight — 28
26 (25). Dorsoposterior margin concave — 27
26a. Dorsoposterior margin straight — 84
27 (26). Anterior half higher than posterior half — *eifliensis* (p. 25)
27a. Both halves the same height — *subfusiformis* (p. 32)
28 (25a). Posterior long; greatest width in dorsal outline at approximate midlength, greatest length less than 2 mm — *peracuta* (p. 30)
28a. Posterior short; greatest width in dorsal outline posterior to midlength, greatest length to 3 mm — *asymmetrica* (p. 22)
29 (24a). Greatest length more than twice greatest height — sp. F (p. 33)
29a. Greatest length twice or less the greatest height — 30
30 (29a). Greatest width in dorsal outline in anterior quarter of greatest length — *submucronata* (p. 32)
30a. Greatest width in dorsal outline at midlength — 31
31 (30a). Dorsoposterior margin concave — 32
31a. Dorsoposterior margin straight or convex — *harltoni* (p. 27)
32 (31). Junction of anterior and dorsoanterior margins at approximate midheight — 73
32a. Junction of anterior and dorsoanterior margins above midheight — 38
33 (2a). Anterior margin pointed — 34
33a. Anterior margin round — 35
34 (33). Posterior point below midheight — 93
34a. Posterior point above midheight — *leguminoides* (p. 29), (*amplectens, summacuminata*)
35 (33a). Ventral margin straight — *grahamensis* (p. 26), (*deloi*?, *menardensis, menardvillensis*?, *marginata*?)

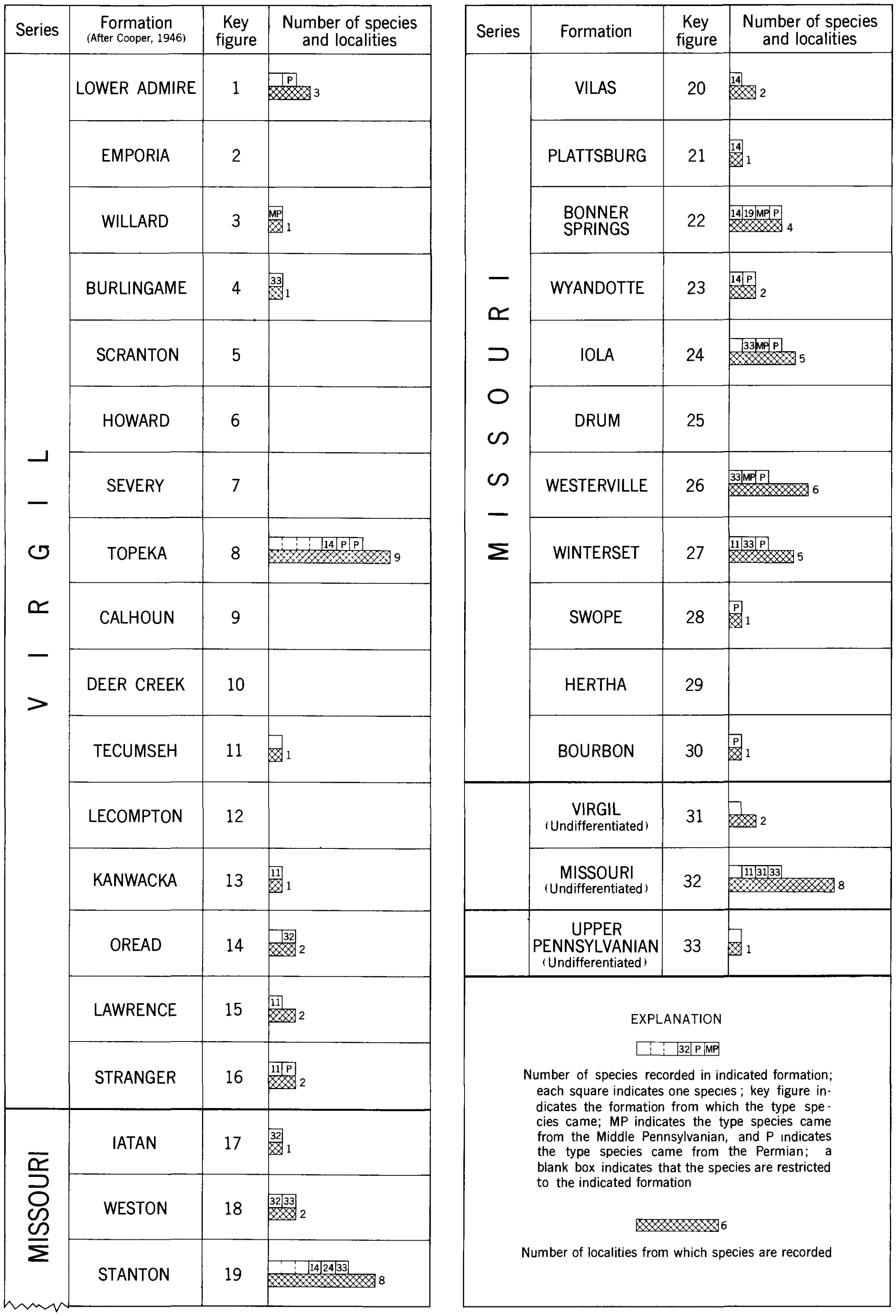

FIGURE 6.—The stratigraphic range and frequency distribution of species in *Bairdia* in the Upper Pennsylvanian.

35a. Ventral margin curved 36
36 (35a). Ventral margin concave 37
36a. Ventral margin convex 40
37 (36). Posterior point in ventral quarter of greatest height *terebra* (p. 32)
37a. Posterior point at approximate midheight 39
38 (32a). Posterior point in ventral third of greatest height *kelleri* (p. 28)
38a. Posterior point in middle third of greatest height 88
39 (37a). Dorsoanterior margin straight *aculeala* (p. 22)
39a. Dorsoanterior margin concave *subcylindrica* (p. 32)
40 (36a). Dorsoposterior margin concave sp. H (p. 34)
40a. Dorsoposterior margin straight or convex 41
41 (40a). Ventroanterior margin straight *kinderhookensis* (p. 29)
41a. Ventroanterior margin convex 42
42 (41a). Posterior pointed 74
42a. Posterior blunt *hispida* (p. 27)
43 (1a). Anterior with dorsal hook 90
43a. Anterior without dorsal hook 44
44 (43a). Ventral margin straight 45
44a. Ventral margin curved 57
45 (44). Dorsoposterior margin concave 46
45a. Dorsoposterior margin straight or convex 56
46 (45). Greatest height more than half the greatest length 47
46a. Greatest height less than half the greatest length 50
47 (46). Junction of anterior and dorsoanterior margins above midheight 48
47a. Junction of anterior and dorsoanterior margins at or below midheight *kansasensis* (p. 28)
48 (47). Shoulder on and parallel to dorsal margin of left valve. *rhomboidalis* (p. 31)
48a. No shoulder on dorsal margin of left valve 49
49 (48a). Greatest width approximately equal to greatest height 75
49a. Greatest width about two-thirds the greatest height 89
50 (46a). Dorsoanterior margin occupies anterior quarter of greatest length sp. I (p. 34)
50a. Dorsoanterior margin occupies anterior third or more of greatest length 51
51 (50a). Ventral lip present 52
51a. Ventral lip absent 54
52 (51). Ventroposterior margin straight *pompilioides* (p. 30), (*subcitriformis*)
52a. Ventroposterior margin convex 53
53 (52a). Angle between dorsoposterior and dorsal margins about 40° *regularis* (p. 31)
53a. Angle between dorsoposterior and dorsal margins about 50° 86
54 (51a). Commissure of dorsal overlap angular in lateral view dorsal outline subhexagonal sp. J (p. 34)
54a. Commissure of dorsal overlap smooth in lateral view, dorsal outline subelliptical 55
55 (54a). Commissure sinuous at midlength in dorsal view sp. K (p. 34)
55a. Commissure smooth at midlength in dorsal view *acuminata* (p. 22).
56 (45a). Greatest height more than half the greatest length *impedere* (p. 28)
56a. Greatest height half or less of the greatest length 80
57 (44a). Ventral margin convex 58
57a. Ventral margin concave 69
58 (57). Dorsoposterior margin curved 59
58a. Dorsoposterior margin straight 66
59 (58). Dorsoposterior margin convex *usatchovae* (p. 32)
59a. Dorsoposterior margin concave 60
60 (59a). Greatest height half or more greatest length 61
60a. Greatest height less than half the greatest length 64
61 (60). Dorsoanterior margin convex *hypsoconcha* (p. 28), (*subtilla?*)
61a. Dorsoanterior margin concave 62
62 (61a). Dorsal margin evenly convex 63
62a. Dorsal margin angular *gibbera* (p. 26) (*Subampla?*)
63 (62). Outline of right valve in dorsal view evenly convex *brevis* (p. 24)
63a. Outline of right valve in dorsal view fusiform, bulge in center *whitesidei* (p. 33), (*bicornis, concava?, punctata?*)
64 (60a). Ventral lip present 65
64a. Ventral lip absent sp. Q (p. 34)
65 (64). Ventral lip anterior to midlength *pompilioides* (p. 30)
65a. Ventral lip posterior to midlength sp. M (p. 34)
66 (58a). Junction of anterior and dorsoanterior margins in central third of greatest height 67
66a. Junction of anterior and dorsoanterior margins in upper third of greatest height sp. P (p. 34)
67 (66). Posterior point at midheight *rjabinini* (p. 32)
67a. Posterior point below midheight 68
68 (67a). Posterior point in ventral third of greatest height *hurwitzi* (p. 27), (*beedei* var. *inflata?*)
68a. Posterior point in ventral quarter of greatest height *ivanovae* (p. 28)
69 (57a). Dorsoposterior margin straight 70
69a. Dorsoposterior margin concave 72
70 (69). Greatest height half or more the greatest length 71
70a. Greatest height less than half the greatest length 76
71 (70). Dorsoanterior margin convex 96
71a. Dorsoanterior margin concave 97
72 (69a). Dorsoanterior margin straight *golcondensis* (p. 26)
72a. Dorsoanterior margin curved 81
73 (32). Ends in dorsal outline concave *citriformis* (p. 24)
73a. Ends in dorsal outline convex *eleziana* (p. 25)
74 (42). Commissure angular at junction of dorsal and dorsoanterior margins *garrisonensis* (p. 25), (*eissensis?*)
74a. Commissure smooth at junction of dorsal and dorsoanterior margins *beedei* (p. 23), *ciscoensis, conilata, hispida* var. *alta?, marmorea,* (*samplei, seligi?, wrefordensis?*)
75 (49). Dorsoanterior margin convex *bradfieldi* (p. 23), (*dissimilis?*)
75a. Dorsoanterior margin straight or concave 85
76 (70a). Ends symmetrical in dorsal outline 79
76a. Ends not symmetrical in dorsal outline, posterior shorter *naumovae* (p. 29)
77 (23a). Thin ridge on lateral surface near and parallel to ventral margin *monstrabilis* (p. 29)
77a. No thin ridge on lateral surface *angustata* (p. 22)
78 (12). Posterior below midheight 99
78a. Posterior above midheight *egorovi* (p. 25)
79 (76). End view narrows towards venter, greatest width at midheight *permagna* (p. 30), (*salemensis*)
79a. End view narrows towards dorsum, greatest width below midheight sp. N (p. 34)
80 (56a). Posterior point below midheight 91
80a. Posterior point above midheight sp. S (p. 35)
81 (72a). Dorsoanterior margin convex *reussiana* (p. 31)
81a. Dorsoanterior margin concave 82

82 (81). Posterior point below midheight *mccoyi* (p. 29), (*renaultensis*)
82a. Posterior point at above midheight 83
83 (82a). Posterior point approximately at midheight *pompilioides* (p. 30)
83a. Posterior point above midheight *girtyi* (p. 26)
84 (26a). Greatest height more than half the greatest length *nalivkini* (p. 29)
84a. Greatest height less than half the greatest length *pseudoglennensis* (p. 31)
85 (75a). Posterodorsal slope steep, makes an angle of about 55° with dorsal commissure sp. Q (p. 34)
85a. Posterodorsal slope gentle, makes an angle of about 35° with dorsal commissure *pecosensis* (p. 30), (*irionensis?, permiana*)
86 (53a). Dorsoanterior margin convex *matfieldensis* (p. 29)
86a. Dorsoanterior margin straight or slightly concave 87
87 (86a). Greatest height at approximate midlength *elongatella* (p. 25)
87a. Greatest height posterior to midlength *neptuni* (p. 29)
88 (38a). Dorsoanterior margin straight sp. O (p. 34)
88a. Dorsoanterior margin concave *grahamensis* (p. 26), (*deloi?, menardensis, menardvillensis?, marginata?*)
89 (49a). Dorsoanterior margin convex sp. R (p. 123)
89a. Dorsoanterior margin straight or slightly concave 94
90 (43). Posterior point in central third of greatest height *macdonelli* (p. 29)
90a. Posterior point in lower third of greatest height *kellettae* (p. 28)
91 (80). Anterior point above midheight *tokmovoensis* (p. 32)
91a. Anterior point below midheight sp. T (p. 35)
92 (16). Posterior point above midheight *graciosa* (p. 26)
92a. Posterior point below midheight *pecosensis* (p. 30)
93 (34). Dorsoposterior margin arcuate, ventral margin deeply concave sp. G (p. 33)
93a. Dorsoposterior margin gently concave, ventral margin very gently concave *piscis* (p. 30)
94 (89a). Dorsal margin slightly curved *verwiebei* (p. 32)
94a. Dorsal margin evenly convex *hassi* (p. 27)
95 (9). Dorsal margin evenly convex *galei* (p. 25)
95a. Dorsal margin pointed *mandelstami* (p. 29)
96 (71). Posterior pointed *aperta* (p. 22)
96a. Posterior blunt sp. U (p. 35)
97 (71a). Greatest concavity in posterior half of dorsoposterior margin 98
97a. Greatest concavity in anterior half of dorsoposterior margin *curvirostris* (p. 25)
98 (97). Dorsal outline pointed on both ends *nikomlensis* (p. 30)
98a. Dorsal outline blunt on posterior end *petiniana* (p. 30)
99 (78). Posterior point in lowest third of greatest height *leptura* (p. 29), (*plebia* var. *caudata?*)
99a. Posterior point in middle third of greatest height *hebeatus* (p. 27)

ASSIGNED SPECIES

Bairdia aculeala Cooper, 1957

Bairdia aculeala Cooper, 1957, Jour. Paleontology, v. 31, p. 674.

Bairdia aculeata Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 24, pl. 11, figs. 48, 49. Kinkaid formation, NE¼ SW¼NE¼ sec. 20, T. 12 S., R. 3 E., one-half a mile south of Veatch School, Johnson County, Ill.

[not] *Bairdia aculeata* Bonnema, 1940, Natuurh. Maandbl., v. 29, no. 10, p. 108, pl. 3, figs. 9–14. Cretaceous, Holland.

Geologic range.—Upper Mississippian.

Bairdia acuminata Cooper, 1946

Bairdia acuminata Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 40, pl. 1, figs. 27, 28. Shale in Little Vermilion limestone, SE¼ sec. 36, T. 33 N., R. 1 E., La Salle County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 82, pl. 17, figs. 15–16. Tops of Bonner Springs shale, Hickory Creek shale, Vilas shale, and Eudora shale, west side of State Highway 169, near top of first hill south of Little Platte River bridge, on boundary between secs. 22 and 23, about 0.2 the distance from south to north along section line, T. 53 N., R. 33 W., southwest edge of Smithville, Clay County; 3½ ft below top of Farley limestone to 6 ft above base of Vilas shale, quarry a few hundred feet east of State Highway 92, SW¼SW¼SE¼ sec. 28, T. 52 N., R. 55 W., at west end of Farley, Platte County, Mo.

?*Bairdia verwiebei* Kellett. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 52, pl. 4, figs. 7, 8. Shale above and below thin limestone, Newton cyclothem, SW¼ sec. 33, T. 12 N., R. 3 E., Shelby County, Ill.

[not] *Bairdia acuminata* (Alth). Reuss, 1854, K. Akad. Wiss. Denkschr., v. 7, p. 139. Cretaceous; senior secondary homonym. (See p. 9, item 6.)

Geologic range.—Upper Pennsylvanian.

Bairdia angustata Cooper, 1957

Bairdia angustata Cooper, 1957, Jour. Paleontology, v. 31, p. 674.

Bairdia angusta Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 41, pl. 1, figs. 41–44. Shale between Seville limestone beds, SW¼ sec. 32, T. 14 N., R. 2 W., Mercer County, Ill.

[not] *Bairdia angusta* (Münster). Jones, 1849, Palaeontogr. Soc. London, p. 26, pl. 6, figs. 18a–f. Cretaceous. England = [part] *Bythocypris reussiana* Jones and Hinde, 1890; [part] *Pontocypris bosquetiana* Jones and Hinds, 1890.

[not] *Bairdia angusta* Sars, 1866, Vidensk.-Selsk., Christiana, Forh. 1865, p. 22. Living. = *Macrocypris sarsi* Müller, 1912. (See p. 9, item 7.)

Geologic range.—Middle Pennsylvanian.

Bairdia aperta Polenova, 1952

Bairdia aperta Polenova, 1952, Microfauna SSSR, pt. 5, p. 133, pl. 13, figs. 3a, b. Middle Devonian, Kursk and Veronez regions, Russia.

Geologic range.—Middle Devonian.

Bairdia asymmetrica Kummerow, 1939

Bairdia asymmetrica Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n.f., no. 194, pt. A, p. 44, pl. 5, figs. 2a–c. Lower Visé C_2–S_1, Ratingen, Rheinland, Germany.

Geologic range.—Carboniferous (Upper Mississippian).

Bairdia beedei Ulrich and Bassler, 1906

Plate 1, figures 4, 5, 7, 8, 11–14

Bairdia beedei Ulrich and Bassler, 1906, U.S. Natl. Mus. Proc., v. 30, p. 161, pl. 11, figs. 19, 20. Cottonwood shale, 2 miles east of Cottonwood Falls, Chase County, Kans.

Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 16, pl. 1, figs. 4a–c. Middle Funston limestone, upper contact, roadcut in U.S. Highway 36, 4 miles east of Home City, Marshall County, Kans.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 41, pl. 1, figs. 35–40. Shale in Brereton limestone, SW¼ sec. 9, T. 5 S., R. 6 W., Randolph County; weathered lowered part of Millersville limestone, NE¼ sec. 28, T. 12 N., R. 1 W., Christian County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 83, pl. 18, figs. 18–20. Six feet below top of Wea shale to 1 ft 6 in above base of Westerville limestone, west side roadcut, about 200 ft southeast of Polecat Creek bridge, 3.3 miles south of Bethany near northeast cor. sec. 3, T. 62 N., R. 28 W., Harrison County, Mo.

Tasch, 1953, Jour. Paleontology, v. 27, p. 399, pl. 49, fig. 12. Pennsylvanian shale bank to right of road entering Country Club Heights, Emporia, Lyon County, Kans.

Bairdia beedei var. *abrupta* Ulrich and Bassler, 1906, U.S. Natl. Mus. Proc., v. 30, p. 162, pl. 11, figs. 21, 22. Cottonwood shale, 2 miles east of Cottonwood Falls, Chase County, Kans.

Bairdia auricula Knight. Bradfield, 1935, Am. Paleontology Bull., v. 22, no. 73, p. 89, pl. 6, figs. 13a, b. Union Dairy limestone, roadcut at south edge of Ardmore, Carter County, Okla.

Bairdia ciscoensis Harlton, 1927, Jour. Paleontology, v. 1, p. 210, pl. 33, fig. 8. Shale below Sedwick limestone, 2 ½ miles northeast of Coleman, Coleman County, Tex.

Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 265, pl. 25, fig. 8. East Mountain shale, Mineral Wells formation, Mineral Wells, Palo Pinto County, Tex.

?*Bairdia ciscoensis* Harlton. Bradfield, 1935 [part], Am. Paleontology Bull., v. 22, no. 73, p. 91, pl. 7, figs. 3a, b [not 1, 2, 4–6; see ***Bairdia*** **sp. E**]. **Union Dairy** limestone, railroad cut, south edge of Ardmore, Carter County, Okla. Based on an abraded specimen.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 42, pl. 1, figs. 29, 30, pl. 4, figs. 5, 6. Shale in Collinsville limestone, SW¼ sec. 34, T. 3 N., R. 8 W., Madison County; shale in Woodbury cyclothem, SE¼ sec. 32, T. 9 N., R. 8 E., Cumberland County, Ill.

Bairdia conilata Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 268, pl. 2, fig. 13. Shale near base of Wapanucka limestone, quarry, 2 miles south of Hartshorne, NW¼ sec. 18, T. 4 N., R. 17 E., Pittsburg County, Okla.

?*Bairdia hispida* var. *alta* Bradfield, 1935, Am. Paleontology Bull., v. 22, no. 73, p. 88, pl. 6, figs. 6a, b [not *B. plebia* var. *alta* Jones and Kirkby, 1895; see *Orthobairdia cestriensis* (Ulrich), 1891]. Hoxbar formation, Crineville member, Pleasant Hill syncline, northwest side of Criner hills, 4 miles south and 2½ miles west of Ardmore, Carter County, Okla. The type (Indiana Univ. 2135) is a corroded specimen without the posterior and ventroposterior portions.

Bairdia hispida Harlton. Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 262, pl. 25, fig. 10. East Mountain shale, Mineral Wells formation, Mineral Wells, Palo Pinto County, Tex.

Bairdia marmorea Kellett, 1934, Jour. Paleontology, v. 8, p. 127, pl. 15, figs. 1a–h. Wreford formation, north-south road between Lincolnville and Elmdale, north of District No. 17 School, Chase County, Kans.

?*Bairdia moorei* Knight, 1928, Jour. Paleontology, v. 2, p. 318, pl. 43, figs. 1a–c. Shale partings in "Brown lime" of Labette shale, exposed in south bank of creek east of Price Rd., and south of Ladue Rd., St. Louis County, Mo.

Coryell and Billings, 1932, Am. Midland Naturalist, v. 13, p. 173, pl. 17, fig. 4. Wayland shale, Graham formation, 5 miles east and 2,000 ft north of Cisco, Eastland County, Tex.

Bairdia samplei Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 264, pl. 3, figs. 12, 13. Wayland shale, Graham formation, near the Graham–Throckorton road, west of Salt Creek, 1 mile west of Graham, Young County, Tex.

?*Bairdia seligi* Delo, 1930, Jour. Paleontology, v. 4, p. 165, pl. 12, fig. 17. Carboniferous, Southern Crude Oil Purchasing Co., Allison No. 1 well, 950–961 ft, Sutton County, Tex. The holotype (USNM 81785) is a corroded specimen.

?*Bairdia seminalis* Knight. Kellett, 1934, Jour. Paleontology, v. 8, p. 127, pl. 15, figs. 2a–c. Elmdale(?)formation, weathered limestone in roadcut, Kansas State Highway 29, just southeast of Manhattan, Riley County, Kans.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 51, pl. 3, figs. 27–29. Shale below lower bench in Lonsdale limestone, SE¼ sec. 16, T. 12 N., R. 9 E., Marshall County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 91, pl. 17, figs. 5, 6, 7(?), 8(?). Pleasanton shale, S½SW¼ sec. 6, T. 52 N., R. 29 W., 0.2–0.6 miles east of Excelsior Springs, Ray County, Mo.

?*Bairdia wrefordensis* Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 22, pl. 2, figs. 5a, b. Upper shale seam of the Fourmile limestone, roadcut 3½ miles southeast of Randolph, Riley County, Kans.

[not] *Bairdia beedei* Ulrich and Bassler. Warthin, 1930 = *B. whitesidei*? Bradfield, 1935.

[not] *Bairdia beedei* Ulrich and Bassler. Kellett, 1934 = *B. hurwitzi* Coryell and Booth, 1933.

[not] *Bairdia beedei* Ulrich and Bassler. Johnson, 1936 = *B. hassi*? n. sp.

[not] *Bairdia beedei* Ulrich and Bassler. Payne, 1937 = *B. hurwitzi* Coryell and Booth, 1933.

[not *Bairdia beedei* var. *inflata* Payne, 1937=*B. hurwitzi* Coryell and Booth, 1933.

[not] *Bairdia ciscoensis* Harlton. Bradfield, 1935 = *Bairdia* sp. E.

[not] *Bairdia moorei* (Jones). Issler, 1908, Palaeontographica, v. 55, p. 95, pl. 7, fig. 343. Jurassic.

Geologic range.—Lower Pennsylvanian-Permian.

Bairdia bradfieldi Payne, 1937

Bairdia bradfieldi Payne, 1937, Jour. Paleontology, v. 11, p. 283, pl. 39, figs. 3a, b. Hayden Branch formation, Sullivan County, Ind.

?*Bairdia dissimilis* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 44, pl. 2, figs. 27–29. Shale below Seville limestone, SE¼ sec. 14, T. 12 N., R. 2 W., Warren County, Ill.

The holotype of *B. bradfieldi*, Indiana University 3214, is a specimen from which a great deal of the shell material has been dissolved; it is very close to *B. dissimilis*.

Geologic range.—Middle Pennsylvanian.

Bairdia brevis Jones and Kirkby, 1879

Bairdia brevis Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 575, pl. 31, figs. 1–8. Lower Carboniferous Limestone Series, near Glasgow, Scotland.

Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 305, pl. 16, fig. 9. Carboniferous, Mongolia.

Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 45, pl. 5, figs. 4a, b. Viséan, Germany.

[not] *Bairdia brevis* Jones and Kirkby. Vine, 1884, = sp. indet.

[not] *Bairdia brevis* Jones and Kirkby. Cooper, 1941 = *Orthobairdia* sp. A.

[not] *Bairdia brevis* Lienenklaus, 1900, Deutsch Geol. Gesell. Zeitschr., v. 52, p. 510, pl. 19, fig. 6. Lower Oligocene, Germany.

Key, 1955, K. Nederl. Akad. Wetensch Natuurk., Verh. ser. 1, v. 21, no. 2, p. 106, pl. 15, fig. 1; Stampian, France. This post-Paleozoic species was renamed *B. abbreviata* Key *in* Van den Bold, 1957.

Bairdia brevis var. *jonesi* Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 90, pl. 21, figs. 5a, b, c; pl. 20, figs. 4, 5. Lower Carboniferous, Russia.

Bassler and Kellett (1934, p. 187) credit this species to Jones and Kirkby, 1867, who listed it (1867, pages 221 and 225), but indicated in the footnote (Jones and Kirkby, 1867, p. 228) that it is a nomen nudum.

Geologic range.—Carboniferous.

Bairdia caudata Kirkby, 1859

Bairdia mucronata Reuss. Kirkby, 1858 [part], Annals Mag. Nat. History, ser. 3, v. 2, p. 327, pl. 10, figs. 9a, b, 10 [not fig. 11 = *Cryptobairdia amygdalina* (Kirby), 1859]. Permian, Shell limestone, Tunstall Hill, Durham, England.

Bairdia plebia var. *caudata* Kirkby, 1859, Tyneside Naturalists' Field Club, Trans., v. 4, p. 143, woodcut 3 [not 2, 4 = *B. leptura* (Richter), 1867], pl. 9, figs. 9, 10 [not figs. 12, 12a = sp. indet.]. Permian, Shell limestone, Tunstall Hill, Durham, England.

Cythere (*Bairdia*) *plebia* var. *caudata* Kirkby. Jones, 1859, *in* Kirkby, 1859, idem, p. 166, pl. 11, figs. 17, 18a–c. Shell limestone, Permian, Tunstall Hill, Durham, England.

[not] *Cythere caudata* (Kirkby). Richter, 1867 = *Bairdia* sp. G.

Geologic range.—Permian.

Bairdia citriformis Knight, 1928

Bairdia citriformis Knight, 1928, Jour. Paleontology, v. 2, p. 321, pl. 43, figs. 4a–d. Pawnee limestone, Clayton, St. Louis County, Mo.

?*Bairdia* cf. *B. citriformis* Bradfield, 1935, Am. Paleontology Bull., v. 22, no. 73, p. 78, pl. 5, figs. 2a, b. Lester limestone member, Dornick Hills formation, Ardmore Basin, Okla. The illustration is based on a steinkern.

?*Bairdia blakei* Harlton. Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 21, pl. 2, figs. 1a, b. Shale in Fourmile limestone, roadcut 3½ miles southeast of Randolph, Riley County, Kans.

[not] *Bairdia citriformis* Knight. Cooper, 1946 = ?*B. crassa* Harlton, 1929.

Geologic range.—Middle Pennsylvanian–Permian(?).

Bairdia crassa Harlton, 1929

Plate 1, figures 17, 18

Bairdia crassa Harlton, 1929, Texas Univ. Bull. 2901, p. 158, pl. 4, figs. 3a–c. Canyon group, limestone, San Saba River valley, near Hext, Menard County, Tex.

?*Bairdia crassa* Harlton. Delo, 1930, Jour. Paleontology, v. 4, p. 164, pl. 12, fig. 15, Ft. McKavett Oil Co., Tisdall No. 1 well, 1,510–1,515 ft, Schleicher County, Tex.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 71, pl. 6, figs. 1a, b. Holdenville formation, limestone and shale in Sasakwa member, old quarry (1930) south part of Sasakwa, Seminole County, Okla.

Bairdia crassa Harlton. Delo, 1931, Washington Univ. Studies, new ser., Sci. and Tech., no. 5, p. 49, pl. 4, fig. 9. Pennsylvanian limestone, Wood Oil Co., Ranson No. 1 well, 4,100 ft, northeast cor. sec. 5, T. 26 S., R 41 W., Hamilton County, Kans.

Kellett, 1934, Jour. Paletontology, v. 8, p. 129, pl. 15, figs. 5a–g. Oread or Iatan limestone, roadcut about 600 ft south of the Missouri River bridge at the Ft. Leavenworth Military Reservation, Leavenworth County, Kans.

?*Bairdia crassa* Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 44, pl. 2, figs. 1, 2. Shale at base of Brereton limestone, NE¼ sec. 8, T. 14 N., R. 5 E., Henry County, Ill.

Bairdia crassa Harlton. Cordell, 1952 [part], Jour. Paleontology, v. 26, p. 85, pl. 19, figs. 7–10 [not figs. 11, 12 = *Cryptobairdia coryelli* (Roth and Skinner), 1931]. Weston shale, top, and shale partings 1–2 ft above base of Iatan limestone, N½SW¼ sec. 14, T. 54 N., R. 35 W.; 0.8 miles south of New Market, high bank on east side of State Highway 71, Platte County, Mo.

?*Bairdia tumida* Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 21, pl. 2, figs. 3a–c. Cottonwood-Florena contact, 2 miles southeast of Stockdale, Riley County, Kans. Based on a corroded specimen.

?*Bairdia citriformis* Knight. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 43, pl. 1, figs. 23–26. Shale below Brereton limestone, SW¼ sec. 31, T. 5 S., R. 2 W., Perry County, Ill.

[not] *Bairdia crassa* Harlton. Bradfield, 1935 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.

Harlton's cotypes (USNM 80589) are three partly corroded specimens. The original of Harlton's (1929) figure 3a is here designated as the lectotype. Cooper's specimen of *B. crassa* may be a new species characterized by a break in slope in ventroanterior margin. He does not record the hinge to be incised, nor is the posterior as tumid in dorsal view as the lectotype.

Geologic range.—Middle Pennsylvanian–Permian (?).

Bairdia curta McCoy, 1844

Bairdia curtus McCoy, 1842 [nomen nudum], *in* Griffith, Notice respecting the fossils of the Mountain Limestone of Ireland, p. 22.

Bairdia curtus McCoy, 1844, A synopsis of the characters of the Carboniferous limestone fossils of Ireland, p. 164, pl. 23, fig. 6. Mountain Limestone, Granard, County Longford, Ireland.

Bairdia curta McCoy. Jones, 1870, Monthly Micros. Jour., v. 4, p. 185, pl. 61, fig. 1. Type specimen freed from matrix.

Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 567, pl. 28, figs. 1, 2 [not figs. 3, 4, 6 = *B.* sp. A; *B.* sp. B]. The same specimen as Jones, 1870.

Jones and Kirkby, 1896, Royal Dublin Soc. Trans., ser. 2, v. 6, pt. 7, p. 173, pl. 106, figs. 21a, b. Same as Jones, 1870.

Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 4, pl. 2, figs. 1–3. Outlines of above figures.

[not] *Bairdia curta* McCoy of authors see: *Bairdia* spp. A, B, C, D, F; *Cryptobairdia aequalis* (Eichwald), 1857; and spp. indet.

McCoy (1842, p. 22) listed this species from two localities; this supports my previous supposition (Sohn, 1954, p. 4) that more than one specimen is involved. Jones (1870, p. 185) possibly received a specimen that was not the one illustrated by McCoy; it is this specimen that was assumed by subsequent workers to be the holotype. McCoy's description and illustration is inadequate, and Jones' illustration may or may not be of a conspecific specimen. The net result is that *Bairdia curta* is an inadequately defined species.

Geologic range.—Carboniferous.

Bairdia curvirostris Posner, 1951

Bairdia alta var. *curvirostris* Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 92, pl. 19, fig. 5. Lower Carboniferous, Russia.

Geologic range.—Lower Carboniferous.

Bairdia egorovi Sohn, n. name

Bairdia symmetrica Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 14, pl. 12, figs. 2a–d. Frasnian, European Russia.

[not] *Bairdia symmetrica* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 52, pl. 3, figs. 37, 38. Pennsylvanian, Illinois.

This species is named in honor of the late V. G. Egorov, who has added to the knowledge of Russian ostracodes.

Geologic range.—Upper Devonian.

Bairdia eifliensis Kummerow, 1953

Bairdia eifliensis Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 51, pl. 5, figs. 9a, b. Middle Devonian lower *Stringocephalus* beds, Sötenich, Germany.

Geologic range.—Middle Devonian.

Bairdia eleziana Egorov, 1953

Bairdia eleziana Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 12, pl. 7, figs. 1a–d. Famennian, Sosna River, Russia.

Geologic range.—Upper Devonian.

Bairdia elongatella Sohn, n. name

Bairdia plebia var. *elongata* Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 325, pl. 10, figs. 4, 4a. Permian, Shell limestone, Tunstall Hill, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 145, text fig. 6, pl. 9, figs. 4, 4a. Same locality as above.

[not] *Cythere elongata* Münster, 1830, [Neues] Jahrb. Mineralogie, Geognosie, Geologie, Petrefaktenkunde, Jahrg. 1, p. 65=*Bairdia elongata* (Müster)=nomen dubium.

Jones and Kirkby, 1865, Annals Mag. Nat. History, ser. 3, v. 15, p. 408, pl. 20, figs. 14a–c=nomen dubium.

Geologic range.—Permian.

Bairdia galei Croneis and Thurman, 1939

Bairdia galei Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 325, pl. 7, fig. 21. Kinkaid formation 1¼ miles east of Bloomfield, Johnson County, Ill.

[not] *Bairdia galei* Croneis and Thurman. Cooper, 1941 = *B.*? *sohni* Coryell and Rozanski, 1942.

Geologic range.—Upper Mississippian.

Bairdia garrisonensis Upson, 1933

Bairdia garrisonensis Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 20, pl. 1, figs. 10a–c. Basal 2 ft of Florena shale, SW¼ sec. 34, T. 1 N., R. 14 E., roadcut along Kansas-Nebraska State line.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 45, pl. 2, figs. 14–18. Shale in Shumway cyclothem, SW¼ sec. 26 T. 9 N., R. 5 E., Effingham County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 85, pl. 18, fig. 32. Shale parting 3 ft above base of Winterset limestone, roadcut State Highway 6, W½SE¼ sec. 17, T. 59 N., R. 27 W., northeast edge of Gallatin, Daviess County, Mo.

?*Bairdia eissensis* Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 20, pl. 1, figs. 9a–c. Shale at base of the middle zone of the Eiss limestone, roadcut along Kansas-Nebraska State line, southeast cor. sec. 34, T. 1 N., R. 13 E.

Kellett, 1934, Jour. Paleontology, v. 8, p. 134, pl. 14, figs. 7a, b. Wreford formation, low outcrop, north-trending road, north of District No. 17 School, Chase County, Kans.

[not] *Bairdia garrisonensis* Upson. Kellett, 1934=*B. hassi* n. sp.

[not] *Bairdia garrisonensis* Upson. Scott and Borger, 1941 = *B. hassi?* n. sp.

[not] *Bairdia garrisonensis* Upton. Glebovskaya, 1939=sp. indet.

The holotype of *B. garrisonensis* is slightly corroded and that of *B. eissensis* is a steinkern showing muscle scar impressions on both valves.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia gibbera Morey, 1935

Bairdia gibbera Morey, 1935, Jour. Paleontology, v. 9, p. 323, pl. 28, fig. 12. Lower Mississippian, 3 miles north of Williamsburg, Mo.

Morey, 1936, idem, v. 10, p. 119, pl. 17, figs. 8, 10. Chouteau formation, Browns Station, Mo.

[not] *Bairdia gibbera* Kesling and Kilgore, 1952 = *Rishona epicypha* (Kesling and Kilgore), 1955.

?*Bairdia subampla* Posner, 1951, Vsesoyuz. Neft. Nauch-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 94, pl. 19, fig. 6. Lower Carboniferous, Russia.

Geologic range.—Lower Mississippian(?) (see Sohn, 1951, p. 34), Carboniferous.

Bairdia girtyi Sohn, n. name

Plate 1, figures 32–36

Bairdia attenuata Girty, 1910, New York Acad. Sci. Annals, v. 20, no. 3, pt. 2, p. 237 [no illus.]. Fayetteville shale, near Fayetteville, Ark.

?*Bairdia mccoyi* Croneis and Gutke. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 2, figs. 17, 18. Glen Dean formation, just below upper ledge of Okaw limestone, SW¼NW¼ sec. 30, T. 7 S., R. 6 W., Randolph County, Ill.

[not] *Bairdia attenuata* Brady, 1880, *Challenger*, Rept. Sci. Results Voyage H.M.S., Zool., v. 1, pt. 3, p. 59, pl. 11, figs. 3a–e. Recent, Torres Straits, lat 11°35′ S., long 144°3′ E.,·155 fathoms; reefs at Honolulu, 40 fathoms. Senior primary homonym.

[not] *Bairdia attenuata* (Reuss). Reuss, 1854, K. Akad. Wiss. Denkschr., Math.-Naturwiss. Cl., Wien, v. 7, p. 140, pl. 27, figs. 3a–c. Cretaceous, Bohemia = *Pontocypris*?

[not] *Bairdia attenuata* Girty. Cooper, 1941=*Bairdia* sp. L.

There are three specimens labeled "types" of this species in Girty's collection. One is a very young individual that may not belong to this species; the other two specimens illustrated here are both abraded, and the ends are broken. This is one of the transitional species discussed on page 8; it is referred to *Bairdia* rather than *Rectobairdia* because the paratype (pl. 1, figs. 32, 34–36) has a distinctly convex dorsal margin. The original of plate 1, figure 33, is here designated as the lectotype. Cooper's specimen of *Bairdia mccoyi* Croneis and Gutke has a sinuous dorsal margin in lateral outline (1941, pl. 2, fig. 18); the photograph shows that the specimen is sheared just in front of the midlength; consequently, it is assumed that the concavity at approximately the midlength was introduced by preservation. The ends of this specimen are preserved, while those of Girty's specimens are missing; it is therefore questionably assigned to Girty's species.

Geologic range.—Upper Mississippian.

Bairdia golcondensis Croneis and Gale, 1939

Bairdia golcondensis Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 286, pl. 6, figs. 26, 27. Golconda formation, west bank of Lusk Creek, 2 miles north of Waltersburg, Pope County, Ill.

Croneis and Gutke, 1939, idem, v. 34, p. 58, pl. 2, fig. 23. Renault formation, sec. 5, T. 13 S., R. 8 E., Hardin County, Ill.

?*Bairdia golcondensis* Croneis and Gale. Croneis and Bristol, 1939, idem, p. 95, pl. 3, fig. 20. Menard formation, Ill. The figured specimen is a steinkern.

Coryell and Rozanski, 1942, Jour. Paleontology, v. 16, p. 146, pl. 24, fig. 2. Glen Dean formation, center sec. 18, T. 12 S., R. 10 E., Hardin County, Ill.

[not] *Bairdia golcondensis* Croneis and Gale. Cooper, 1941 = *B. impedere* Cooper, 1941.

[not] *Bairdia golcondensis* Croneis and Gale. Cooper, 1947 = *Orthobairdia cestriensis* (Ulrich), 1891.

The holotype is a specimen with most of the shell material dissolved.

Geologic range.—Upper Mississippian.

Bairdia graciosa Glebovskaya, 1939

Bairdia pecosensis var. *graciosa* Glebovskaya, 1939, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 115, p. 170, 175, pl. 2, figs. 12, 12a. *Schwagerina* zone, northern Russia.

Geologic range.—Permian.

Bairdia grahamensis Harlton, 1928

Plate 1, figures 9, 10, 15, 16

Bairdia grahamensis Harlton, 1928, Jour. Paleontology, v. 2, p. 139, pl. 21, fig. 11. Graham formation, top of South Bend shale, below Gunsight limestone, west of Graham, Young County, Tex.

Harlton, 1929, Texas Univ. Bull. 2901, p. 156, pl. 3, fig. 4. Canyon group, San Saba River valley, near Hext, Menard County, Tex.

Bairdia menardensis Harlton, 1929, Texas Univ. Bull. 2901, p. 158, pl. 8, figs. 1a–d. Canyon group, San Saba River valley, near Hext, Menard County, Tex.

?*Bairdia menardensis* Harlton. Delo, 1930, Jour. Paleontology, v. 4, p. 164, pl. 12, fig. 16. Pennsylvanian, C. Cromwell, Winslow no. 1 well, 775 ft, Menard County, Tex.

Bradfield, 1935 [part], Am. Paleontology Bull., v. 22, no. 73, p. 85, pl. 6, fig. 4 [not figs. 5, 9]; the original of fig. 5 is not with Bradfield's types, the original of fig. 9, (Indiana Univ. 2058) is a specimen with the dorsal margin broken, and consequently unidentifiable. Union Dairy limestone, top part, railroad cut south edge of Ardmore, SW¼ sec. 6, T. 5 S., R. 2 E., Carter County, Okla.

Bairdia menardensis Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 47, pl. 2, figs. 32–35. Shale adjacent to Oak Grove limestone beds, SW¼ sec. 6, T. 2 S., R. 3 W., Brown County, and shale below lower bench of Lonsdale limestone, SE¼ sec. 16 T. 12 N., R. 9 E., Marshall County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 87, pl. 17, figs. 29–33. Collections in lower Lawrence shale, and at base of Kanwaka formation, bluff, Missouri River, east of State Highway 45 and railroad tracks, southeast of Armour, NE¼NE¼ sec. 34 T. 55 N., R. 37 W.; and Lawrence shale, also shale parting in Haskell limestone, ditch and bluff to the northeast, corner of State Highway 59 and Russell St., South St. Joseph, Buchanan County, Mo.

?*Bairdia deloi* Kellett, 1934, Jour. Paleontology, v. 8, p. 126, pl. 14, figs. 6a, b. Elmdale formation, carbonaceous shale on top of massive buff limestone, where road bends halfway up hill, near Cottonwood River bridge, east of Elmdale, Chase County, Kans.

?*Bairdia menardvillensis* Harlton, 1931, Jour. Paleontology, v. 5, p. 163, new name for *B. marginata* Harlton, 1929 [not Bosquet, 1852].

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 48, pl. 2, figs. 38–42, pl. 4, figs. 9–11. Shales below lower bench of Lonsdale limestone, SE¼ sec. 16, T. 12 N., R. 9 E., Marshall County, and shale above and below Exiline limestone, NE¼ sec. 22, T. 14 N., R. 7 E. Stark County, Ill.

?*Bairdia marginata* Harlton, 1929, Texas Univ. Bull. 2901, p. 158, pl. 4, fig. 2. The holotype (USNM 80588) is a steinkern from the same collection as *B. menardensis*.

[not] *Bairdia? deloi* Croneis and Gale, 1939 = ?*Bairdia osorioi* Croneis and Gale, 1939.

[not] *Bairdia grahamensis Harlton*. Warthin, 1930 = *Orthobairdia* sp. B.

[not] *Cythere (Bairdia) marginata* Richter, 1867 = sp. indet.

The types of *B. menardensis* (USNM 80587) consist of five specimens labeled "cotypes." Most of the shell material of these specimens has been dissolved, and the illustrations were retouched to show overlap that is not discernible on the specimens. The holotype of *B. deloi* (USNM 89466) is a steinkern of an individual that is larger than the type of *B. menardensis*. The holotype (slide labeled "cotype") of *B. grahamensis* (USNM 72243) is a steinkern of a very young instar.

Geologic range.—Middle Pennsylvanian–Permian.

Bairdia harltoni Cooper, 1946

Bairdia harltoni Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 45, pl. 2, figs. 30, 31. Shale below Seville zone, SE¼ sec. 14, T. 12 N., R. 2 W., Warren County, Ill.

Bairdia ardmorensis Harlton. Cooper, 1946, idem, p. 41, pl. 1, figs. 14, 15. Shale below Ferdinand limestone, NW¼ sec. 20, T. 6 S., R. 4 W., Spencer County, Ind.

?*Bairdia grandis* Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 572, pl. 29, figs. 1, 2. Yoredale rocks at Worlton, Durham, England.

Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 306, pl. 16, fig. 12. Carboniferous, Mongolia.

?*Bairdia plebia* Reuss. Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 304, pl. 16, figs. 7, 8. Carboniferous, Mongolia.

[not] *Bairdia ardmorensis* Harlton, 1929=*Bairdiolites ardmorensis* (Harlton) 1929.

[not] *Bairdia plebia grandis* Jones, *in* Kirkby, 1859, Tyneside Naturalists' Field Club, Trans. v. 4, p. 162, pl. 11, fig. 13 = nomen dubium, based on a steinkern.

Bairdia grandis is twice the size of *B. harltoni* Cooper, 1946.

Geologic range.—Carboniferous, Middle Pennsylvanian.

Bairdia hassi Sohn, n. sp.

Plate 1, figures 28, 29

Bairdia garrisonensis Upson. Kellett, 1934, Jour. Paleontology, v. 8, p. 134, pl. 17, figs. 5a–c. Shale parting in massive limestone in Elmdale formation, exposed below the road and upstream from the Cottonwood River bridge, east of Elmdale, Chase County, Kans.

?*Bairdia garrisonensis* Upson. Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 354, pl. 49, fig. 19. Macoupin cyclothem, along Embarrass River, 1 mile east of Lawrenceville, Ill.

?*Bairdia beedei* Ulrich and Bassler. Johnson, 1936, Nebraska Geol. Survey Paper no. 11, p. 38, pl. 4, figs. 1, 2. Bonner Springs shale, Dyson Hollow, Nebr.

Differs from *Bairdia whitesidei* Bradfield, 1935 by absence of central bulge. The original of Kellett's figures 5a and 6 is here designated as the holotype (USNM 89480).

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia hebeatus Posner, 1951

Bairdia curta var. *hebeatus* Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 88, pl. 21, figs. 1a, b. Lower Carboniferous, Russia.

Geologic range.—Lower Carboniferous.

Bairdia hispida? Harlton, 1928

Plate 1, figure 6

Bairdia hispida Harlton, 1928, Jour. Paleontology, v. 2, p. 140, pl. 21, fig. 14. Cisco formation, 4½ miles west of Cisco on Cisco-Abiline road, Eastland County, Tex.

Harlton, 1929, Texas Univ. Bull. 2901, p. 155, pl. 3, figs. 2a, b. Canyon Group, San Saba River, near Hext, Menard Co., Tex.

Delo, 1930, Jour. Paleontology, v. 4, p. 163, pl. 12, figs. 14a, b. Carboniferous, C. Cromwell and others, Winslow no. 1 well, 600–620 ft and 1,000 ft, Menard County, Tex.

[not] *Bairdia hispida* Harlton. Coryell and Sample, 1932 = *B. beedei* Ulrich and Bassler, 1906.

The holotype (USNM 72246), illustrated by a drawing in 1928 and by a photograph in 1929 (fig. 2a), is an abraded specimen. Harlton (1928, p. 140) refers to the specimen as the holotype; but the slide is marked "cotypes" and contains a second specimen, here illustrated, that is similar to the one illustrated in 1929 (fig. 2b). Because it is not possible to determine whether the holotype and the paratype are conspecific, the illustrated specimen is referred to as "*hispida?*".

Geologic range.—Upper Pennsylvanian.

Bairdia hurwitzi Coryell and Booth, 1933

Bairdia hurwitzi Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 262, pl. 3, figs. 8, 9. Wayland shale, west of Salt Creek, near the Graham-Throckorton road, 1 mile west of Graham, Young County, Tex.

?*Bairdia hurwitzi* Coryell and Booth. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 46, pl. 2, figs. 11–13. Shale parting in Newton limestone, SE¼ sec. 35, T. 9 N., R. 7 E., Cumberland County, Ill.

Bairdia beedei Ulrich and Bassler. Kellett, 1934, Jour. Paleontology, v. 8, p. 123, pl. 14, figs. 1a–h, 2. Wreford formation, low outcrop, (near) north-south road between Lincolnville and Elmdale, north of District no. 17 School, Chase County, Kans.

?*Bairdia beedei* Ulrich and Bassler. Payne, 1937, Jour. Paleontology, v. 11, p. 282, pl. 38, figs. 9a, b, pl. 39, figs. 1a, b. Hayden Branch formation, Sullivan County, Ind.

?*Bairdia beedei* var. *inflata* Payne. 1937, Jour. Paleontology, v. 11, p. 283, pl. 39, figs. 2a, b. Same locality as above. The holotype (Indiana Univ. 3213) is a specimen of a juvenile.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia hypsoconcha Gibson, 1955

Bairdia hypsoconcha Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 14, pl. 1, fig. 16. Cerro Gordo formation, upper 20 ft, at clay pit operated by Rockford Brick and Tile Co., Rockford, Iowa.

?*Bairdia subtilla* Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 16, pl. 1, figs. 14a, b. Cerro Gordo formation, upper 20 ft, at clay pit operated by Rockford Brick and Tile Co., Rockford, Iowa. Based on one left valve (holotype USNM 123089) and one right valve (paratype, USNM 123090) that are slightly larger than the holotype of *B. hypsoconcha*. (See p. 10, item 11.)

[not] *Bairdia subtila* Cooper, 1941 = *Cryptobairdia subtila* (Cooper), 1941.

The holotype *B. hypsoconcha* (USNM 123085) is a partly corroded young instar, with some matrix near the dorsal margin which causes the illustration to appear more angular at the junction of the dorsoanterior and dorsal margin than the specimen actually is.

Geologic range.—Upper Devonian.

Bairdia impedere Cooper, 1941

Bairdia impedere Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 26, pl. 2, figs. 7, 8. Renault formation, NE¼SW¼ sec. 23, T. 4 S., R. 9 W., Monroe County, Ill.

?*Bairdia ampla* Reuss. Jones and Kirkby, 1875, Annals Mag. Nat. History, ser. 4, v. 15, p. 56, pl. 6, figs. 15a–c. Carboniferous, Government of Toula, Russia.

?*Bairdia golcondensis* Croneis and Gale. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 1, figs. 9, 10. Golconda formation, Ohio River bluff, near Rock Quarry School, SW¼SE¼ sec. 5, T. 13 S., R. 7 E., Pope County, Ill.

[not] *Bairdia impedere* Cooper. Cooper, 1947, Jour. Paleontology, v. 21, p. 84 [list], pl. 21, figs. 29, 30. Kinkaid shale, about 40 miles southeast of Chester, Johnson County, Ill. The illustrated specimen is crushed (?), showing parallel sides in dorsal outline.

The holotype appears from the illustration to be a crushed specimen. This species differs from *B. golcondensis* Croneis and Gale, 1939, by a straight rather than convex ventral margin.

Geologic range.—Upper Mississippian (Carboniferous of Russia).

Bairdia ivanovae Egorov, 1953

Bairdia ivanovae Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 9, pl. 5, figs. 2a–e, 3a, b, 4, 5. Frasnian, European Russia.

Geologic range.—Upper Devonian.

Bairdia kansasensis Kellett, 1934

Bairdia kansasensis Kellett, 1934, Jour. Paleontology, v. 8, p. 128, pl. 15, figs. 3a, b, 4a, b. Stanton limestone, cut in U.S. Highway 40, just west of Victory Junction, Leavenworth County, Kans.; shale in Elmdale formation, lighter colored shale above carbonaceous shale on top of massive buff limestone, in roadcut where road bends about halfway up hill, near Cottonwood River bridge east of Elmdale, Chase County, Kans.

?*Bairdia kansasensis* Kellett. Cordell, 1952 [part], Jour. Paleontology, v. 26, p. 86, pl. 17, figs. 11, 12 [not figs. 9, 10; see *B. monstrabilis* Cooper, 1946]. Collection from 2 ft 6 in below top of Farley limestone to top of Eudora shale, outcrops along Smith Branch, west of bridge and west of north-trending road, 2.2 miles northwest of Winston, SE¼ sec. 29, T. 59 N., R. 29 W., Daviess County, Mo.

The right valve of one of Kellett's paratypes (USNM 89489) is similar in outline to the illustration of *B. plebia* Reuss, 1854. The ventral ridges discussed by Cordell (1952, p. 86) are not discernible on Kellett's types.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia kelleri Egorov, 1953

Bairdia kelleri Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 13, pl. 8, figs. 1a–d., 2a–c. Frasnian, European Russia.

Geologic range.—Upper Devonian.

Bairdia kellettae Glebovskaya, 1939

Bairdia kelletti Glebovskaya, 1939, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 115, p. 170, 175, pl. 2, figs. 13, 13a. Upper Carboniferous, northern Urals, Russia.

Bairdia kellettae Glabovskaya. Branson, 1948, Geol. Soc. America Mem. 26, p. 858 [list].

[not] *Bairdia* cf. *B. kelletti* Glebovskaya. Glebovskaya, 1938, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 101, p. 181, pl. 1, figs. 7, 7a. Permo-Carboniferous oil bearing deposits, Ishimbaev district, Russia = *Cryptobairdia*? sp. indet.

The holotype, a left valve, is the only specimen; it is recorded as 2.4 millimeters long, which makes this one of the larger species of *Bairdia*. The 1938 reference is obviously to a manuscript name. Although this species is referred to Upper Carboniferous rocks, Branson (1948, p. 858) lists the species from those *Schwagerina moelleri* beds of Russia that are now considered Permian.

Geologic range.—Permian.

Bairdia kinderhookensis Morey, 1936

Bairdia kinderhookensis Morey, 1936, Jour. Paleontology, v. 10, p. 120, pl. 17, figs. 13, 15. Chouteau formation, Browns Station, Boone County, Mo.

Geologic range.—Lower Mississippian.

Bairdia leguminoides Ulrich, 1891

Plate 1, figures 19–21

Bairdia leguminoides Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 197, pl. 17, figs. 5a–c. Ludlowville formation, Hamilton group, Eighteen Mile Creek, New York.

?*Bairdia leguminoides* Ulrich. Batalina, 1941, SSSR Acad. Nauk Paleont. Inst., v. 1, p. 295, pl. 1, figs. 5a, b. Middle Devonian, Volkhov River, Russia.

Bairdia summacuminata Coryell and Malkin, 1936, Am. Mus. Novitates, no. 891, p. 9, pl. fig. 23. Coral zone of the Widder Beds, Hamilton group, just above the Encrinal limestone, on Ausable River, about 1½ miles east of Arkona, Lambton County, Ontario, Canada.

Bairdia amplectens Kesling and Kilgore, 1952, Mich. Univ., Mus. Paleontology Contr., v. 10, no. 1, p. 12, pl. 4, figs. 1–3. Grenshaw formation, outcrop in roadcut and ditch on west side of West Long Lake Road, about one-half a mile south of LeRoy's Resort, at the junction of the road and entrance to Martin's Resort, near center W½ sec. 32, T. 33 N., R. 8 E., Presque Isle County, Mich.

The holotype (USNM 41788) is a partly abraded specimen with the posterior point broken. This species is common in the Wanakah shale, 1½ miles south of East Bethany, N.Y.

Geologic range.—Middle Devonian.

Bairdia leptura (Richter), 1867

Cythere leptura Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 230, pl. 5, fig. 29. Permian, lower Zechstein, Knollenkalke of Zschippen at Gera and Riffdolomit, Germany.

?*Bairdia plebia* var. *caudata* Kirkby, 1859 [part], Tyneside Naturalists' Field Club Trans., v. 4, p. 143, woodcuts 2, 4. Permian, Shell limestone, Tunstall Hill, Durham, England.

Geologic range.—Permian.

Bairdia mccoyi Croneis and Gutke, 1939

Bairdia mccoyi Croneis and Gutke, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 59, pl. 2, fig. 15. Shale, Shetlerville member of the Renault formation, sec. 5, T. 13 S., R. 8 E., Hardin County, Ill.

Bairdia renaultensis Croneis and Gutke, 1939, idem, p. 59, pl. 1, figs. 5, 6. Same locality as above.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 2, figs. 9, 10. Renault formation, Hardin County, Ill.

[not] *Bairdia mccoyi* Croneis and Gutke. Cooper, 1941, = *B. girtyi* Sohn, n. name.

USGS locality 12844, about 10 feet stratigraphically below Croneis and Gutke's locality 0905.52D, contains abundant corroded and squashed specimens representing various stages of growth of this species.

Geologic range.—Upper Mississippian.

Bairdia macdonelli Harlton, 1929

Bairdia macdonelli Harlton, 1929, Texas Univ. Bull. 2901, p. 157, pl. 3, figs. 7a, b. Canyon group, San Saba River valley, near Hext, Menard County, Tex.

Geologic range.—Upper Pennsylvanian.

Bairdia mandelstami Posner, 1951

Bairdia mandelstami Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 58, p. 96, pl. 20, figs. 1a, b. Lower Carboniferous, Russia.

The right valve of this species resembles *Rectobairdia bicornis* (Jones and Kirkby), 1879, which is based on a right valve that has a proportionally longer dorsal margin.

Geologic range.—Carboniferous.

Bairdia matfieldensis Upson, 1933

Bairdia matfieldensis Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 18, pl. 1, figs. 7a, b. Shale in Kinney limestone, railroad cut just east of Kinney, Gage County, Nebr.

?*Bairdia reussiana* Kirkby. Upson, 1933, idem, p. 19, pl. 2, fig. 2a. Shale in Fourmile limestone, roadcut 3½ miles southeast of Randolph, Riley County, Kans. Based on a corroded specimen.

Geologic range.—Permian.

Bairdia monstrabilis Cooper, 1946

Bairdia monstrabilis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 48, pl. 3, figs. 5–10. Shale on top of Macoupin limestone, SW¼ sec. 2, T. 14 N., R. 11 W., Edgar County; shale below and within Livingston(?) limestone, NE¼ sec. 12, T. 7 S. R. 9 E., White County, Ill.

Geologic range.—Upper Pennsylvanian.

Bairdia nalivkini Egorov, 1953

Bairdia nalivkini Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. nst., Moscov. Fillial, Moscow-Leningrad, p. 8, pl. 4, figs. 4a–c. Frasnian, northeastern part European Russia.

Geologic range.—Upper Devonian.

Bairdia naumovae Egorov, 1953

Bairdia naumovae Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. nst., Moscov. Fillial, Moscow-Leningrad, p. 23, pl. 11, figs. 1a–c, 2. Frasnian, northeastern part European Russia.

Geologic range.—Upper Devonian.

Bairdia neptuni Kirkby, 1858

Bairdia plebia var. *neptuni* Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 325, pl. 10, figs. 5, 5a. Permian, Shell limestone, Tunstall Hill, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 145, text fig. 7, pl. 9, figs. 5, 5a. Same locality as above.

Kirkby (1858, p. 325) considered this species as a variety of *B. plebia* Reuss, because he considered this as an end member of a gradational series from that species. Kirkby's specimens of *B. plebia* are here designated as *Bairdia* sp. I, and pending additional study of topotype material the variety is here elevated to specific rank.

Geologic range.—Permian.

Bairdia nikomlensis Posner, 1951

Bairdia nikomlensis Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. nst., Trudy, (VNIGRI), new ser., no. 56, p. 89, pl. 20, figs. 7a, b, pl. 17, fig. 5. Lower Carboniferous, Russia.

Geologic range.—Lower Carboniferous.

Bairdia pecosensis Delo, 1930

Plate 1, figures 22–25

Bairdia pecosensis Delo, 1930, Jour. Paleontology, v. 4, p. 166, pl. 13, figs. 1a, b. Permian(?), Transcontinental Oil Co., Blackstone-Slaughter No. 1 well, 1032–1038 ft, Pecos County, Tex.

?*Bairdia pecosensis* Delo. Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 23, pl. 2, figs. 6a–d. Wreford formation, Fourmile limestone, U.S. Highway 36, 3½ miles east of Home City, Marshall County, Kans.

?*Bairdia irionensis* Delo, 1930, Jour. Paleontology, v. 4, p. 165, pl. 12, fig. 18. Pennsylvanian or Permian, Kingwood Oil Co.; Suggs No. 1 well, 1382–1386 ft, Irion County, Tex. Based on a corroded specimen of a very young instar.

Bairdia permiana Hamilton, 1942, Jour. Paleontology, v. 16, p. 715, pl. 110, figs. 1a, b. Limestone, uppermost Leonard or lowermost Word formation, Glass Mountains, Tex.

?*Bairdia* aff. *B. plebia* Reuss. Girty, 1908, U.S. Geol. Survey Prof. Paper 58, p. 510, pl. 25, figs. 16, 16a. An imperfect right valve etched from Permian basal black limestone. Guadalupe point, Guadalupe Mountains, Tex.

[not] *Bairdia pecosensis* var. *graciosa* Glebovskaya, 1939 = *B. graciosa* Glebovskaya, 1939.

The holotype of *B. pecosensis* (USNM 81784) is, as noted by Kellett (1934, p. 125), a deformed specimen. The diagnostic ridge on the ventral part of the right valve of *B. permiana* is not as pronounced as shown on the original illustration. Upson's specimens are not as wide in dorsal outline as the holotype of *B. pecosensis*, should these specimens have a slight ridge on the dorsal margin of the left valve, they would be closer related to *B. rhomboidalis* Hamilton, 1942.

Geologic range.—Permian.

Bairdia peracuta Warthin, 1930

Bairdia peracuta Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 71, pl. 6, figs. 2a–c. Holdenville formation, 3 miles east of Ada, Pontotoc County, Okla.

Glebovskaya, 1939, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 115, p. 165 [list], pl. 2, fig. 11. *Schwagerina* zone, Russia.

Cooper, 1946 [part], Illinois Geol. Survey Bull. 70, p. 49, pl. 4, figs. 1, 2 [not pl. 3, figs. 11, 12, the illustrations suggest a steinkern]. Shale between limestone members of the Liverpool cyclothem, NW¼ sec. 21, T. 6 N., R. 3 E., Fulton County, Ill.

Geologic range.—Middle Pennsylvania-Permian (?).

Bairdia permagna Geis, 1932

Plate 2, figures 20–24

Bairdia permagna Geis, 1932, Jour. Paleontology, v. 6, p. 175, pl. 25, figs. 11a, b. Salem limestone, Indiana.

Bairdia salemensis Geis, 1932, Jour. Paleontology, v. 6, p. 176, pl. 25, figs. 10a, b. Salem limestone, Indiana.

A series of growth stages suggest that *B. salemensis* is a young instar. Plate 2, figure 20, is an anterior section at the dorsanterior margin, showing the ventral thinning of the carapace. Note the well-developed inner lamella. The figured specimen is from the Salem limestone, USGS locality 7698 green; Indiana.

Geologic range.—Upper Mississippian.

Bairdia petiniana Egorov, 1953

Bairdia petiniana Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 17, pl. 7, figs. 2a–c. Frasnian, River Don, Russia.

Geologic range.—Upper Devonian.

Bairdia piscis Richter, 1867

Cythere (Bairdia) piscis Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 231, pl. 5, fig. 26, Zechstein, Thuringia, Germany.

Geologic range.—Permian.

Bairdia pompilioides Harlton, 1928

Bairdia pompilioides Harlton, 1928, Jour. Paleontology, v. 2, p. 140, pl. 21, fig. 13. Hoxbar formation, NW. cor. sec. 20, T. 5 S., R. 1 E., about 2 miles south of Ardmore, Carter County, Okla.

Harlton, 1929, Texas Univ. Bull. 2901, p. 154, pl. 2, fig. 7 [holotype], pl. 3, fig. 8. Canyon Group, San Saba River valley, near Hext, Menard County, Tex.

Kellett, 1934 [part], Jour. Paleontology, v. 8, p. 130, pl. 16, figs. 2a, b [not figs. 3a, b, 4a, b, both specimens are unrecognizable steinkerns]. Wakarusa(?) limestone, Wabaunsee group, roadcut near a small church, SE. cor. sec. 3, T. 13 S., R. 15 E., about 6 miles south-southwest of Topeka, Shawnee County, Kans.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 87, pl. 6, figs. 15a, b. Union Dairy limestone, railroad cut northeast of cemetery, south edge of Ardmore, centerline SW¼ sec. 6, T. 5 S., R. 2 E., Carter County, Okla.

?*Bairdia pompilioides* Harlton. Payne, 1937, Jour. Paleontology, v. 11, p. 284, pl. 39, figs. 7a, b. Hayden Branch limestone, 85 ft below Merom sandstone, near Dodds bridge over Turmans Creek, Sullivan County, Ind.

Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 354 [list], pl. 49, figs. 13, 14. Macoupin cyclothem, Embarrass River, 1 mile east of Lawrenceville, Lawrence County, Ill.

Bairdia pompilioides Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 49, pl. 3, figs. 39–43. Weathered lower part of Millersville limestone NE¼ sec. 28, T. 12 N., R. 1 W., Christian County, Ill.

?*Bairdia pompilioides* Harlton. Cordell, 1952, Jour. Paleontology, v. 26, p. 89, pl. 18, figs. 25–27. Fontana shale, parting 3 ft above base of Winterset limestone, roadcut on State Highway 6, W½SE¼, sec. 17, T. 59 N., R. 27 W., northeast edge of Gallatin, Daviess County, and Eudora shale, base to 6 ft below top of Weston shale, crops out on north slope of steep hill, south of junction between State Highways 45 and 92, two-tenths of the distance from east to west along boundary of secs. 30 and 31, T. 53 N., R. 35 W., Beverly County, Mo.

?*Bairdia geisi* Kellett. Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 356 [list], pl. 49, fig. 20. Macoupin cyclothem, Embarrass River, 1 mile east of Lawrenceville, Lawrence County, Ill. Kellett's holotype is a steinkern: Scott and Borger illustrate a specimen that is closer to *B. pompilioides*.

Bairdia subcitriformis Knight, 1928, Jour. Paleontology, v. 2, p. 322, pl. 43, figs. 5a, b. Weathered bottom 2 ft of Pawnee limestone, 200 ft north of Clayton Rd. on first street west of Kirkwood-Ferguson trolley, St. Louis County, Mo. The locality is no longer usable.

?*Bairdia* sp. 9, Cordell, 1952, Jour. Paleontology, v. 26, p. 94, pl. 18, figs. 30, 31. Shale parting, 16 ft above base of Winterset limestone, roadcuts along crooked stretch of gravel road on west bluff of Weldon River, NE¼SE¼ sec. 8, T. 64 N., R. 24 W., 2.6 miles southwest of Princeton, Mercer County, Mo.

[not] *B. pompilioides* Harlton. Warthin, 1930 = *Bairdia whitesidei* Bradfield 1935.

Geologic range.—Middle and Upper Pennsylvanian.

Bairdia pseudoglennensis Sohn, n. sp.

Plate 3, figures 11, 12

Bairdia glennensis Harlton. Kellett, 1935, Jour. Paleontology, v. 9, p. 133, pl. 18, figs. 4a–e. Pennsylvanian, Stanton limestone, roadcut, U.S. Highway 40, between Lawrence and Kansas City, just west of Victory Junction, Leavenworth County, Kans.; Permian, Elmdale formation, limestone and shale, above water level and below road on Cottonwood River, upstream from bridge east of Elmdale, Chase County, Kans.

Elongate, greatest height less than half the greatest length. Dorsal margin gently convex; ventral margin concave. Anterior margin round, joins straight dorsoanterior margin above midheight. Dorsoposterior margin straight, approximately one-third as long as the greatest length of valve.

The distinct dorsoanterior margin excludes these specimens from *Fabalicypris glennensis* (Harlton), 1927. Because this species is distinct from any previously described species of *Bairdia* and because Kellett's types are on hand (USNM 90095), the species is here named. The original of Kellett's figure 4a, a left valve, from the Elmdale formation, is designated as the holotype.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia quasisymmetrica Egorov, 1953

Bairdia quasisymmetrica Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 15, pl. 12, figs. 1a–c, Frasnian, European Russia.

Geologic range.—Upper Devonian.

Bairdia radlerae Kellett, 1934

Bairdia radlerae Kellett, 1934, Jour. Paleontology, v. 8, p. 125, pl. 14, figs. 3a–c. Shale in Neva limestone, several hundred yards up the highway 505, from where it bends about halfway up the hill, near the Cottonwood River bridge east of Elmdale, Chase County, Kans.

Geologic range.—Permian.

Bairdia regularis Cooper, 1946

Bairdia regularis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 50, pl. 3, figs. 30–32. Shale above and below Exiline limestone. NE¼ sec. 22, T. 14 N., R. 7 E., Stark County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 89, pl. 17, figs. 34–39. Base of Bonner Springs shale to base of Hickory Creek shale, 4 miles east of Berlin, Gentry County, and southwest edge of Smithville, Clay County, Mo.

Geologic range.—Middle and Upper Pennsylvanian.

Bairdia reussiana Kirkby, 1858

Bairdia reussiana Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 326, pl. 10, figs. 6, 6a. Permian. Tunstall Hill, Durham, England.

Cordell, 1952 [part], Jour. Paleontology, v. 26, p. 89, pl. 18, figs. 1, 2 [not pl. 17 figs. 24–28; = *Rectobairdia symmetrica* (Cooper), 1946, and *B. subfusiformis* Hamilton, 1942]. Farley limestone, Smith Branch, west of bridge and of north-trending road, 2.2 miles northwest of Winston, SE¼ sec. 29, T. 59 N., R. 29 W., Daviess County, Mo.

Bairdia plebia var. *reussiana* Kirkby, 1859, Tyneside Naturalists' Field Club, Trans. v. 4, p. 146, pl. 9, figs. 6, 6a, woodcut 8. Permian, Tunstall Hill, Durham, England.

[not] *Cythere reussiana* (Kirkby). Richter, 1867 = nomen dubium.

[not] *Bairdia reussiana* Kirkby. Upson, 1933 = *B. matfieldensis* Upson, 1933.

[not] *Bairdia reussiana* Kirkby. Kellett, 1934 = *Rectobairdia symmetrica* (Cooper), 1946.

[not] *Bairdia reussiana* Kirkby. Glebovskaya, 1939 = *Rectobairdia* sp. H.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia rhomboidalis Hamilton, 1942

Plate 1, figs. 26, 27

Bairdia rhomboidalis Hamilton, 1942, Jour. Paleontology, v. 16, p. 715, pl. 110, figs. 11a, b. Limestone, upper Leonard or lowermost Word formation, Glass Mountains, Tex.

Because *B. geisi* Kellett, 1934 is based on a steinkern (USNM 89476), it is here considered a nomen dubium. It is not possible to determine whether the shell had a dorsal ridge on the left valve that characterizes *B. rhomboidalis*. Should future work with topotype material demonstrate the presence of this ridge, then

B. rhomboidalis would become a junior synonym of *B. geisi.* The species is closely related to *B. pecosensis* Delo, which is based on a deformed specimen. *B. pecosensis* Delo. Upson, 1933 may belong here. *Orthobairdia powersi* (Kellett), 1934, differs from this species by ventral overlap and by parallel sides in dorsal outline.

Geologic range.—Permian.

Bairdia rjabinini Egorov, 1953

Bairdia rjabinini Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 16, pl. 6, figs. 3a–c. Frasnian, main Devonian field, Russia.

Geologic range.—Upper Devonian.

Bairdia seideradensis Krömmelbein, 1950

Bairdia seideradensis Krömmelbein, 1950, Senckenbergiana, v. 31, p. 334, pl. 1, figs. 2 a–d. Middle Devonian (Givetian), Seiderad bei Pelm, Gerolsteiner valley, Germany.

Přibyl, 1953, Ustř. úst. geol., Sbornik, v. 20, Paleont., p. 29 (261), 71 (303), 104 (336), pl. 4, figs. 10–16. Middle Devonian (Upper Givetian), St. Croix Mountains, Poland.

Geologic range.—Middle Devonian.

Bairdia? sohni Coryell and Rozanski, 1942

Bairdia sohni Coryell and Rozanski, 1942, Jour. Paleontology, v. 16, p. 147, pl. 24, fig. 4. Glen Dean formation, upper part Frailey's Store section, Hardin County, Ill.

?*Bairdia galei* Croneis and Thurman. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 1, figs. 38, 39. Kinkaid formation [core], Perry County, Ill.

The holotype of *B. sohni* is an abraded specimen with the ends broken; Cooper's illustration of *B. galei* suggests a corroded specimen.

Geologic range.—Upper Mississippian.

Bairdia subcylindrica (Münster), 1830

Cythere subcylindrica Münster, 1830, [Neues] Jahrb. Mineralogie, Geognosie Geologie Petrefaktenkunde, 1830, p. 65, no. 21 [no illus.]. Carboniferous, Regnitzlosan, near Hof, Bavaria.

Bairdia subcylindrica (Münster). Jones and Kirkby, 1865, Annals Mag. Nat. History, ser. 3, v. 15, p. 409, pl. 20, figs. 13a, b. Topotype? specimen.

?*Bairdia subcylindrica* (Münster) Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 578 [not p. 573], pl. 30, figs. 14, 15. Topotype? specimen.

[not] *Bairdia subcylindrica* Sandberger, 1866, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1866, p. 41 = *Cytherella*?

[not] *Bairdia subcylindrica* (Münster). Kummerow, 1939 = gen. indet.

Jones and Kirkby (1865, p. 409, 410) consider *B. gracilis* McCoy, 1844 as a possible synonym of this species. *B. gracilis* is illustrated in dorsal (?) outline by McCoy (1844, pl. 23, fig. 7) as having concave sides near the ends, while Jones and Kirkby illustrated the dorsal outline of a specimen (1865, pl. 20, fig. 13b) that has convex sides near the ends.

Geologic range.—Carboniferous.

Bairdia subfusiformis Hamilton, 1942

Bairdia subfusiformis Hamilton, 1942, Jour. Paleontology, v. 16, p. 716, pl. 110, figs. 8a, b. Permian, uppermost Leonard or lowermost Word formation, limestone, Glass Mountains, Brewster County, Tex.

?*Bairdia reussiana* Kirkby. Cordell, 1952 [part], Jour. Paleontology, v. 26, p. 89, pl. 17, figs. 24, 25 [not figs. 26–28 = *Rectobairdia symmetrica*? (Cooper), 1946; not pl. 18, figs. 1, 2 = *B. reussiana* Kirkby, 1858]. Shale partings in Haskell limestone, Buchanan County, Mo.; 2.5 ft below top of Farley limestone to top of Eudora shale, 2.2 miles northwest of Winston, Daviess County, Mo.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia submucronata Jones and Kirkby, 1879

Bairdia submucronata Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 572, pl. 29, figs. 12–18. Carboniferous, England, Wales and Scotland.

[not] *Bairdia submucronata* Jones and Kirkby. Kummerow, 1939 = *Bairdia* sp. H.

Geologic range.—Carboniferous.

Bairdia summa Coryell and Billings, 1932

Bairdia summa Coryell and Billings, 1932, Am. Midland Natulist, v. 13, p. 170 pl. 17, fig. 1. Wayland shale, Eastland County, Tex.

[not] *Bairdia summa* Coryell and Billings. Cooper, 1946 = *Cryptobairdia hoffmanae* (Kellett), 1934.

Geologic range.—Upper Pennsylvanian.

Bairdia terebra Jones and Kirkby, 1879

Bairdia curta var. *terebra* Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 568, pl. 28, fig. 5. Carboniferous. Wyebourne, Cumberland, England.

Differs from *B. curta* McCoy in size and in shape of dorsoposterior margin.

Geologic range.—Carboniferous.

Bairdia tokmovoensis Egorov, 1953

Bairdia tokmovoensis Egorov, 1953. Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 15, pl. 11, figs. 4a–d. Frasnian, Don River, Mordovskaya Republic, Russia.

Geologic range.—Upper Devonian.

Bairdia usatchovae Egorov, 1953

Bairdia usatchovae Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 10, pl. 5, figs. 1a–e. Frasnian, European Russia.

Geologic range.—Upper Devonian.

Bairdia verwiebei Kellett, 1934

Bairdia verwiebei Kellett, 1934, Jour. Paleontology, v. 8, p. 129, pl. 16, figs. 1a–h, pl. 17, figs. 2a–c. Falls City limestone, roadcut west of the German Lutheran church, Kansas State Highway 29, across Kansas River, about 1 mile south of Wamego, Pottawatomie County; Wreford formation, small quarry in roadcut of Highway U.S. 40, about 4 miles west of Junction City, Geary County, Kans.

[not] *Bairdia verwiebei* Kellett. Cooper, 1946 = *B. acuminata* Cooper, 1946.

The holotype (USNM 89471a) and all but one paratype which is the original of Kellett's figure 1e (USNM 89471b) are steinkerns. The original of figure 1e has some of the shell material dissolved, but the original shape is probably preserved.

Geologic range.—Upper Pennsylvanian–Permian.

Bairdia whitesidei Bradfield, 1935

Plate 1, figs. 30, 31; plate 2, figure 30

Bairdia whitesidei Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 82, pl. 5, figs. 10a, b. Shale in Deese formation, near centerline NE¼NW¼ sec. 33, T. 3 S., R. 1 E., Carter County, Okla.

Sohn, 1956, Jour. Paleontology, v. 30, p. 114, text fig. 1, pl. 25, figs. 1–6. Topotype specimen. The anterior part of the ventral margin in fig. 5 was inadvertently cut off the photograph; the specimen is refigured as pl. 1, fig. 31.

?*Bairdia punctata* Bradfield, 1935, op. cit., p. 79, pl. 5, figs. 7a, b. Shale in Devil's Kitchen member of Deese formation, NW. cor. sec. 4, T. 6 S., R. 2 E., Carter County, Okla.

?*Bairdia beedei* Ulrich and Bassler. Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 69, pl. 5, figs. 9a, b. Holdenville formation, fusulinid limestone in gulley, 200 ft northwest of center sec. 36, T. 4 N., R. 6 E., Pontotoc County, Okla.

?*Bairdia pompilioides* Harlton. Warthin 1930, idem, p. 70, pl. 5, figs. 11a, b. Limestone and shale partings in Sasakwa member of Holdenville formation, old quarry in south part of Sasakwa, Seminole County, Okla.

?*Bairdia nitida* Harlton. Warthin, 1930, idem, p. 72, pl. 6, figs. 3a, b. Same locality as above.

?*Bairdia concava* Cooper 1946, Illinois Geol. Survey Bull. 70, p. 43, pl. 1, figs. 31–34. Shale above Greenup limestone, NW¼ sec. 10, T. 9 N., R. 9 E., Cumberland County, Ill.

Bairdia bicornis Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 84, pl. 6, figs. 3a, b. Union Dairy limestone, top part, railroad cut, about centerline SW¼ sec. 6, T. 5 S., R. 2 E., Carter County, Okla.

?*Bairdia bicornis* Bradfield. Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 356 [list], pl. 49, fig. 17. Macoupin cyclothem along Embarrass River 1 mile east of Lawrenceville, Lawrence County, Ill.

The type of *B. punctata* (Indiana Univ. 2144) is a crushed specimen that is probably a young individual of this species.

Geologic range.—Middle and Upper Pennsylvanian.

MISIDENTIFIED SPECIES IN BAIRDIA

The descriptions and illustrations of the following specimens indicate that they were misidentified and probably represent undescribed species. The figured specimens of two misidentified species are available in the U.S. National Museum; consequently, they are named here as *Bairdia hassi* n. sp. and *B. pseudoglennensis* n. sp. The original specimens of the following 20 misidentifications are not available for examination; therefore they are cited with letters rather than with new specific names.

Bairdia sp. A

Bairdia curta McCoy. Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 567, pl. 28, fig. 6 [not fig. 12 see *B. curta* McCoy, 1844; not figs. 3, 4 = *Bairdia* sp. B]. Carboniferous, Settle, Yorkshire, England.

Geologic range.—Carboniferous.

Bairdia sp. B

Bairdia curta McCoy. Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, pl. 28, figs. 3, 4. Carboniferous, Brockley, near Lesmahagow, Scotland.

Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 304, pl. 16, fig. 5. Carboniferous, Mongolia.

Geologic range.—Carboniferous.

Bairdia sp. C

Bairdia curta McCoy, Roemer, 1856 (?), *in* Bronn, 1851–56, Letheae Geognostica * * *, v. 1, pt. 2, p. 530, pl. 9^3, figs. 12a–c. Carboniferous, Europe.

Geologic range.—Carboniferous.

Bairdia sp. D

Bairdia curta McCoy. Eichwald, 1860 [part], Lethaea Rossica, v. 1, p. 1338, pl. 52, figs. 17a–c [not fig. 18 = *Cryptobairdia aequalis* (Eichwald), 1857]. Carboniferous, provinces of St. Petersburg, Kalouga, Novgorod, and Toula (?), Russia.

Geologic range.—Carboniferous.

Bairdia sp. E

Bairdia ciscoensis Harlton. Bradfield, 1935 [part], Bull. Am. Paleontology, v. 22, no. 73, p. 91, pl. 7, figs. 1, 2, 4–6 [not figs. 3a, b = *B. beedei* Ulrich and Bassler, 1906]. Union Dairy limestone, Hoxbar formation, railroad cut south edge of Ardmore, Carter County, Okla. The original of fig. 1 (Indiana Univ. 2024) is abraded; consequently, this species is not named.

Geologic range.—Upper Pennsylvanian.

Bairdia sp. F

Bairdia curta McCoy. Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 39, pl. 4, figs. 5a, b. Mississippian, Tournasian-Viséan, Trogenau bei Hof; Binsfeldhammer bei Stolberg, Rheinland, Germany.

Geologic range.—Carboniferous.

Bairdia sp. G

Cythere caudata (Kirkby). Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 230, pl. 5, figs. 30–33. Zechstein, Thuringia, Germany.

Geologic range.—Permian.

Bairdia sp. H

Bairdia submucronata Jones and Kirkby. Kummerow, 1939. Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 43, pl. 5, figs. 1a, b. Middle Visé, S., Binsfeldhammer bei Stolberg, Rheinland, Prussia.

This species resembles *Cryptobairdia drupacea* (Richter), 1855, from the Permian of Germany, differing only in the outline of the anterior margin.

Geologic range.—Carboniferous.

Bairdia sp. I

Bairdia plebia Reuss. Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 324, pl. 10, figs. 1, 2, 2a. Permian, Tunstall Hill, Humbleton Hill, and Byers' quarry, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 141, pl. 9, figs. 1, 2, 2a. Same illustration as Kirkby, 1858.

Geologic range.—Permian.

Bairdia sp. J

Bairdia granireticulata Harlton. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 26, pl. 1, figs. 17–20. Golconda formation, Ohio River bluff near Rock Quarry School, SW¼SE¼ sec. 5, T. 13 S., R. 7 E., Pope County, and Paint Creek formation, SE¼SW¼ sec. 32, T. 5 S., R. 8 W., Randolph County, Ill.

?*Bairdia ampla* Reuss. Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 571, pl. 28, fig. 23; pl. 32, figs. 17–20 [not pl. 29, fig. 3 = sp. indet.; pl. 28, figs. 20–22 = *Bairdia* sp. P]. Carboniferous, Hairmyres, East Kilbride and Blinkbonny quarry, Scotland.

Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 305, pl. 16, fig. 11. Carboniferous, Mongolia.

Differs from Harlton's species in dorsal outline and by curved dorsoposterior margin.

Geologic range.—Upper Mississippian (Carboniferous of Europe and Asia).

Bairdia sp. K

Bairdia delicata Morey. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 25, pl. 1, figs. 45, 46. Menard formation NW¼NE¼ sec. 2, T. 7 S., R. 7 W., Randolph County, Ill.

Differs from Morey's species by curved dorsum in lateral and dorsal views and by shorter and concave dorsoposterior margin.

Geologic range.—Upper Mississippian.

Bairdia sp. L

Bairdia attenuata Girty. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 25, pl. 1, figs. 33, 34. Glen Dean formation, just below upper ledge of Okaw limestone, SW¼NW¼ sec. 30, T. 7 S., R. 6 W., Randolph County, Ill.

Cooper, 1947, Jour. Paleontology, v. 21, p. 84 [list], pl. 21, figs. 27, 28. Kinkaid formation, about 40 miles southeast of Chester, Jackson County, Ill.

?*Bairdia plebia* Reuss. Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 569, pl. 28, figs. 9–14 [not figs. 15–19, position uncertain]. Lower Carboniferous limestone, High Blantyre in Lanarkshire, and Craigenglen in Stirlingshire, Scotland.

Geologic range.—Upper Mississippian (Calciferous Sandstone Series of Scotland).

Bairdia sp. M

Bairdia contracta Morey. Scott, 1942, Jour. Paleontology, v. 16, p. 161, pl. 25, figs. 14, 15. Upper Otter formation, Montana.

[not] *Bairdia hisingeri* var. *contracta* Jones and Kirkby, 1895 = *Cryptobairdia contractella* Sohn, n. name.

The holotype of *B. contracta* Morey is a steinkern; consequently, the specific characters are unrecognizable, and the species is listed as a nomen dubium. This specimen differs from Morey's in both dorsal and ventral outlines; consequently, it is here considered a distinct species.

Geologic range.—Upper Mississippian.

Bairdia sp. N

Cythere (Bairdia) ampla Reuss. Jones, 1859 [part], *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 166, pl. 11, figs. 19a–f. Permian limestone, Hampole, Yorkshire, England.

Geologic range.—Permian.

Bairdia sp. O

Bairdia magnacurta Morey. Morey, 1936, Jour. Paleontology, v. 10, p. 118, pl. 17, figs. 16, 18. Chouteau formation, Browns Station and Providence, Boone County, Mo.

[not] *Bairdia magnacurta* Morey 1935 = *Cryptobairdia compacta*? (Geis), 1932.

Geologic range.—Lower Mississippian.

Bairdia sp. P

Bairdia ampla Reuss. Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 571, pl. 28, figs. 20–22 [not pl. 28, fig. 23, pl. 32, figs. 17–20 = *Bairdia* sp. J]. Carboniferous, Hairmyres, East Kilbride, Scotland.

Differs from *B. beedei* Ulrich and Bassler, 1906, by position of greatest width and by pointed ends in dorsal outline.

Geologic range.—Carboniferous.

Bairdia sp. Q

Bairdia plebia Reuss. Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 40, pl. 4, figs. 7a, b. Limestone, Lower Tournasian and Lower Viséan, Ratingen, Rheinland, Germany.

Geologic range.—Carboniferous.

Bairdia sp. R

Bairdia blakei Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 42, pl. 1, figs. 16–19. Shales in Shumway cyclothem SW¼ sec. 26, T. 9 N., R. 5 E., Effingham County, Ill.

Geologic range.—Upper Pennsylvanian.

Bairdia? sp. S

Bairdia kingii Reuss. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 47, pl. 2, figs. 36, 37. Shale parting in Newton limestone, SE¼ sec. 35, T. 9 N., R. 7 E., Cumberland County, Ill.

This species has a distinct dorsoanterior margin that differentiates it from *Cryptobairdia* sp. B and from *Bairdia attenuata* Girty, 1910 = *B. girtyi* Sohn, n. name. The almost straight dorsal margin suggests affinities with *Rectobairdia* n. gen.

Geologic range.—Upper Pennsylvanian.

Bairdia? sp. T

Bairdia lunata Bradfield. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 47, pl. 2, figs. 19, 20. Weathered lower part of Millersville limestone, NE¼ sec. 28, T. 12 N., R. 1 W., Christian County, Ill.

The broadly arcuate dorsal margin suggests affinities to *Rectobairdia.*

Geologic range.—Upper Pennsylvanian.

Bairdia sp. U

Bairdia alta Jones and Kirkby. Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 91, pl. 19, figs. 2a, b, pl. 20, fig. 2. Lower Carboniferous, Russia.

Posner elevated *Bairdia plebia* var. *alta* Jones and Kirkby, 1895 to specific rank. The English specimen is here referred to *Orthobairdia cestriensis* (Ulrich), 1891. The Russian specimens differ in lateral outline, in the dorsoposterior margin, and possibly in dorsal outline.

Geologic range.—Carboniferous.

DOUBTFUL AND INDETERMINATE SPECIES

Under this heading are included two groups: the first group includes species based on specimens that are either steinkerns or corroded and broken specimens; the second group contains misidentified specimens that cannot be placed in the proper species. Some species included in both of these groups are relegated to this category because the descriptions and illustrations are inadequate to recognize the species. The relegation of species to this category does not necessarily mean that the species in question are not valid; it merely points out that more work on these species is needed. Examination of the types or of topotype material will probably move many of these into the category of valid species of known or of as yet undescribed genera. Homonyms are indicated but not renamed because of the questionable status of this category.

Bairdia acuta Jones, 1850

Cythere (*Bairdia*) *acuta* Jones, 1850, *in* King, A Monograph of the Permian Fossils of England: Palaeontogr. Soc. London, p. 63, pl. 18, fig. 10. Permian limestone, Byers' quarry, Durham, England.

Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 163, pl. 11, fig. 16. Same (?) locality as above.

Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Palaöntologie, 1867, p. 581, pl. 6, fig. 38. Zechstein, Selters, Wetterau, Germany.

[not] *Cythere acuta* Cornuel, 1844, Soc. Géol. France Mém., ser. 2, v. 1, p. 199, pl. 1, figs. 7, 8. Cretaceous, France. = *Paracypris acuta* (Cornuel) (Sharapova, 1939, p. 10).

Bairdia affinis Morris, 1845

Bairdia affinis Morris, 1845, *in* Strzelecki, Physical description of New South Wales and Van Diemens' Land, p. 291, pl. 18, fig. 10. Permo-Carboniferous, Australia and New South Wales.

[not] *Bairdia affinis* Terquem, 1885, Soc. Géol. France Mém., ser. 3, v. 4, p. 8, pl. 3, fig. 6, Jurassic, France.

Bairdia ampla Reuss, 1854

Bairdia ampla Reuss, 1854, Wetterauer Gesell. Naturk. Hanau, Jahresb. 1851–53, p. 68, text figs. 7a, b. Zechstein, Salters, Wetterau, Germany.

Cythere (*Bairdia*) *ampla* Reuss. Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1867, p. 581, pl. 6, fig. 39. Permian, Germany.

Bairdia ampla Reuss. Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 571, pl. 29, fig. 3 [not pl. 28, figs. 20–22 = *Bairdia* sp. P; not pl. 28, fig. 23; pl. 32, figs. 17–20 = ?*Bairdia* sp. J]. Yoredale rocks, Carboniferous, Whorlton, Durham, England.

Bairdia cf. *B. ampla*? (Reuss). Bolton, 1911, Geol. Soc. London Quart. Jour., v. 67, p. 325, pl. 27, fig. 4. Coal measures, Bristol, England. The specimen is stated to be 6 mm long and is probably not an ostracode.

[not] *Bairdia ampla* Reuss of authors; see the following:

Cythere (*Bairdia*) *ampla* Reuss. Jones, 1859 = *Cryptobairdia* sp. A.

Bairdia ampla Reuss. Jones and Kirkby, 1879 [part] = *Bairdia* sp. J.

Bairdia ampla Reuss. Jones and Kirkby, 1892 = *Bairdia* sp. J.

Bairdia ampla Reuss. Jones and Kirkby, 1879 [part] = *Bairdia* sp. P.

Cythere ampla (Reuss). Richter, 1867 = probably the same as *Cythere brevicauda* (Jones). Richter, 1867.

Bairdia ampla Reuss. Kummerow, 1939 = ?*Rectobairdia sinuosa* (Morey), 1936.

Bairdia ampla Reuss. Cooper, 1946 = *Orthobairdia texana* (Harlton), 1927.

Bairdia amputata Kirkby, 1859

Bairdia truncata Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 433, pl. 11, figs. 4, 4a. Permiaini, England. Based on a steinkern.

[not] *Bairdia truncata* Brady, 1890, Royal Soc. Edinburgh Trans., v. 35, pt. 2, no. 14, p. 494, pl. 2, figs. 1, 2. Recent, pools in the inner reef of Apia, Upolu: shore sand from Porcheron's Beach, Noumea. This living species belongs to a genus that can be determined only by

study of the hinge, muscle scars and soft parts. It is a junior primary homonym and requires a new name. Stephenson (1947, p. 578) referred this species tentatively to *Triebelina* Van den Bold, 1946, but the shape of the original illustration (Brady, 1890, pl. 2, fig. 1) excludes the species from that genus.

Cythere amputata Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 155, pl. 10, figs. 4, 4a, new name for *B. truncata*. Permian, Durham, England.

Jones, 1859, *in* Kirkby, idem, p. 167, pl. 11, figs. 22a–d. Permian, Durham, England.

[not] *Bairdia amputata* (Kirkby). Jones and Kirkby, 1879 = *Rectobairdia* sp. A.

[not] *Bairdia amputata* (Kirkby). Jones and Kirkby, 1892 = *Rectobairdia* sp. A.

Bairdia amygdaliformis Bradfield, 1935

Bairdia amygdaliformis Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 89, pl. 6, figs. 12a, b. Hoxbar formation, Oklahoma.

The holotype is a steinkern.

Bairdia anomala Payne, 1937

Bairdia anomala Payne, 1937, Jour. Paleontology, v. 11, p. 282, pl. 38, figs. 8a, b. Hayden Branch formation, Sullivan County, Ind.

This species is based on a corroded specimen.

Bairdia bartholomewensis Stewart and Hendrix, 1945

Bairdia bartholomewensis Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 109, pl. 12, figs. 7, 8. Olentangy shale, Delaware County, Ohio.

This species is based on a corroded specimen.

Bairdia biacuta Bradfield, 1935

Bairdia biacuta Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 79, pl. 5, figs. 5a, b. Dornick Hills formation, Carter County, Okla.

The holotype of this species is an abraded specimen.

Bairdia brevicauda (Jones). Richter, 1867

Cythere brevicauda (Jones). Richater, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 229, pl. 5, fig. 34. Zechstein, Thuringia, Germany.

?*Cythere ampla* (Reuss). Richter, 1867, idem, p. 231, pl. 5, fig. 27. Zechstein, Thuringia, Germany.

Bairdia brevis Jones and Kirkby. Vine, 1884

Bairdia brevis Jones and Kirkby. Vine, 1884, Yorkshire Geol. and Polytech. Soc. Proc., new ser., v. 8, p. 233, pl. 12, figs. 4, 4a. Carboniferous, Yorkshire, England.

Bairdia sp. Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 578, pl. 32, figs. 7, 8. Carboniferous, Cowden's quarry, Fife, England.

Cooper (1941, p. 24) refers Jones and Kirkby's 1879 illustrations to *B. aculeata* Cooper, 1941. The right valve differs from *B. aculeata* in that the posterior is lower; see *Orthobairdia* sp. A.

Bairdia? browniana Jones, 1874

Bairdia? browniana Jones, 1874, Geol. Mag., dec. 2, v. 1, p. 511, text fig. 1. Silurian, Scotland.

According to Jones' description, this species is based on a steinkern. The illustration and description are inadequate for proper generic determination, but it definitely does not belong to any of the genera treated in this paper.

Bairdia cestriensis Ulrich, 1891

Bairdia cestriensis Ulrich, 1891 [part], Cincinnati Soc. Nat. History Jour., v. 13, p. 210, pl. 17, figs. 7a, b [not figs. 6a–c = *Orthobairdia cestriensis* (Ulrich), 1891]. Chester shales, Grayson Springs Station, Grayson County, Ky.

This specimen is a steinkern.

Bairdia circumcisa Jones and Kirkby, 1879

Bairdia circumcisa Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 578, pl. 32, figs. 13–16. Lower Carboniferous, Whitebaulks quarry, Linlithgowshire, Scotland.

This species is based on a single damaged specimen that may be broken on the posterior.

Bairdia contracta Morey, 1935

Bairdia contracta Morey, 1935 [not *B. hisingeri* var. *contracta* Jones and Kirkby, 1895], Jour. Paleontology, v. 9, p. 480, pl. 54, figs. 11, 12. Amsden formation, Cherry Creek, Fremont County, Wyo. (See Strickland, 1957.)

[not] *Bairdia contracta* Morey. Scott, 1942 = *Bairdia* sp. M.

Bairdia crassa Harlton. Warthin, 1930

Bairdia crassa Harlton. Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 71, pl. 6, figs. 1a, b. Holdenville formation, limestone and shale partings of Sasakwa member, quarry in south part of Sasakwa, Seminole County, Okla.

Bairdia curta McCoy. Richter, 1855

Bairdia curta McCoy. Richater, 1855, Deutsch. Geol. Gesell. Zeitschr., v. 7, p. 530, pl. 26, figs. 13–15. Permian, Germany.

The illustration of this species does not show dorsal overlap.

Bairdia curta McCoy. Chapman, 1921

Bairdia curta McCoy. Chapman, 1921, Royal Microsc. Soc. Jour., pt. 4, p. 330, pl. 8, fig. 11. Middle Devonian, Germany.

There are insufficient data to determine proper relationship.

Bairdia delawarensis Stewart and Hendrix, 1945

Bairdia delawarensis Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 109, pl. 12, figs. 9, 10. Olentangy shale, Bartholomew Run, Dublin quadrangle, E½SW¼ sec. 4, T. 3 N., R. 19 W., 1 mile north of Franklin-Delaware County line, Delaware County, Ohio.

The illustrations consist of a dorsal view of one steinkern (fig. 10), and a lateral view of possibly a corroded specimen.

Bairdia delicata Morey, 1935

Bairdia delicata Morey, 1935, Jour. Paleontology, v. 9, p. 480, pl. 54, figs. 14, 16. Amsden formation, Cherry Creek, Fremont County, Wyo.

[not] *Bairdia delicata* Morey. Cooper, 1941 = *Bairdia* sp. K.

Bairdia devonica Gürich, 1896

Bairdia devonica Gürich, 1896, Russ. K. Mineralog. Gesell. St. Petersburg, Verh., ser. 2, v. 32, p. 391, pl. 14, figs. 4a–e. Devonian, Russia.

The illustrations appear to be of a corroded specimen.

Bairdia? dorsalis (Richter), 1867

Cythere dorsalis Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 232, pl. 5, fig. 24. Zechstein, Saalfeld, and Kamsdorf, Thuringia, Germany.

Cythere (?Bairdia) dorsalis Richter. Bassler and Kellett 1934, Geol. Soc. America, Spec. Paper 1, p. 269 [list].

Bairdia(?) dorsalis (Richter). Branson, 1948, Geol. Soc. America, Memoir 26, p. 856 [list].

Bairdia drupacea (Richter). Branson, 1948

Cythere (Cythereis) drupacea Richter. Schmidt, 1867, Neues Jahrb. Mineralogie, Geologie, Palaontologie 1867, p. 579, 581, pl. 6, fig. 17. Zechstein, Germany.

Bairdia drupacea (Richter). Branson, 1948, Geol. Soc. America, Mem. 26, p. 857.

Bairdia elongata (Münster), 1830

Cythere elongata Münster, 1830 [not McCoy, 1844 = *Cypridina*], [Neues] Jahrb. Mineralogie, Geognosie, Petrefaktenkunde, Geologie, Jahrg. 1, p. 65 [no illus.]. Carboniferous, Rognitzlosau, near Hof, Bavaria.

Bairdia elongata (Münster). Jones and Kirkby, 1865, Annals Mag. Nat. History, ser. 3, v. 15, p. 408, pl. 20, figs. 14a–c. First illustration, a broken and corroded topotype specimen.

[not] *Cythere elongata* Münster. Jones, 1850, *in* King = *Cavellina*?

[not] *Cythere elongata*? Münster. Jones, 1859, *in* Kirkby = *Cavellina*?

[not] *Bairdia elongata* Lienenklaus, 1900 [not (Münster), 1830; not Kummerow, 1924] = *B. longa* Key, 1957, *in* Van den Bold.

[not] *Bairdia elongata* Kummerow, 1924 [not (Münster), 1830; not Lienenklaus, 1900] = gen. indet.

[not] *Bairdia elongata* (Münster). Kummerow, 1939 = *Bairdiacypris* sp. B.

[not] *Bairdia elongata* Lienenklaus. Key, 1955 = *B. longa* Key, 1957, *in* Van den Bold, n. name.

Bairdia excisa Eichwald, 1857

Bairdia excisa Eichwald, 1857, Soc. Imp. Nat. Moscou Bull., v. 30, no. 4, p. 311. Carboniferous, village of Sloboda, Russia.

Eichwald, 1860, Lethaea Rossica, v. 1, p. 1342, atlas pl. 53, figs. 8a–d. Carboniferous limestone, near Likhvine, Kalonga Government, and near Sloboda, Toula Government, Russia.

The illustrations are inadequate for generic determination. Jones and Kirkby (1875, p. 57, pl. 6, figs. 8–10) referred this species to *Cythere (Potamocypris?) bilobata* (Münster), 1830.

Bairdia extenda Gibson, 1955

Bairdia extenda Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 16, pl. 1, fig. 18. Cerro Gordo formation, in clay pit of Rockford Brick and Tile Co., Rockford, Floyd County, Iowa.

Bairdia lancelata Gibson, 1955, idem, p. 18, pl. 1, fig. 11. Same horizon and locality as above. Based on a corroded steinkern.

The holotype and only specimen (USNM 123084) is a steinkern that resembles *Cryptobairdia? singularis* (Krömmelbein), 1954, from the Upper Devonian of Germany. *B. extenda* and *B. lancelata* probably represent growth stages of a single species.

Bairdia frumentum Reuss, 1854

Bairdia frumentum Reuss, 1854, Wetterauer Gesell. Naturk. Hanau Jahresb. 1851–53, p. 68, plate figs. 8a, b. Permian, Germany.

Cythere (Bairdia) frumentum (Reuss). Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1867, p. 581, pl. 6, fig. 18. Zechstein, Germany.

Bairdia garrisonensis Upson. Glebovskaya, 1939

Bairdia garrisonensis Upson. Glebovskaya, 1939, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 115, p. 165 [list], pl. 2, fig. 5. Permian, northern Urals, Russia.

The illustration is of a right valve that differs in outline from Upson's species.

Bairdia geinitziana (Jones). Richter, 1855

Bairdia geinitziana (Jones). Richter, 1855, Deutsch. Geol. Gesell. Zeitschr., v. 7, p. 530, pl. 26, fig. 12. Permian, Germany.

[not] *Cythere geinitziana* Jones 1850 = *Fabalicypris? geinitziana* (Jones), 1850.

This species is referred by Bassler and Kellett (1934, p. 171) to *B. plebia* Reuss from which it differs by a straight dorsoposterior margin.

Bairdia geisi Kellett, 1934

Bairdia geisi Kellett, 1934, Jour. Paleontology, v. 8, p. 132, pl. 16, figs. 7a, b [steinkern]. Elmdale formation, Chase County, Kans.

[not] *Bairdia geisi* Kellett. Scott and Borger, 1941; see *Bairdia pompilioides* Harlton, 1928.

Bairdia cf. B. glennensis Harlton. Cooper, 1946

Bairdia cf. *B. glennensis* Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 45, pl. 2, figs. 6, 7. Shale on top of Fulda limestone, NW¼ sec. 11, T. 5 S., R. 4 W., Spencer County, Ind.

The illustrations of this species are a right view of a carapace and of a right valve; consequently, the dorsal outline is unknown, and the specimens are not identifiable at this time.

Bairdia glennensis Harlton. Marple, 1952

Bairdia glennensis Harlton. Marple, 1952, Jour. Paleontology, v. 26, p. 930, pl. 133, fig. 12. Lower Mercer limestone, Baltimore and Ohio Railroad cut, Somerset, Perry County, Ohio.

The illustration of this species is of an unidentifiable specimen.

Bairdia gracilis McCoy, 1844

Brairdia gracilis McCoy, 1842 [nomen nudum], *in* Griffith, Richard, Notice respecting the fossils of the Mountain Limestone of Ireland, p. 22.

Bairdia gracilis McCoy, 1844, A synopsis of the characters of the Carboniferous limestone fossils of Ireland, p. 165, pl. 23, fig. 7. Mountain limestone, northern districts, Ireland.

[not] *Bairdia gracilis* McCoy. Reuss, 1854 = *Cryptobairdia*? *subgracilis* (Geinitz), 1861.

[not] *Bairdia gracilis* McCoy. Richter, 1855 = *Cryptobairdia*? *subgracilis* (Geinitz), 1861.

[not] *Bairdia gracilis* Alexander, 1929 = *B. roundyi* Alexander, 1932.

[not] *Bairdia arcuata gracilis* Bosquet, 1854, requires new name.

One of the ends of the illustrated specimen is broken, but the description states that both ends are alike. Jones (1850, p. 63) referred a "much worn" specimen to this species. The illustration (Jones, 1850, pl. 18, fig. 7) is of a specimen with a round anterior that is unidentifiable. Jones (1859, p. 163, pl. 11, fig. 15) illustrated a worn steinkern similar to the one illustrated in 1850 that he questionably referred to this species.

Bairdia gracillima Richter, 1867

Cythere (*Bairdia*) *gracillima* Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 231, pl. 5, fig. 28. Zechstein, Thuringia, Germany.

Bassler and Kellett (1934, p. 270) list this species as *Cythere gracillima* and refer it to *Macrocypris*. Richter considered *Bairdia* a subgenus of *Cythere* (1867, p. 288); consequently, this species should be listed here.

Bairdia griffithiana Jones and Holl, 1868

Bairdia griffithiana Jones and Holl, 1868, Annals Mag. Nat. History, ser. 4, v. 2, p. 58, pl. 7, figs. 10a, b. Ordovician, Ireland.

The illustration suggests a cast of a specimen with a ventrolateral ridge or rim; the lateral outline excludes this species from the genera discussed in this paper.

Bairdia hisingeri (Münster), 1830

Cythere hisingeri Münster, 1830, [Neues] Jahrb. Mineralogie, Geognosie, Geologie, Petrefaktenkunde, 1830, p. 65, no. 18 [no illus.]. Carboniferous, Regnitzlosan, near Hof, Bavaria.

?*Bairdia hisingeri* (Münster). Jones and Kirkby, 1865 [part], Annals Mag. Nat. History, ser. 3, v. 15, p. 408, pl. 20, figs. 12a–c. Topotype material.

[not] *Bairdia hisingeri* (Münster). Kummerow, 1939 [part] = *Rectobairdia sinuosa* (Morey), 1936.

[not] *Bairdia hisingeri* (Münster). Kummerow, 1939 [part] = *Rectobairdia* sp. B.

[not] *Bairdia hisingeri* (Münster). Jones and Kirkby, 1879 = *Rectobairdia* sp. D.

[not] *Bairdia hisingeri* (Münster). Jones and Kirkby, 1895 = *Rectobairdia* sp. C.

[not] *Bairdia schaurothiana* Kirkby, 1858 = *Rectobairdia schaurothiana* (Kirkby), 1858.

This species was not illustrated by Münster, who described it as resembling a small *Modiola*. Jones and Kirkby obtained topotype material and illustrated this species in 1865 at which time they placed *B. schaurothiana* Kirkby, 1858, in synonymy. The original description and illustration by Kirkby is of a species with a straight dorsum that is here recognized as valid in *Rectobairdia*.

Bairdia hisingeri (Münster). Vine, 1884

Bairdia hisingeri (Münster). Vine, 1884, Yorkshire Geol. and Polytech. Soc. Proc., new ser., v. 8, p. 232, pl. 12, figs. 2a, b. Carboniferous, Yorkshire, England.

This species differs from *B. hisingeri* by having a convex dorsum, and a higher position of the posterior point.

Bairdia hooverae Kellett. Payne, 1937

Bairdia hooverae Kellett. Payne, 1937, Jour. Paleontology, v. 11, p. 284, pl. 39, figs. 5a, b. Hayden Branch formation, Sullivan County, Ind.

Bairdia ignota Bradfield, 1935

Bairdia ignota Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 91, pl. 6, fig. 14. Deese formation, Oklahoma.

This species is based on a steinkern.

Bairdia kingi Reuss, 1854

Bairdia kingi Reuss, 1854, Wetterauer Gesell. Naturk. Hanau Jahresb. 1851–53, p. 67, text fig. 4. Zechstein, Bleichenback, Wetterau, Germany.

[not] *B. kingi* Reuss. Kirkby, 1858 = *Cryptobaidia* sp. B.

Cythere (*Bairdia*) *kingi* Reuss. Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1867, p. 581, pl. 6, fig. 32, 33. Zechstein, Germany.

Cythere kingiana (Reuss). Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 243, pl. 5, fig. 18. Zechstein, Thuringia, Germany.

Bairdia lanulata Harlton, 1929

Bairdia lanulata Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 269, pl. 2, fig. 16. Fayetteville shale, 5 miles east of Vinita, SW. cor. sec. 15, T. 25 N., R. 21 E., Craig County, Okla.

The holotype is a steinkern.

Bairdia lenticulata Stewart and Hendrix, 1945

Bairdia lenticulata Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 110, pl. 12, fig. 11. Olentangy shale, Delaware County, Ohio.

This species is based on a steinkern.

Bairdia longirostris Bradfield, 1935

Bairdia longirostris Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 89, pl. 6, figs. 11a, b. Hoxbar formation, Oklahoma.

The holotype of this species is a steinkern.

Bairdia lunata Bradfield, 1935

Bairdia lunata Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 90, pl. 6, fig. 10. Hoxbar formation, 2½ miles south of Ardmore, Carter County, Okla.

[not] *Bairdia arcuata* var. *lunata* Bosquet, 1854=*Bythocypris limburgensis* Van Veen, 1934 = *Bythocypris lunata* (Bosquet), 1854.

The holotype of this species is a steinkern.

Bairdia marginata Richter, 1867

Cythere (Bairdia) marginata Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 233, pl. 5, fig. 20. Zechstein, Thuringia, Germany.

[not] *Bairdia marginata* Harlton, 1929 = *Bairdia grahamensis* Harlton, 1928.

Bairdia mucronata Reuss, 1854

Bairdia mucronata Reuss, 1854, Wetterauer Gesell. Naturk. Hanau Jahrb. 1851–53, p. 67, pl. 1, fig. 6. Zechstein, Germany. Insufficient data.

Bairdia mucronata Reuss. Richter, 1855, Deutsch. Geol. Gesell. Zeitschr., v. 7, p. 531, pl. 26, figs. 18, 19. Permian, Germany.

Schmidt, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, Jahrg. 1867, p. 580, pl. 6, fig. 4. Indeterminate specimen.

Cythere mucronata (Reuss). Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 228, pl. 5, figs. 37–40. Permian, Germany. Indeterminate specimens.

Bairdia mucronata Reuss. Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 572, pl. 29, fig. 11. Exterior of left valve, mold (?), insufficient data.

[not] *Bairdia mucronata* Reuss. Kirkby, 1858 [part] = *Bairdia caudata* Kirkby, 1859; [part] = *Cryptobairdia amygdalina* (Kirkby), 1859.

Bairdia murchisoniana Jones and Holl, 1868

Bairdia murchisoniana Jones and Holl, 1868, Annals Mag. Nat. History, ser. 4, v. 2, pl. 7, figs. 9a, b. Ordovician, Ireland.

This species is based on a steinkern of an indeterminate genus, probably related to the same genus in which *Bairdia griffithiana* Jones and Holl, 1868, belongs.

Bairdia nasuta Morey, 1935

Bairdia nasuta Morey, 1935, Jour. Paleontology, v. 9, p. 480, pl. 54, figs. 13, 15. Amsden formation, Cherry Creek, Fremont County, Wyo.

The holotype of this species is an abraded specimen.

Bairdia nitida Jones and Kirkby, 1879

Bairdia nitida Jones and Kirkby, 1879, Geol. Soc. London Qaurt. Jour., v. 35, p. 577, pl. 32, figs. 9–12. Lower Carboniferous, Anstruther, Fife, Scotland.

[not] *Bairdia nitida* Harlton, 1928 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.

The illustrations are probably of a steinkern, overlap is not shown.

Bairdia notoconstricta Gibson, 1955

Bairdia notoconstricta Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 15, pl. 1, figs. 17a, b. Cerro Gordo formation, clay pit of Rockford Brick and Tile Co., Rockford, Floyd County, Iowa.

This species is based on a steinkern.

Bairdia nyei Crespin, 1945

Bairdia nyei Crespin, 1945, Royal Soc. Queensland Proc., v. 56, no. 4, p. 32, pl. 4, figs. 2a, b. Permian, Eastern Australia.

This species is based on a steinkern fide Crespin.

Bairdia? osorioi Croneis and Gale, 1939

Bairdia? osorioi Croneis and Gale, 1939, *in* Croneis, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 28, new name for *B.? deloi* Croneis and Gale, 1939, not Kellett, 1934.

Bairdia? deloi Croneis and Gale, 1939, idem, v. 33, p. 288, pl. 6, figs. 13, 14. Golconda formation, southwest of Ruma, Randolph County, Ill.

This species is based on a corroded specimen.

Bairdia parmula Richter, 1867

Cythere (Bairdia) parmula Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 233, pl. 5, figs. 21, 22. Zechstein, Thuringia, Germany.

This species is probably based on a steinkern.

Bairdia pennata Coryell and Sample, 1933

Bairdia pennata Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, erratum accompanying table of contents; = nomen nudum.

Bairdia pennata Coryell and Sample, 1933, Am. Midland Naturalist, v. 14, p. 187. New name for *B. angulata* Coryell and Sample, 1932 [not Brady, 1870].

Bairdia angulata Coryell and Sample, 1932, idem, v. 13, p. 262, pl. 25, fig. 16. East Mountain formation, shale 3 miles west of Mineral Wells, Palo Pinto County, Tex.

The holotype of this species is a juvenile of an unrecognized species.

Bairdia plebia Reuss, 1854

Bairdia plebia Reuss, 1854, Wetterauer Gesell. Naturk. Hanau, Jahresb. 1851–53, p. 67, text figs. 5a, b. Permian, Germany.

Cythere (*Bairdia*) *plebia* Reuss. Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 161, pl. 11, fig. 8. Permian, Durham, England. A right valve.

Kirkby, 1862, Annals Mag. Nat. History, ser. 3, v. 10, p. 203, pl. 4, figs. 5–10. Carboniferous, Permian, England.

Cythere plebia Reuss. Richter, 1867, Deutsch. Geol. Gesell. Zeitschr., v. 19, p. 234, pl. 5, fig. 19. Permian, Germany.

Cythere (*Bairdia*) *plebeja* Reuss. Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1867, p. 581, pl. 6, fig. 26, Zechstein, Germany.

Bairdia plebia Reuss. Vine, 1884, Yorkshire Geol. and Polytech. Soc. Proc., new ser., v. 8, p. 233, pl. 12, figs. 3, 5a, b. Carboniferous, Yorkshire, England.

[not] *Bairdia plebia* Reuss. Kirkby, 1858 = *Bairdia* sp. I.

[not] *Bairdia* aff. *B. plebia* Reuss. Girty, 1908 = *B. pecosensis* Delo, 1930.

[not] *Bairdia plebia* Reuss. Jones and Kirkby, 1879=*Bairdia* sp. L.

[not] *Bairdia plebia* Reuss. Jones and Kirkby, 1892=*Bairdia harltoni*? Cooper, 1946.

[not] *Bairdia plebia* Reuss. Kummerow, 1939 = *Bairdia* sp. Q.

The original illustrations are a lateral view of a right valve, and a ventral outline of a carapace. The character of the species cannot be determined without knowledge of the left valve. Reuss states that this species is similar in outline to *B. subdeltoidea* from the Cretaceous. According to Bosquet (1854, p. 66 (56)), Reuss illustrated a Cretaceous form as *Cytherina subdeltoidea* (Reuss, 1845, p. 16, pl. 5, fig. 38), and later the same form from Tertiary sediments (Reuss, 1849, p. 9, pl. 8, figs. 1a, b). The illustrations of the Cretaceous form is a left valve view of a carapace; that of the Tertiary form is a right valve view of a carapace. Both specimens have a round anterior margin with the break in curvature at approximately midheight. Because Reuss records *B. plebia* from both Bleichenbach and Salters, it is reasonable to assume that he had two or more specimens of this species. The shape of the species as illustrated by Reuss may therefore be assumed to be correct. The conception of *B. plebia* was very broad, and specimens that differed markedly from the original illustration and that ranged in age from Carboniferous to Permian were assigned to this species, or as varieties of this species. Most of the varieties were subsequently raised to specific rank. All the specimens subsequently illustrated as *B. plebia* differ in outline from the original and belong to other species.

Bairdia plebia var. caudata Kirkby, 1859

Bairdia plebia var. *caudata* Kirkby, 1859 [part], Tyneside Naturalists' Field Club Trans., v. 4, p. 143, pl. 9, figs. 12, 12a [not Woodcuts 2, 4 = *B. leptura*? (Richter), 1867; not. figs. 9, 10 = *B. caudata* Kirkby, 1859]. Permian, Durham, England.

Figure 12 is a right side; consequently, information is insufficient to identify the specimen which differs in dorsoposterior margin from *B. caudata*.

Bairdia plebia var. grandis Jones, 1859

Cythere (*Bairdia*) *plebia* var. *grandis* Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 162, pl. 11, fig. 13. Permian, Durham, England.

[not] *Bairdia grandis* Jones and Kirkby, 1879 = *B. harltoni*? Cooper, 1946.

Bairdia plebia var. munda Jones and Kirkby, 1875

Bairdia plebia var. *munda* Jones and Kirkby, 1875, Annals Mag. Nat. History, ser. 4, v. 15, p. 57, pl. 6, fig. 7. Carboniferous, yellow limestone Tscherepete River near Tschernischine, district of Likhwine, Government of Kalonga, Russia. Probably belongs in *Cryptobairdia* n. gen. Based on a single specimen of which the outside of the left valve is illustrated.

?*Bairdia plebia* var. *munda* Jones and Kirkby. Glebovskaya, 1939, Neft. Geol.-Razv., Inst., Trudy, ser. A, no. 115, p. 165 [list], pl. 2, figs. 2–4. Lower Permian, Russia. The illustrations differ from the Carboniferous species by greater height.

Bairdia plebia var. rhombica Jones, 1859

Cythere (*Bairdia*) *plebia* var. *rhombica* Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 162, pl. 11, figs. 10, 11, 12a, 12b. Permian, near Sunderland, Durham, England.

Bairdia plebia var. *rhombica* Jones. Jones and Kirkby, 1875, Annals Mag. Nat. History, ser. 4, v. 15, p. 56, pl. 6, fig. 6. Permian (?), Sloboda, Russia.

The information available is inadequate to determine the species represented.

Bairdia polenovae Samoilova, 1951

Bairdia polenovae Samoilova, 1951, Moskov. Obshch. Ispytatelei Prirody, Trudy, Geol., v. 1, p. 173, pl. 1, fig. 17. Upper Devonian, Russia.

The illustration is a right valve exterior view, and the description is inadequate to identify the species.

Bairdia polygonata Scott, 1942

Bairdia polygonata Scott, 1942, Jour. Paleontology, v. 16, p. 161, pl. 25, fig. 9. Otter formation, Wheatland County, Mont.

Bairdia pseudomagna Stewart and Hendrix, 1945

Bairdia pseudomagna Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 110, pl. 12, figs. 13, 14. Olentangy formation, Bartholomew Run, 80 yd north of the confluence of the main tributaries, 1 mile north of the Franklyn-Delaware County line, E½SW¼ sec. 4, T. 3 N., R. 19 W., Delaware County, Ohio.

This species is based on two steinkerns.

Bairdia pyrrhae Eichwald, 1860

Bairdia pyrrhae Eichwald, 1860 (?), Lethaea Rossica, v. 1, p. 1344, pl. 52, figs. 3a, b. Permian, near Bourakova, Kazan, Russia.

The illustrations and description are inadequate to determine the species. Bassler and Kellett (1934, p. 347) refer this species to *Jonesina* and cite the first reference as Eichwald, 1844, without page or illustration citation. (See p. 86.)

Cythere reussiana (Kirkby). Richter, 1867

Cythere reussiana (Kirkby). Richter, 1867, Deutsch. Geol. Gesell. Zeitschr, v. 19, p. 229, pl. 5, fig. 35. Zechstein, Germany.

Both the illustration and the description are inadequate to determine the affinities of this species.

Bairdia reussiana var. ischimbajevensis Glebovskaya, 1938

Bairdia reussiana var. *ischimbajevensis* Glebovskaya, 1938, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 101, p. 180, 189, pl. 1, figs. 5, 5a. Lower Permian, Ischimbaevo, Russia.

The illustrations are inadequate to identify this subspecies.

Bairdia rhomboidea Kirkby. Schmid [known also as Schmidt], 1867

Cythere (Bairdia) rhomboidea Kirkby. Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1867, p. 580, pl. 6, fig. 7, Zechstein, Wetterau, Germany.

Bairdia cf. B. rhomboidea Kirkby. Cooper, 1946

Bairdia cf. *B. rhomboidea* Kirkby. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 50, pl. 3, figs. 25, 26. Shales in Shumway cyclothem, SW¼ sec. 26, T. 9 N., R. 5 E. Effingham County, Ill.

The illustrations of this species suggest a corroded specimen.

Bairdia rockfordensis Gibson, 1955

Bairdia rockfordensis Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 17, pl. 1, fig. 8. Cerro Gordo formation, clay pit of Rockford Brick and Tile Co., Rockford, Floyd County, Iowa.

The holotype (USNM 123088) of this species is a damaged steinkern of an undeterminate genus.

Bairdia rostrata Péneau, 1929

Bairdia rostrata Péneau, 1929, Soc. Sci. Nat. Ouest France Bull., ser. 4, v. 8, p. 178, pl. 9, fig. 8, pl. 11, figs. 6a, b. Upper Famennian, *Clymenia* beds, Saint-Julien-de-Vouvantes, Armoricain Massif, France.

[not] *Bairdia rostrata* Issler, 1908, Palaeontographica, v. 55, p. 95, pl. 7, fig. 345. Lias = gen. indet.

The original of plate 9, figure 8, is probably a steinkern; the illustrations on plate 11 suggest *Alanella*, which has been renamed *Alanella? dubia* Kesling and Sohn, 1958.

Bairdia semilunulata Netschajew, 1894

Bairdia semilunulata Netschajew, 1894, Kazan Univ., Obshchestvo Estestvoiispitatelei, Trudy, [Soc. Nat. Kazan, Mém.], v. 27, no. 4, p. 373, text figs. 1, 2. Permian, European Russia.

The illustrations of this species are inadequate for proper identification; the outlines suggest *Acratia* Delo, 1930.

Bairdia subelongata Jones and Kirkby. Vine, 1884

Bairdia subelongata Jones and Kirkby. Vine, 1884, Yorkshire Geol. Polytechn. Soc. Proc., new ser., 8, p. 231, 239, pl. 12, figs. 1, 1a. Carboniferous, Yorkshire, England.

The illustration of this species is unrecognizable.

Bairdia subparallela Morey, 1935

Bairdia subparallela Morey, 1935, Jour. Paleontology, v. 9, p. 323, pl. 28, fig. 24. Sylamore sandstone, 3 miles north of Williamsburg, Callaway County, Mo.

?*Bairdia subparallela* Morey. Morey, 1936, Jour. Paleontology, v. 10, p. 119, pl. 17, fig. 7. Chouteau limestone, near Browns Station, Boone County, Mo.

The holotype (Missouri Univ. Os 1005–3) is a steinkern with fragments of shell(?) attached along the posterodorsal margin, and possibly along the posterior two-thirds of the ventral margin. The specimen measures 2.25 millimeters in greatest length to the point where the posterior is broken. Morey (1936, p. 119) states that he found five distorted specimens in the Chouteau limestone. Because it is not possible to determine the specific characters of this species, it is considered as a nomen dubium. The large size of this species is reminiscent of *B. grandis* Jones in Kirkby, 1859.

Bairdia subquadrata Glebovskaya, 1939

Bairdia subquadrata Glebovskaya, 1939, Neft. Geol.-Razv., Inst., Trudy, ser. A, no. 115, p. 171, 175, pl. 2, fig. 15. *Schwagerina* zone, Wishera River, northern Urals, Russia.

The description and illustration of a lateral view of a left valve, are inadequate to define the species.

Bairdia unica Stewart and Hendrix, 1945

Bairdia unica Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 110, pl. 12, fig. 12. Olentangy shale, along Bartholomew Run, 80 yd north of the confluence of the main tributaries, 1 mile north of the Franklyn-Delaware County line, E½SW¼ sec. 4, T. 3 N., R. 19 W., Delaware County, Ohio.

The holotype and only specimen of this species is a steinkern.

Bairdia spp.

Bairdia sp. Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, pl. 6, figs. 7a, b. Shale, 1 ft below Otterville formation, 200 yd south of north line and one-quarter of a mile west of east line sec. 12, T. 3 S., R. 2 E., Carter County, Okla.

Bairdia, sp. Péneau, 1927, Soc. Sci. Nat. Ouest France Bull., ser. 4, v. 7, p. 111, pl. 3, fig. 7. Devonian, France.

Bairdia sp. no. 1 Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy (VNIGRI), new ser., no. 58, p. 97, pl. 21, fig. 3. Lower Carboniferous, Russia.

The preceding taxa are based on right valves.

After this study was completed, I received on loan from Dr. S. A. Levinson a paper by Y. T. Hou, 1954, on some lower Permian ostracodes from western Hupeh, that contains the following new species not included in this revision:

Bairdia convexa Hou, 1954, p. 256, pl. 1, figs. 12a, b.
subrounda Hou, 1954, p. 257, pl. 1, figs. 13a–c.
hupeiensis Hou, 1954, p. 257, pl. 1, fig. 14.
fusiformis Hou, 1954, p. 258, pl. 2, figs. 1a–d.
changyangensis Hou, 1954, p. 258, pl. 2, figs. 2a, b.
sinensis Hou, 1954, p. 259, pl. 2, figs. 3a–c.
mui Hou, 1954, p. 259, pl. 2, figs. 4a–d.
yangi Hou, 1954, p. 260, pl. 2, figs. 5a–d.
sp. A. Hou, 1954, p. 260, pl. 2, figs. 6a, b.
sp. B. Hou, 1954, p. 261, pl. 2, figs. 7a, b.
sp. C. Hou, 1954, p. 261, pl. 2, fig. 8.
sp. D. Hou, 1954, p. 261, pl. 1, fig. 15.

SYNONYMS AND REJECTED SPECIES OF BAIRDIA

acetalata Coryell and Billings, 1932 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
acetalata Coryell and Billings. Coryell and Booth, 1933 = *Fabalicypris*? *hoxbarensis*? (Harlton), 1927.
aculeata Cooper, 1941 [not Bonnema, 1940] = *B. aculeala* Cooper, 1957.
acuta Jones *in* King, 1850 = nomen dubium.
acuta Jones. Schmid, 1867 = sp. indet.
aequa Cooper, 1941 = *Orthobairdia cestriensis* (Ulrich), 1891.
aequalis Eichwald, 1857 = *Cryptobairdia aequalis* (Eichwald), 1857.
aequalis Eichwald. Jones and Kirkby, 1875 = gen. indet.
affinis Morris, 1845 = nomen dubium.
alta Jones and Kirkby. Posner, 1951 = *Bairdia* sp. U.
alta var. *curvirostris* Posner, 1951 = *Bairdia curvirostris* Posner, 1951.
altifrons Knight, 1928 = *Orthobairdia texana* (Harlton), 1927.
ampla Reuss, 1854 = nomen dubium.
ampla Reuss. Jones, 1859 [part] = *Cryptobairdia* sp. C.; [part] = *Bairdia* sp. N.
ampla (Reuss). Richter, 1867 = probably the same as *Cythere brevicauda* (Jones). Richter, 1867.
ampla Reuss. Jones and Kirkby, 1875 = *Bairdia impedere*? Cooper, 1941.
ampla (Reuss). Jones and Kirkby, 1879 = *Bairdia* sp. J?; *Bairdia* sp. P: and sp. indet.
ampla (Reuss). Kummerow, 1939 = *Rectobairdia sinuosa*? (Morey), 1936.
ampla (Reuss). Cooper, 1946 = *Orthobairdia texana* (Harlton), 1927.
amplectens Kesling and Kilgore, 1952 = *Bairdia leguminoides* Ulrich, 1891.
amputata Kirkby, 1859 = nomen dubium.
amputata Kirkby. Jones and Kirkby, 1879 = *Rectobairdia* sp. A.
amygdaliformis Bradfield, 1935 = nomen dubium.
angulata Coryell and Sample, 1932 [not Brady (1870a)] = nomen dubium (same as *B. pennata*).
angulata Posner, 1951 [not Brady (1870a); not Coryell and Sample (1933)] = *Rectobairdia posneri* Sohn, n. name.
angulatiformis Posner, 1951 = *Rectobairdia legumen*? (Jones and Kirkby), 1886.
angusta Cooper, 1946 = *Bairdia angustata* Cooper, 1957.
anomala Payne, 1937 = nomen dubium.
anticostiensis Jones, 1890 = *Krausella*? *anticostiensis* (Jones), 1890.
arcuata (McCoy). Bassler and Kellett, 1934 = gen. indet.
ardmorensis Harlton, 1929 = *Bairdiolites ardmorensis* (Harlton), 1929.
ardmorensis Harlton. Cooper, 1946 = *Bairdia harltoni* Cooper, 1946.
cf. *B. ardmorensis* Harlton. Bradfield, 1935 = *Orthobairdia powersi*? (Kellett), 1934.
attenuata Girty, 1910 = *Bairdia girtyi* Sohn, n. name.
attenuata Girty. Cooper, 1941 = *Bairdia* sp. L.
auricula Knight, 1928 = *Orthobairdia oklahomaensis* (Harlton), 1927.
auricula Knight. Bradfield, 1935 = *Bairdia beedei* Ulrich and Bassler, 1906.
bartholomewensis Stewart and Hendrix, 1945 = nomen dubium.
bedfordensis Geis, 1932 = *Bairdiacypris bedfordensis* (Geis), 1932.
beedei Ulrich and Bassler. Warthin, 1930 = *Bairdia whitesidei*? Bradfield, 1935.
beedei Ulrich and Bassler. Kellett, 1934 = *Bairdia hurwitzi* Coryell and Booth, 1933.
beedei Ulrich and Bassler. Johnson, 1936 = *Bairdia hassi* Sohn, n. sp.
beedei Ulrich and Bassler. Payne, 1937 = *Bairdia hurwitzi*? Coryell and Booth, 1933.
beedei var. *abrupta* Ulrich and Bassler, 1906 = *Bairdia beedei* Ulrich and Bassler, 1906.
beedei var. *inflata* Payne, 1937 = *Bairdia hurwitzi*? Coryell and Booth, 1933.
?*berniciensis* Kirkby, 1858 = *Cryptobairdia*? *berniciensis* (Kirkby), 1858.
berniciensis (Kirkby). Richter, 1867 = *Cryptobairdia* sp. B.
biacuta Bradfield, 1935 = nomen dubium.
bicornis Bradfield, 1935 [not *B. curta* var. *bicornis* Jones and Kirkby, 1879] = *Bairdia whitesidei* Bradfield, 1935.
bidorsalis Bradfield, 1935 = *Cryptobairdia coryelli*? (Roth and Skinner), 1931.
bilobata (Münster). Jones and Kirkby, 1895 [list] = *Silenites*? *bilobatus* (Münster), 1830.
binodosa Polenova, 1952 = gen. indet.
blakei Harlton, 1931 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
blakei Harlton. Upson, 1933 = *Bairdia citriformis*? Knight, 1928.
blakei Harlton. Bradfield, 1935 = *Cryptobairdia seminalis* (Knight), 1928.
blakei Harlton. Cooper, 1946 = *Bairdia* sp. R.
brevicauda (Jones). Richter, 1867 = sp. indet.
brevicauda Jones. Schmid, 1867 = *Rectobairdia brevicauda* (Jones), 1859.

brevis Jones and Kirkby. Vine, 1884 = sp. indet.
brevis Jones and Kirkby. Cooper, 1941 = *Orthobairdia* sp. A.
brevis Lienenklaus, 1900, and Key, 1955; this post-Paleozoic species = *B. abbreviata* Key, 1957, *in* Van den Bold.
brevis var. *jonesi* Posner, 1951 = *Bairdia brevis* Jones and Kirkby, 1879.
? *browniana* Jones, 1874 = nomen dubium.
bulleta Harris and Lalicker, 1932 = *Haworthina bulleta* (Harris and Lalicker), 1932.
calceolae Kummerow, 1953 = *Rectobairdia calceolae* (Kummerow), 1953.
cestriensis Ulrich, 1891 = *Orthobairdia cestriensis* (Ulrich), 1891.
cestriensis Ulrich, 1891 [part], fig. 7 = sp. indet.
cestriensis var. *granulosa* Girty, 1910 = *Orthobairdia cestriensis* (Ulrich), 1891.
chasae Kellett, 1934 = *Orthobairdia texana* (Harlton), 1927.
circumcisa Jones and Kirkby, 1879 = nomen dubium.
ciscoensis Harlton, 1927 = *Bairdia beedei* Ulrich and Bassler, 1906.
ciscoensis Harlton. Bradfield, 1935 [part] = *Bairdia beedei* Ulrich and Bassler, 1906; [part] = *Bairdia* sp. E.
citriformis Knight. Cooper, 1946 = *Bairdia crassa* Harlton, 1929.
clorensis Cooper, 1943 = *Orthobairdia cestriensis*? (Ulrich), 1891.
compacta Geis, 1932 = *Cryptobairdia compacta* (Geis), 1932.
compressa Geis, 1932 [not *plebia compressa* Kirkby, 1858] = *Orthobairdia kirki* Geis, n. name.
concava Cooper, 1946 = *Bairdia whitesidei*? Bradfield, 1935.
conilata Harlton, 1929 = *Bairdia beedei* Ulrich and Bassler, 1906.
contracta Morey, 1935 [not *hisingeri* var. *contracta* Jones and Kirkby, 1895] = nomen dubium.
contracta Morey. Scott, 1942 = *Bairdia* sp. M.
cooperi Croneis and Gale, 1939 = *Orthobairdia cestriensis* (Ulrich), 1891.
coryelli Roth and Skinner, 1931 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
crassa Harlton. Warthin, 1930 = sp. indet.
crassa Harlton. Bradfield, 1935 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
crassa Harlton. Cordell, 1952 [part] = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
crassimarginata Cooper, 1946 = *Orthobairdia powersi*? (Kellett), 1934.
cultrata Kummerow, 1939 [part] = *Rectobairdia*? *cultrata* (Kummerow), 1939; [part] = *Bairdiacypris robusta*? Kummerow, 1939.
cultrijugati Krömmelbein, 1950 = *Rectobairdia cultrijugati* (Krömmelbein), 1950.
? *cuneata* (Steusloff), 1894. Kummerow, 1924 = *Steusloffina cuneata* (Steusloff), 1894.
curta McCoy. Richter, 1855 = sp. indet.
curta McCoy. Roemer, 1856 (?) = *Bairdia* sp. C.
curta McCoy. Eichwald, 1860 [part] = *Cryptobairdia aequalis* (Eichwald), 1857; [part] = *Bairdia* sp. D.
curta McCoy. Jones and Kirkby, 1879 [part] = *Bairdia* sp. A; [part] = *Bairdia* sp. B.
curta McCoy. Chapman, 1921 = sp. indet.
curta McCoy. Kummerow, 1939 = *Bairdia* sp. F.
curta var. *bicornis* Jones and Kirkby, 1879 = *Rectobairdia*? *bicornis* (Jones and Kirkby), 1879.
curta var. *deformis* Jones and Kirkby, 1879 = *Rectobairdia deformis* (Jones and Kirkby), 1879.
curta var. *hebeatus* Posner, 1951 = *Bairdia hebeatus* Posner, 1951.
curta var. *terebra* Jones and Kirkby, 1879 = *Bairdia terebra* Jones and Kirkby, 1879.
curtus McCoy, 1942 [nomen nudum] = *Bairdia curta* McCoy, 1844.
curvis Cooper, 1941 = *Bairdiacypris curvis* (Cooper), 1941.
cyclas (Keyserling), 1854 = gen. indet.
delawarensis Stewart and Hendrix, 1945 = nomen dubium.
delicata Morey, 1935 = nomen dubium.
delicata Morey. Cooper, 1941 = *Bairdia* sp. K.
deloi Kellett, 1934 = *Bairdia grahamensis*? Harlton, 1928.
deloi Croneis and Gale, 1939 = *Bairdia osorioi* Croneis and Gale, 1939 = nomen dubium.
demissa Cooper, 1946 = *Cryptobairdia forakerensis*? (Kellett), 1934.
depressa Geis, 1932 = *Bairdia distressa* (Geis), 1940, *in* Sohn = *Rectobairdia distressa* (Geis), 1940.
devonica Gürich, 1896 = nomen dubium.
dissimilis Cooper, 1946 = *Bairdia bradfieldi*? Payne, 1937.
distracta Eichwald, 1857 = *Rishona*? *distracta* (Eichwald), 1857.
distracta Eichwald. = *Fabalicypris* sp.
distressa Geis, 1940, *in* Sohn = *Rectobairdia distressa* (Geis), 1940.
dornickhillensis Harlton, 1929 = *Orthobairdia oklahomaensis* (Harlton), 1927.
dorsalis (Richter), 1867 = nomen dubium.
drupacea (Richter), 1855 = *Cryptobairdia drupacea* (Richter), 1855.
drupacea (Richter). Schmid, 1867 = sp. indet.
drupacea (Richter). Branson, 1948 = sp. indet.
eissensis Upson, 1933 = *Bairdia garrisonensis*? Upson, 1933.
elongata (Münster), 1830 = nomen dubium.
elongata (Münster). Jones, 1850, *in* King = *Cavellina*? sp.
elongata (Münster). Jones, 1859, *in* Kirkby = *Cavellina*? sp.
elongata (Münster). Kummerow, 1939 = *Bairdiacypris* sp. A.
elongata Kummerow, 1924 = gen. indet.
elongata Lienenklaus, 1900; and Key, 1955 = *B. longa* Key, 1957, *in* van den Bold.
emaciata Kesling and Kilgore, 1952 = *Rectobairdia*? *emaciata* (Kesling and Kilgore), 1952.
epicypha Kesling and Kilgore, 1955 = *Rishona epicypha* (Kesling and Kilgore), 1955.
excisa Eichwald, 1857 = nomen dubium.
extenda Gibson, 1955 = nomen dubium.
florenaensis Upson, 1933 = *Orthobairdia texana*? (Harlton), 1927.
folgeri Kellett, 1934 = *Cryptobairdia folgeri* (Kellett), 1934.
forakerensis Kellett, 1934 = *Cryptobairdia forakerensis* (Kellett), 1934.
fragosa Morey, 1935 = *Rectobairdia*? *fragosa* (Morey), 1935.
frumentum Reuss, 1854 = nomen dubium.
galei Croneis and Thurman. Cooper, 1941 = ?*Bairdia sohni* Coryell and Rozanski, 1942.
garrisonensis Upson. Kellett, 1934 = *Bairdia hassi* Sohn, n. sp.
garrisonensis Upson. Scott and Borger, 1941 = *Bairdia hassi* Sohn, n. sp.
garrisonensis Upson. Glebovskaya, 1939 = sp. indet.
geinitziana (Jones), 1850 = *Fabalicypris*? *geinitziana* (Jones), 1850.

geinitziana (Jones). Reuss, 1854 = *Orthobairdia texana*? (Harlton), 1927.
geinitziana (Jones). Richter, 1855 = sp. indet.
geisi Kellett, 1934 = nomen dubium.
geisi Kellett. Scott and Borger, 1941 = *Bairdia pompilioides*? Harlton, 1928.
gibbera Kesling and Kilgore, 1952 [not *B. gibbera* Morey, 1935] = *Rishona epicypha* (Kesling and Kilgore), 1955.
gibbosa Payne, 1937 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
glennensis Harlton, 1927 = *Fabalicypris glennensis* (Harlton), 1927.
glennensis Harlton. Knight, 1928 = *Bairdiacypris*? sp. indet.
glennensis Harlton. Bradfield, 1935 = ?*Fabalicypris hoxbarensis* (Harlton), 1927.
glennensis Harlton. Glebovskaya, 1939 = *Bairdiacypris*? sp. indet.
cf. *B. glennensis* Harlton. Cooper, 1946 = sp. indet.
glennensis Harlton. Marple, 1952 = sp. indet.
golcondensis Croneis and Gale. Cooper, 1941 = *Bairdia impedere*? Cooper, 1941.
golcondensis Croneis and Gale. Cooper, 1947 = *Orthobairdia cestriensis*? (Ulrich), 1891.
gracilis McCoy, 1842 = nomen nudum.
gracilis McCoy, 1844 = nomen dubium.
gracilis McCoy. Reuss, 1854 = *Cryptobairdia*? *subgracilis* (Geinitz), 1861.
gracilis McCoy. Richter, 1855 = *Cryptobairdia*? *subgracilis* (Geinitz), 1861.
gracilis Alexander, 1929 = *Bairdia roundyi* Alexander, 1932, a post-Paleozoic species.
gracillima Richter, 1867 = nomen dubium.
grahamensis Harlton. Warthin, 1930 = *Orthobairdia* sp. B.
grandis Jones and Kirkby, 1879 = *Bairdia harltoni*? Cooper, 1946.
granireticulata Harlton, 1929 = *Orthobairdia cestriensis* (Ulrich), 1891.
granireticulata Harlton. Cooper, 1941 = *Bairdia* sp. J.
grayi Crespin, 1945 = *Silenites grayi* (Crespin), 1945.
griffithiana Jones and Holl, 1868 = nomen dubium.
guadalupiana Hamilton, 1942 = *Orthobairdia texana* (Harlton), 1927.
haworthi Knight, 1928 = *Cryptobairdia haworthi* (Knight), 1928.
haworthi Knight. Warthin, 1930 = *Fabalicypris warthini* (Bradfield), 1935.
hexagona Polenova, 1952 = *Rectobairdia hexagona* (Polenova), 1952.
hextensis Harlton, 1929 = *Rectobairdia*? *hextensis* (Harlton), 1929.
hisingeri (Münster), 1830 = nomen dubium.
hisingeri (Münster). Jones and Kirkby, 1879 = *Rectobairdia* sp. D.
hisingeri (Münster). Jones and Kirkby, 1895 = *Rectobairdia* sp. C.
hisingeri (Münster). Kummerow, 1939 [part] = *Rectobairdia sinuosa*? (Morey), 1936 [part] = *Rectobairdia* sp. B.
hisingeri (Münster). Sylvester-Bradley, 1950 = *Rectobairdia distressa*? (Geis), 1940.
hisingeri var. *contracta* Jones and Kirkby, 1895 = *Cryptobairdia contractella* Sohn, n. name.
hisingeri var. *mongoliensis* Jones and Kirkby, 1892 = *Rectobairdia mongoliensis* (Jones and Kirkby), 1892.
hisingeriformis Posner, 1951 = *Rectobairdia sinuosa*? (Morey), 1936.
hispida Harlton. Coryell and Sample, 1932 = *Bairdia beedei* Ulrich and Bassler, 1906.
hispida var. *alta* Bradfield, 1935 = *Bairdia beedei* Ulrich and Bassler, 1906.
hispida var. *lesterica* Bradfield, 1935 = *Cryptobairdia coryelli*? (Roth and Skinner), 1931.
hoffmanae Kellett, 1934 = *Cryptobairdia hoffmanae* (Kellett), 1934.
hooverae Kellett, 1934 = *Cryptobairdia hooverae* (Kellett), 1934.
hooverae Kellett. Payne, 1937 = sp. indet.
hooverae Kellett. Cooper, 1946 = *Cryptobairdia* sp. A.
hoxbarensis Harlton, 1927 = *Fabalicypris*? *hoxbarensis* (Harlton), 1927.
hoxbarensis Harlton. Harlton, 1929 = *Orthobairdia texana* (Harlton), 1927.
hoxbarensis Harlton. Bradfield, 1935 = *Orthobairdia texana* (Harlton), 1927.
hoxbarensis Harlton. Kellett, 1934 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
hoxbarensis Harlton. Johnson, 1936 = *Fabalicypris acetalata*? (Coryell and Billings), 1936.
hoxbarensis Harlton. Payne, 1937 = *Fabalicypris acetalata*? (Coryell and Billings), 1932.
hoxbarensis Harlton. Scott and Borger, 1941 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
ignota Bradfield, 1935 = nomen dubium.
illinoiensis Scott and Borger, 1941 = *Basslerella*? *illinoiensis* (Scott and Borger), 1941.
insolens Cooper, 1941 = *Orthobairdia cestriensis*? (Ulrich), 1891.
irionensis Delo, 1930 = *Bairdia pecosensis*? Delo, 1930.
jonesiana Kirkby 1858 = gen. indet.
kanwakensis Kellett, 1935 = *Cryptobairdia forakerensis*? (Kellett), 1934.
cf. *B. kelletti* Glebovskaya. Glebovskaya, 1938 = *Cryptobairdia*? sp. indet.
kingi Reuss, 1854 = nomen dubium.
kingiana (Reuss). Richter, 1867 = sp. indet.
kingii Reuss. Kirkby, 1858 = *Cryptobairdia* sp. D.
kingii Reuss. Cooper, 1946 = *Bairdia*? sp. S.
kingii var. *compressa* Kirkby, 1859 = *Cryptobairdia compressa* (Kirkby), 1858.
kolwensis Glebovskaya 1939 = gen. indet.
korzenewskajae Posner, 1951 = *Rectobairdia korzenewskajae* (Posner), 1951.
laevigata (Eichwald), 1857 = *Rishona*? *laevigata* (Eichwald), 1857.
lancelata Gibson, 1955 = *Bairdia extenda* Gibson, 1955 = nomen dubium.
lanulata Harlton, 1929 = nomen dubium.
legumen Jones and Kirkby, 1886 = *Rectobairdia legumen* (Jones and Kirkby), 1886.
lenticulata Stewart and Hendrix, 1945 = nomen dubium.
lepidocentri Krömmelbein, 1950 = *Rectobairdia lepidocentri* (Krömmelbein), 1950.
longirostris Bradfield, 1935 = nomen dubium.
lunata Bradfield, 1935 = nomen dubium.
lunata Bradfield. Cooper, 1946 = *Bairdia*? sp. T.
mccoyi Croneis and Gutke. Cooper, 1941 = *Bairdia girtyi* Sohn, n. name.

magnacurta Morey, 1935 = *Cryptobairdia compacta*? (Geis), 1932.
magnacurta Morey. Morey, 1936 = *Bairdia* sp. O.
marginata Harlton, 1929 [not Bosquet, 1852] = *Bairdia grahamensis*? Harlton, 1928.
marginata Richter, 1867 = nomen dubium.
marmorea Kellett, 1934 = *Bairdia beedei* Ulrich and Bassler, 1906.
maxeyi Harris and Lalicker, 1932 = *Cryptobairdia maxeyi* (Harris and Lalicker), 1932.
menardensis Harlton, 1929 = *Bairdia grahamensis* Harlton, 1928.
menardvillensis Harlton, 1931 = *Bairdia grahamensis*? Harlton, 1928.
merivia Benson, 1955 = *Cryptobairdia compacta*? (Geis), 1932.
?*micra* Öpik, 1937 = Recent(?) *Candona*?
moorei Knight, 1928 = *Bairdia beedei*? Ulrich and Bassler, 1906.
mossolovellaeformis Egorov, 1953 = *Rectobairdia mossolovellaeformis* (Egorov), 1953.
mucronata Reuss, 1854 = nomen dubium.
mucronata Reuss. Kirkby, 1850 [part] = *Cryptobairdia amygdalina* (Kirkby), 1859; [part] = *Bairdia caudata* Kirkby, 1859.
murchisoniana Jones and Holl, 1868 = nomen dubium.
nasuta Morey, 1935 = nomen dubium.
nebraskensis Upson, 1933 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
nevensis Kellett, 1934 = *Orthobairdia texana* (Harlton), 1927.
nitida Jones and Kirkby, 1879 = nomen dubium.
nitida Harlton, 1928 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
nitida Harlton. Warthin, 1930 = *Bairdia whitesidei*? Bradfield, 1935.
notoconstricta Gibson, 1955 = nomen dubium.
nyei Crespin, 1945 = nomen dubium.
occidentalis Girty, 1909 = gen. indet.
oklahomaensis Harlton, 1927 = *Orthobairdia oklahomaensis* (Harlton), 1927.
?*osorioi* Croneis and Gale, 1939 = nomen dubium.
osorioi Croneis and Gale. Cooper, 1941 = *Cryptobairdia* sp. E.
ovata (Eichwald). Eichwald, 1860; illustration not seen.
paffrathensis Kummerow, 1953 = *Bairdiacypris*? *paffrathensis* (Kummerow), 1953.
parmula Richter, 1867 = nomen dubium.
pecki Morey, 1935 = *Bekena pecki* (Morey), 1935.
pecosensis var. *graciosa* Glebovskaya, 1939 = *Bairdia graciosa* Glebovskaya, 1939.
pennata Coryell and Sample, 1932 = nomen nudum.
pennata Coryell and Sample, 1933 = nomen dubium.
perincerta Kellett, 1934 = *Orthobairdia powersi*? (Kellett), 1934.
permiana Hamilton, 1942 = *Bairdia pecosensis* Delo, 1930.
perplexa Coryell and Rozanski, 1942 = *Fabalicypris*? *perplexa* (Coryell and Rozanski), 1942.
phillipsiana Jones and Holl, 1869 = gen. indet.
pinnula Coryell and Booth, 1933 = *Cryptobairdia pinnula* (Coryell and Booth), 1933.
planoconvexa Coryell and Williamson, 1936 = *Camdenidea*? *planoconvexa* (Coryell and Williamson), 1936.
plebia Reuss, 1854 = nomen dubium.
plebia Reuss. Kirkby, 1858 = *Bairdia* sp. I.
plebia Reuss. Jones, 1959, *in* Kirkby = sp. indet.

plebia Reuss. Jones and Kirkby, 1879 = *Bairdia* sp. L?
plebia Reuss. Jones and Kirkby, 1892 = *Bairdia harltoni*? Cooper, 1946.
aff. *B. plebia* Reuss. Girty, 1908 = *Bairdia pecosensis*? Delo, 1930.
plebia Reuss. Kummerow, 1939 = *Bairdia* sp. Q.
plebia var. *alta* Jones and Kirkby, 1895 = *Orthobairdia cestriensis*? (Ulrich), 1891.
plebia var. *amygdalina* Kirkby, 1859 = *Cryptobairdia amygdalina* (Kirkby), 1859.
plebia var. *brevicauda* Jones, 1859, *in* Kirkby = *Rectobairdia brevicauda* (Jones), 1859.
plebia var. *caudata* Kirkby, 1859 [part] = *Bairdia caudata* Kirkby, 1859; [part] = *B. leptura*? (Richter), 1867; [part] = sp. indet.
plebia var. *caudata* Kirkby. Jones, 1859 = *Bairdia caudata* Kirkby, 1859.
plebia var. *compressa* Kirkby, 1858 = *Cryptobairdia compressa* (Kirkby), 1858.
plebia var. *elongata* Kirkby, 1858 = *Bairdia elongatella* Sohn, n. name.
plebia var. *grandis* Jones, 1859, *in* Kirkby = nomen dubium.
plebia var. *munda* Jones and Kirkby, 1875 = nomen dubium.
plebia var. *neptuni* Kirkby, 1858 = *Bairdia neptuni* Kirkby, 1858.
plebia var. *reussiana* Kirkby, 1859 = *Bairdia reussiana* Kirkby, 1858.
plebia var. *rhombica* Jones, 1859 = nomen dubium.
plebia var. *ventricosa* Kirkby, 1859 = *Cryptobairdia ventricosa* (Kirkby), 1858.
plicatula Polenova, 1952 = *Bekena*? *plicatula* (Polenova), 1952.
polenovae Samoilova, 1951 = nomen dubium.
polygonata Scott, 1942 = nomen dubium.
pompilioides Harlton. Warthin, 1930 = *Bairdia whitesidei*? Bradfield, 1935.
pottsvillensis Harlton, 1929 (in expl. of pl. 2) = *Orthobairdia oklahomaensis* (Harlton), 1927.
powersi Kellett, 1934 = *Orthobairdia powersi* (Kellett), 1934.
praecisa Jones and Kirkby, 1879 = *Cryptobairdia praecisa* (Jones and Kirkby), 1879.
protracta Eichwald, 1860 = *Rishona*? *protracta* (Eichwald), 1860.
pruniseminata Sohn, 1954 = *Pustulobairdia pruniseminata* (Sohn), 1954.
pseudocestriensis Přibyl and Snajdr, 1950 = gen. indet.
pseudomagna Stewart and Hendrix, 1945 = nomen dubium.
punctata Bradfield, 1935 = *Bairdia whitesidei*? Bradfield, 1935.
pyrrhae Eichwald, 1860 = gen. indet., referred to *Jonesina* by Bassler and Kellett (1934, p. 342).
quadraspinosa Scott and Borger, 1941 = *Basslerella*? *quadraspinosa* (Scott and Borger), 1941.
qualeni Eichwald, 1857 = gen. indet.
quartziana Egorov, 1953 = *Bairdiacypris*? *quartziana* (Egorov), 1953.
recta Harlton, 1929 = *Cryptobairdia recta* (Harlton), 1929.
renaultensis Croneis and Gutke, 1939 = *Bairdia mccoyi* Croneis and Gutke, 1939.
reniformis Kirkby, 1858 = *Orthobairdia*? *subreniformis* (Kirkby), 1859.
reussiana Kirkby. Richter, 1867 = sp. indet.
reussiana Kirkby. Upson, 1933 = *Bairdia matfieldensis*? Upson, 1933.
reussiana Kirkby. Kellett, 1934 = *Rectobairdia symmetrica*? (Cooper), 1946.

reussiana Kirkby. Glebovskaya, 1939 = *Rectobairdia* sp. H.
reussiana Kirkby. Cordell, 1952 [part] = *Rectobairdia symmetrica?* (Cooper), 1946; [part] = *Bairdia subfusiformis?* Hamilton, 1942; [part] = *Bairdia reussiana* Kirkby, 1858.
reussiana var. *ischimbajevensis* Glebovskaya, 1938 = nomen dubium.
rhomboidea Kirkby, 1858 = *Cryptobairdia? rhomboidea* (Kirkby), 1858.
rhomboidea Kirkby. Schmid, 1867 = sp. indet.
cf. *B. rhomboidea* Kirkby. Cooper, 1946 = sp. indet.
rockfordensis Gibson, 1955 = nomen dubium.
rogatzi Coryell and Sample, 1932 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
rostrata Péneau, 1929 [part] = nomen dubium; [part] = *Alanella? dubia* Kesling and Sohn, 1958.
rostrata Issler, 1908 [senior primary homonym] = gen. indet. (Lias).
salemensis Geis, 1932 = *Bairdia permagna* Geis, 1932.
salteriana Jones and Holl, 1868 = gen. indet.
samplei Coryell and Booth, 1933 = *Bairdia beedei* Ulrich and Bassler, 1906.
saxifraga Krömmelbein, 1954 = *Rectobairdia saxifraga* (Krömmelbein), 1954.
scapha Eichwald, 1860 = gen. indet.
schaurothiana Kirkby, 1858 = *Rectobairdia schaurothiana* (Kirkby), 1858.
schaurothiana Kirkby. Kirkby, 1862 [part] = *Rectobairdia* sp. E; [part] *Rectobairdia schaurothiana* (Kirkby), 1858.
schaurothiana Kirkby. Cooper, 1946 = *Rectobairdia* sp. G.
schaurothiana Kirkby. Marple, 1952 = *Rectobairdia* sp. G.
scholli Coryell and Booth, 1933 = *Orthobairdia texana?* (Harlton), 1927.
scholli Coryell and Booth. Cooper, 1946 = *Cryptobairdia pinnula?* (Coryell and Booth), 1933.
scholli Coryell and Booth. Cordell, 1952 = *Cryptobairdia pinnula* (Coryell and Booth), 1933.
seligi Delo, 1930 = *Bairdia beedei?* Ulrich and Bassler, 1906.
semilunulata Netschajew, 1894 = nomen dubium.
seminalis Knight, 1928 = *Cryptobairdia seminalis* (Knight), 1928.
seminalis Knight. Kellett, 1934 = *Bairdia beedei?* Ulrich and Bassler, 1906.
seminalis Knight. Payne, 1937 = *Orthobairdia oklahomaensis* (Harlton) 1927.
seminalis Knight. Coryell and Rozanski, 1942 = *Orthobairdia cestriensis?* (Ulrich) 1891.
seminalis? Knight. Cooper, 1946 = *Bairdia beedei?* Ulrich and Bassler, 1906.
seminalis Knight. Cordell, 1952 = *Bairdia beedei?* Ulrich and Bassler, 1906.
shideleri Delo, 1930 = *Fabalicypris shideleri* (Delo), 1930.
siliquoides Jones and Kirkby, 1879 = gen. indet.
singularis Krömmelbein, 1954 = *Cryptobairdia? singularis* (Krömmelbein), 1954.
sinuosa Morey, 1936 = *Rectobairdia sinuosa* (Morey), 1936.
sinuosa Cooper, 1941 = *Orthobairdia cestriensis?* (Ulrich), 1891.
spinosa Cooper, 1946 = *Pustulobairdia spinosa* (Cooper), 1946.
spinosa Polenova, 1952 [not Cooper, 1946] = *Rectobairdia tikhyi?* (Polenova), 1952.
aff. *B. spinosa* Cooper. Sohn, 1954 = *Pustulobairdia* sp. A.
stictica Krömmelbein, 1950 = *Orthobairdia stictica* (Krömmelbein), 1950.
subaequalis Geis, 1932 = *Fabalicypris? subaequalis* (Geis), 1932.
subampla Posner, 1951 = *Bairdia gibbera?* Morey, 1935.
subcitriformis Knight, 1928 = *Bairdia pompilioides* Harlton, 1928.
subconvexa Coryell and Billings. Tasch, 1953 [misspelling for *subvexa*] = *Cryptobairdia folgeri?* (Kellett), 1934.
subcylindrica (Münster). Kummerow, 1939 = gen. indet.
subelongata Jones and Kirkby, 1879 [part] = *Bairdiacypris subelongata* (Jones and Kirkby), 1879; [part] = *Cryptobairdia* sp. F; [part] = *Rectobairdia* sp. F; [part] = *Fabalicypris?* sp. indet.
subelongata Jones and Kirkby. Vine, 1884 = sp. indet.
subelongata Jones and Kirkby. Jones and Kirkby, 1892 = *Bairdiacypris* sp. A?
subelongata Jones and Kirkby. Harlton, 1927 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
subelongata? Jones and Kirkby. Knight, 1928 = *Fabalicypris?* sp. indet.
subelongata Jones and Kirkby. Harlton, 1929 = *Bairdiacypris? trojana* (Wilson), 1933.
cf. *B. subelongata* Jones and Kirkby. Cooper, 1941 = *Bairdiacypris* sp. indet.
subelongata var. *major* Jones and Kirkby, 1886 = *Bairdiacypris major* (Jones and Kirkby), 1886.
subequalis Geis. Sohn, 1940 = *Fabalicypris? subaequalis* (Geis), 1932.
subgracilis Geinitz, 1861 = *Cryptobairdia? subgracilis* (Geinitz), 1861.
subgracilis Geinitz. Jones and Kirkby, 1879 = *Cryptobairdia?* sp.
submucronata Jones and Kirkby. Kummerow, 1939 = *Bairdia* sp. H.
subparallela Morey, 1935 = nomen dubium.
subquadrata Glebovskaya, 1939 = nomen dubium.
subreniformis (Kirkby), 1859 = *Orthobairdia? subreniformis* (Kirkby), 1859.
subroundata Harlton, 1929 = gen. indet.
subtila Cooper, 1941 = *Cryptobairdia? subtila* (Cooper), 1941.
subtilla Gibson, 1955 = *Bairdia hypsoconcha?* Gibson, 1955.
subvexa Coryell and Billings, 1932-= *Rectobairdia subvexa* (Coryell and Billings), 1932.
summa Coryell and Billings. Cooper, 1946 = *Cryptobairdia hoffmanae?* (Kellett), 1932.
summacuminata Coryell and Malkin, 1936 = *Bairdia leguminoides* Ulrich, 1891.
symmetrica Cooper, 1946 = *Rectobairdia symmetrica* (Cooper), 1946.
symmetrica Egorov, 1953 [not Cooper, 1946] = *Bairdia egorovi* Sohn, n. name.
tantilla Kummerow, 1953 = *Rectobairdia tantilla* (Kummerow), 1953.
texana Harlton 1927 = *Orthobairdia texana* (Harlton), 1927.
tichomirovi Egorov, 1953 = *Rectobairdia tichomirovi* (Egorov), 1953.
tikhyi Polenova, 1952 = *Rectobairdia tikhyi* (Polenova), 1952.
trojana Wilson, 1933 = *Bairdiacypris? trojana* (Wilson), 1933.
truncata Kirkby, 1858 = *Bairdia amputata* Kirkby, 1859 = nomen dubium.
tumida Kummerow, 1928 = gen. indet.
tumida Upson, 1933 = *Bairdia crassa?* Harlton, 1929.
unica Stewart and Hendrix, 1945 = nomen dubium.
ventricosa Kirkby, 1858 = *Cryptobairdia ventricosa* (Kirkby), 1858.

ventricosa Roth and Skinner, 1930 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.
verwiebei Kellett. Cooper, 1946 = *Bairdia acuminata* Cooper, 1946.
? *volaformis* Polenova, 1952 = gen. indet.
wabashensis Scott and Borger, 1941 = gen. indet.
warthini Bradfield, 1935 = *Fabalicypris warthini* (Bradfield), 1935.
whortani Kellett, 1935 = *Cryptobairdia forakerensis* (Kellett), 1934.
wordensis Hamilton, 1942 = *Ceratobairdia wordensis* (Hamilton) 1942.
wrefordensis Upson, 1933 = *Bairdia beedei*? Ulrich and Bassler, 1906.
sp. Bradfield, 1935 = position uncertain.
sp. 1 to sp. 8 Cordell, 1952 [not revised because of obviously inadequate material].
sp. 9 Cordell, 1952 = *Bairdia pompilioides*? Harlton, 1928.
sp. Hou, 1955 = steinkern of *Healdia*?
sp. Kummerow, 1939 = gen. indet.
sp. Péneau, 1927 = position uncertain.
sp. No. 1 Posner, 1951 = position uncertain.
? sp. Scott, 1942 = position uncertain.
sp. Stewart, 1936 = position uncertain.
? sp. Stewart, 1950 = position uncertain.
sp. A Upson, 1933 = steinkern, gen. undet.

Genus **CRYPTOBAIRDIA** Sohn, n. gen.

Type species.—*Bairdia ventricosa* Roth and Skinner, 1930 [not Kirkby, 1858], Jour. Paleontology, v. 4, p. 352, pl. 28, figs. 12–14. Pennsylvania, Colorado; = *B. coryelli* Roth and Skinner, 1931.

Diagnosis.—Differs from *Bairdia* s. s. by the dorsoanterior margin being not distinct.

Discussion.—This genus is unique in having a rounded anterior margin into which the dorsal margin grades without differentiation of a dorsoanterior margin. It resembles *Bairdia* s. s. in having a convex dorsal margin, a pointed or bluntly pointed posterior, and curved sides in dorsal outline.

The genus *Cryptobairdia* is defined as not possessing a distinct dorsoanterior margin. It consists of two groups: in the first the greatest height is equal to more than half the greatest length, in the second the greatest height is less than half the greatest length. A total of 29 species, 6 of which are new, but are here designated by letter, are recognized. These are defined by a dichotomous key. The stratigraphic range and the frequency of occurrence of these species are shown in figure 7.

Figure 7 shows that 21 of the total of 29 species are of Middle Pennsylvanian through Permian in age. These species are recorded from 44 out of 57 localities; the remaining 13 localities are one each from the Middle and Upper Devonian, and 11 from Mississippian and Carboniferous.

Geologic range.—Middle Devonian–Permian.

Lithology.—Limestone and shale.

Habitat.—Marine.

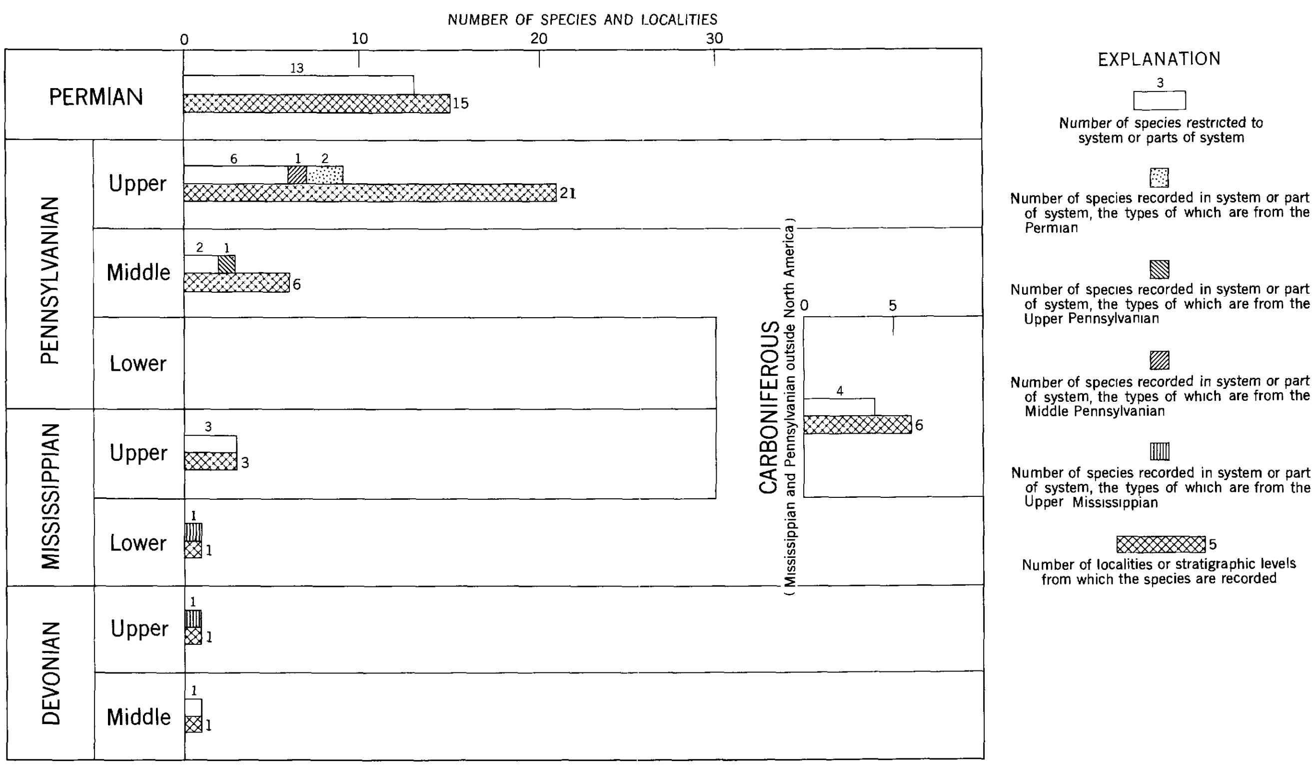

FIGURE 7.—Stratigraphic range and frequency distribution of species in *Cryptobairdia*.

KEY TO THE SPECIES OF CRYPTOBAIRDIA

1. Greatest height more than half the greatest length — 2
1a. Greatest height less than half the greatest length — 14
2. Ventral margin straight — 9
2a. Ventral margin curved — 3
3 (2). Dorsoposterior margin approximately one-third of of the greatest length — 4
3a. Dorsoposterior margin about one-half of the greatest length — 7
4 (3). Greatest width below midheight — 12
4a. Greatest width at midheight — 5
5 (4a). Ends blunt in dorsal outline — 6
5a. Ends pointed in dorsal outline — *compacta* (p. 49), (*magnacurta*?, *merivia*?)
6 (5). Both ends convex in dorsal outline — *folgeri* (p. 50)
6a. Posterior ends concave in dorsal outline — sp. A (p. 51)
7 (3a). Posterior blunt in lateral outline — *recta* (p. 50)
7a. Posterior pointed in lateral outline — 8
8 (7a). Dorsoposterior part of right valve inflated *forakerensis* (p. 50), (*demissa*?, *kanwakensis*?, *whortani*)
8a. Dorsoposterior part of right valve not inflated *pinnula* (p. 50)
9 (2a). Ventral margin concave — 13
9a. Ventral margin covex — 10
10 (9a). Dorsoposterior margin convex — *seminalis* (p. 51)
10a. Dorsoposterior margin concave — 11
11 (10a). Greatest width equal to or larger than greatest height — *coryelli* (p. 49), (*bidorsalis*?, *gibbosa*, *hispida* var. *lesterica*?, *nitida*)
11a. Greatest width less than greatest height — *drupacea* (p. 49)
12 (4). Posterior point in ventral third of greatest height; greatest width approximately equal to greatest height, located median — *hooverae* (p. 50)
12a. Posterior point in ventral quarter of greatest height; greatest width two-thirds the greatest height, located anterior to midlength — *praecisa* (p. 50)
13 (9). Dorsoposterior margin to one-third of the greatest length — sp. B (p. 52)
13a. Dorsoposterior margin to one-quarter of the greatest length — *contractella* (p. 49)
14 (1a). Ventral margin straight — 15
14a. Ventral margin curved — 19
15 (14). Dorsoposterior margin to one-quarter of greatest length — 16
15a. Dorsoposterior margin to one-third or more of greatest length — 17
16 (15). Ends symmetrical in dorsal outline; greatest width at midlength — *hoffmanae* (p. 50)
16a. Ends not symmetrical in dorsal outline; posterior blunt — *aequalis* (p. 48) (*distracta*?)
17 (15a). Ventroposterior margin straight — sp. C (p. 52)
17a. Ventroposterior margin convex — 18
18 (17a). Anterior margin round — *compressa* (p. 49)
18a. Anterior margin bluntly pointed — sp. E (p. 52)
19 (14a). Ventral margin convex — 20
19a. Ventral margin concave — 21
20 (19). Dorsoposterior margin straight; dorsoanterior margin straight to slightly concave — *rhomboidea* (p. 51)
20a. Dorsoposterior margin concave; dorsoanterior margin convex — 28
21 (19a). Dorsoposterior margin to one-quarter of greatest length — 22
21a. Dorsoposterior margin to one-third or more of greatest length — 24
22 (21). Greatest height about one-third of greatest length *subgracilis* (p. 51)
22a. Greatest height more than one-third of greatest length — 23
23 (22a). Greatest width in dorsal outline at midlength — 27
23a. Greatest width in dorsal outline behind midlength *subtila*? (p. 51)
24 (21a). Anterior margin pointed — 25
24a. Anterior margin round — 26
25 (24). Dorsoposterior margin convex — sp. D (p. 52)
25a. Dorsoposterior margin concave — *maxeyi* (p. 50)
26 (24a). Greatest height more than one-third of greatest length; junction of ventroanterior and anterior margins at approximately midheight — *haworthi* (p. 50)
26a. Greatest height one-third or less of greatest length; junction of ventroanterior and anterior margins above midheight — sp. F (p. 52)
27 (23). Sides of posterior in dorsal outline convex — *singularis* (p. 51)
27a. Sides of posterior in dorsal outline concave — *ventricosa* (p. 51)
28 (20a). Posterior point below midheight — *amygdalina* (p. 48)
28a. Posterior point above midheight — *berniciensis* (p. 49)

ASSIGNED SPECIES

Cryptobairdia aequalis (Eichwald), 1857

Bairdia aequalis Eichwald, 1857, Soc. Imp. Nat., Moscou. Bull., v. 30, pt. 2, no. 4, p. 311 [no illus.].
Eichwald, 1860, Letheae Rossica, v. 1, p. 1340, atlas, pl. 52, figs. 6a–c [probably a corroded specimen]. Carboniferous, village of Sloboda, Toula Government, Russia.
?*Bairdia curta* McCoy. Eichwald, 1860 [part], Letheae Rossica, v. 1, p. 1338, atlas, pl. 52, figs. 18a–c [not figs 17a–c = *Bairdia* sp. D]. Carboniferous, red sandstone, near Tschuodowa, Government of St. Petersburg, Russia.
[not] *Bairdia aequalis* Eichwald. Jones and Kirkby, 1875 = gen. indet.

In 1860, Eichwald (p. 1340) referred to this species as "*B. aequalis* Eichwald, 1857, Soc. Natur. Moscou Bull., p. 199." I am unable to obtain numbers 1 and 2 of this bulletin, but in number 4, he discussed this species (p. 311) without reference to any previous citation. Jones and Kirkby (1875, p. 53) and Bassler and Kellett (1934, p. 164) refer to this species as Eichwald, 1857, p. 311.

Geologic range.—Carboniferous.

Cryptobairdia amygdalina (Kirkby), 1859

Bairdia plebia var. *amygdalina* Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 145, text fig. 5, pl. 9, figs. 11, 11a. Permian, shell limestone, Tunstall Hill, Durham, England.
Bairdia mucronata Reuss. Kirkby, 1858 [part], Annals Mag. Nat. History, ser. 3, v. 2, p. 327, pl. 10, figs. 11, 11a [not figs. 9, 10; see *Bairdia caudata* Kirkby, 1859]. Same illustrations as above.

[not] *Bairdia mucronata* Reuss, 1854 = nomen dubium.

Geologic range.—Permian.

Cryptobairdia? berniciensis (Kirkby), 1858

Bairdia? berniciensis Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 330, pl. 10, figs. 15, 15a. Permian limestone, Tunstall Hill, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 149, woodcuts 13, pl. 9, fig. 15. Same locality as above.

[not] *Cythere berniciensis* (Kirkby). Richter, 1867 = *Cryptobairdia* sp. B.

Geologic range.—Permian.

Cryptobairdia compacta (Geis), 1932

Bairdia compacta Geis, 1932, Jour. Paleontology, v. 6, p. 177, pl. 25, figs. 14a–d. Salem limestone, Indiana.

?*Bairdia magnacurta* Morey, 1935, Jour. Paleontology, v. 9, p. 323, pl. 22, fig. 22. Sylamore sandstone, Williamsburg, Mo.

?*Bairdia merivia* Benson, 1955, Jour. Paleontology, v. 29, p. 1033, pl. 107, figs. 7, 12. Fern Glen formation, railroad cut Fern Glen Station, SE¼SE¼ sec. 14, T. 44 N., R. 4 E., St. Louis County, Mo.

Geologic range.—Upper Devonian(?), Mississippian.

Cryptobairdia compressa (Kirkby), 1858

Bairdia plebia var. *compressa* Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 325, pl. 10, figs. 7, 7a. Permian Shell limestone of Tunstall Hill (?), Durham, England.

Bairdia kingii var. *compressa* Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 148, woodcuts 12, pl. 9, figs. 7, 7a. Same as above.

[not] *Bairdia compressa* Geis, 1932 = *Orthobairdia kirki* n. name.

Geologic range.—Permian.

Cryptobairdia contractella Sohn, n. name

Bairdia hisingeri var. *contracta* Jones and Kirkby, 1895, Annals Mag. Nat. History, ser. 6, v. 16, p. 475, pl. 21, fig. 7. Carboniferous limestone, Dowgill, Settle, Scotland.

[not] *Bairdia contracta* Jones, 1857, Monograph Tertiary Entomostraca of England: Palaeontogr. Soc. London, p. 53, pl. 5, figs. 1a–c. Eocene, England; senior primary homonym = *Paracypris*.

[not] *Bairdia contracta* Morey, 1935 = Junior homonym. Because the holotype of Morey's species (Missouri Univ. No. 0.1029–5) is a steinkern so badly corroded that it is not possible to determine the specific characters, it is best not to rename the species, but to carry it as nomen dubium.

[not] *Bairdia contracta* Morey. Scott, 1942 = *Bairdia* sp. M.

Geologic range.—Carboniferous.

Cryptobairdia coryelli (Roth and Skinner), 1931

Plate 2, figures 16–19

Bairdia coryelli Roth and Skinner, 1931, Jour. Paleontology, v. 5, p. 48; new name for *B. ventricosa* Roth and Skinner, 1930 [not Kirkby, 1858].

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 43, pl. 2, figs. 8–10; pl. 4, figs. 16–17. Shoal Creek to Greenup zones, Adams County, Macoupin County, Cumberland County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 84, pl. 17, figs. 17–20. Bethany Falls member of Swope formation to upper shale member of the Lawrence formation, De Kalb, Clinton, and other Counties, Mo.

Bairdia ventricosa Roth and Skinner, 1930, Jour. Paleontology, v. 4, p. 352, pl. 28, figs. 12–14, McCoy formation, McCoy Post Office, Eagle County, Colo.

Bairdia blakei Harlton, 1931, Jour. Paleontology, v. 5, p. 163; n. name for *B. nitida* Harlton, 1928 [not Jones and Kirkby, 1879].

?*Bairdia bidorsalis* Bradfield, 1935, Bull. Am. Paeontology, v. 22, no. 73, p. 81, pl. 5, figs. 6a, b. Deese formation, Ardmore Basin, Okla. Based on a young individual.

Bairdia nitida Harlton, 1928, Jour. Paleontology, v. 2, p. 139, pl. 21, figs. 12a, b. Hoxbar formation, Love County, Okla.

Harlton, 1929, Texas Univ. Bull. 2901, p. 155, pl. 3, figs. 3a, b. Canyon Group, Menard County, Tex. Plesiotype (USNM 80581) is a specimen with the shell partly dissolved.

Bairdia gibbosa Payne, 1937 [not *B. neglecta gibbosa* Egger, 1858], Jour. Paleontology, v. 11, p. 283, pl. 39, figs. 4a, b. Hayden Branch formation, Turman Township, Sullivan County, Ind.

Bairdia crassa Harlton. Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 80, pl. 5, figs. 8a, b. Deese formation, Ardmore Basin, Okla. Based on a young individual.

Cordell, 1952 [part], Jour. Paleontology, v. 26, p. 85, pl. 19, figs. 11, 12 [not figs. 7–10 = *B. crassa* Harlton, 1929]. Stanton formation, shale parting in about middle of Stoner limestone, 0.8 mile northwest of Scearces, Clinton County, Mo.

?*Bairdia hispida* var. *lesterica* Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 88, pl. 5, figs. 4a, b. Dornick Hills formation, Ardmore County, Okla. Corroded specimens.

[not] *Bairdia blakei* Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 42, pl. 1, figs. 16–19 = *Bairdia* sp. R.

[not] *Bairdia nitida* Harlton. Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 72, pl. 6, figs. 3a, b = *B. whitesidei*? Bradfield, 1935.

Many of the species in the synonymy are based on specimens that are either young indiivduals, or from which a certain amount of shell material has been dissolved.

Geologic range.—Middle and Upper Pennsylvanian.

Cryptobairdia drupacea (Richter), 1855

Cythereis drupacea Richter, 1855, Deutsch Geol. Gesell. Zeitschr., v. 7, p. 529, pl. 26, figs. 11, 12. Zechstein, Thuringia, Germany.

Bairdia drupacea (Richter). Bassler and Kellett, 1934, Geol. Soc. America, Spec. Paper 1, p. 170.

[not] *Cythere (Cythereis) drupacea* Richter. Schmid, 1867 = sp. indet.

Geologic range.—Permian.

Cryptobairdia folgeri (Kellett), 1934

Bairdia folgeri Kellett, 1934, Jour. Paleontology, v. 8, p. 136, pl. 18, figs. 1a–f, 4a–f, pl. 19, figs. 1a–d, 4a–f, 6a–d. Virgilian series, the holotype (USNM 89483) is from the Wakarusa limestone, Webaunsee group, about 8 miles south-southwest of Topeka, Shawnee County, Kans.

?*Bairdia subconvexa* Coryell and Billings. Tasch, 1953 [misspelling for *subvexa*], Jour. Paleontology, v. 27, p. 400, pl. 29, fig. 13. Pennsylvanian shale bank to right of road entering Country Club Heights, Emporia, Lyon County, Kans.

Geologic range.—Upper Pennsylvanian.

Cryptobairdia forakerensis (Kellett), 1934

Plate 2, figures 1, 2

Bairdia forakerensis Kellett, 1934, Jour. Paleontology, v. 8, p. 137, pl. 18, figs. 3a, b. Limestone and shale, lower Elmdale formation, below road and above water level of Cottonwood River, upstream of Cottonwood River bridge, east of Elmdale, Chase County, Kans.

Bairdia whortani Kellett, 1935, Jour. Paleontology, v. 9, p. 135, text fig. 5. Kanwaka shale, U.S. Highway 166, 3 miles west of Sedan, sec. 5, T. 34 S., R. 11 E., Chautauqua County, Kans.

?*Bairdia demissa* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 44, pl. 2, figs. 23–26. Shales in Shumway and Woodbury zones, SE¼ sec. 32, T. 9 N., R. 8 E., Cumberland County, Ill.

?*Bairdia kanwakensis* Kellett, 1935, Jour. Paleontology, v. 9, p. 134, text figs. 1a–d. Kanwaka shale, same locality as *B. whortani.*

The holotype of *B. forakerensis* (USNM 89484) is partly abraded. Kellett illustrated *B. whortani* with an outline drawing of the inside of a right valve. The carapace of a paratype of *B. whortani* (USNM 90097a) is here illustrated.

Geologic range.—Upper Pennsylvanian–Permian.

Cryptobairdia haworthi (Knight), 1928

Bairdia haworthi Knight, 1928, Jour. Paleontology, v. 2, p. 325, pl. 43, figs. 7a, b. Shale parting in "Brown lime" in Labette shale exposed in south bank of creek east of Price Rd. and south of Ladue Rd., St. Louis County, Mo.

[not] *Bairdia haworthi* Knight. Warthin, 1930 = *Fabalicypris warthini* (Bradfield), 1935.

Geologic range.—Middle Pennsylvanian.

Cryptobairdia hoffmanae (Kellett), 1934

Plate 2, figures 27, 28

Bairdia hoffmanae Kellett, 1934, Jour. Paleontology, v. 8, p. 133, pl. 17, fig. 3. Americus limestone, 1¼ miles south of Allen, Lyon County, Kans.

?*Bairdia summa* Coryell and Billings. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 52, pl. 3, figs. 35, 36. Shales above and below "Centralia" limestone, SW¼ sec. 19, T. 7 N., R. 4 W., Montgomery County, Ill.

The holotype (USNM 89478), is an abraded specimen that is almost a steinkern.

Geologic range.—Upper Pennsylvanian–Permian.

Cryptobairdia hooverae (Kellett), 1934

Bairdia hooverae Kellett, 1934, Jour. Paleontology, v. 8, p. 126, pl. 14, figs. 5a, b. Top of Ervine Creek limestone member, Deer Creek formation, Shawnee group, railroad cut near Kansas River just west of Shawnee-Douglas County line crossing Highway 10, Kans.

[not] *Bairdia hooverae* Kellett. Payne, 1937 = sp. indet.

[not] *Bairdia hooverae* Kellett. Cooper, 1946 = *Cryptobairdia* sp. A.

Geologic range.—Upper Pennsylvanian.

Cryptobairdia maxeyi (Harris and Lalicker), 1932

Bairdia maxeyi Harris and Lalicker, 1932, Am. Midland Naturalist, v. 13, p. 405, pl. 37, fig. 9. Garrison shale, Cowley County, Kans.

Geologic range.—Permian.

Cryptobairdia pinnula (Coryell and Booth), 1933

Bairdia pinnula Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 263, pl. 3, fig. 14. Wayland shale west side of Salt Creek, near Graham–Throckorton road, 1 mile west of Graham, Young County, Tex.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 49, pl. 3, figs. 13, 14. Shale in Shumway cyclothem, SW¼ sec. 26, T. 9 N., R. 5 E., Effingham County, Ill.

?*Bairdia scholli* Coryell and Booth. Cooper, 1946, idem, p. 51, pl. 3, figs. 33, 34. Shale in Little Vermillion limestone, SE¼ sec. 36, T. 33 N., R. 10 E., Jasper County, Ill.

Bairdia scholli Coryell and Booth. Cordell, 1952, Jour. Paleontology, v. 26, p. 90, pl. 18, fig. 11; pl. 19, figs. 1–6. Eudora shale, SE¼ sec. 29, T. 59 N., R. 29 W., Daviess County; NE¼ sec. 17, T. 55 N., R. 31 W., Clinton County; shale partings in Block limestone SE¼NE¼ sec. 36, T. 60 N., R. 25 W., Daviess County, Mo.

Geologic range.—Upper Pennsylvanian.

Cryptobairdia praecisa (Jones and Kirkby), 1879

Bairdia praecisa Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 577, pl. 32, figs. 1–6. Thin limestone of the Calciferous-Sandstone Series near Randerstone, Fife, Scotland.

The wedge shape towards the posterior in dorsal outline and the almost straight truncated anterior distinguish this species.

Geologic range.—Carboniferous.

Cryptobairdia recta (Harlton), 1929

Plate 2, figures 6, 7

Bairdia recta Harlton, 1929, Texas Univ. Bull. 2901, p. 159, pl. 4, figs. 4a–e. Canyon Group, near Hext, Menard County, Tex.

The original of figure 4b from Harlton's cotypes (USNM 80590) is here designated as the lectotype.

Geologic range.—Upper Pennsylvanian.

Cryptobairdia? rhomboidea (Kirkby), 1858

Bairdia rhomboidea Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 433, pl. 11, figs. 3, 3a. Permian, Shell limestone, Tunstall Hill, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 149, woodcuts 14, pl. 10, figs. 3, 3a. Locality same as above.

[not] *Cythere* (*Bairdia*) *rhomboidea* Kirkby. Schmid, 1867 = sp. indet.

[not] *Bairdia* cf. *B. rhomboidea* Kirkby. Cooper 1946 = sp. indet.

[not] *Bairdia rhomboidea* Brady, 1869, *in* Folin and Perier 1867–71, Fonds de la Mer, p. 162, pl. 19, figs. 14, 15. Recent, Mauritius = *B. tuberculata* Brady, 1880. This species differs from *Bairdia* and *Cryptobairdia* in lateral outline.

[not] *Bairdia rhomboidea* Jones and Sherborn, 1887, Geol. Mag., new ser., dec. 3, v. 4, p. 388 [no illus.]. Pliocene, White (coralline) Crag of Sutton, Suffolk, England.

Jones and Sherborn, 1889, Supplementary Monograph Tertiary Entomostraca, England: Palaeontogr. Soc. London, p. 18, pl. 1, figs. 3a–c. Same locality as above. Requires a new name.

Geologic range.—Permian.

Cryptobairdia seminalis (Knight), 1928

Bairdia seminalis Knight, 1928, Jour. Paleontology, v. 2, p. 320, pl. 43, figs. 2a–d. Shale partings in "Brown lime" of Labette formation, exposed in south bank of creek east of Price Rd., and south of Ladue Rd., St. Louis County, Mo.

Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 262, pl. 25, fig. 14. East Mountain shale, Mineral Wells formation, Mineral Wells, Palo Pinto County, Tex.

Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 40, pl. 4, fig. 31. Shale in South Bend limestone, Stanton formation, Atwood quarry, [county not given], Nebr.

Bairdia blakei Harlton. Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 84, pl. 6, figs. 1a, b, 2. Union Dairy limestone, top part, railroad cut, center line SW¼ sec. 6, T. 5 S., R. 2 E., shale 112–115 ft above conglomerate, near base of Hoxbar formation; SE¼SE¼ sec. 22, T. 3 S., R. 2 E., 7 miles north and 3 miles east of Ardmore, Carter County, Okla.

[not] *Bairdia seminalis* Knight. Kellett, 1934 = *B. beedei* Ulrich and Bassler, 1906.

[not] *Bairdia seminalis* Knight. Payne, 1937 = *Orthobairdia oklahomaensis* (Harlton), 1927.

[not] *Bairdia seminalis* Knight. Coryell and Rozanski, 1942 = *Orthobairdia cestriensis*? (Ulrich), 1891.

[not] *Bairdia seminalis* Knight. Cooper, 1946 = *B. beedei* Ulrich and Bassler, 1906.

[not] *Bairdia seminalis* Knight. Cordell, 1952 = *B. beedei* Ulrich and Bassler, 1906.

Geologic range.—Middle and Upper Pennsylvanian.

Cryptobairdia? singularis (Krömmelbein), 1954

Bairdia singularis Krömmelbein, 1954, Senckenbergiana, v. 34, no. 4/6, p. 248, pl. 1, figs. 1a–d. Givetian, Paffrather Mulde, Germany.

Geologic range.—Middle Devonian.

Cryptobairdia? subgracilis (Geinitz), 1861

Bairdia subgracilis Geinitz, 1861, Dyas, v. 1, p. 34, figs. 9a–c. Permian, Zechstein, Wetterau and Selters, Germany.

Bairdia gracilis McCoy. Reuss, 1854, Wetterauer Gesell. Naturk. Hanau, Jahresb. 1851–53, p. 65, pl. figs. 2a, b [not fig. 3 = sp. indet.). Permian, Bleichenback, Germany.

?*Bairdia gracilis* McCoy. Richter, 1855, Deutsch. Geol. Gesell. Zeitschr., v. 7, p. 530, pl. 26, figs. 16, 17. Permian, Germany.

[not] *Bairdia gracilis* McCoy, 1844 = nomen dubium.

[not] *Bairdia subgracilis* Geinitz. Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 375, pl. 30, fig. 17. Carboniferous, "Main Limestone," Carluke district, West Scotland = *Cryptobairdia*? sp.

[not] *Bairdia arcuata* var. *gracilis* Bosquet, 1854, Monograph. Crustaces Fossiles du Terrain Crétacé du Duche de Limbourg, p. 60, pl. 5, figs. 4a–d = *Paracypris*?.

Geinitz erected this species for *Bairdia gracilis* Jones, 1850 [not McCoy, 1844], and illustrated Reuss' German specimen. Jones' species is here considered a nomen dubium.

Jones and Kirkby, 1879, illustrated a Carboniferous species which they referred to *Bairdia subgracilis* Geinitz. The Carboniferous species differs from Reuss' species by the posterior being more rounded and should be referred to *Cryptobairdia*? sp.

Geologic range.—Permian.

Cryptobairdia? subtila (Cooper), 1941

Bairdia subtila Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 26, pl. 2, figs. 5, 6. Kinkaid formation, NE¼SW¼ NE¼ sec. 20, T. 12 S., R 3 E., one-half a mile south of Veatch School, Johnson County, Ill.

Geologic range.—Upper Mississippian.

Cryptobairdia ventricosa (Kirkby), 1858

Bairdia ventricosa Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 326, pl. 10, figs. 3, 3a. Permian limestone, Tunstall Hill, Durham, England.

Bairdia plebia var. *ventricosa* Kirkby. Kirkby 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 146, woodcuts 9, pl. 9, figs. 3, 3a. Same locality as above.

[not] *Bairdia ventricosa* Brady, 1890, Royal Soc. Edinburgh Trans., v. 35, p. 494, pl. 4, figs. 17, 18. Requires a new name. The muscle scar patterns and lateral outline of this living species differ from *Bairdia* and *Cryptobairdia*.

[not] *Bairdia ventricosa* Roth and Skinner, 1930 = *Cryptobairdia coryelli* (Roth and Skinner), 1931.

Geologic range.—Permian.

Cryptobairdia sp. A

Bairdia hooverae Kellett. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 46, pl. 2, figs. 21, 22. Shale below La Salle limestone, NW¼ sec. 33, T. 16 N., R. 11 E., Bureau County, Ill.

Geologic range.—Upper Pennsylvanian.

Cryptobairdia sp. B

Cythere berniciensis (Kirkby). Richter, 1867, Deutsch. Geol. Gosell. Zeitschr., v. 19, p. 235, pl. 5, figs. 16–18. Zechstein, Germany.

[not] *Bairdia berniciensis* Kirkby, 1858 = *Cryptobairdia*? *berniciensis* (Kirkby), 1858.

Geologic range.—Permian.

Cryptobairdia sp. C

Cythere (*Bairdia*) *ampla* Reuss. Jones, 1859 [part], *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 162, pl. 11, figs. 14a–c. Permian, Byers' Quarry, Durham, England.

Geologic range.—Permian.

Cryptobairdia sp. D

Bairdia kingii Reuss. Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 327, pl. 10, figs. 8, 8a. Permian, Shell limestone, Tunstall Hill, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 148, woodcuts 11, pl. 9, figs. 8, 8a. Same locality as above.

Geologic range.—Permian.

Cryptobairdia sp. E

Bairdia osorioi Croneis and Gale. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 9, 14 [list], pl. 2, figs. 13, 14. Golconda formation NE¼NW¼ sec. 20, T. 5 S., R. 8 W., Randolph County, Ill.

[not] *Bairdia*? *osorioi* Croneis and Gale *in* Croneis, 1939 = nomen dubium.

Geologic range.—Upper Mississippian.

Cryptobairdia sp. F

Bairdia subelongata Jones and Kirkby, 1879 [part], Geol. Soc. London, Quart. Jour., v. 35, p. 573, pl. 30, figs. 8, 9 [not figs. 1–6 = *Bairdiacypris subelongata;* not fig. 7 = sp. indet.; not figs. 10, 11 = *Rectobairdia* sp. F; not fig. 16 = *Fabalicypris*? sp.] Carboniferous, Paiston quarry, East Lothian, Scotland.

Differs from other species in this genus by truncated ventroanterior margin and by gently convex ventral margin.

Geologic range.—Carboniferous.

Cryptobairdia? sp.

Bairdia subgracilis Geinitz. Jones and Kirkby, 1879, Geol. Soc. London, Quart. Jour., v. 35, p. 375, pl. 30, fig. 17. "Main Limestone," Carluke district, West Scotland.

Geologic range.—Carboniferous.

Cryptobairdia? sp. indet.

Bairdia cf. *B. kelletti* Glebovskaya. Glebovskaya, 1938, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 101, p. 181, pl. 1, figs. 7, 7a. Permo-Carboniferous oil-bearing deposits, Ishimbaev district, Russia.

For discussion see *Bairdia kellettae* Glebovskaya, 1939.

Genus RECTOBAIRDIA Sohn, n. gen.

Type species.—*Bairdia depressa* Geis, 1932 [not Kafka, 1885], Jour. Paleontology, v. 6, p. 178, pl. 25, figs. 12a, b. Salem limestone, Indiana = *Bairdia distressa* Geis, 1940, *in* Sohn.

Diagnosis.—Differs from *Bairdia* s. s. by having a straight to very gently curved dorsal margin.

Discussion.—Species in this genus have pointed posteriors. Several species seem to be transitional (p. 8) and are included here because the dorsal margin, as seen in lateral view, is markedly less convex than that of *Bairdia* s. s. The one exception is *Bairdia girtyi* Sohn, which is not assigned to this genus because the dorsal margin as seen from the left side is definitely arcuate (pl. 1, fig. 32).

The genus *Rectobairdia* is defined as having a straight dorsal margin and a pointed posterior. A total of 31 species are defined by a dichotomous key. Eight of these species are new but are here not named; they are designated by letters. The stratigraphic range and frequency of occurrence of these species are shown in figure 8.

Geologic range.—Middle Devonian–Permian.

Lithology.—Limestone, shale, sandstone(?).

Habitat.—Marine.

KEY TO SPECIES OF RECTOBAIRDIA

1.	Dorsoposterior slope of larger valve located one-third of greatest length	2
1a.	Dorsoposterior slope of larger valve located approximately one-quarter of the greatest length	6
2 (1).	Anterior pointed	3
2a.	Antericr round	4
3 (2).	Dorsoanterior and dorsoposterior margins concave	30
3a.	Dorsoanterior margins straight; dorsoposterior margin slightly concave	*symmetrica* (p. 55)
4 (2a).	Ventral margin straight	5
4a.	Ventral margin concave	*mongoliensis* (p. 55)
5 (4).	Posterior point above midheight	*cultrijugati* (p. 54)
5a.	Posterior point at or below midheight	*legumen* (p. 55)
6 (1a).	Anterior pointed	7
6a.	Anterior round	8
7 (6).	Ventral margin not hooked in front	23
7a.	Ventral margin hooked in front	sp. A (p. 56)
8 (6a).	Ventral margin straight	9
8a.	Ventral margin concave	11
9 (8).	Dorsoanterior margin straight	10
9a.	Dorsoanterior margin curved	28
10 (9).	Posterior point above midheight	*cultrijugati* (p. 54)
10a.	Posterior point below midheight	22
11 (8a).	Posterior point at approximately midheight	21
11a.	Posterior point below midheight	12
12 (11a).	Dorsoposterior margin concave	13
12a.	Dorsoposterior margin straight	16
13 (12).	Concavity of ventral margin behind midlength	*deformis* (p. 54)
13a.	Concavity of ventral margin in front of midlength	14

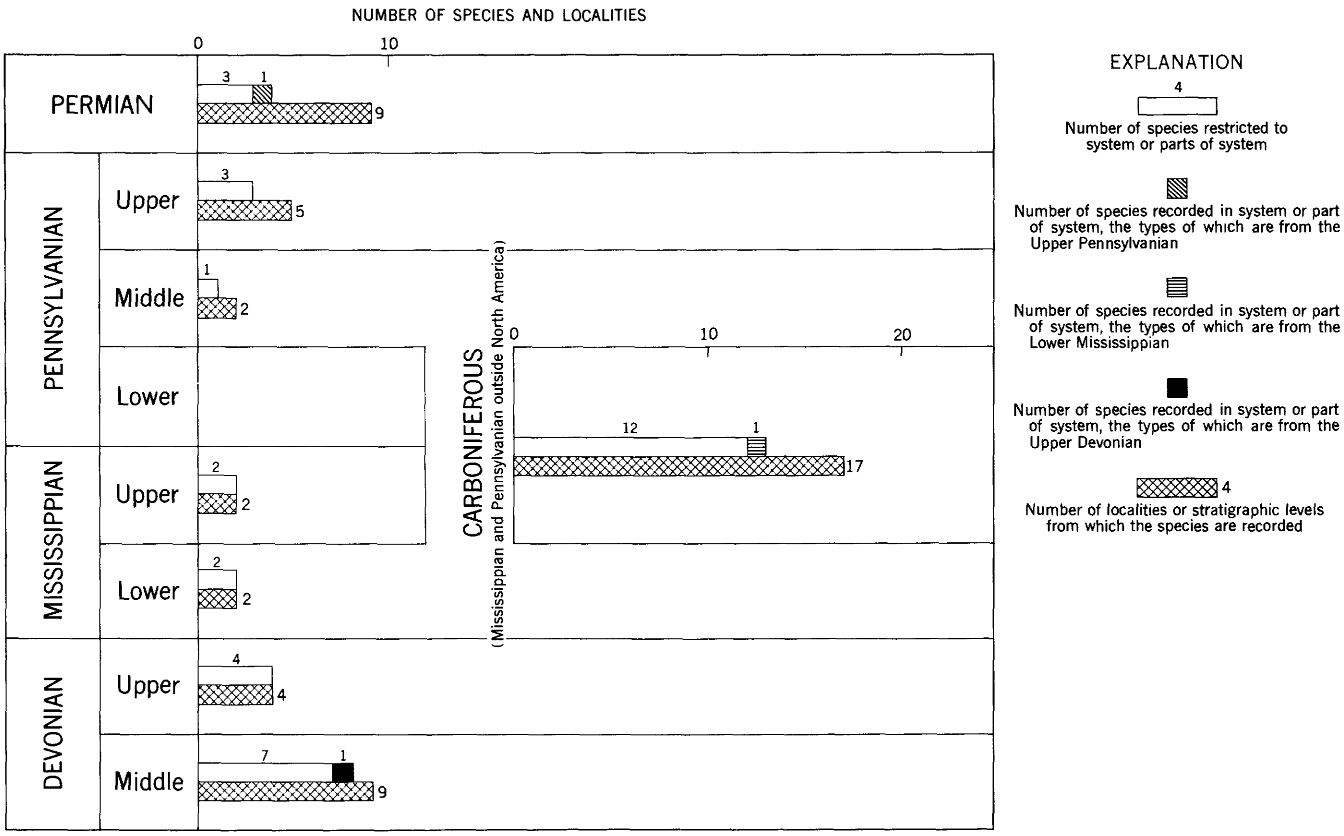

FIGURE 8.—Stratigraphic range and frequency of distribution of species in *Rectobairdia*.

14 (13a). Dorsoanterior margin concave........*tikhyi* (p. 56)
14a. Dorsoanterior margin straight or convex......... 15
15 (14a). Greatest width in dorsal outline behind midlength *sinuosa* (p. 55) (*hisingeriformis*?)
15a. Greatest width in dorsal outline at midlength sp. B (p. 56)
16 (12a). Greatest length approximately twice the greatest height.................................... 17
16a. Greatest length more than twice the greatest height 18
17 (16). Concavity of ventral margin behind midlength *subvexa* (p. 55)
17a. Concavity of ventral margin in front of midlength *hexagona* (p. 54)
18 (16a). Junction of anterior and ventral margins directly below anterior third of dorsoanterior margin sp. C (p. 56)
18a. Junction of anterior and ventral margins directly below posterior half of dorsoanterior margin... 19
19 (18a). Dorsoanterior margin straight or convex......... 20
19a. Dorsoanterior margin concave........sp. E (p. 56)
20 (19). Convexity of ventral margin shallow, at midlength *schaurothiana* (p. 55)
20a. Convexity of ventral margin deep, in front of midlength...........................sp. D (p. 56)
21 (11). Dorsoposterior margin convex.....*lepidocentri* (p. 55)
21a. Dorsoposterior margin concave................ 26
22 (10a). Posterior point in ventral quarter of greatest height *fragosa* (p. 54)
22a. Posterior point above ventral quarter of greatest height.................................. 24
23 (7). Dorsoanterior and dorsoposterior margins concave 31
23a. Dorsoanterior and dorsoposterior margins straight *hextensis* (p. 55)
24 (22a). Greatest height about half or more the greatest length.................................. 32
24a. Greatest height less than half the greatest length.. 25
25 (24a). Posterior point in ventral third of greatest height.. 27
25a. Posterior point at approximate midheight *cultrata* (p. 54)
26 (21a). Greatest height half or more than half the greatest length.................................. 29
26a. Greatest height about one-third of greatest length; dorsal margin straight.............sp. F (p. 56)
27 (25). Dorsoposterior margin straight.....*tichomirovi* (p. 56)
27a. Dorsoposterior margin concave......*saxifraga* (p. 55)
28 (9a). Dorsoanterior margin concave *korzenewskajae* (p. 55)
28a. Dorsoanterior margin convex................ 33
29 (26). Dorsoanterior margin convex, short....*calceolae* (p. 54)
29a. Dorsoanterior margin straight or slightly concave about one-third the greatest length.....sp. G (p. 56)
30 (3). Dorsoanterior point above midheight *bicornis* (p. 54)
30a. Dorsoanterior point at or below midheight *emaciata* (p. 54)
31 (23). Dorsoposterior margin concave............... 34
31a. Dorsoposterior margin straight........sp. H (p. 57)
32 (24). Dorsal and ventral margins subparallel *distressa* (p. 54)
32a. Dorsal and ventral margin converge toward posterior *posneri* (p. 55)

33 (28a). Dorsal and ventral margins subparallel *tantilla* (p. 56)
33a. Dorsal and ventral margins converge toward posterior *mossolovellaeformis* (p. 55)
34 (31). Dorsoposterior point above midheight *brevicauda* (p. 54)
34a. Dorsoposterior point below midheight *trapezoides* (p. 56)

ASSIGNED SPECIES

Rectobairdia? bicornis (Jones and Kirkby), 1879

Bairdia curta var. *bicornis* Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 568, pl. 28, fig. 7. Carboniferous, Steerway, near Wellington, Salop, England.

?*Bairdia curta bicornis* Jones and Kirkby. Kummerow, 1939, Preuss. Geol. Landesanstalt. Abh., n. f., no. 194, pt. A, p. 40, pl. 4, figs. 6a, b. Lower Tournasian limestone, Ratingen, Rhinland, Germany.

[not] *Bairdia bicornis* Bradfield, 1935 = *Bairdia whiteside* Bradfield, 1935.

This species is based on a right valve that resembles *Bairdia mandelstami* Posner, 1951 but has a proportionately longer dorsal margin. It differs from *Bairdia leguminoides* Ulrich, 1891, by possessing a straight dorsal margin.

Geologic range.—Carboniferous.

Rectobairdia brevicauda (Jones), 1859

Cythere plebia var. *brevicauda* Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 161, pl. 11, figs. 9a–c. Permian, Shell limestone, Tunstall Hill, Durham, England.

?*Cythere* (*Bairdia*) *brevicauda* Jones. Schmid, 1867, Neues Jahrb. Mineralogie, Geologie, Paläontologie, 1867, p. 581, pl. 6, fig. 36. Zechstein, Selters, Watterau, Germany.

?*Cythere curta* (McCoy). Jones, 1850, *in* King, A monograph of the Permian fossils of England, p. 61, pl. 18, fig. 3. Permian, England.

[not] *Cythere brevicauda* Jones. Richter, 1867 = sp. indet.

Geologic range.—Permian.

Rectobairdia calceolae (Kummerow), 1953

Bairdia calceolae Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 51, pl. 5, figs. 7a, b. Middle to Upper Devonian, Germany.

Geologic range.—Middle-Upper Devonian.

Rectobairdia? cultrata (Kummerow), 1939

Bairdia cultrata Kummerow, 1939 [part]. Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 42, pl. 4, figs. 12a, b [not fig. 13 = *Bairdiacypris robusta*? Kummerow, 1939]. Lower Tournasian limestone Ratingen, Rheinland, Germany.

Geologic range.—Carboniferous.

Rectobairdia cultrijugati (Krömmelbein), 1950

Bairdia cultrijugati Krömmelbein, 1950, Senckenbergiana, v. 31, p. 333, pl. 1, figs. 1a–d. Lower Middle Devonian, Salmerwald-Mulde, Eifel, Germany.

Geologic range.—Middle Devonian.

Rectobairdia deformis (Jones and Kirkby), 1879

Bairdia curta var. *deformis* Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 568, pl. 28, fig. 8. Carboniferous, Steerway, near Wellington Salop, England.

Geologic range.—Carboniferous.

Rectobairdia distressa (Geis), 1940

Plate 2, figures 3–5

Bairdia distressa Geis, 1940, *in* Sohn, Jour. Paleontology, v. 14, p. 154. New name for *B. depressa* Geis, 1932.

Bairdia depressa Geis, 1932, Jour. Paleontology, v. 6, p. 178, pl. 25, figs. 12a, b. Salem limestone, Indiana.

[not] *Bairdia depressa* Kafka, 1885, K. böhm. Wiss. Gesell., Sitzungsber., p. 2, pl. 1, figs. 1a, b. Cretaceous, Bohemia = *Cytherella*?.

?*Bairdia hisingeri* (Münster). Sylvester-Bradley, 1950, Annals Mag. Nat. History, ser. 12, v. 3, p. 755, fig. 5B. Lower Carboniferous, Craigen Glen, Campsie near Glasgow, Scotland.

Geologic range.—Upper Mississippian.

Rectobairdia? emaciata (Kesling and Kilgore), 1952

Plate 2, figures 14, 15

Bairdia emaciata Kesling and Kilgore, 1952, Michigan Univ. Mus. Paleontology Contrb., v. 10, no. 1, p. 13, pl. 4, figs. 4–8. Genshaw formation, dark-gray shale, about 3 ft below the Killians black limestone. Outcrop in a roadcut and ditch on the west side of Long Lake, about one-half a mile south of LeRoy's Resort, at the junction of West Long Lake Road and the entrance to Martin's Resort, near the center of the W½ sec. 32, T. 33 N., R. 8 E., Presque Isle County, Mich.

The flattened ventroterminal margins may exclude this species from *Rectobairdia.*

Geologic range.—Middle Devonian.

Rectobairdia? fragosa (Morey), 1935

Plate 2, figure 26

Bairdia fragosa Morey, 1935, Jour. Paleontology, v. 9, p. 322, pl. 28, fig. 17. Sylamore sandstone, 3 miles north of Williamsburg, Callaway County, Mo.

Morey stated (1935, p. 322) that the dorsal outline is subelliptical; his types labeled "syntypes" (Missouri Univ. Os 1004–3) consist of the illustrated specimen which he designated as the holotype in the explanation to plate 28, and one paratype on which the posterior point is missing. Both specimens are somewhat abraded, and it is difficult to determine if the sides are curved or straight in dorsal outline.

Geologic range.—Lower Mississippian, probably reworked Devonian. (See Sohn, 1951, p. 34.)

Rectobairdia hexagona (Polenova), 1952

Bairdia hexagona Polenova, 1952, Microfauna SSSR, v. 5, p. p. 128, pl. 13, figs. 5, 6. Middle Devonian, Kursk and Voronez regions, Russia.

Geologic range.—Middle Devonian.

Rectobairdia? hextensis (Harlton), 1929

Plate 2, figure 25

Bairdia hextensis Harlton, 1929, Texas Univ. Bull. 2901, p. 157, pl. 3, fig. 9. Canyon group, San Saba River valley, near Hext, Menard County, Tex.

The holotype (USNM 80586) is a partly corroded specimen.

Geologic range.—Upper Pennsylvanian.

Rectobairdia korzenewskajae (Posner), 1951

Bairdia korzenewskajae Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 96, pl. 21, fig. 2. Lower Carboniferous, Russia.

Differs from *R. fragosa* (Morey) by having a concave dorsoanterior margin and a higher position of the posterior point.

Geologic range.—Carboniferous.

Rectobairdia legumen (Jones and Kirkby), 1886

Bairdia legumen Jones and Kirkby, 1886, Annals Mag. Nat. History, ser. 5, v. 18, p. 266, pl. 9, figs. 13a, b. Carboniferous, Yoredale rocks (D_1–P_2), Gleaston Castle, Lancashire, England.

Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy (VNIGRI), new ser., no. 56, p. 93, pl. 21, fig. 4. Lower Carboniferous.

?*Bairdia angulatiformis* Posner, 1951, idem, p. 93, pl. 21, fig. 7. Lower Carboniferous, Russia.

Geologic range.—Carboniferous.

Rectobairdia lepidocentri (Krömmelbein), 1950

Bairdia lepidocentri Krömmelbein, 1950, Senckenbergiana, v. 31, p. 335, pl. 1, figs. 4a–d. Middle Devonian, Südhang Auburg, Gerolsteiner Mulde, Eifel, Germany.

Geologic range.—Middle Devonian.

Rectobairdia mongoliensis (Jones and Kirkby), 1892

Bairdia hisingeri var. *mongoliensis* Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 306, pl. 16, fig. 13. Carboniferous, River Bardun, south Mongolia.

Geologic range.—Carboniferous.

Rectobairdia mossolovellaeformis (Egorov), 1953

Bairdia mossolovellaeformis Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 21, pl. 11, figs. 3a, b. Frasnian, Russia.

Geologic range.—Upper Devonian.

Rectobairdia posneri Sohn, n. name

Bairdia angulata Posner, 1951 [not Brady, 1870a; not Coryell and Sample, 1933], Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 90, pl. 20, figs. 6a, b. Lower Carboniferous, Russia.

Geologic range.—Lower Carboniferous.

Rectobairdia saxifraga (Krömmelbein), 1954

Bairdia saxifraga Krömmelbein, 1954, Senckenbergiana, v. 34, p. 249, pl. 1, figs. 2a–d. Givetian, Paffrather Mulde, Germany.

Geologic range.—Middle Devonian.

Rectobairdia schaurothiana (Kirkby), 1858

Bairdia schaurothiana Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 329, pl. 10, figs. 14a, b. Permian, Tunstall Hill, Durham, England.

Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 147, woodcuts 10, pl. 9, figs. 14, 14a [same illustration as above].

Cythere (Bairdia) schaurothiana Kirkby. Kirkby, 1862 [part], Annals Mag. Nat. History, ser. 3, v. 10, p. 203, pl. 4, figs. 3, 4, 12 [not figs. 1, 2, 11 = *Rectobairdia* sp. E]. Permian, Tunstall Hill, Durham, England.

[not] *Bairdia schaurothiana* Kirkby. Cooper, 1946 = *Rectobairdia* sp. G.

[not] *Bairdia schaurothiana* Kirkby. Marple, 1952 = *Rectobairdia* sp. G.

Geologic range.—Permian.

Rectobairdia sinuosa (Morey), 1936

Bairdia sinuosa Morey, 1936, Jour. Paleontology, v. 10, p. 119, pl. 17, figs. 17, 19. Basal Chouteau limestone, near Browns Station, Boone County, Mo.

?*Bairdia hisingeri* (Münster). Kummerow, 1939 [part], Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 41, pl. 4, figs. 9a, b [not fig. 8 = sp. indet.; not figs. 10a, b = *Rectobairdia* sp. B.]. Lower Visé, C_2, Ratingen, Rheinland, Germany.

?*Bairdia ampla* Reuss. Kummerow, 1939, idem, p. 44, pl. 5, figs. 3a, b. Lower Tournasian, Ratingen, Rheinland, Germany.

?*Bairdia hisingeriformis* Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 95, pl. 19, fig. 1, Lower Carboniferous, Russia.

[not] *Bairdia sinuosa* Cooper, 1941 = *Orthobairdia cestriensis* (Ulrich), 1891.

Geologic range.—Lower Mississippian, Carboniferous.

Rectobairdia subvexa (Coryell and Billings), 1932

Bairdia subvexa Coryell and Billings, 1932, Am. Midland Naturalist, v. 13, p. 172, pl. 17, fig. 2. Wayland shale, 5 miles east and 2,000 ft north of Cisco, along Cisco-Eastland highway, Eastland County, Tex.

[not] *Bairdia subconvexa* Coryell and Billings. Tasch, 1953, [misspelling], Jour. Paleontology, v. 27, p. 400, pl. 49, fig. 13 = *Cryptobairdia folgeri* (Kellett), 1934.

Geologic range.—Upper Pennsylvanian.

Rectobairdia symmetrica (Cooper), 1946

Bairdia symmetrica Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 52, pl. 3, figs. 37, 38. Shale between upper and lower Trivoli limestone, SW¼ sec. 3, T. 8 N., R. 5 E., Peoria County, Ill.

?*Bairdia reussiana* Kirkby. Kellett, 1934, Jour. Paleontology, v. 8, p. 132, pl. 17, figs. 1a–h, 4a, b. Wreford formation, small quarry in roadcut on north side of U.S. Highway 40, about 4 miles west of Junction City, Geary County, and limestone, Cottonwood formation, U.S. Highway 40 at Ogden, Riley County, Kans.

Cordell, 1952, [part], Jour. Paleontology, v. 26, p. 89, pl. 17, figs. 26–28 [not figs. 24, 25 = ?*B. subfusiformis* Hamilton, 1942; not pl. 18, figs. 1, 2 = *B. reussiana* Kirkby, 1858]. Collections 2½ ft below top of Farley limestone to 6 ft above base of Vilas shale, west end of Farley, SE¼SW¼SE¼ sec. 28, T. 52 N., R. 35 W.; and base of Eudora shale to 6 ft below top of Winston shale, Beverly Station, south of junction of State Highways 45 and 92, boundary secs. 30 and 31, T. 53 N., R. 35 W., Platte County, Mo.

[not] *Bairdia symmetrica* Egorov, 1953 = *B. egorovi* Sohn n. name.

All Kellett's types (USNM 89492) are badly corroded, and more than this species may be represented.

Geologic range.—Upper Pennsylvanian–Permian.

Rectobairdia tantilla (Kummerow), 1953

Bairdia tantilla Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 52, pl. 5, figs. 8a, b. Middle Devonian, Wolhynia, Poland, and Amalia, near Paffrath, Germany.

Geologic range.—Middle Devonian.

Rectobairdia tichomirovi (Egorov), 1953

Bairdia tichomirovi Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 24, pl. 14, figs. 9a, b. Frasnian, Penzenskaya district, Russia.

Geologic range.—Upper Devonian.

Rectobairdia tikhyi (Polenova), 1952

Bairdia tikhyi Polenova, 1952, Micropaleontology SSSR, v. 5, p. 129, pl. 12, figs. 4a, b. Middle Devonian, Voronez and Kursk regions, Russia.

?*Bairdia spinosa* Polenova, 1952 [not Cooper, 1946], Microfauna SSSR, pt. 5, p. 131, pl. 12, figs. 5a, b. Middle Devonian, central Devonian field, Russia.

Geologic range.—Middle Devonian.

Rectobairdia trapezoides (Gibson), 1955

Beecherella trapezoides Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 21, pl. 1, figs. 5a, b. Calcareous clay of Cerro Gordo formation, pit operated by the Rockford Brick and Tile Co., Rockford, Iowa.

Geologic range.—Upper Devonian.

Rectobairdia sp. A

Bairdia amputata (Kirkby). Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 576, pl. 31, figs. 15–18. Shale in Lower Carboniferous limestone, Paiston quarry, East Lothian, Scotland.

?*Bairdia amputata* (Kirkby). Jones and Kirkby, 1892, Ann. Mag. Nat. History, ser. 6, v. 9, p. 305, pl. 16, fig. 10. Carboniferous, Mongolia.

[not] *Cythere amputata* Kirkby, 1859, new name for *Bairdia truncata* Kirkby, 1858 = nomen dubium.

[not] *Cythere amputata* Kirkby. Jones, 1859, *in* Kirkby = nomen dubium.

From the description and illustrations, the type of *Bairdia truncata* Kirkby, 1858 is, according to Jones (1859, p. 168) and Jones and Kirkby (1879, p. 567), a cast that is indeterminate even as to genus.

The nomenclature of *Bairdia amputata* is confused because Kirkby (1859, p. 156, 157) decided that the species belonged to *Cythere* s. s. rather than to *Cythere* subgenus *Bairdia*. Because Jones informed him that *Cythere truncata* was previously used by Bosquet, Kirkby changed the name to *amputata*. The Carboniferous species illustrated by Jones and Kirkby in 1879 is based on a carapace and is a valid species of *Rectobairdia* that requires a new name.

Geologic range.—Carboniferous.

Rectobairdia sp. B

Bairdia hisingeri (Münster). Kummerow, 1939 [part], Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 41, pl. 4, figs. 10a, b [not fig. 8 = sp. indet.; not figs. 9a, b = ?*Rectobairdia sinuosa* (Morey) 1936]. Upper Visé, Altwasser, Niederachlesien, Germany.

Geologic range.—Upper Mississippian.

Rectobairdia sp. C

Bairdia hisingeri (Münster). Jones and Kirkby, 1895, Annals Mag. Nat. History, ser. 6, v. 16, p. 454, pl. 21, fig. 1. Carboniferous, Yoredale series, Hurst, head of Swaledale, Yorkshire, England.

Geologic range.—Carboniferous.

Rectobairdia sp. D

Bairdia hisingeri (Münster). Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 570, pl. 29, figs. 4–10. Lower Carboniferous limestone, Craigenglen, Campsie, Stirlingshire, Scotland.

Geologic range.—Carboniferous.

Rectobairdia sp. E

Cythere (*Bairdia*) *schaurothiana* Kirkby. Kirkby, 1862, Annals Mag. Nat. History, ser. 3, v. 10, p. 203, pl. 4, figs. 1, 2, 11 [not figs. 3, 4, 12 = *R. schaurothiana* (Kirkby), 1858]. Lower Carboniferous limestone, Craigenglen, Campsie, Stirlingshire, Scotland.

Geologic range.—Carboniferous.

Rectobairdia sp. F

Bairdia subelongata Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 573, pl. 30, figs. 10, 11 [not figs. 1–6 = *Bairdiacypris subelongata;* not fig. 7 = sp. indet.; not figs. 8, 9 = *Cryptobairdia* sp. F; not fig. 16 = *Fabalicypris*? sp.]. Carboniferous, Newfield Quarry, Scotland?

Geologic range.—Carboniferous.

Rectobairdia sp. G

Bairdia schaurothiana Kirkby. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 50, pl. 3, figs. 21–24. Shales between Seville limestone beds, SW¼ sec. 32, T. 14 N., R. 2 W., Mercer County, Ill.

Marple, 1952, Jour. Paleontology, v. 26, p. 930, pl. 133, fig. 13. Lower Mercer limestone member, valley of tributary of Jonathan Creek, on line between Madison Township, Perry County, and Newton Township, Muskingum County, Ohio.

Geologic range.—Middle Pennsylvanian.

Rectobairdia sp. H

Bairdia reussiana Kirkby. Glebovskaya, 1939, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 115, p. 165 [list], pl. 2, figs. 7, 7a, b. *Schwagerina* zone, northern Urals, Russia.

Geologic range.—Permian.

Genus BAIRDIACYPRIS Bradfield, 1935

Bairdiacypris Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 93.
Cordell, 1952, Jour. Paleontology, v. 26, p. 95.
?*Actuaria* Schneider, 1956, *in* Kiparisovoi, L. D., Markovskovo, B. P., and Radchenko, G. P., Vsesoyuz. Nauch.-Issled. Geol. Inst. (VSEGEI), Ministerstva Geologii i Okrany Nedr SSSR. Materialy, new ser., v. 12, (Paleontologia), p. 91. Type species by original designation *A. diffusa* Schneider, 1956, idem, p. 91, figs. 2a, b. Permian, Russian platform.
Bairdia [part] of authors.

Type species.—Original designation *B. deloi* Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 93, pl. 7, figs. 8a, b, 9a, b. Hoxbar formation, Union Dairy limestone member, south edge of Ardmore, Carter County, Okla.

Diagnosis.—Thin-shelled elongate ostracodes, with gently arcuate to straight dorsum, straight to concave ventral margin, curved to straight dorsoposterior margin, curved anterior margin, and blunt posterior margin. Greatest length below midheight. Left valve overlaps right along free margins. Hinge simple; inner margin wide. Muscle scars not known.

Discussion.—Bradfield illustrated the holotype which is an abraded specimen, and a paratype that is better preserved than the holotype. Both are refigured on plate 3, figures 1–5. Cordell (1952, p. 95) would limit this genus to species that have straight anterodorsal slopes and would include species with slightly convex ventral margins. This is not practical because some of the species assigned to this genus have a convex anterodorsal margin, and none of the known species has a convex ventral margin. The reason for *B? haydenbranchensis* (Payne) having a convex ventral margin is that the type is abraded. *Bairdiacypris* differs from *Fabalicypris* Cooper, 1946, by absence of anteroventral offset of larger valve and by the left valve not overhanging the right along the hinge.

Schneider (1956, p. 91) gives the following description of *Actuaria* [Miss Poire very generously assisted in the translation]:

> Valves elongated, length 2 to 2½ times the height, inequivalvad, left overlaps right on all margins. Ventral margin noticeably concave. Dorsal margin evenly curved, greatest curvature in median part. Anterior rounded; posterior "attenuated" in the ventral portion and slanted in the upper part. Surface smooth. [Dorsal outline of] valves convex in posterior part and flattens towards the anterior. Hinge simple. Hinge margin of left valve is a furrow into which enters the thin edge of the right valve. The elongate form of the shell, the hinge, and the outline differentiate the new genus from previously described genera of Bairdiidae, to which it is conditionally referred.

Schneider assigns *Bythocypris shideleri* Delo (= *Fabalicypris shideleri* (Delo)) to this genus. *Actuaria* is here tentatively considered as a synonym of *Bairdiacypris*.

The genus *Bairdiacypris* is defined as having a straight to shallowly curved dorsal margin, and a blunt posterior margin. It differs from *Fabalicypris* in that the ventral overlap does not have a steplike offset. A total of 18 species are defined by a dichotomous key. One of these is new but is here designated by letter. The stratigraphic range and frequency of occurrence of these species are shown on figure 9 which includes three taxons that are referred to as sp. indet. because of inadequate data.

Geologic range.—Ordovician, Devonian-Pennsylvanian, Permian(?).

Lithology.—Shale.

Habitat.—Marine.

KEY TO BAIRDIACYPRIS

1. Ventral margin straight 2
1a. Ventral margin concave 5
2 (1). Dorsoposterior margin as much as one-third of greatest length .... *ardua* (p. 58)
2a. Dorsoposterior margin as much as one-quarter of greatest length 3
3 (2a). Dorsoanterior margin as much as one-third of greatest length 12
3a. Dorsoanterior margin as much as one-eighth of greatest length 4
4 (3a). Length of dorsoposterior margin less than greatest height .... *major* (p. 59)
4a. Length of dorsoposterior margin more than greatest height .... *subelongata* (p. 59)
5 (1a). Dorsoanterior margin well defined 6
5a. Dorsoanterior margin not well defined 9
6 (5). Dorsoposterior margin curved .... *elongata* (p. 59)
6a. Dorsoposterior margin straight 7
7 (6a). Greatest height about one-half the greatest length .... *quartziana* (p. 59)
7a. Greatest height about one-third the greatest length 8
8 (7a). Concavity of ventral margin shallow, about midlength 13
8a. Concavity of ventral margin deep, in front of midlength .... *curvis* (p. 58)
9 (5a). Dorsoposterior margin straight 11
9a. Dorsoposterior margin curved 10
10 (9a). Junction of posterior and dorsoposterior margins about one-third the greatest height 14
10a. Junction of posterior and dorsoposterior margins about one-fourth the greatest height .... *diffusa* (p.59)
11 (9). Ventral margin slightly concave .... *trojana* (p.60)
11a. Ventral margin distinctly concave .... sp. A (p.60)
12 (3). Junction of dorsoanterior and anterior margins above midheight, posterior concave in dorsal outline .... *bedfordensis* (p.58)

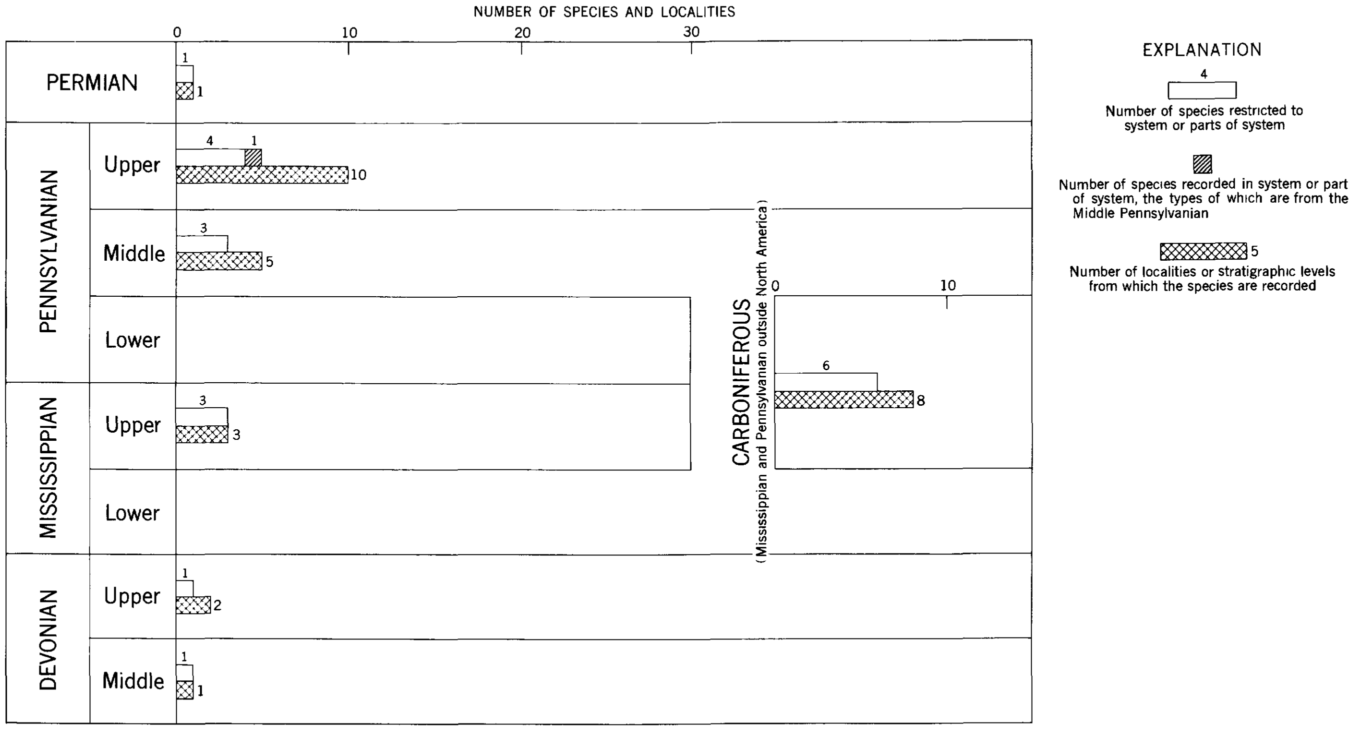

FIGURE 9.—Stratigraphic range and frequency distribution of species of *Bairdiacypris*.

12a. Junction of dorsoanterior and anterior margins at or below midheight; posterior convex in dorsal outline *haydenbranchensis* (p. 59)

13 (8). Dorsal outline elliptical; greatest width at approximate midlength *deloi* (p. 58)

13a. Dorsal outline subelliptical; greatest width behind midlength *paffrathensis* (p. 59)

14 (10). Dorsoposterior margin as much as one-third of greatest length *acuminata* (p. 58)

14a. Dorsoposterior margin as much as one-quarter of greatest length *robusta* (p. 59)

ASSIGNED SPECIES

Bairdiacypris acuminata Cooper, 1946

Bairdiacypris acuminata Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 53, pl. 4, figs. 24, 25. Shale below La Salle limestone, NW¼ sec. 33, T. 16 N., R. 11 E., Bureau County, Ill.

?*Bairdiacypris glennensis* (Harlton). Cordell, 1952, Jour. Paleontology, v. 26, p. 96, pl. 19, figs. 27, 28. Spring Hill limestone member of Plattsburg formation, center N½ sec. 20, T. 55 N., R. 31 W., quarry 2 miles east of Plattsburg, just north of State Highway 116, Clinton County, Mo.

Geologic range.—Upper Pennsylvanian.

Bairdiacypris? ardua Cooper, 1946

Bairdiacypris ardua Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 53, pl. 4, figs. 18, 19. Shales in Shumway cyclothem, SW¼ sec. 26, T. 9 N., R. 5 E., Effingham County, Ill.

The illustration shows a slight ventroanterior offset that suggests affinities with *Fabalicypris*.

Geologic range.—Upper Pennsylvanian.

Bairdiacypris bedfordensis (Geis), 1932

Plate 2, figures 8–10

Bairdia bedfordensis Geis, 1932, Jour. Paleontology, v. 6, p. 176, pl. 25, figs. 9a, b. Salem limestone, Indiana.

Geologic range.—Upper Mississippian.

Bairdiacypris curvis (Cooper), 1941

Plate 2, figures 11–13

Bairdia curvis Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 25, pl. 1, figs. 43, 44. Mississippian, Paint Creek formation, 1,304–1,343 ft in Phillips-Shearm No. 3 well, 9 miles east of Greenville, Mulenberg County, Ky.

Geologic range.—Upper Mississippian.

Bairdiacypris deloi Bradfield, 1935

Plate 2, figure 29; plate 3, figures 1–5

Bairdiacypris deloi Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 93, pl. 7, figs. 8a, b, 9a, b. Pennsylvanian, Union Dairy limestone member of Hoxbar formation, south edge of Ardmore, Carter County, Okla.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 53, pl. 4, figs. 22, 23. Shales above and below "Centralia" limestone, SW¼ sec. 19, T. 7 N., R. 4 W., Montgomery County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 95, pl. 19, figs. 19, 20. Island Creek shale, S½ sec. 13, T. 56 N., R. 30 W., 4.8 miles south of Cameron, Clinton County, Mo.

?*Bairdiacypris haydenbranchensis* (Payne). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 54, pl. 4, figs. 20, 21. Weathered lower part of Millersville limestone, NE¼ sec. 28, T. 12 N., R. 1 W., Christian County, Ill.

Geologic range.—Upper Pennsylvanian.

Bairdiacypris diffusa (Schneider), 1956

Actuaria diffusa Schneider, 1956, *in* Kiparisovoi, L. D., Markovskovo, B. P., and Radchenko, G. P., Vsesoyuz. Nauch.-Issled. Geol. Inst. (VSEGSI), Ministertstva Geologii i Okrany Nedr. SSSR. Materialy, new ser., v. 12, (Paleontologia), p. 91, pl. 21, figs. 2a, b. Permian (Kazanian), Russian platform.

Bythocypris shideleri Delo. Schneider, 1948, Fauna ostracod vechnepermskych otlozhenii neftenosnych rayonov SSSR, p. 32, pl. 3, figs. 10a, b [not seen].

The specimen in Schneider's 1956 illustration differs from *Fabalicypris shideleri* (Delo) (pl. 3, fig. 6) by absence of ventroanterior offset in overlapping valve.

Geologic range.—Permian.

Bairdiacypris elongata Kummerow, 1939

Bairdiacypris elongata Kummerow, 1939 Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 47, pl. 5, figs. 7a, b. Lower Tournasian, Ratingen, Rheinland, Germany.

Geologic range.—Carboniferous.

Bairdiacypris? haydenbranchensis (Payne), 1937

Bythocypris haydenbranchensis Payne, 1937, Jour. Paleontology, v. 11, p. 285, pl. 40, figs. 1a, b. Hayden Branch formation, T. 8 N., R. 10 W., Sullivan County, Ind.

[not] *Bairdiacypris haydenbranchensis* (Payne). Cooper, 1946 = *B. deloi*? Bradfield, 1935.

The holotype (Indiana Univ. 3221) is a corroded specimen that may not reflect the true shape and overlap of the species.

Geologic range.—Middle Pennsylvanian.

Bairdiacypris major (Jones and Kirkby), 1886

Bairdia subelongata var. *major* Jones and Kirkby, 1886, Annals Mag. Nat. History, ser. 5, v. 18, p. 267, pl. 9, fig. 14. Carboniferous Limestone Series at Barmoor Redhouse (Lowick), Northumberland, England.

Geologic range.—Carboniferous.

Bairdiacypris? paffrathensis (Kummerow), 1953

Bairdia paffrathensis Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 52, pl. 5, figs. 10a, b. Middle Devonian, Paffrath, Germany.

The drawings indicate coloration that is not usual for Paleozoic ostracodes from this or any other area. Ostracodes from the Paffrath area are illustrated by excellent photographs (Krömmelbein, 1954), and these photographs do not show coloration. The shape as well as coloration of Kummerow's species suggests that this may be a contaminant of a Recent species of possibly "*Candona.*" It is not unusual for Recent contaminants to be mistaken for fossil forms. For example, *Macrocypris kayi* Spivey, 1939 (p. 173, pl. 21, figs. 11–13), is described as rare in the "depauperate zone" of the lower Maquoketa shale (Upper Ordovician) near Clermont, Iowa. The holotype, a right valve, is a Recent "*Candona*" that was collected on the east bank of the stream which joins Turkey River.

Geologic range.—Middle Devonian(?) or Recent.

Bairdiacypris? quartziana (Egorov), 1953

Bairdia quartziana Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Fillial, Moscow-Leningrad, p. 22, pl. 13, figs. 1–6, pl. 14, figs. 1–4, 8. Frasnian, northeastern European Russia.

Bairdia cf. *B. quartziana* Egorov, 1953, idem, p. 23, pl. 14, figs. 5–7. Frasnian, Don River, Russia.

Without examining the types it is not possible to determine whether all the figured specimens are conspecific. This species differs from *B. deloi* by its steeper dorsoposterior slope.

Geologic range.—Upper Devonian.

Bairdiacypris robusta Kummerow, 1939

Bairdiacypris robusta Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 46, pl. 5, figs. 6a, b. Lower Tournasian limestone, Insemont, Belgium.

?*Bairdia cultrata* Kummerow, 1939 [part], idem, p. 42, pl. 4, fig. 13 [not figs. 12a, b = *Rectobairdia*? *cultrata* (Kummerow), 1939]. Lower Tournasian limestone, Ratingen, Rheinland, Germany.

Geologic range.—Lower Mississippian.

Bairdiacypris subelongata (Jones and Kirkby), 1879

Bairdia subelongata Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 573, pl. 30, figs. 1–5, 6 (?) [not fig. 7 = sp. indet.; not figs. 8, 9 = *Cryptobairdia* sp. F; not figs. 10, 11 = *Rectobairdia* sp. F; not fig. 16 = *Fabalicypris*? sp. indet.]. Carboniferous, Woodend quarry, Ladedda quarry, Fife; Blinkbonny (?) quarry, Mid Lothian, Scotland.

[not] *Bairdia subelongata* Jones and Kirkby. Vine, 1884, Yorkshire Geol. and Polytech. Soc. Proc., new ser., v. 8, p. 231, pl. 12, figs. 1, 1a. Carboniferous, Yorkshire; based on unrecognizable specimens.

[not] *Bairdia subelongata* Jones and Kirkby. Jones and Kirkby, 1886 = *Bairdiacypris major* (Jones and Kirkby), 1886.

[not] *Bairdia subelongata* Jones and Kirkby. Jones and Kirkby, 1892 = *Bairdiacypris* sp. A.

[not] *Bairdia subelongata* Jones and Kirkby. Harlton, 1927 = *Fabalicypris acetalata* (Coryell and Billings), 1932.

[not] *Bairdia subelongata* Jones and Kirkby. Knight, 1928 = *Fabalicypris* sp. indet.

[not] *Bairdia subelongata* Jones and Kirkby. Harlton, 1929 = *Bairdiacypris*? *trojana* (Wilson), 1933.

[not] *Bairdia* cf. *B. subelongata* Jones and Kirkby. Cooper, 1941 = *Bairdiacypris* sp. indet.

A lectotype should be designated from the original specimens.

Geologic range.—Carboniferous.

Bairdiacypris? trojana (Wilson), 1933

Bairdia trojana Wilson, 1933, Jour. Paleontology, v. 7, p. 418, pl. 50, figs. 9a–c. Pennsylvanian, McAlester shale, 3-in zone immediately above McAlister coal in Trojan Coal Co. pit, sec. 13, T. 11 N., R. 19 E., Muskogee County, Okla.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 54, pl. 4, figs. 36–38. Pennsylvanian, shale on top of Seville limestone, SW¼ sec. 26, T. 17 N., R. 1 W., Rock Island County, Ill.

?*Bairdia trojana* Wilson. Marple, 1952, Jour. Paleontology, v. 26, p. 931, pl. 133, fig. 15. Pennsylvanian, lower Mercer limestone member, in valley in fork of stream, NE¼ sec. 32, Elk Township, Vinton County, Ohio.

?*Bairdiacypris ardua* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 53, pl. 4, figs. 18, 19. Shales in Shumway cyclothem, SW¼ sec. 26, T. 9 N., R. 5 E., Effingham County, Ill.

Bairdia subelongata Jones and Kirkby. Harlton, 1929, Texas Univ. Bull. 2901, p. 157, pl. 3, figs. 6a–d. Pennsylvanian, Canyon group. San Saba River valley near Hext, Menard County, Tex.

The holotype (USNM 112429) is an abraded specimen with a straight ventral margin; Cooper's specimen has a slightly concave ventral margin, and the larger valve has an anterior offset like *Fabalicypris*, while Marple's specimen has a slightly more curved dorsal margin. This species appears to be intermediate between *Bairdiacypris* and *Fabalicypris*.

Geologic range.—Middle and Upper Pennsylvanian.

Bairdiacypris sp. A

Bairdia elongata (Münster). Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, pt. A, p. 42, pl. 4, figs. 11a, b. Mississippian, Lower Visé C_2–S, dark limestone, Regnitzlosau and Trogenau near Hof, Bayern, Germany.

[not] *Cythere elongata* Münster, 1830 = nomen dubium.

?*Bairdia subelongata* Jones and Kirkby. Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 304, pl. 16, fig. 6. Carboniferous, Mongolia.

[not] *Bairdia* cf. *B. subelongata* Jones and Kirkby. Cooper, 1941 = *Bairdiacypris* sp. indet.

Geologic range.—Carboniferous.

Bairdiacypris sp. 1

Bairdiacypris sp. 1 Cordell, 1952, Jour. Paleontology, v. 26, p. 98, pl. 19, figs. 23, 24. Pennsylvanian shale, Vinland member of the Stranger formation, outcrops from midboundary secs. 25 and 26 to midboundary secs. 25 and 30, T. 56 N., R. 35 W., 2 miles southwest of agency, Buchanan County, Mo.

Only one specimen is recorded, and it appears to be intermediate between *B. deloi* and *B. curvis*.

Geologic range.—Upper Pennsylvanian.

Bairdiacypris sp. indet.

Bairdia cf. *B. subelongata* Jones and Kirkby. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 26, pl. 2, figs. 2, 3. Mississippian, Golconda formation, NE¼SW¼NW¼ sec. 28, T. 13 S., R. 3 W., Johnson County, Ill.

This is based on a corroded specimen.

Geologic range.—Upper Mississippian.

Bairdiacypris? sp. indet.

Bairdia glennensis Harlton. Knight, 1928, Jour. Paleontology, v. 2, p. 325, pl. 43, figs. 8a, b. Pawnee limestone, residual from lower 2 ft exposed in street construction in Davis Place subdivision. First street west of Clayton-Ferguson trolley tracks and 200 ft north of Clayton Road, Clayton, St. Louis County, Mo.

The illustrations are of a broken specimen.

Geologic range.—Middle Pennsylvanian.

Bairdiacypris? sp. indet.

Bairdia glennensis Harlton. Glebovskaya, 1939, Neft. Geol.-Rasv. Inst., Trudy, ser. A, no. 115, p. 165 (list), pl. 2, fig. 6. Permian, *Schwagerina* zone, Northern Urals, Russia.

The illustration consists of a right view of a carapace(?) that differs from Harlton's specimens in that the highest part is in the anterior quarter of the greatest length. Although the ventral offset diagnostic of *Fabalicypris* is not shown, additional specimens may indicate that this species has that offset.

Geologic range.—Permian.

TRANSFERRED SPECIES

Bairdiacypris glennensis (Harlton). Cordell, 1952 = ***B. acuminata*** Cooper, 1946.

Bairdiacypris nebraskensis (Upson). Cooper, 1946 = ***Fabalicypris*** sp. B.

Bairdiacypris punctata Scott, 1942 = gen. indet.

Bairdiacypris? rotundata Kummerow, 1953 = *Fabalicypris? rotundata* (Kummerow), 1953.

Bairdiacypris shideleri (Delo). Cooper, 1946 = ***Fabalicypris*** sp. A.

Genus FABALICYPRIS Cooper, 1946

Fabalicypris Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 59. Cordell, 1952, Jour. Paleontology, v. 26, p. 103.

Type species.—Original designation *F. wileyensis* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 61, pl. 6, figs. 4–8. Pennsylvanian, Illinois.

Diagnosis.—Differs from *Bairdiacypris* Bradfield by having a ventroanterior offset of overlapping valve and by a wide overlap along the dorsal margin. Hinge simple; inner margin wide; muscle scars unknown.

Discussion.—In the original description Cooper (1946, p. 59) differentiated this genus from *Bairdiacypris* by the ventroanterior offset and the absence of a pronounced posterodorsal margin. Several species here referred to this genus have in addition to the diagnostic ventroanterior offset a pronounced posterodorsal margin. Some species are gradational between the two genera, and it is possible that the two should be considered as subgenera of *Bairdiacypris*.

The genus *Fabalicypris* differs from *Bairdiacypris* by having a wider overlap along the dorsal margin and a ventroanterior steplike offset. It is possible that both genera should be given subgeneric rank in *Bairdiacypris*. A total of 21 species are defined by a dichotomous key. Three of these are new but are here designated by letter. Four additional species are neither named nor designated by letter, but are included in figure 10. The stratigraphic range and frequency of occurrence of these species are shown on figure 10. Included in the chart are 4 unnamed species, 3 of which are tentatively referred to this genus because of inadequate data. One species, *F. shideleri* (Delo), 1930 is queried in the Permian column because data is not sufficient to determine the stratigraphic level in the well from which it is described.

Geologic range.—Middle Devonian–Permian.

Lithology.—Shale and limestone.

Habitat.—Marine.

KEY TO SPECIES OF FABALICYPRIS

1. Ventral margin straight ---------- 2
1a. Ventral margin curved ---------- 3
2 (1). Greatest width in dorsal outline at midlength ---------- sp. A (p. 64)
2a. Greatest width in dorsal outline behind midlength ---------- 6
3 (1a). Ventral margin convex ---------- 4
3a. Ventral margin concave ---------- 11
4 (3). Dorsal overlap of approximate even width ---------- 5
4a. Dorsal overlap not of even width ---------- 9
5 (4). Dorsoposterior margin extends to posterior third of greatest length ---------- *minuta* (p. 63)
5a. Dorsoposterior margin extends to posterior quarter of greatest length ---------- 7
6 (2a). Posterior point above midheight ---------- sp. 1 (p. 64)
6a. Posterior point below midheight ---------- *shideleri* (p. 63)
7 (5a). Dorsal outline wedge shaped; greatest width in posterior third ---------- 8
7a. Dorsal outline elliptical ---------- *pulcher* (p. 63)
8 (7). Posterior round in dorsal outline ---------- *wileyensis* (p. 64)
8a. Posterior pointed in dorsal outline ---------- *subelliptica* (p. 63)
9 (4a). Dorsoposterior margin extends to approximately midlength ---------- *acuminata* (p. 62), (*dispar, plana*?)
9a. Dorsoposterior margin extends to posterior quarter of greatest length ---------- 10
10 (9a). Dorsal outline wedge shaped ---------- sp. C (p. 64)
10a. Dorsal outline subelliptical ---------- *tenuis* (p. 64)
11 (3a). Dorsoposterior margin straight ---------- 12
11a. Dorsoposterior margin convex ---------- 13
12 (11). Anteriormost point above midheight ---------- sp. B (p. 64)
12a. Anteriormost point at midheight ---------- *hoxbarensis* (p. 63)
13 (11a). Ventral convexity in front of midlength ---------- 14
13a. Ventral convexity at midlength ---------- 17
14 (13). Posterior pointed in dorsal outline ---------- *muensteriana* (p. 63)
14a. Posterior round in dorsal outline ---------- 15
15 (14a). In dorsal outline, greatest width central ---------- *regularis* (p. 63)
15a. In dorsal outline, greatest width behind center ---------- 16
16 (15a). Anteriormost point below midheight ---------- *geinitziana* (p. 62)

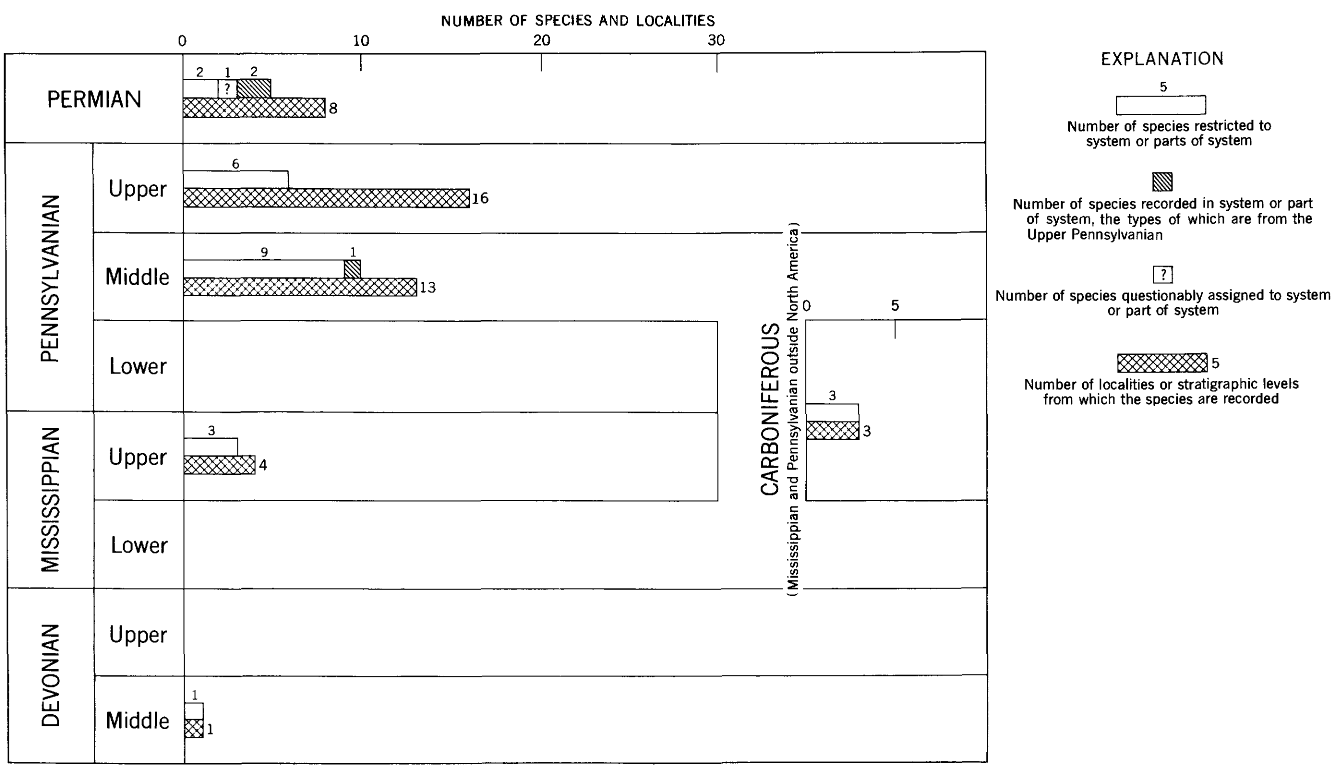

FIGURE 10.—Stratigraphic range and frequency distribution of species of *Fabalicypris*.

16a. Anteriormost point at midheight. ------------------ *warthini* (p. 64), (*wetumkaensis*)
17 (13a). Posteriormost point below midheight----------- 18
17a. Posteriormost point at midheight-------------- 21
18 (17). Anteriormost point above midheight------------ 19
18a. Anteriormost point at or below midheight------- 20
19 (18). In dorsal outline, greatest width at midlength------- ? *perplexa* (p. 63), (*ovata*)
19a. In dorsal outline, greatest width in posterior quarter ? *subaequalis* (p. 63)
20 (18a). In dorsal outline, greatest width in front of midlength anteriormost point at midheight----------------- *glennensis* (p. 62)
20a. In dorsal outline, greatest width at midlength; anteriormost point below midheight---------------- ? *antiqua* (p. 62)
21 (17a). Anteriormost point above midheight-------------- ? *rotundata* (p. 63)
21a. Anteriormost point at midheight------------------ *acetalata* (p. 62), (*nebraskensis, rogatzi*)

ASSIGNED SPECIES

Fabalicypris acetalata (Coryell and Billings), 1932

Bairdia acetalata Coryell and Billings, 1932, Am. Midland Naturalist, v. 13, p. 173, pl. 17, fig. 5. Wayland shale, highway leading from Cisco to Eastland, 5 miles east and 2,000 ft north of Cisco, Eastland County, Tex.

Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 17, pl. 1, fig. 5a. Shale in Eiss limestone, SE. cor. SE¼ sec. 3, T. 1 N., R. 13 E., Furnas County, Nebr.

Bairdia rogatzi Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 264, pl. 25, fig. 7. East Mountain shale, Mineral Wells formation, shale pit, 3 miles west of Mineral Wells, Palo Pinto County, Tex.

Bairdia nebraskensis Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 18, pl. 1, figs. 6a, b. Shale seam in upper part of Fourmile limestone, roadcut 3½ miles southeast of Randolph, Pottawatomie County, Kans.

Bairdia subelongata Jones and Kirkby. Harlton, 1927, Jour. Paleontology, v. 1, p. 210, pl. 33, fig. 11. Upper Glenn formation, NW¼NW¼ sec. 18, T. 5 S., R. 2 E., about 2 miles south of Ardmore, Carter County, Okla.

Bairdia hoxbarensis Harlton. Kellett, 1934, Jour. Paleontology, v. 8, p. 131, pl. 16, figs. 5a–c. Elmdale formation, upstream from Cottonwood River bridge, east of Elmdale, Chase County, Kans.

?*Bairdia hoxbarensis* Harlton. Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 40, pl. 4, fig. 8. Island Creek shale, bluffs just south of the Burlington RR., sec. 32, T. 13 N., R. 13 E., between 2½ and 3¾ miles west of Oreapolis, Cass County, Nebr. Based on a steinkern.

Payne, 1937, Jour. Paleontology, v. 11, p. 284, pl. 39, figs. 6a, b. Hayden Branch formation, near Dodds Bridge on Turmans Creek, Sullivan County, Ind.

Bairdia hoxbarensis Harlton. Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 354 [list], pl. 50, fig. 7. Macoupin cyclothem, along Embarrass River, 1 mile east of Lawrenceville, Lawrence County, Ill.

[not] *Bairdia acetalata* Coryell and Billings. Coryell and Booth, 1933 = *Fabalicypris*? *hoxbarensis* (Harlton), 1927.

[not] *Bairdiacypris nebraskensis* (Upson). Cooper, 1946 = *Fabalicypris* sp. B.

This species is distinguished by a convex dorsoposterior margin.

Geologic range.—Upper Pennsylvanian–Permian.

Fabalicypris acuminata Cooper, 1946

Fabalicypris acuminata Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 60, pl. 5, figs. 33–36. Shale above Liverpool limestone, NW¼ sec. 17, T. 5 N., R. 4 E., Fulton County, Ill.

Fabalicypris dispar Cooper, 1946, idem, p. 60, pl. 5, figs. 37–39. Shale above Liverpool limestone; same locality as above.

?*Fabalicypris plana* Cooper, 1946, idem, p. 60, pl. 5, fig. 26. Shale above Liverpool limestone; same locality as above.

The three species from the same collection are considered here to be synonymous. Because Cooper (1946, p. 60) does not illustrate the dorsal outline of *F. plana* it is referred to *F. acuminata* with reservations.

Geologic range.—Middle Pennsylvanian.

Fabalicypris? antiqua Pokorný, 1950

Fabalicypris antiqua Pokorný, 1950, Czechoslovakia, Stát. geol. úst. Sbornik, v. 17, Paleontol., p. 548 (98), 611 (99), pl. 5, fig. 14, text figs. 4–7. Middle Devonian, Red Coral limestone, Celechovice, Czechoslovakia.

Geologic range.—Middle Devonian.

Fabalicypris? geinitziana (Jones), 1850

Cythere geinitziana Jones, 1850, *in* King, Paleontogr. Soc. London, p. 62, pl. 6, fig. 46; pl. 18, figs. 4a–c. Permian. Humbleton, England.

Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 159, pl. 11, figs. 4a–c. Permian limestone, Byers' quarry, Durham, England.

[not] *Bairdia geinitiziana* (Jones). Richter 1855 = sp. indet.

The original description (Jones, 1850, p. 62) states that the specimen is "slightly punctated towards the anterior extremity." Well-preserved specimens of *Fabalicypris* in the United States are smooth shelled; consequently, this species may belong to an hitherto undescribed genus.

Geologic range.—Permian.

Fabalicypris glennensis (Harlton), 1927

Plate 3, figures 9–10

Bairdia glennensis Harlton, 1927, Jour. Paleontology, v. 1, p. 210, pl. 33, fig. 10. Upper Glenn formation, one-fourth of a mile north of SE¼ sec. 9, T. 5 S., R. 1 E., Carter County, Okla., about 2 miles south of Ardmore.

?*Bairdia glennensis* Harlton. Kellett, 1935, Jour. Paleontology, v. 9, p. 133, pl. 18, figs. 2a–e. Elmdale formation, carbonaceous shale on top of buff limestone, near Cottonwood River bridge east of Elmdale, Chase County, Kans.

?*Bairdianella oblongata* Harlton, 1929, Texas Univ. Bull. 2901, p. 160, pl. 4, fig. 6. Pennsylvanian limestone, San Saba River valley, near Hext, Menard County, Tex.

[not] *Bairdia glennensis* Harlton. Knight, 1928 = *Bairdiacypris*? sp. indet.

[not] *Bairdia glennensis* Harlton. Bradfield, 1935 = *Fabalicypris hoxbarensis*? (Harlton), 1927.
[not] *Bairdia glennensis* Harlton. Glebovskaya, 1939 = *Bairdiacypris*? sp. indet.
[not] *Bairdia* cf. *B. glennensis* Harlton. Cooper, 1946 = sp. indet.
[not] *Bairdia glennensis* Harlton. Marple, 1952 = sp. indet.
[not] *Bairdiacypris glennensis* (Harlton). Cordell, 1952 = *Bairdiacypris acuminata* Cooper, 1946.

Geologic range.—Upper Pennsylvanian–Permian.

Fabalicypris? hoxbarensis (Harlton), 1927

Bairdia hoxbarensis Harlton, 1927, Jour. Paleontology, v. 1, p. 211, pl. 33, fig. 12. Hoxbar formation, NW. cor. sec. 20, T. 5 S., R. 1 E., about 2 miles south of Ardmore, Carter County, Okla.
?*Bairdia hoxbarensis* Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 46, pl. 2, figs. 43, 44. Shale above Trivoli limestone, SW¼ sec. 29, T. 14 N., R. 10 W., Edgar County, Ill.
Bairdia hoxbarensis Harlton. Cordell, 1952, Jour. Paleontology, v. 26, p. 86, pl. 19, figs. 29, 30. Farley limestone and Vilas shale, Missouri River bluff, east of State Highway 92, SW¼SW¼SE¼ sec. 28, T. 52 N., R. 35 W., at west end of Farley, Platte County, Mo.
?*Bairdia acetalata* Coryell and Billings. Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 263, pl. 3, figs. 10, 11. Wayland shale, 1 mile west of Graham, Young County, Tex.
?*Bairdia glennensis* Harlton. Bradfield, 1935. Bull. Am. Paleontology, v. 32, no. 73, p. 81, pl. 5, figs. 12a, b. Shale, Devils Kitchen member of Deese formation, NW. cor. sec. 4, T. 6 S., R. 2 E., Love County, Okla.
[not] *Bairdia hoxbarensis* Harlton. Harlton, 1929 = *Orthobairdia texana* (Harlton), 1927.
[not] *Bairdia hoxbarensis* Harlton. Kellett, 1934 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
[not] *Bairdia hoxbarensis* Harlton. Johnson, 1936 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
[not] *Bairdia hoxbarensis* Harlton. Payne, 1937 = *Fabalicypris acetalata* (Coryell and Billings), 1932.
[not] *Bairdia hoxbarensis* Harlton. Scott and Borger, 1941 = *Fabalicypris acetalata* (Coryell and Billings), 1932.

Harlton's holotype (USNM 71408) is a partly corroded specimen that does not have the subelliptical dorsal outline with the greatest width at midlength as illustrated by Cooper (1946, pl. 2, fig. 43).

Geologic range.—Middle and Upper Pennsylvanian.

Fabalicypris minuta Cooper, 1946

Fabalicypris minuta Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 60, pl. 5, figs. 31, 32. Shale on top of Seville limestone, SW¼ sec. 26, T. 17 N., R. 1 W., Rock Island County, Ill.

Geologic range.—Middle Pennsylvanian.

Fabalicypris? muensteriana (Jones and Kirkby), 1865

Cythere muensteriana Jones and Kirkby, 1865, Annals Mag. Nat. History, ser. 3, v. 15, p. 410, pl. 20, figs. 11a, b. Carboniferous or Mountain Limestone at Regnitzlosan, near Hof, Bavaria.

Geologic range.—Carboniferous.

Fabalicypris? perplexa (Coryell and Rozanski), 1942

Bairdia perplexa Coryell and Rozanski, 1942, Jour. Paleontology, v. 16, p. 147, pl. 24, fig. 3. Glen Dean limestone, Hardin County, Ill.
?*Macrocypris ovata* Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 34, pl. 4, figs. 25, 26. Kinkaid formation, NE¼SW¼NE¼ sec. 20, T. 12 S., R. 3 E., one-half a mile south of Veatch school, Johnson County, Ill.

Geologic range.—Upper Mississippian.

Fabalicypris pulcher Cordell, 1952

Fabalicypris pulcher Cordell, 1952, Jour. Paleontology, v. 26, p. 103, pl. 19, figs. 32, 35, 36, 39. Ladore shale, Hushpuckney shale, and Bethany Falls limestone, W½ sec. 13, T. 61 N., R. 25 W., near head of ravine across State Highway 6, 350 ft west of junction with County Highway W, 1.8 miles west of Trenton, Grundy County, Mo.

Geologic range.—Upper Pennsylvanian.

Fabalicypris regularis Cooper, 1946

Fabalicypris regularis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 60, pl. 6, figs. 1–3. Shale parting in upper part of Seville limestone, SW¼ sec. 24, T. 15 N., R. 4 W., Mercer County, Ill.

Geologic range.—Middle Pennsylvanian.

Fabalicypris? rotundata (Kummerow), 1953

Bairdiacypris? *rotundata* Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, Berlin, p. 17, pl. 1, figs. 11a, b. Upper Carboniferous, Grodziec I, well no. 201, 171.4–171.5 m, Poland (?).

The illustrations are of a specimen that agrees in shape and thickness with *Fabalicypris*, but the diagnostic ventroanterior offset is not shown.

Geologic range.—Upper Carboniferous.

Fabalicypris shideleri (Delo), 1930

Plate 3, figures 6–8

Bairdia shideleri Delo, 1930, Jour. Paleontology, v. 4, p. 167, pl. 13, fig. 2. Pennsylvanian or Permian core, 1365–75 ft, Transcontinental Oil Co., Blackstone-Slaughter No. 1 well, blk. 129, sec. 29, Texas and St. Louis Survey; 250 ft from west lines, elev. 3,635 ft. Pecos County, Tex.
[not] *Bairdiacypris shideleri* (Delo). Cooper, 1946 = *Fabalicypris* sp. A.

Geologic range.—Pennsylvanian or Permian.

Fabalicypris? subaequalis (Geis), 1932

Bairdia subaequalis Geis, 1932, Jour. Paleontology, v. 6, p. 178, pl. 25, figs. 13a, b. Salem limestone, Indiana.
Bairdia subequalis Geis. Sohn, 1940, Jour. Paleontology, v. 14, p. 155 [spelling error].

Geologic range.—Upper Mississippian.

Fabalicypris subelliptica Cordell, 1952

Fabalicypris subelliptica Cordell, 1952, Jour. Paleontology, v. 26, p. 104, pl. 19, figs. 37, 38. Pleasanton shale and shale parting 3 ft above base of Sniabar limestone member of Herta formation, NE¼NE¼ sec. 21, T. 57 N., R. 25 W., ditch along County Highway D, and gully and creek to the east; 0.1–0.2 miles south of State Highway 36, 0.3 mile southeast of Mooresville, Livingston County, Mo.

Geologic range.—Upper Pennsylvanian.

Fabalicypris tenuis Cooper, 1946

Fabalicypris tenuis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 61, pl. 6, figs. 9–11. Shale below Seville limestone NE¼ sec. 21, T. 17 N., R. 1 E., Henry County, and SW¼ sec. 5, T. 14 N., R. 2 W., Mercer County, Ill.

Geologic range.—Middle Pennsylvanian.

Fabalicypris warthini (Bradfield), 1935

Plate 3, figure 28

Bairdia warthini Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 83, pl. 5, figs. 11a, b. Deese formation, near NE. cor. NW¼ sec. 33, T. 3 S., R. 1 E., Carter County, Okla.

Fabalicypris wetumkaensis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 61, pl. 6, figs. 12–19. Shale above Brereton limestone, SW¼ sec. 9, T. 5 S., R. 6 W., Randolph County, Ill.

Bairdia haworthi Knight. Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 72, pl. 6, figs. 4a, b. Shale, Wewoka formation, hill 1,300 ft north and 200 ft east of SW. cor. sec. 4 T. 3 N., R. 7 E., Pontotoc County, Okla.

[not] *Bairdia haworthi* Knight, 1928 = *Cryptobairdia haworthi* (Knight), 1928.

Geologic range.—Middle Pennsylvanian.

Fabalicypris wileyensis Cooper, 1946

Fabalicypris wileyensis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 61, pl. 6, figs. 4–8. Shale from Wiley cyclothem, SW¼ sec. 36, T. 17 N., R. 9 W., Vermilion County, Ind.

?*Fabalicypris wileyensis* Cooper. Marple, 1952, Jour. Paleontology, v. 26, p. 932, pl. 134, figs. 1–3. Lower Mercer limestone, fork of stream, NE¼ sec. 32, Elk Township, Vinton County, Ohio.

Marple illustrated a specimen with a straight ventral margin, but because most of her material is corroded, it is possible that her identification is not correct.

Geologic range.—Middle Pennsylvanian.

Fabalicypris sp. A

Bairdiacypris shideleri (Delo). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 54, pl. 4, figs. 26, 27. Shale below lower bench of Lonsdale limestone, SE¼ sec. 16, T. 12 N., R. 9 E., Marshall County, Ill.

[not] *Bairdia shideleri* Delo, 1930 = *Fabalicypris shideleri* (Delo), 1930.

The holotype of *F. shideleri* (Delo) (pl. 3, figs. 6–8) has the greatest width posterior to midlength, while Cooper's specimen is more spindle shaped and has the greatest width at midlength.

Geologic range.—Middle Pennsylvanian.

Fabalicypris sp. B

Bairdiacypris nebraskensis (Upson). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 54, pl. 4, figs. 28, 29. Shale above and below Exiline limestone, NE¼ sec. 22, T. 14 N., R. 7 E., Stark County, Ill.

[not] *Bairdia nebraskensis* Upson, 1933 = *F. nebraskensis* (Upson), 1933.

The dorsoposterior margin of Cooper's species is straight, while Upson's species has a convex dorsoposterior margin.

Geologic range.—Middle Pennsylvanian.

Fabalicypris? sp. C

Microcheilinella pergracilis Croneis and Gale. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 15 [list], pl. 4, figs. 39, 40. Vienna formation, SE¼SW¼ sec. 26, T. 11 S., R. 1 W., Union County, Ill.

[not] *Microcheilinella pergracilis* Croneis and Gale, 1939; based on a steinkern of probably *Cavellina.*

The specimen illustrated by Croneis and Gale (1939 pl. 6, figs. 23, 24) differs from this species in the shape of the dorsal outline and by an apparently visible overlap along the anterior margin.

Geologic range.—Upper Mississippian.

Fabalicypris sp. 1 Cordell, 1952

Fabalicypris sp. 1 Cordell, 1952, Jour. Paleontology, v. 26, p. 104, pl. 119, figs. 31, 33, 34. Pleasanton shale, NE¼SE¼ sec. 33, T. 65 N., R. 24 W., southeast and south bluffs of Weldon River valley, gulley immediately southeast of Chicago, Rock Island and Pacific Railroad, 0.3 mile southwest of Princeton, Mercer County, Mo.

Geologic range.—Upper Pennsylvanian.

Fabalicypris? sp. indet.

Bairdia subelongata Jones and Kirkby, 1879 [part], Geol. Soc. London Quart. Jour., v. 35, p. 573, pl. 30, fig. 16 [not figs. 1–11; see *Bairdiacypris subelongata* (Jones and Kirkby), 1879 for disposition]. Carboniferous, Pitlessie, Fifeshire, Scotland.

The illustration is of a specimen related to *Fabalicypris*, but as only one view is shown, it is not possible to identify the species.

Geologic range.—Carboniferous.

Fabalicypris? sp. indet.

Bairdia? subelongata Jones and Kirkby. Knight, 1928, Jour. Paleontology, v. 2, p. 326, pl. 43, fig. 9. Shaley upper surface of the Upper Fort Scott limestone exposed in vacant lot at northwest corner of Gustine and Mac Donald Streets, St. Louis, Mo.

The illustration is inadequate for identification; in 1952 it was not possible to collect at this locality because of building construction.

Geologic range.—Middle Pennsylvanian.

Fabalicypris sp.

Bairdia distracta Eichwald. Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled Geol.-Razv. Inst., Trudy, (VNIGRI), new ser., no. 56, p. 87, pl. 19, figs. 4a–c. Aleksinskaya formation, Lower Carboniferous, Russia.

Geologic range.—Lower Carboniferous.

Genus ORTHOBAIRDIA Sohn, n. gen.

Type species.—Bairdia cestriensis Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 210, pl. 17, figs. 6a–c. Chester shale, Kentucky.

Diagnosis.—Differs from *Bairdia* in that the sides are parallel in dorsal outline.

Discussion.—The reason for erecting this genus for species with parallel sides in dorsal outline is discussed on p. 12. The fact that very young instars as well as adults have parallel sides indicates that this feature is not due to dimorphism and ontogeny.

The genus *Orthobairdia* is characterized by parallel sides in dorsal outline. Nine species are defined by a dichotomous key. Two of these species are new but are designated here by letter. The stratigraphic range and frequency of occurrence of these species are shown on figure 11.

Geologic range.—Middle Devonian, Upper Mississippian–Permian.

Lithology.—Shale, limestone.

Habitat.—Marine.

KEY TO THE SPECIES OF ORTHOBAIRDIA

1. Dorsoposterior margin of larger valve equals one-third or more of greatest length.................. 2
1a. Dorsoposterior margin of larger valve equals one-quarter of greatest length.................. 4
2 (1). Dorsoposterior margin straight, approximately one-half of greatest length.............. sp. A (p. 69)
2a. Dorsoposterior margin curved................. 3
3 (2a). Dorsoposterior margin convex, approximately one-half of greatest length
oklahomaensis (p. 66), (*dornickhillensis, auricular*)
3a. Dorsoposterior margin concave, approximately one-third of greatest length
powersi (p. 67), (*perincerta?, crassimarginata?*)
4 (1a). Dorsoanterior margin concave.......... sp. B (p. 69)
4a. Dorsoanterior margin straight or convex.......... 5
5 (4a). Posterior point above midheight...... *stictica* (p. 68)
5a. Posterior point at or below midheight.......... 6
6 (5a). Greatest height less than half the greatest length.. 7
6a. Greatest height half or more than half the greatest length.................................. 8
7 (6). Dorsoposterior margin convex... *subreniformis* (p. 68)
7a. Dorsoposterior margin straight or concave
kirki (p. 66)
8 (6a). Posterior half of right valve inflated, dorsum incised
texana (p. 68), (*altifrons, chasae, florensis?, guadalupiana, nevensis, scholli?*)
8a. Posterior half of right valve not inflated
cestriensis (p. 65), (*aequa, clorensis?, plebia* var. *alta?, granireticulata, insolens?, cestriensis* var. *granulosa*)

ASSIGNED SPECIES

Orthobairdia cestriensis (Ulrich), 1891

Plate 3, figures 24–27

Bairdia cestriensis Ulrich, 1891 [part], Cincinnati Soc. Nat. History Jour., v. 13, p. 210, pl. 17, figs. 6a–c [not figs. 7a, b; steinkern of indet. sp.]. Chester shale, Grayson Springs Station, Grayson County, Ky.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 25, pl. 1, figs. 27, 28. Golconda formation NE¼SW¼NW¼ sec. 28, T. 13 S., R. 3 W., Johnson County, Ill.

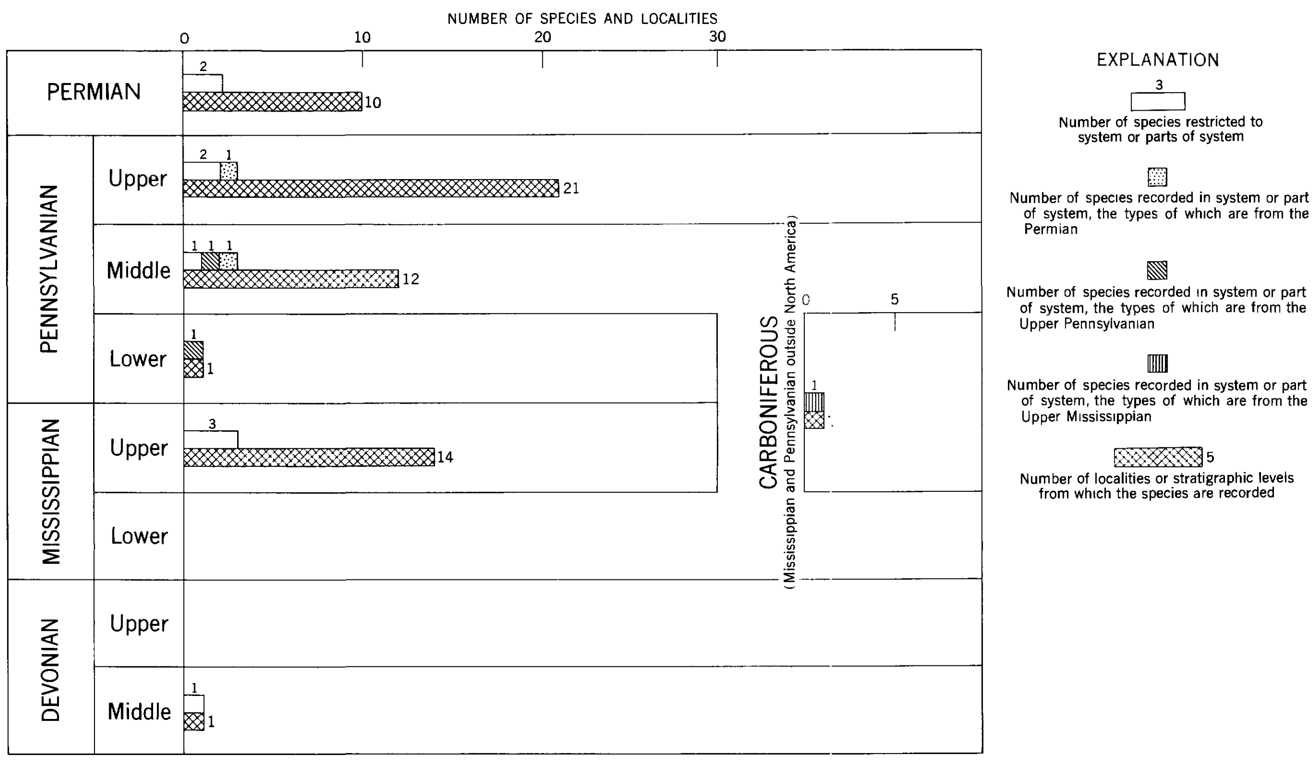

FIGURE 11.—Stratigraphic range and frequency distribution of species of *Orthobiardia*.

?*Bairdia* aff. *B. cestriensis* Ulrich. Girty, 1915, U.S. Geol. Survey Bull. 595, p. 39, pl. 2, fig. 10. "Spring Creek limestone." (Mississippian), chert, about 120 ft above black shale outcrop in bluff about a mile above Ruddells Mill, Batesville quadrangle, Ark.

Bairdia cestriensis var. *granulosa* Girty, 1910, New York Acad. Sci. Annals, v. 20, p. 237 [no illus.]. Limestone at bottom of Fayetteville shale, Fayetteville quadrangle, NW¼ NW¼ sec. 27, T. 17 N., R. 29 W., Washington County, Ark.

Bairdia granireticulata Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 267, pl. 2, figs. 10a, b. Fayetteville shale, just below limestone, 5 miles east of Vinita, SW. cor. sec. 15, T. 25 N., R. 21 E., Craig County, Okla.

Bairdia aequa Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 24, pl. 1, figs. 21, 22. Renault formation, NE¼ SW¼ sec. 9, T. 12 S., R. 1 W., Union County, Ill.

?*Bairdia insolens* Cooper, 1941, idem, p. 28, pl. 2, figs. 1, 2. Renault formation, NW¼NW¼ sec. 3, T. 14 S., R. 3 E., Massac County, Ill.

Bairdia cooperi Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 287, pl. 6, figs. 11, 12. Golconda formation, west bank of Lusk Creek, 2 miles north of Waltersburg, Pope County, Ill.

?*Bairdia cooperi* Croneis and Gale. Coryell and Rozanski, 1942, Jour. Paleontology, v. 16, p. 107, pl. 24, fig. 5. Glen Dean formation, Frailey's Store section, Hardin County, Ill.

?*Bairdia seminalis* Knight. Coryell and Rozanski, 1942, Jour. Paleontology, p. 146, pl. 24, fig. 1. Glen Dean formation, Ohio River bluff, one-half a mile southwest of Frailey's Store, Hardin County, Ill.

?*Bairdia clorensis* Cooper, 1943, Jour. Paleontology, v. 17, p. 629, n. name for *B. sinuosa* Cooper, 1941.

?*Bairdia sinuosa* Cooper, 1941 [not Morey, 1936], Illinois Geol. Survey Rept. Inv. 77, p. 26, pl. 2, figs. 11, 12. Clore formation, railroad cut at Robbs, NE¼NW¼ sec. 30 and SE¼SW¼ sec. 19, T. 12 S., R. 5 E., Pope County, Ill. Based on a specimen that is probably partly abraded.

?*Bairdia plebia* var. *alta* Jones and Kirkby, 1895 [not *Bairdia hispida* var. *alta* Bradfield, 1935 = *B. beedei* Ulrich and Bassler, 1906], Annals Mag. Nat. History, ser. 6, v. 16, p. 457, pl. 21, fig. 6. Carboniferous limestone, Dowgill Settle, Yorkshire, England.

?*Bairdia golcondensis* Croneis and Gale. Cooper, 1947, Jour. Paleontology, v. 21, p. 84 [list], pl. 21, figs. 25, 26. Kinkaid formation, about 40 miles southeast of Chester, Johnson County, Ill.

[not] *Bairdia granireticulata* Harlton. Cooper, 1941 = *Bairdia* sp. J.

Ulrich's cotypes (USNM 41789) consist of 12 specimens that belong to 2 species. Eight specimens are *Orthobairdia cestriensis* (Ulrich), 1891, (figs. 6a–c), the other 4 (figs. 7a, b) are steinkerns of young growth stages of an unidentifiable species with convex sides. The two cotypes of *B. granireticulatus* Harlton (USNM 79370) are identical with Ulrich's specimens. The specimen illustrated here (pl. 3, figs. 24–26) is presumed to be the original of Ulrich's illustration (1891, fig. 6b) and is designated as the lectotype.

Geologic range.—Upper Mississippian and Carboniferous.

Orthobairdia kirki Geis, n. name

Bairdia compressa Geis, 1932, Jour. Paleontology, v. 6, p. 178, pl. 25, figs. 8a, b. Salem limestone, Indiana.

[not] *Bairdia plebia* var. *compressa* Kirkby, 1858 = *Cryptobairdia compressa* (Kirkby), 1858.

[not] *B. kingii* var. *compressa* Kirkby, 1859 = *Cryptobairdia compressa* (Kirkby), 1858.

This name is changed with Dr. Geis' permission.

Geologic range.—Upper Mississippian.

Orthobairdia oklahomaensis (Harlton), 1927

Plate 3, figures 13–21

Bairdia oklahomaensis Harlton, 1927, Jour. Paleontology, v. 1, p. 209, pl. 33, fig. 7. Upper Glenn formation NW¼NW¼ NW¼ sec. 18, T. 5 S., R. 2 E., about 2 miles south of Ardmore, Carter County, Okla.

Harlton, 1929, Texas Univ. Bull. 2901, p. 156, pl. 3, figs. 5a, b. Graham formation, marly shale and limestone, San Saba River valley, near Hext, Menard County, Tex.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 69, pl. 5, figs. 8a, b. Lower Holdenville formation, 10–20 ft above base, shale in creek valley, 600 ft west of road, cor. NE¼NW¼ sec. 1, T. 3 N., R. 6 E. Pontotoc County, Okla.

?*Bairdia oklahomaensis* Harlton. Coryell and Billings, 1932, Am. Midland Naturalist, v. 13, p. 172, pl. 17, fig. 3. Wayland shale, 5 miles east and 2,000 ft north of Cisco, on Cisco-Eastland road, Eastland County, Tex.

Coryell and Sample, 1932, idem, p. 264, pl. 25, fig. 9. East Mountain shale, Mineral Wells formation, shale pit, west of Mineral Wells, Palo Pinto County, Tex.

Bairdia oklahomaensis Harlton. Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 85, pl. 5, figs. 9a, b. Hoxbar formation, shale about 175 ft above Hollis limestone 270 ft north along road, east line sec. 7, T. 5 S., R. 2 E., Carter County, Okla.

?*Bairdia oklahomaensis* Harlton. Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 41, pl. 4, figs. 6, 7. Missouri series, Hickory Creek shale, west of Oreapolis, Nebr.

Bairdia oklahomaensis Harlton. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 48, pl. 3, figs. 15 (?), 17, 18, 19 (?), 20 [not fig. 16, which is a ventral view of an indeterminate species]. Shale below Liverpool limestone, SE¼ sec. 35, T. 34 N., R. 1 E., La Salle County, and shale above Macoupin coal, NW¼ sec. 2, T. 9 N., R. 7 W., Macoupin County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 88, pl. 18, figs. 21–24. Ladore shale, creekbed, a short distance north of gravel road, about midway between north and south lines of sec. 23, 0.2 mile west of east boundary of the section, T. 46 N., R. 31 W., 1.5 miles west of Pleasant Hill, Cass County, Mo.

Marple, 1952, Jour. Paleontology, v. 26, p. 930, pl. 133, figs. 6–11. Lower Mercer limestone, Poverty Run, Hopewell Township, Muskingum County, Ohio.

Bairdia auricula Knight, 1928, Jour. Paleontology, v. 2, p. 319, pl. 43, figs. 3a, b. "Brown lime" of Labette shale, south bank of creek east of Price Rd. and south of Ladue Rd., St. Louis, Mo.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 68, pl. 5, figs. 7a, b. Wewoka formation, shale 75 ft above base, hill 1,300 ft east of southwest cor. sec. 4, T. 3 N., R. 7 E., Pontotoc County, Okla.

Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 263, pl. 25, fig. 6. East Mountain shale, shale pit west of Mineral Wells, Palo Pinto County, Tex. The description states that the species is moderately convex in dorsal outline, which, if correct would exclude it from this species.

Bairdia dornickhillensis Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 268, pl. 2, figs. 12a, b. Dornick Hills formation, SE¼SW¼NE¼ sec. 11, T. 4 S., R. 1 E., Carter County, Okla.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 78, pl. 5, figs. 3a, b. Devil's Kitchen member of Deese formation, 10 ft of shale with thin limestone streaks below main limestone, between the two Devil's Kitchen sandstones, NW. cor. sec. 4, T. 6 S., R. 2 E., Love County, Okla.

Bairdia seminalis Knight. Payne, 1937, Jour. Paleontology, v. 11, p. 285, pl. 39, figs. 9a, b. Hayden Branch limestone, 85 ft below Merom sandstone, near Dodds Bridge over Turmans Creek, Sullivan County, Ind.

The two specimens of *Orthobairdia oklahomaensis* (Harlton), 1927, illustrated here on plate 3, figures 16–19, are from the same sample (USGS loc. 12845) collected at Bradfield's loc. 68 (Bradfield, 1935, p. 143). They have the following measurements:

	Greatest length (mm)	Greatest height (mm)	Greatest width (mm)
Pl. 3, figs. 18, 19	0.85	0.49	0.35
Pl. 3, figs. 16, 17	1.26	.74	.52

The greatest length was measured perpendicular to the ventral commissure (Sohn, 1954, p. 3); the greatest height was measured perpendicular to the length; and the greatest width was oriented as described by Sohn (Sohn, 1950, p. 34).

In order to discuss the ontogeny of this species, the fact that the larger specimen is probably an adult should be established. The following measurements are published for this species:

Published measurements for Orthobairdia oklahomaensis

	Length (mm)	Height (mm)	Width (mm)	Comments
Harlton (1927)	0.72	0.48	0.32	Holotype.
Harlton (1929)	1.2	.7		
Warthin (1930)	1.13	.72	.61	
Coryell and Billings (1932)	.83	.50	.40	Assignment questioned.
Coryell and Sample (1932)	1.25	.76		Do.
Bradfield (1935)	1.3	.79	.56	Locality 25.
Johnson (1936)	1.05	.70		
Do	1.00	.62		
Cooper (1946)	1.36	.85	.61	
Cordell (1952)	1.13	.69	.39	
Marple (1952)	.53	.33	.17	Single valve (?).
Do	.61	.38	.25	
Do	.71	.46	.30	
Do	.92	.56	.41	
Do	1.10	.66	.51	

This table shows that only two specimens, those of Bradfield (1935), and Cooper (1946), are reported to be larger than the one illustrated in this paper. Harlton's holotype (USNM 71409) is recorded as having a length of 0.72 mm; remeasured with the same instrument as the two illustrated specimens, the greatest length is 1.23 mm, and the greatest height is 0.68 mm. Unfortunately, it is not practical to remeasure all the specimens for which measurements are listed. Because the size data are from 10 different investigators, they should not be used to construct an ontogenetic graph.

Dr. R. V. Kesling very generously analyzed the two sets of measurements; he writes as follows (Oct. 11, 1956):

Of your two specimens of "*Bairdia*" *oklahomaensis*, I would assign the smaller to the penultimate instar before the larger. As I analyze them, an ideal series would be:

	Length	*Height*	*Width*	*Product*
3. (your large specimen)	1.26	0.74	0.52	0.4848
2. (missing) [estimated]	1.00	.58	.41	.2424
1. [estimated]	.79	.47	.33	.1212
Your smaller specimen	.85	.49	.35	.1458

All dimensions of your smaller specimen are much closer to line 1 than to line 2, and hence the specimen appears to be two instars behind the larger.

As previously stated (p. 7), adults in the *Bairdia* s. l. groups are approximately 1 mm in greatest length. The term "adult" is used in this paper to include postmaturity molt stages (Sohn, 1950a, p. 429). It is not possible to determine in this group the size at which maturity is reached, but the odds are in favor of specimens as small as 0.6 mm in greatest length being more than one instar removed from maturity. The group with straight sides are removed into the new genus *Orthobairdia* because young as well as mature individuals have this feature.

Geologic range.—Middle and Upper Pennsylvanian.

Orthobairdia powersi (Kellett), 1934

Bairdia powersi Kellett, 1934, Jour. Paleontology, v. 8, p. 133, pl. 17, figs. 6a–e. Burlingame limestone, U.S. Highway 50, 4 miles north of Burlingame, Osage County, Kans.

?*Bairdia perincerta* Kellett, 1934, Jour. Paleontology, p. 132, pl. 16, figs. 6a–d. Same locality as above.

Bairdia perincerta Kellett. Cordell, 1952, Jour. Paleontology, v. 26, p. 88, pl. 17, figs. 21–23. Hickory Creek shale, roadcuts along hill north of Oak Ridge School, 1.8 miles southeast of Weatherby, NE¼NE¼ sec. 35, T. 59 N., R. 30 W., De Kalb County; and lower shale in Lawrence formation, ditch at corner of Russel Street and Highway 59, St. Joseph, Buchanan County, Mo.

?*Bairdia crassimarginata* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 44, pl. 2, figs. 3–5. Shale below La Salle limestone, NW¼ sec. 33, T. 16 N., R. 11 E., Bureau County, Ill.

?*Bairdia* cf. *B. ardmorensis* Harlton. Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 92, pl. 7, figs. 7a, b. Shale breaks in Otterville limestone, main gully, 200 yd south of north line and one-quarter of a mile west of east line of sec. 12, T. 3 S., R. 2 E., Carter County, Okla. Based on a corroded specimen that represents a very young individual.

[not] *Bairdia ardmorensis* Harlton, 1929 = *Bairdiolites ardmorensis* (Harlton), 1929.

Cooper does not state whether or not *B. crassimarginata* has a horizontal ridge on the left valve near the dorsal margin. His specimens have the thickened part of the centroventral edge of the left valve that is present in *B. powersi;* consequently, the assignment to *O. powersi* is tentative.

Geologic range.—Lower and Upper Pennsylvanian.

Orthobairdia subreniformis (Kirkby), 1859

Cythere subreniformis Kirkby, 1859, Tyneside Naturalist's Field Club Trans., v. 4, p. 154, pl. 9, fig. 13. New name for *Bairdia reniformis* Kirkby, 1858.

Jones, 1859, *in* Kirkby, idem, p. 155, 168, pl. 11, figs. 23a–d [23c is labeled 24c]. Permian, Sunderland, England.

Bairdia reniformis Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 329, pl. 10, fig. 13. Permian, Tunstall Hill, Durham, England.

Kirkby (1859, p. 154) decided that this species belonged to *Cythere*, and because there was a *Cythere reniformis* Baird, 1835 (Recent), he renamed the species *Cythere subreniformis.* Bassler and Kellett (1934, p. 238) referred this species to *Carbonita intermedia* (Münster), 1830, from which it differs significantly.

Geologic range.—Permian.

Orthobairdia stictica (Krömmelbein), 1950

Bairdia stictica Krömmelbein, 1950, Senckenbergiana, v. 31, p. 334, pl. 1, figs. 3a–d. Lower Middle Devonian, Salmerwald Mulde, Eifel, Germany.

Geologic range.—Middle Devonian.

Orthobairdia texana (Harlton), 1927

Plate 3, figure 29

Bairdia texana Harlton, 1927, Jour. Paleontology, v. 1, p. 210, pl. 33, fig. 9. Shale just below Sedwick limestone, 2½ miles northeast of Coleman, Coleman County, Tex.

Bairdia altifrons Knight, 1928, idem, v. 2, p. 324, pl. 43, figs. 6a, b. "Brown lime" of Labette shale, exposed in south bank of creek east of Price Rd. and south of Ladou Rd., St. Louis County, Mo.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 70, pl. 5, figs. 10a, b. Wewoka(?) formation, 75 ft above base, shale on hill, 1,300 ft north and 200 ft east of SW. cor. sec. 4, T. 3 N., R. 7 E., Pontotoc County, Okla.

Kellett, 1934, Jour. Paleontology, v. 8, p. 135, pl. 18, figs. 6a, b. Wewoka formation, 1,300 ft north of SW¼ sec. 4, T. 7 E., R. 3 N., Oklahoma. Note discrepancy between the above two localities that are supposed to be identical.

Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 42, pl. 4, figs. 4, 5. Hickory Creek shale (Stanton formation), bluffs just south of Burlington Railroad, between 2½ and 3½ miles west of Oreapolis, sec. 32, T. 13 N., R. 13 E., Cass County, Nebr.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 40, pl. 1, figs. 20–22. Shale below lower bench of Lonsdale limestone, SE¼ sec. 16, T. 12 N., R. 9 E., Marshall County, Ill.

Cordell, 1952, Jour. Paleontology, v. 26, p. 82, pl. 17, figs. 1–4. Base of Bonner Springs shale to base of Hickory Creek shale, SE¼SE¼ sec. 28 and along boundary between secs. 28 and 33, T. 61 N., R. 30 W., 4 miles east of Berlin, Gentry County, Mo.

?*Bairdia altifrons* Knight. Marple, 1952, Jour. Paleontology, v. 26, p. 929, pl. 133, figs. 4, 5. Lower Mercer limestone, valley of tributary of Johnathan Creek, on line between Madison Township, Perry County, and Newton Township, Muskingum County, Ohio. The illustrations are not adequate to determine the species.

Bairdia hoxbarensis Harlton. Harlton, 1929, Texas Univ. Bull. 2901, p. 154, pl. 3, figs. 1a–d. Canyon series, San Saba River valley, near Hext, Menard County, Tex. Figure 1a is listed as the holotype; however, it is a different specimen than the holotype (USNM 71408).

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 86, pl. 6, fig. 8. Union Dairy formation railroad cut, SW¼ sec. 6, T. 5 S., R. 2 E., Carter County, Okla.

Bairdia chasae Kellett, 1934, Jour. Paleontology, v. 8, p. 135, pl. 18, figs. 5a–d. Deer Creek formation, railroad cut near Kansas River, just west of Shawnee-Douglas County line crossing Highway 10, Kansas.

?*Bairdia florenaensis* Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 22, pl. 2, figs. 4a–c. Basal Florena shale, roadcut along south line of SW¼ sec. 34, T. 1 N., R. 14 E., Richardson County, Nebr.

Kellett, 1934, Jour. Paleontology, v. 8, p. 137, pl. 14, fig. 4; pl. 18, figs. 1a–d, 2a–d; pl. 19, figs. 1e, f, 2a–d. Cottonwood formation, Highway U.S. 40 at Ogden, Riley County; Wreford formation, low outcrop, road north of District No. 17 school, Chase County; Elmdale formation, shale parting exposed below road upstream from Cottonwood river bridge, east of Elmdale, Chase County; shale directly above Cottonwood limestone, large abandoned (1934) quarry, east of Cottonwood Falls, Chase County, Kans.

?*Bairdia* cf. *B. florenaensis* Upson. Glebovskaya, 1938, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 101, p. 180, pl. 1, figs. 6, 6a. Lower Permian, Ischimbaev district, Russia.

?*Bairdia scholli* Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 264, pl. 4, figs. 3, 4. Wayland shale, 1 mile west of Graham, near Graham–Throckorton Rd., west of Salt Creek, Young County, Tex.

Bairdia ampla Reuss. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 40, pl. 1, figs. 45–49. Shale in Shumway cyclothem, SW¼ sec. 26, T. 9 N., R. 5 E., Effingham County, Ill.

?*Bairdia geinitziana* (Jones). Reuss, 1854, Wetterauer Gesell. Naturk. Hanau Jahresb. 1851–53, p. 66, unnumbered plate, figs. 1a, b. Permian, Bleichenbach and Selters, Germany.

Bairdia guadalupiana Hamilton, 1942, Jour. Paleontology, v. 16, p. 714, pl. 110, figs. 5a, b. Permian, uppermost Leonard or lowermost Word formation, Glass Mountains, Brewster County, Tex.

Bairdia nevensis Kellett, 1934, Jour. Paleontology, v. 8, p. 137, pl. 19, figs. 3a, b. Shale, Neva formation, along road winding uphill near Cottonwood River Bridge, east of Elmdale, Chase County, Kans.

The holotype of *B. nevensis* (USNM 89485) is a steinkern, as is the holotype of *B. texana* (USNM

71720), which appears to have a concave ventral margin.

Geologic range.—Middle Pennsylvanian–Permian.

Orthobairdia sp. A

Bairdia brevis Jones and Kirkby. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 25, pl. 1, figs. 11, 12. Menard formation, south entrance to railroad tunnel SW¼NE¼ sec. 1, T. 13 S., R. 4 E., Johnson County, Ill.

Geologic range.—Upper Mississippian.

Orthobairdia sp. B

Bairdia grahamensis Harlton. Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 70, pl. 5, figs. 12a, b. Holdenville formation, 10–20 ft above base, shale in creek valley, 600 ft west of road, corner NE¼NW¼ sec. 1 T. 3 N., R. 6 E., Pontotoc County, Okla.

Geologic range.—Middle Pennsylvanian.

Genus PUSTULOBAIRDIA Sohn, n. gen.

Type species.—*Bairdia*? *pruniseminata* Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 4, pl. 1, figs. 1–7, Permian, Texas.

Diagnosis.—Differs from *Bairdia* in that the surface is covered with pustules.

Geologic range.—Upper Pennsylvanian-Permian.

Lithology.—Limestone, shale.

Habitat.—Marine.

KEY TO SPECIES OF PUSTULOBAIRDIA

1.	End margins beaded	*pruniseminata* (p. 69)
1a.	End margins not beaded	2
2 (1a).	Ventral margin concave	*spinosa* (p. 69)
2a.	Ventral margin convex	sp. A (p. 69)

ASSIGNED SPECIES

Pustulobairdia pruniseminata (Sohn), 1954

Plate 3, figures 22, 23

Bairdia pruniseminata Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 4, pl. 1, figs. 1–7, text figs. 1a–d. Silicified limestone, uppermost Leonard or lowermost Word formation, Glass Mountains, Brewster County, Tex.

Geologic range.—Permian.

Pustulobairdia spinosa (Cooper), 1946

Bairdia spinosa Cooper, 1946 [not Polenova, 1952], Illinois Geol. Survey Bull. 70, p. 52, pl. 3, figs. 44–46. Shale parting in upper Shoal Creek limestone, NW¼ sec. 36, T. 10 N., R. 7 W., Macoupin County, Ill.

[not] *Bairdia*? aff. *B. spinosa* Cooper. Sohn, 1954 = *Pustulobairdia* sp. A.

[not]) *Bairdia spinosa* Polenova, 1952=*Rectobairdia tikhyi*? (Polenova), 1952.

Geologic range.—Upper Pennsylvanian.

Pustulobairdia sp. A

Bairdia? aff. *B. spinosa* Cooper. Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 5, pl. 1, figs. 12–18. Silicified limestone uppermost Leonard or lowermost Word formation Glass Mountains, Brewster County, Tex.

Geologic range.—Permian.

Genus CERATOBAIRDIA Sohn, 1954

Ceratobairdia Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 5.

Type species.—Original designation *C. dorsospinosa* Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 6, pl. 1, figs. 27–32; pl. 2, figs. 17, 19. Permian, west Texas.

Diagnosis.—Differs from *Bairdia* by the presence of thick spines or knobs along the dorsum of the larger valve and by a ventrolateral alate ridge.

Geologic range.—Permian.

Lithology.—Calcarenite.

Habitat.—Marine.

ASSIGNED SPECIES

Ceratobairdia dorsospinosa Sohn, 1954

Plate 3, figures 30–32

Ceratobairdia dorsospinosa Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 6, pl. 1, figs. 27–32; pl. 2, figs. 17, 19. Upper Leonard or Lower Word formation, Glass Mountains, Tex.

Geologic range.—Permian.

Ceratobairdia wordensis (Hamilton), 1942

Plate 4, figures 8–17

Bairdia wordensis Hamilton, 1942, Jour. Paleontology, v. 16, p. 716, pl. 110, fig. 4. Upper Leonard or lower Word formation, Glass Mountains, Tex.

Geologic range.—Permian.

Genus BAIRDIOLITES Croneis and Gale, 1939

Bairdiolites Croneis and Gale, 1939, Denison Univ. Bull. Jour. Sci. Lab., v. 33, p. 288.

Type species.—Original designation *B. crescentis* Croneis and Gale, 1939, idem, v. 33, p. 288, pl. 6, figs. 19, 20. Golconda formation, Illinois.

Diagnosis.—Differs from *Bairdia* s. l. by possessing two curved parentheseslike ridges on the anterocentral and posterocentral parts of each valve.

Discussion.—The dorsal outline of this genus varies in that the area between the curved ridges may be convex, parallel, or wedge shaped; the lateral outline of species in this genus is also variable, having the shape of several of the genera here removed from *Bairdia*.

The genus *Bairdiolites* is characterized by two parentheseslike ridges near each end of the valve. A total of 15 species are defined by a dichotomous key. Two of these species are new, but are designated here by letters. The sratigraphic range and the frequency of occurrence of these species are shown on figure 12.

This is essentially an Upper Mississippian genus, having only 1 species, *B. ardmorensis* (Harlton), 1929, recorded from the 2 localities of Early Pennsylvanian age in Oklahoma.

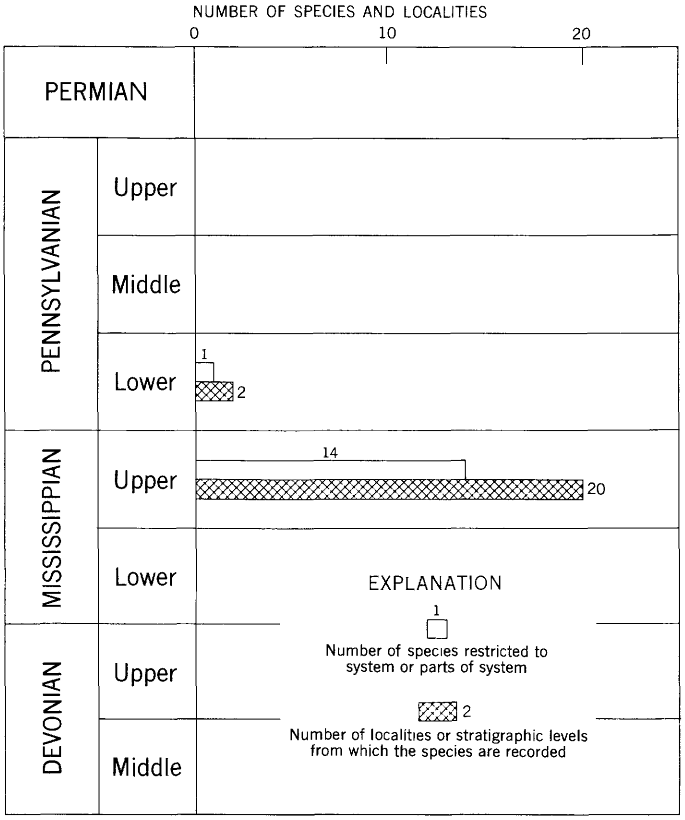

FIGURE 12.—Stratigraphic range and frequency distribution of species of *Bairdiolites*.

Geologic range.—Upper Mississippian–Lower Pennsylvanian.

Lithology.—Limestone(?), shale.

Habitat.—Marine.

KEY TO THE SPECIES OF BAIRDIOLITES

1. Dorsal margin straight ---------- 2
1a. Dorsal margin convex ---------- 4
2 (1). Dorsal outline hexagonal; sides subparallel *crescentis* (p. 71)
2a. Dorsal outline not hexagonal ---------- 3
3 (2a). Greatest width in dorsal outline at midlength *elongatus* (p. 71)
3a. Greatest width in dorsal outline behind midlength *tenuis* (p. 71)
4 (1a). Ventral margin straight ---------- 5
4a. Ventral margin curved ---------- 10
5 (4). Dorsoanterior margin straight ---------- 6
5a. Dorsoanterior margin curved ---------- 7
6 (5). Posterior point in ventral quarter of greatest height *bulbosus* (p. 70)
6a. Posterior point in ventral third of greatest height *vulgaris* (p. 71)
7 (5a). Dorsoanterior margin concave ---------- *fovealis* (p. 71)
7a. Dorsoanterior margin convex ---------- 8
8 (7a). Dorsoposterior margin convex ---------- 9
8a. Dorsoposterior margin concave ---------- *crassus* (p. 71)
9 (8). Posterior point in ventral third of greatest height *procerus* (p. 71)
9a. Posterior point in ventral quarter of greatest height *ovatus* (p. 71)
10 (4a). Ventral margin concave ---------- sp. A (p. 71)
10a. Ventral margin convex ---------- 11
11 (10a). Dorsoanterior margin straight ---------- 12
11a. Dorsoanterior margin convex ---------- 13
12 (11). Dorsoanterior margin to approximate midlength *brevirostris* (p. 70)
12a. Dorsoanterior margin to approximate one-third of greatest length ---------- *ardmorensis* (p. 70)
13 (11a). Dorsoposterior margin straight ---------- *fornicatus* (p. 71)
13a. Dorsoposterior margin concave ---------- 14
14 (13a). Posterior point at midheight ---------- sp. B (p. 71)
14a. Posterior point below midheight *platypleurus* (p. 71)

ASSIGNED SPECIES

Bairdiolites ardmorensis (Harlton), 1929

Plate 4, figures 4–7

Bairdia ardmorensis Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 267, pl. 2, fig. 11. Dornick Hills formation, NW¼SE¾ sec. 11, T. 4 S., R. 1 E. Carter County, Okla.
Harlton, 1933, Jour. Paleontology, v. 7, p. 25, pl. 7, fig. 8. Johns Valley shale, below Wapanucka limestone, Hartshorne limestone quarry, center N½ sec. 18, T. 4 N., R. 17 E., Latimer County, Okla.
[not] *Bairdia* cf. *B. ardmorensis* Harlton, Bradfield, 1935 = *Orthobairdia powersi* (Kellett), 1934.

Geologic range.—Lower Pennsylvanian.

Bairdiolites brevirostris Croneis and Thurman, 1939

Bairdiolites brevirostris Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 326, pl. 7, fig. 20. Kinkaid formation, about 2 miles southeast of Bloomfield, presumably in SW¼ sec. 35, T. 12 S., R. 3 E., Johnson County, Ill.
Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 26, pl. 2, figs. 15, 16. Degonia or Clore formation, railroad cut at Robbs, NE¼ sec. 30 and SE¼SW¼ sec. 19, T. 12 S., R. 5 E., Pope County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites bulbosus Croneis and Bristol, 1939

Bairdiolites bulbosus Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 95, pl. 3, figs. 14, 15. Menard formation, Illinois.
?*Bairdiolites emarginatus* Croneis and Bristol, 1939, idem, p. 96, pl. 3, figs. 12, 13. Menard formation, Illinois.
[not] *Bairdiolites bulbosus* Croneis and Bristol. Cooper, 1941 = *B. procerus* Cooper, 1941.

Cooper (1941, p. 27) considered *B. emarginatus* a synonym of *B. bulbosus;* however, because Croneis and Bristol illustrated a left valve view of *B. emarginatus* and a right valve view of *B. bulbosus* and because on the illustrations the posterior point of *B. emarginatus* appears higher on the specimen than *B. bulbosus*, the synonymy is here questioned. Cooper illustrated a specimen of *B. bulbosus* that is closer to *B. procerus* than it is to the holotype of *B. bulbosus.*

Geologic range.—Upper Mississippian.

Bairdiolites crassus Cooper, 1941

Bairdiolites crassus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 27, pl. 2, figs. 29, 30. Clore formation, core, H. Forester No. 1 well, W½SW¼NW¼ sec. 5, T. 6 S., R. 1 W., Perry County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites crescentis Croneis and Gale, 1939

Bairdiolites crescentis Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 288, pl. 6, figs. 19, 20. Golconda formation, Pope County, Ill.

Croneis and Bristol, 1939, idem, v. 34, p. 96, pl. 3, fig. 18. Menard formation, Illinois.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 2, figs. 25, 26. Golconda formation, Ohio River bluff, near Rock Quarry School, SW¾SE¼ sec. 5, T. 13 S., R. 7 E., Pope County, Ill.

Cooper (1941, p. 14) lists this species also from the Paint Creek, Vienna and Kinkaid formations.

Geologic range.—Upper Mississippian.

Bairdiolites elongatus Croneis and Funkhouser, 1939

Bairdiolites elongatus Croneis and Funkhouser, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 356, pl. 9, figs. 16, 17. Clore formation, Johnson County, Ill.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 2, figs. 23, 24. Degonia or Clore formation, railroad cut near Robbs, NE¼NW¼ sec. 30 and SE¼ SW¼ sec. 19, T. 12 S., R. 5 E., Pope County, Ill.

The holotype is probably a steinkern. Cooper (1941, p. 14) lists this species from the Clore and Kinkaid formations, but according to Swann (oral communication) subsequent work by the Illinois Geological Survey determined Cooper's locality 5 to be either Degonia or Clore formation. A subsequent collection at Cooper's locality 5 (USGS 12840) did not yield this species. There is, however, a question whether the exact layer was sampled.

Geologic range.—Upper Mississippian.

Bairdiolites fornicatus Cooper, 1941

Bairdiolites fornicatus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 27, pl. 2, figs. 27, 28. Menard formation, SW¼NE¼ sec. 1, T. 13 S., R. 4 E., Johnson County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites fovealis Coryell and Rozanski, 1942

Bairdiolites fovealis Coryell and Rozanski, 1942, Jour. Paleontology, v. 16, p. 147, pl. 24, figs. 6, 7. Glen Dean limestone, Hardin County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites? ovatus Croneis and Funkhouser, 1939

Bairdiolites ovatus Croneis and Funkhouser, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 35, p. 357, pl. 9, figs. 13, 14. Clore formation, limestone and shale in ravine north of road, 1 mile west of Whiteside School, Johnson County, Ill.

[not] *Bairdiolites ovatus* Croneis and Funkhouser. Cooper, 1941 = *Bairdiolites* sp. B.

The holotype, Walker Museum 44472, is a corroded specimen.

Geologic range.—Upper Mississippian.

Bairdiolites platypleurus Croneis and Gale, 1939

Bairdiolites platypleurus Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 289, pl. 6, fig. 25. Golconda limestone and shale, roadcut near Douglas School, Hardin County, Ill.

Bairdiolites platipleurus Croneis and Gale. Sohn, 1940, Jour. Paleontology, v. 14, p. 156 [list].

[not] *Bairdiolites platypleurus* Croneis and Gale. Cooper, 1941 = *Bairdiolites* sp. A.

Geologic range.—Upper Mississippian.

Bairdiolites procerus Cooper, 1941

Bairdiolites procerus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 27, pl. 2, figs. 39, 40. Kinkaid formation, NE¼ SW¼ sec. 35, T. 8 S., R. 4 W., Jackson County, Ill.

?*Bairdiolites bulbosus* Croneis and Bristol. Cooper, 1941, idem, p. 27, pl. 2, figs. 19, 20. Menard formation, NW¼ NE¼ sec. 2, T. 7 S., R. 7 W., Randolph County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites tenuis Cooper, 1941

Bairdiolites tenuis Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 27, pl. 2, figs. 37–38. Renault formation, NE¼SW¼ sec. 9, T. 12 S., R. 1 W., Union County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites vulgaris Cooper, 1941

Bairdiolites vulgaris Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 28, pl. 2, figs. 41–42. Paint Creek formation, SW¼ sec. 4, T. 6 S., R. 8 W., Randolph County, Ill.

Geologic range.—Upper Mississippian.

Bairdiolites sp. A

Bairdiolites platypleurus Croneis and Gale. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 14 [list], pl. 2, figs. 43, 44. Renault (Shetlerville?) formation, loading docks for fluorspar southwest of Rosiclare, SW¼SE¼ sec. 5, T. 13 S., R. 8 E., Hardin County, Ill.

This species differs from *B. platypleurus* by having a concave ventral margin.

Geologic range.—Upper Mississippian.

Bairdiolites sp. B

Bairdiolites ovatus Croneis and Funkhouser. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 27, pl. 2, figs. 21, 22. Degonia or Clore formation, railroad cut near Robbs, NE¼NW¼ sec. 30, and SE¼SW¼ sec. 19, T. 12 S., R. 5 E., Pope County, Ill.

Cooper records this as Kinkaid; see comment under *B. elongatus*.

Geologic range.—Upper Mississippian.

SYNONYMS OF AND SPECIES REJECTED FROM BAIRDIOLITES

bulbosus Croneis and Bristol. Cooper, 1941 = *Bairdiolites procerus* Cooper, 1941.

emarginatus Croneis and Bristol, 1939 = *Bairdiolites bulbosus* Croneis and Bristol, 1939.
ovatus Croneis and Funkhouser. Cooper, 1941 = *Bairdiolites* sp. B.
platypleurus Croneis and Gale. Cooper, 1941 = *Bairdiolites* sp. A.

Family HEALDIIDAE? Harlton, 1933

Genus SILENITES Coryell and Booth, 1933

Silenites Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 265.
[not] *Silenites* Ancey, 1880, Le Naturaliste, v. 2, no. 42, p. 334 [error for *Selenites* Fischer, 1877], fide Howe, 1955 (p. 174).

Type species.—Original designation *S. silenus* Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 265, pl. 4, figs. 1, 2. Wayland shale, Young County, Tex.

Diagnosis.—Carapace smooth, large, short; height greater than one-half the length; ends round; overlap on all margins; dorsal margin overhangs smaller valve; duplicature narrow or absent.

Discussion.—Kellett (1935, pl. 17, fig. 91) illustrated a left valve that shows a muscle scar which she interpreted as pinnate, and consequently placed the genus in Cytherellidae. Her specimen and two right valves in the same slide (USNM 90120) show in glycerin with transmitted light a round muscle scar with many individual spots that is closer to the Healdiidae. The hinge structure of a topotype specimen of *S. silenus* differs from that illustrated for *Bairdiocypris üxheimensis* Kegel by Krömmelbein (1952, pl. 4, figs. 1a, b) in that the smaller valve does not have a step-like bevel on the outside into which the larger valve fits.

The genus *Silenites* is characterized by rounded ends, height greater than one-half the greatest length, and concave ventral margin. Nine species are defined by a dichotomous key. The stratigraphic range and the frequency of occurrence of these species are shown on figure 13.

Geologic range.—Mississippian–Permian.

Lithology.—Limestone, shale.

Habitat.—Marine.

KEY TO SPECIES OF SILENITES

1.	Dorsal commissure angular at junction with one or both end margins	2
1a.	Dorsal commissure evenly curved	4
2 (1).	Dorsoanterior margin of larger valve extends to approximate midlength	*warei* (p. 74)
2a.	Dorsoanterior margin of larger valve does not extend to midlength	3
3 (2a).	Dorsoposterior margin of larger valve longer than dorsoanterior margin	*asymmetrica* (p. 73)
3a.	Dorsoposterior margin of larger valve shorter than dorsoanterior margin	8
4 (1a).	Lateral outline not symmetrical; anterior narrower	5
4a.	Lateral outline approximately symmetrical	7
5 (4).	Ends subround in dorsal outline	6

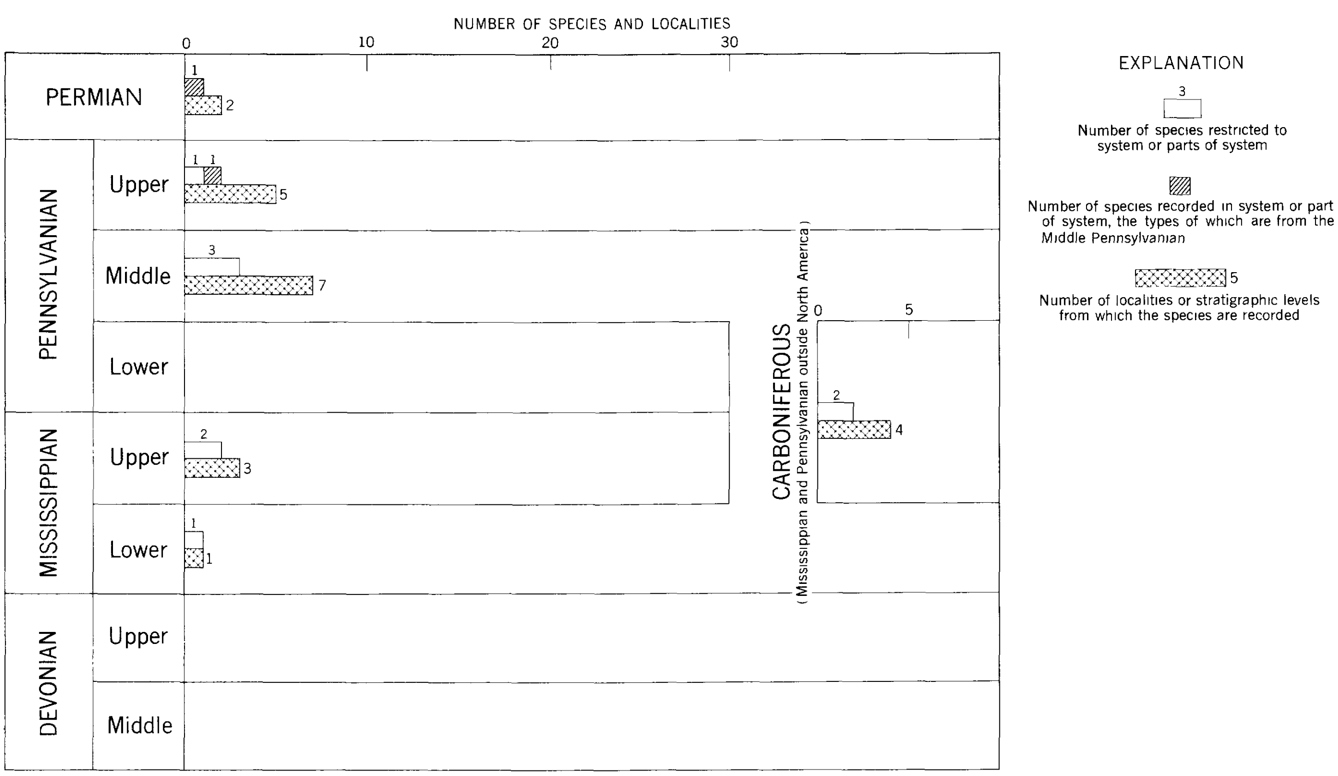

FIGURE 13.—Stratigraphic range and frequency distribution of *Silenites*.

5a. Ends pointed in dorsal outline------- *rudolphi* (p. 74)
6 (5). Posterior end wider in dorsal outline; greatest width behind midlength----------------- *opima* (p. 73)
6a. Both ends approximately the same width in dorsal outline; greatest width at approximate midlength
lenticularis (p. 73), (*faba, gallowayi ?, sasakwaensis*)
7 (4a). Ventral margin gently concave--------- *fabalis* (p. 73)
7a. Ventral margin distinctly concave
bilobatus (p. 73)
8 (3a). Dorsoanterior margin extends approximately to mid-height-------------------------- *silenus* (p. 74)
8a. Dorsoanterior margin extends to ventral third of greatest height------------- *marginiferus* (p. 73)

ASSIGNED SPECIES

Silenites asymmetrica Cooper, 1946

Silenites asymmetrica Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 75, pl. 10, fig. 29. Shale between Seville limestone, SW¼ sec. 32, T. 14 N., R. 2 W., Mercer County, Ill.

Geologic range.—Middle Pennsylvanian.

Silenites? bilobatus (Münster), 1830

Cythere bilobata Münster, 1830, [Neues] Jahrb. Minerologie Geognosie, Geologie, Petrefaktenkunde, Jahrg. 1, p. 65 [no illus.]. Carboniferous limestone Tragenau, near Hof, Bavaria.

?*Cythere bilobata* Münster. Jones and Kirkby, 1865, Annals Mag. Nat. History, ser. 3, v. 15, p. 409, pl. 20, figs. 10a, b. Same locality as above but propably not the same species or an incomplete specimen of the species.

Bythocypris bilobata (Münster). Jones and Kirkby, 1892, Annals Mag. Nat. History, ser. 6, v. 9, p. 303, pl. 16, fig. 3. Carboniferous limestone, River Bardun, falling into the River Ezsin, south Mongolia.

Bairdia bilobata (Münster). Jones and Kirkby, 1895, Annals Mag. Nat. History, ser. 6, v. 16, p. 455 [list].

[not] *Cythere* (*Potamocypris*?) *bilobata* (Münster). Jones and Kirkby, 1875, Annals Mag. Nat. History, ser. 4, v. 15, p. 57, pl. 6, figs. 8a–c, 9a, b, 10a–c. Carboniferous, light-yellow limestone, Kalonga Government, near village of Likhwine, Russia. = sp. indet.

[not] *Bairdia excisa* Eichwald, 1857 (?) = nomen dubium.

[not] *Silenites bilobatus* (Münster). Kummerow, 1939 = *S. rudolphi*? (Kummerow), 1939.

The conception of this species is based on the illustration of *Bythocypris bilobata* as illustrated by Jones and Kirkby, 1892. The first illustration of *Cythere bilobata* is by Jones and Kirkby, 1865, where they state (p. 409) that the specimen is atypical. *Bairdia excisa* Eichwald is inadequately illustrated to determine even generic affinities, and Jones and Kirkby's illustration of *Cythere* (*Potamocypris?*) *bilobata* is based on three specimens sent by Eichwald as *Bairdia excisa* that can also not be determined even as to genus.

Geologic range.—Carboniferous.

Silenites fabalis Cooper, 1946

Silenites fabalis Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 75, pl. 10, figs. 30–32. Shale below St. David limestone, SW¼ sec. 9, T. 5 S., R. 6 W., Randolph County; and shales, Liverpool cyclothem, NW¼ sec. 21, T. 6 N., R. 3 E., Fulton County, Ill.

Geologic range.—Middle Pennsylvanian.

Silenites lenticularis (Knight), 1928

Plate 4, figure 3

Carbonia? *lenticularis* Knight, 1928, Jour. Paleontology, v. 2, p. 335, pl. 44, figs. 9a, b. Residual from lower 2 ft of Pawnee limestone, exposed in street construction, Davis Place subdivision, first street west of Kirkwood-Ferguson trolley tracks, and 200 ft north of Clayton Rd., Clayton, St. Louis County, Mo. Based on weathered immature specimen fide Kellett (1935, p. 151).

Bythocypris sasakwaensis Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 73, pl. 6, figs. 5a, b. Sasakwa limestone member of the Holdenville formation, old quarry (1930), in south part of Sasakwa, Seminole County, Okla.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 96, pl. 7, fig. 13. Weathered Hollis limestone, creek bank near north line NW¼NW¼ sec. 17, T. 5 S., R. 2 E., 3 miles south of Ardmore, Carter County, Okla.

Bythocypris faba Coryell and Osorio, 1932, Am. Midland Naturalist, v. 13, p. 36, pl. 5, fig. 4. Nowata shale, outcrop near Hughes' quarry about 2 miles northeast of Tulsa, Tulsa County, Okla.

?*Bythocypris gallowayi* Coryell and Osorio, 1932, Am. Midland Naturalist, v. 13, p. 35, pl. 5, fig. 3. Nowata shale, outcrop near Hughes' quarry, about 2 miles northeast of Tulsa, Tulsa County, Okla. Based on a very young individual.

Silenites lenticularis (Knight). Kellett, 1935, Jour. Paleontology, v. 9, p. 151, pl. 17, figs. 9a–i. Americus limestone, 1½ miles straight south of Allen, Lyon County; and Elmdale formation, shale partings, below the road and upstream near the Cottonwood River bridge, east of Elmdale, Chase County, Kans.

Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 44, pl. 4, fig. 12. Eudora shale, 1 ft 6 in, buffs just south of Burlington Railroad, between 2½ and 3¾ miles west of Oreapolis, sec. 32, T. 13 N., R. 13 E., Cass County, Nebr.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 76, pl. 10, figs. 33–36. Shale above St. David limestone, SE¼ sec. 1, T. 9 S., R. 1 E. Williamson County; and shales above and below the Brereton Limestone, NE¼ sec. 15, T. 13 N., R. 6 E., Stark County, Ill.

Geologic range.—Middle and Upper Pennsylvanian–Permian.

Silenites marginiferus (Geis), 1932

Bythocypris marginifera Geis, 1932, Jour. Paleontology, v. 6, p. 179, pl. 26, figs. 2a, b. Salem limestone, Indiana.

[not] *Silenites marginiferus* (Geis). Morey, 1936 =*Silenites warei* Morey, 1936.

Geologic range.—Upper Mississippian.

Silenites? opima (Cooper), 1941

Bythocypris opima Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 29, pl. 3, figs. 20, 21. Golconda formation, roadcut 0.8 mile north of Homberg, NW¼NW¼ sec. 3, T. 14 S., R. 6 E., Pope County, Ill.

?*Bythocypris amsdenensis* Morey. Scott, 1942, Jour. Paleontology, v. 16, p. 162, pl. 25, fig. 18. Otter formation. East end of Little Belt Mountains, about 4 miles due west of Judith Gap, Wheatland (?) County, Mont.

Bythocypris amsdenensis as illustrated by Scott is a specimen less than 0.5 mm in greatest length that differs in lateral outline from Morey's holotype. This specimen is questionably referred to *Silenites? opima* because the shapes are similar.

Geologic range.—Upper Mississippian.

Silenites? rudolphi (Kummerow), 1939

Bythocypris rudolphi Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, p. 48, pl. 5, figs. 9a, b. Carboniferous (C_2–S_1), Ratingen, Rheinland, Germany.

?*Silenites bilobatus* (Münster). Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, p. 49, pl. 5, figs. 11a, b. Carboniferous, (C_2), Regnitzlosau bei Hof, Germany.

Geologic range.—Upper Mississippian.

Silenites silenus Coryell and Booth, 1933

Plate 4, figures 1, 2

Silenites silenus Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 265, pl. 4, figs. 1, 2. Wayland shale, near the Graham-Throckorton road, west of Salt Creek, 1 mile west of Graham, Young County, Tex.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 76, pl. 10, figs. 37, 38. Shale parting in Newton limestone, SE¼ sec. 35, T.-9 N., R. 7 E., Cumberland County, Ill.

Geologic range.—Upper Pennsylvanian.

Silenites warei Morey, 1936

Silenites warei Morey, 1936, Jour. Paleontology, v. 10, p. 121, pl. 17, figs. 12, 14. Basal Chouteau limestone, near Brown's Station, 3 miles northwest of the town at the junction of Lost and Clear Fork Creeks, Boone County, Mo.

?*Silenites marginiferus* (Geis). Morey, 1936, Jour. Paleontology, v. 10, p. 121, pl. 17, figs. 23, 25. Basal Chouteau limestone, near Brown's Station, 3 miles northwest of the town at the junction of Lost and Clear Fork Creeks, Boone County, Mo.

Geologic range.—Lower Mississippian (?).

DOUBTFUL NAMES

Silenites texanus Harlton, 1929

Bythocypris? texana Harlton, 1929, Texas Univ. Bull. 2901, p. 160, pl. 1, fig. 1. Canyon group, San Saba River valley near Hext, Menard County, Tex.

The holotype (USNM 80593) of this species is a steinkern that suggests the shape of *Silenites*.

Silenites grayi (Crespin), 1945

?*Bairdia grayi* Crespin, 1945, Royal Soc. Queensland Proc., v. 56–60, p. 32, pl. 4, figs. 1a, b. Permian. Lower Bowen series, shaly limestone, north bank of Cattle Creek, 14 miles southeast of Springsure, Queensland, Australia.

SPECIES REJECTED

Silenites symmetricus Kummerow, 1953

Silenites symmetricus Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 54, pl. 7 [given as pl. 6 in text], figs. 4a, b. Middle Devonian, upper *Stringocephalus* beds, Tagebau, Schwelner Brunnen, Germany.

This species is based on a steinkern fide Kummerow (1953, p. 74) and possibly belongs to *Pullvillites* Öpik, 1937.

Silenites robustus Kummerow, 1953

Silenites robustus Kummerow, 1953 = *Bekena? robusta* (Kummerow), 1953.

Family UNNAMED

This family will be named by Berdan and Sohn in the Treatise on Invertebrate Paleontology, Part Q, Ostracoda (written communication).

Inequivalved subovate asymmetrical medium-sized ostracodes with thick shells; tubules normal to shell surface, wider on interior surface, invisible on exterior of well-preserved specimens. Hinge simple; hingeline straight, shorter than greatest length of carapace. Surface smooth, punctate or rugulose. Geologic range Ordovician (?), Silurian-Devonian.

The hingeline in this family is always incised, and the greatest width is equal to or larger than the greatest height. The tubules normal to the shell surface are here illustrated by a thin section (pl. 5, fig. 12) and by means of radiographs (pl. 5, figs. 5, 7–9) (Schmidt, 1952) prepared by Dr. R. A. M. Schmidt.

This lower Paleozoic family is included here because several species previously assigned to *Bairdiocypris* belong to genera in this group. Species in these genera are not critically revised.

Genus TUBULIBAIRDIA Swartz, 1936

Tubulibairdia Swartz, 1936, Jour. Paleontology, v. 10, p. 581.

Bythocypris (*Bairdiocypris*) Kegel, 1932 [part], Preuss. Geol. Landesanstalt Abh., Jahrb. 1931, v. 52, p. 246.

Pachydomella Ulrich. Krömmelbein, 1955, Senckenbergiana, v. 36, p. 299.

Microcheilinella Geis. Kummerow, 1953, [part], Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 299.

?*Microcheilinella* Geis. Bouček and Přibyl, 1955 [part], Czechoslovakia, Stát. geol. Ustř. úst., Sbornik, v. 21, Paleont., p. 602 (26), 632 (56), 655 (79).

Type species.—Original designation *Tubulibairdia tubulifera* Swartz, 1936, Jour. Paleontology, v. 10, p. 581, pl. 89, figs. 2a–r. Middle Devonian, Pennsylvania.

Diagnosis.—A genus in this family with rounded cross section, without any shoulders, ridges or grooves.

Discussion.—The type material for this genus consists of internal casts and molds. The type species is illustrated on plate 5, figure 6. Later work, mostly by my colleague, Jean M. Berdan, shows this genus to be common in Middle Silurian through Middle Devonian rocks. Dr. K. Krömmelbein, Frankfurt-am-Main, Germany, very generously sent specimens of *Bairdiocypris clava* Kegel, 1932, that undoubtedly belong to this genus. Krömmelbein (1955, p. 299) referred this species to *Pachydomella* Ulrich, 1891, while Kummerow (1953, p. 60) and Bouček and Přibyl (1955, p. 655) assigned this group of species to *Microcheilinella* Geis, 1933. Krömmelbein (1955, text fig. 1, pl. 2, fig. 26) illustrated the diagnostic cross section of this genus that differs from that of *Microcheilinella* Geis, 1933, by having a more incised hingeline; compare plate 5, figure 12 and figure 13. The specimens of *Microcheilinella* are much smaller.

Kummerow (1953, p. 61), and Bouček and Přibyl (1955, p. 657 (81)) included in *Microcheilinella* species with curved hinge lines. These species are excluded from *Tubulibairdia* because of that feature; their proper generic assignment is not yet known. As noted by Bouček and Přibyl (p. 656), the upper Paleozoic species of *Microcheilinella* are all smaller. The type species, *M. distorta* Geis, is more elongate, has a less arched dorsal margin, and does not have tubules in the shell wall.

Geologic range.—Ordovician(?), Middle Silurian–Middle Devonian.

Lithology.—Limestone, shale.

Habitat.—Marine.

ASSIGNED SPECIES

Because this is a lower Paleozoic genus, only those species that are here assigned for the first time to *Tubulibairdia* are listed.

ASSIGNED SPECIES

Tubulibairdia amaliae (Kummerow), 1953

Microcheilinella amaliae Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 59, pl. 6, figs. 5a, b. Middle Devonian, Germany.

Geologic range.—Middle Devonian.

Tubulibairdia antecedens var. antecedens (Kegel), 1932

Bythocypris (Bairdiocypris) clava var. *antecedens* Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrb. 1931, v. 52, p. 247, pl. 13, figs. 3a, b. Middle Devonian, Eifel, Germany.

Pachydomella antecedens var. *antecedens* (Kegel). Krömmelbein, 1955, Senckenbergiana, v. 36, p. 302, pl. 2, figs. 13–20. Middle Devonian, Eifel, Germany.

Geologic range.—Middle Devonian.

Tubulibairdia? antecedens var. wolfarti (Krömmelbein), 1955

Pachydomella antecedens var. *wolfarti* Krömmelbein, 1955, Senckenbergiana, v. 36, p. 307, pl. 2, figs. 21–24. Middle Devonian, Eifel, Germany.

It is not possible to determine whether the horizontal ribbing of this and the previous variety is due to preservation or is an actual ornament. Should this feature be morphologic, then the two varieties probably do not belong to this genus.

Geologic range.—Middle Devonian.

Tubulibairdia clava (Kegel), 1932

Bythocypris (Bairdiocypris) clava Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrb. 1931, v. 52, p. 246, pl. 13, figs. 2a–d. Middle Devonian, Eifel, Germany.

Pachydomella clava (Kegel.) Krömmelbein, 1955, Senckenbergiana, v. 36, p. 300, pl. 1, figs. 8, 12. Middle Devonian, Eifel, Germany.

[not?] *Microcheilinella clava* (Kegel). Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 60, pl. 2, figs. 6a, b. Middle Devonian limestone, Ense bei Wildungen, Germany. Differs in lateral outline.

Geologic range.—Middle Devonian.

Tubulibairdia? corbuloides (Jones and Holl), 1869

Cythere corbuloides Jones and Holl, 1869, Annals Mag. Nat. History, ser. 4, v. 3, p. 211, pl. 15, figs. 4a–e [figs. 5a, b, considered as a young individual or a small male in the discussion, probably represents another species]. Silurian shale and limestone, England.

Geologic range.—Silurian.

Tubulibairdia decaturi (Wilson), 1935

Microcheilinella decaturi Wilson, 1935, Jour. Paleontology, v. 9, p. 646, pl. 78, figs. 11a, b. Birdsong shale, glades on Allan Conrad place, about 2½ miles north-northeast of Jeannette, Decatur County, Tenn. The holotype (USNM 112905) is a corroded specimen.

Geologic range.—Lower Devonian.

Tubulibairdia? fecunda (Přibyl and Snajdr), 1950

Bythocypris (Bairdiocypris?) fecunda Přibyl and Snajdr, 1950, Czechoslovakia, Stát. geol. úst. Sbornik, v. 17, Paleont., p. 119 (19), 161 (61), pl. 2, figs. 5–8. Choteč limestone, Holyně near Prague, Czechoslovakia.

Geologic range.—Middle Devonian.

Tubulibairdia longula (Ulrich and Bassler), 1913

Pachydomella longula Ulrich and Bassler, 1913, Maryland Geol. Survey, Lower Devonian, v., p. 542, pl. 98, figs. 29–31. Keyser member of the Helderberg formation, Cumberland, Md.

Geologic range.—Lower Devonian.

Tubulibairdia punctulata (Ulrich), 1891

Plate 5, figures 7, 10, 11, 14–17

Bythocypris punctulata Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 196, pl. 17, figs. 2a–c. "Onondaga limestone," Falls of the Ohio, Louisville, Ky.

Microcheilinella punctulata (Ulrich). Bassler and Kellett, 1934, Geol. Soc. America, Spec. Paper 1, p. 412.

Geologic range.—Lower Devonian.

Tubulibairdia tenuisulcata (Pokorny), 1950

Bairdiocypris clava tenuisulcata Pokorny, 1950, Czechoslovakia, Stát. geol. úst., Sbornik, v. 17, Paleont., p. 556 (45), 617 (105), pl. 3, figs. 1a–d. Givetian, red marly coral limestone, Růžička quarry, Čelechovice, Czechoslovakia.

Three topotype specimens of this species (USNM 135910) are either squashed or abraded.

Geologic range.—Middle Devonian.

Genus PHANASSYMETRIA Roth, 1929

Phanassymetria Roth, 1929, Jour. Paleontology, v. 3, p. 358. Sohn and Berdan, 1952, Washington Acad. Sci. Jour., v. 42, p. 7.

Phanassymetrica Roth. Neave, 1940, Nomenclator Zoologicus, v. 3, p. 694.

Phanasymmetrica Roth. Van den Bold, 1946, Contrib. to the study of Ostracoda, p. 22.

[not] *Phanassymetria* Roth. Van Veen, 1936, Natuurh. Maandblad, Jaarg. 25, p. 177. Cretaceous, Holland = *Pseudophanasymmetria* Sohn and Berden, 1952.

Type species.—Original designation *P. triserrata* Roth, 1929, Jour. Paleontology, v. 3, p. 358, pl. 37, figs. 20a–c. Devonian, Oklahoma.

Diagnosis.—A genus in this family with angular cross section, groove below shoulder of larger valve and with horizontal ridge below midheight of one or both valves.

Discussion.—Amsden (1956, p. 55) states that the type species was subsequently designated by Bassler and Kellett. The type species is here considered as originally designated by Roth because of the "new genus, new species" rule (Blackwelder, 1952, p. 16). Roth (1929, p. 358) did not define *Phanassymetria.* The first species described, *P. triserrata*, has "n. gen. and n. sp." after the name, which, according to the rules, is the type species.

Sohn and Berdan (1952) removed the post-Paleozoic species previously assigned to this genus because those species lacked the diagnostic shell tubules (pl. 5, fig. 5).

The diagnostic cross section and ridges are illustrated by figure 14.

The sections illustrated on figure 14–2 to 4 were made as follows: A specimen was mounted with canada balsam on a glass slide and oriented with the anterior up by using a wooden toothpick. After grinding down the desired amount, the polished surface was drawn using a camera lucida. After warming the canada balsam, the remainder of the specimen was then oriented in the same plane as the drawing of the carapace, and the image projected with the camera lucida upon the drawing of the complete carapace. It was then possible to show the line of section *A* on figure 14–1. The second and third specimens, illustrated as figures 14–3 and –4, were mounted and ground down to the desired planes. The remaining specimens were reoriented and projected on the drawing. This method has the advantage of preserving the original of each drawing.

The sections illustrated in figure 14–6 to 10 were all made on the same specimen, with the result that only the two final polished surfaces are preserved as USNM 133225.

Geologic range.—Silurian–Devonian.

Lithology.—Marl.

Habitat.—Marine.

Genus PACHYDOMELLA Ulrich, 1891

Pachydomella Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 197.

Swain, 1953, Jour. Paleontology, v. 27, p. 280.

Senescella? Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 113. Type species by original designation *S. marginaspinata* Stewart and Hendrix, 1945. Devonian, Ohio.

[not] *Pachydomella* Ulrich. Krömmelbein, 1955, Senckenberg. Lethaea, v. 36, p. 299 = *Tubulibairdia* Swartz, 1936.

Type species.—Original designation *P. tumida* Ulrich, 1891, Cincinnati Soc. Nat. History, Jour., v. 13, p. 198, pl. 13, figs. 5a–c. Devonian, Falls of the Ohio, Ky.

Diagnosis.—A genus in this family with rounded cross section, with groove below shoulder of larger valve, and without horizontal ridges below midheight.

Discussion.—The original description of the genus and the type species include as a diagnostic character a subcentral umbilical pit. This feature is the result of preservation and is not a true feature of the species (pl. 5, figs. 8, 9, 18–21). Because of this erroneous diagnosis, the genus has been misunderstood. Although no species belonging to this genus have been referred to *Bairdia*, it is included here as an aid in understanding the related genera (fig. 15–1 to 6).

Geologic range.—Devonian.

Lithology.—Limestone, marl, chert.

Habitat.—Marine.

Family RISHONIDAE Sohn, n. fam.

Diagnosis.—Smooth inequivalved ostracodes; one valve overlaps the other along the dorsum; the other valve overlaps the first along the venter.

Discussion.—The characteristic overlap of this family distinguishes it from all other Paleozoic ostracode families. Included in this family are *Samarella* Polenova, 1952 (not assigned to any family in the original description), *Reversocypris* Přibyl, 1955 (= *Samarella*?) (originally described in Bairdiidae Sars, 1887), *Silenis* Neckaja, 1958, and possibly *Whipplella* Holland, 1934, as well as *Gutschickia* Scott,

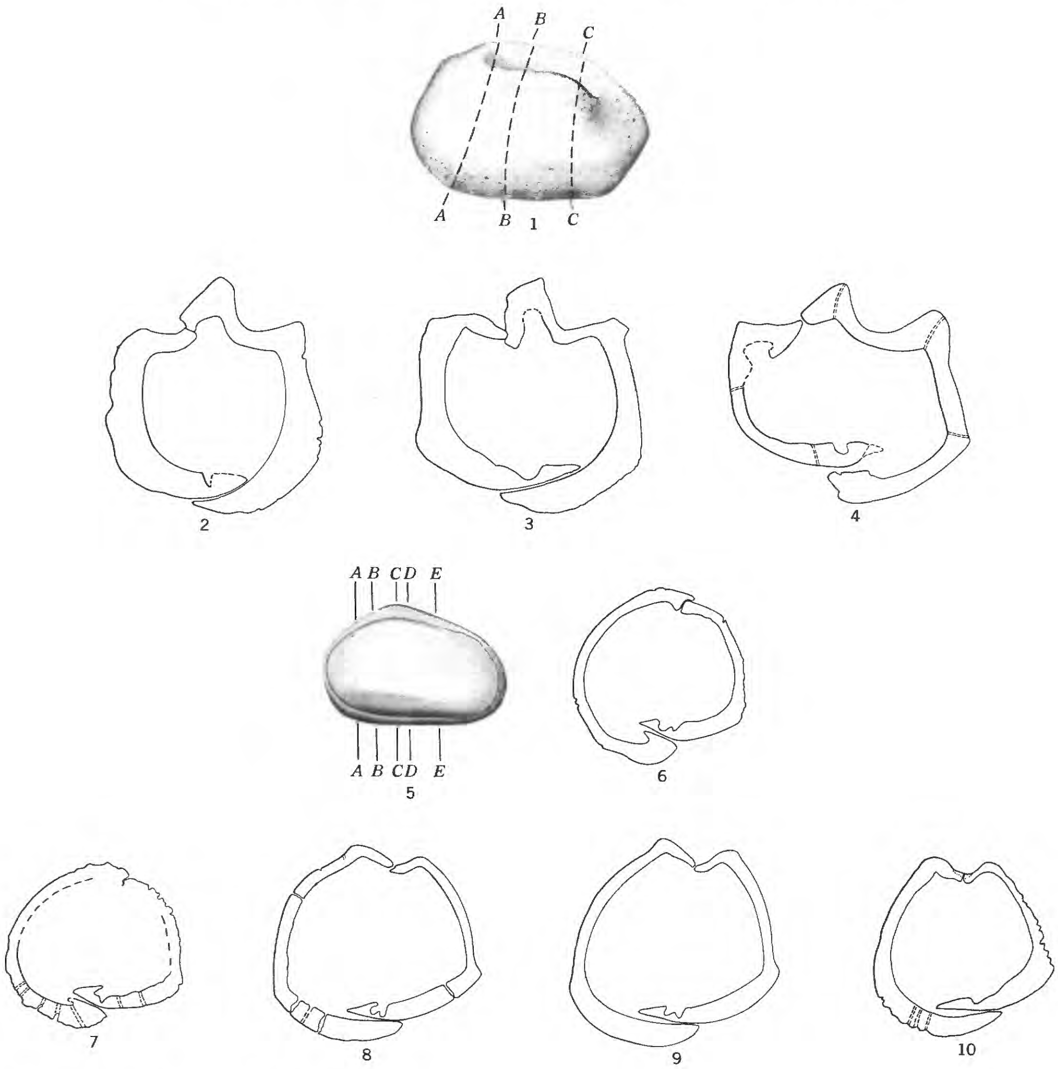

FIGURE 14.—Polished sections through *Phanassymetria*.

1–4. *Phanassymetria triserrata* Roth, 1929.

1. Left view of carapace × 29 upon which are projected the lines of sections 2, 3, 4. Figured specimen USNM 133220.
2. Polished surface through anterior of a carapace × 44, position shown on figure 14–1 as line *A*. USNM 133221.
3. Polished surface through the approximate center of a carapace × 44, position shown on figure 14–1 as line *B*. USNM 133222.
4. Polished surface through posterior portion of a carapace × 44, position shown on figure 14–1 as line *C*. USNM 133223. Haragan marl, one-half mile southeast of "White Mound," Murray County, Okla.

5–10. *Phanassymetria quadrupla* Roth, 1929.

5. Right view of carapace × 14 upon which are projected the lines of sections 6–10. Paratype USNM 1333224. Basal Haragan marl, "White Mound," northeast corner sec. 20, T. 2S, R. 3E., Murray County, Okla.
6. Posterior view of polished surface of section shown on figure 14–5 as line *A*, × 23.
7. Posterior view of polished surface of section shown on figure 14–5 as line *B*, × 23.
8. Posterior view of polished surface of section shown on figure 14–5 as line *C*, × 23.
9. Posterior view of polished surface of section shown on figure 14–5 as line *D*, × 23.
10. Anterior view of polished surface of section shown on figure 14–5 as line *E*, × 23. Figured specimen, USNM 133225. Haragan marl, one-half a mile southeast of "White Mound," Murray County, Okla.

1944. The last two are fresh-water genera of Pennsylvanian and Permian age that are not a part of this study. *Whipplella* was originally described in Aparchitiidae Ulrich and Bassler, 1923. Scott (1944b, p. 142) moved *Whipplella* to Cypridae Baird, 1845, and described the related genus *Gutschickia*. *Bythocypris monoumbonata* Hessland, 1949 (Ordovician), may belong to a genus in this family.

Paraparchites Ulrich and Bassler, 1906, and related genera, have one valve overlapping the other along the venter and the other overhanging the larger valve along the dorsum. These genera do not belong to this family because they have a straight hingeline, and the smaller valve does not really overlap the larger valve: it has a groove into which the larger valve fits. Furthermore, most of these genera are semicircular

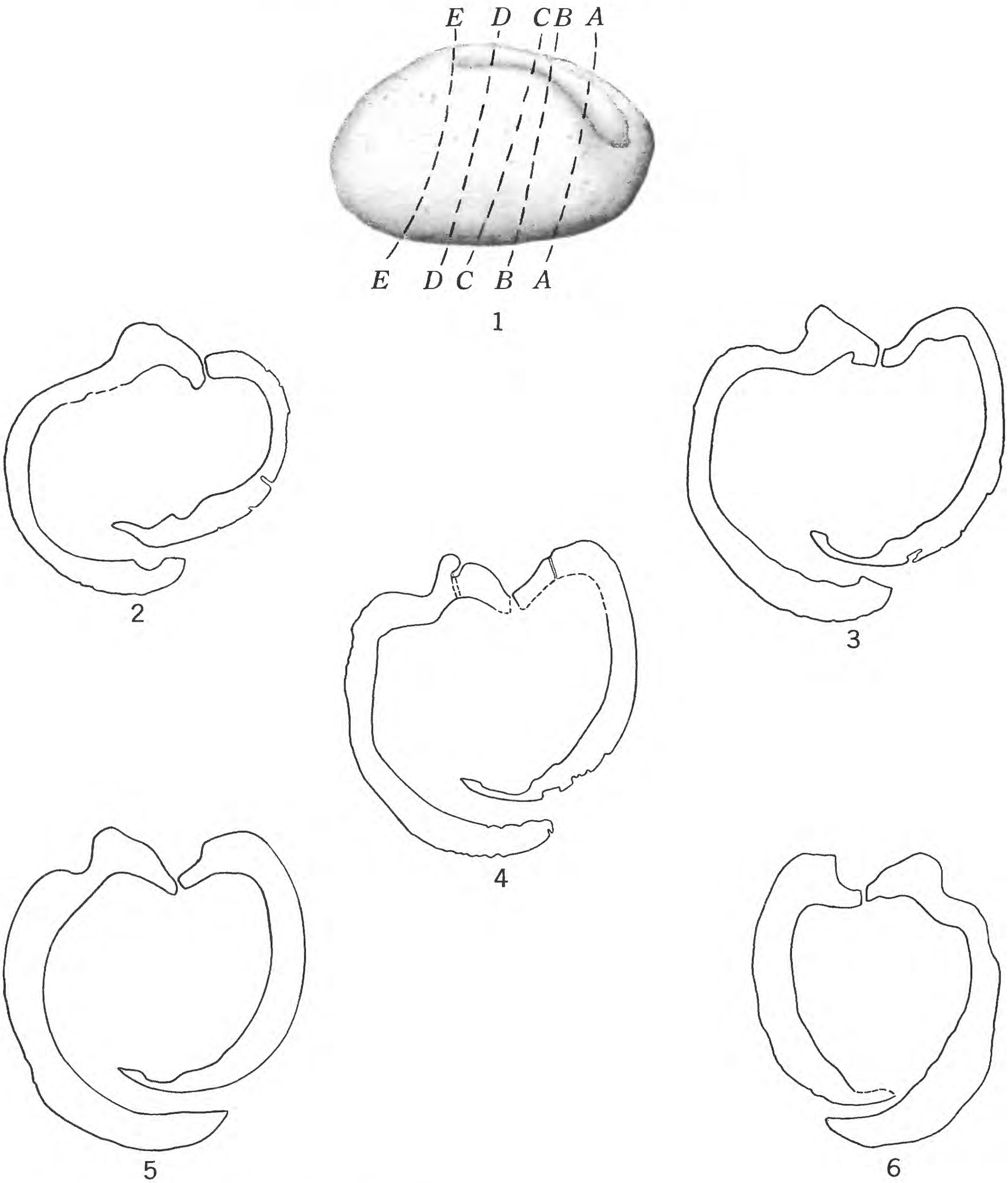

FIGURE 15.—Polished sections through *Pachydomella* sp.

1. Left view of carapace, × 29, upon which are projected the lines of sections 2–6.
2. Polished surface through specimen, posterior view × 44, position shown on figure 15–1 as line *A*.
3. The same through line *B* shown on figure 15–1.
4. The same through line *C* shown on figure 15–1.
5. The same through line *D* shown on figure 15–1.
6. Polished surface through specimen, anterior view × 44, line *E* shown on figure 15–1. Thin section, USNM 133226, Haragan marl, one-half a mile southeast of "White Mound," Murray County, Okla.

in lateral outline and have a spine in the dorsoanterior position of one or both valves.

Genus RISHONA Sohn, n. gen.

Pontocypris Sars. Jones, 1887, Annals Mag. Nat. History, ser. 5, v. 19, p. 182. Silurian, England.

Bairdia McCoy. Eichwald, 1860 [part], Lethaea Rossica, v. 1, p. 1337. Silurian, Russia.

Type species.—*Bairdia gibbera* Kesling and Kilgore, 1952 [not Morey, 1935] = *Bairdia epicypha* Kesling and Kilgore, 1955.

Diagnosis.—Rishonidae with gently curved dorsal margin and with unequal end margins.

Discussion.—Some Lower Paleozoic species that were provisionally referred to the living genus *Pontocypris* Sars, 1866, are provisionally placed in this genus. Additional study may remove the Silurian species into a new genus.

When this study was being edited, Neckaja (1958, p. 370) described the Silurian genus *Silenis*, to which she referred *Pontocypris mawii* Jones, 1887=*Rishona? mawii* (Jones) of this paper. *Silenis subtriangulata* Neckaja, 1958, the type species of *Silenis*, differs in lateral outline from *Rishona epicypha* (Kesling and Kilgore), 1955; consequently, the two genera are probably distinct. It is possible that the Silurian species here referred to *Rishona*, may belong to *Silenis*.

The name *Rishona* is feminine.

Geologic range.—Silurian(?), Devonian, Carboniferous(?).

Lithology.—Limestone, shale, marl.

Habitat.—Marine.

ASSIGNED SPECIES

Rishona bassleri Sohn, n. sp.

Plate 5, figures 1–4

Dorsal margin gently curved; dorsoposterior margin straight to slightly convex, extends to approximately one-third of greatest length; dorsoanterior margin slightly concave, extends to approximately one-quarter of greatest length. End margin subequal; posterior larger; both ends below midheight.

Specimens of this species were in a collection of ostracodes that were segregated by Dr. R. S. Bassler from material collected by Dr. C. Schuchert from the Silurian near Klinkham, Gotland.

Geologic range.—Silurian.

Rishona? distracta (Eichwald), 1857

Bairdia distracta Eichwald, 1857, Soc. Imp. Nat. Moscou Bull., v. 30, pt. 1, p. 199 [not seen].
Eichwald, 1857, idem, pt. 2, no. 4, p. 311 [no illus.].
Eichwald, 1860, Lethaea Rossica, v. 1, p. 1341, atlas, pl. 52, figs. 12a–d. Lower Carboniferous, Borowitschi, Novgorod Province, Russia.

Eichwald (1860, p. 1341) describes "eye tubercles" that are not illustrated. The possibility that this description was somehow confused with the description of his *Bairdia laevigata* (p. 1342), and the illustration of which does show a tubercle on one valve, should be considered. If this species has eye tubercles, it would automatically be excluded from *Rishona*. (See discussion under *R.? laevigata.*)

Geologic range.—Carboniferous.

Rishona epicypha (Kesling and Kilgore), 1955

Plate 5, figures 22–26

Bairdia epicypha Kesling and Kilgore, 1955, Jour. Paleontology, v. 29, p. 189. New name for *B. gibbera* Kesling and Kilgore, 1952 [not Morey, 1935].

Bairdia gibbera Kesling and Kilgore, 1952, Michigan Univ. Mus. Paleontology Contrib., v. 10, no. 1, p. 14, pl. 4, figs. 9–17. Genshaw formation, outcrop in roadcut and ditch on the west side of Long Lake about one-half a mile south of Le Roy's Resort, at the junction of West Long Lake Road and the entrance to Martin's Resort, near the center of the west half of sec. 32, T. 33 N., R. 8 E., Presque Isle County, Mich.

Kesling very generously loaned me his types as well as a slide containing topotype material. The material is poorly preserved, but several crushed specimens suggest a very thin shell. A polished section through one of the topotypes indicates that one valve overlaps on the dorsal margin and the other valve overlaps slightly on the ventral margin.

Geologic range.—Middle Devonian.

Rishona? laevigata (Eichwald), 1857(?)

Cypridina laevigata Eichwald, 1857, Soc. Imp. Nat. Moscou Bull., v. 30, pt. 2, no. 4, p. 310, Carboniferous, near the village of Sloboda, and also near the village of Filimonoff, Tula Government, Russia.

Bairdia laevigata Eichwald, 1860, Lethaea Rossica, v. 1, p. 1342, pl. 52, figs. 5a–d. Same localities as above.

In the discussion Eichwald (1860, p. 1343) established a smaller black variety, *Bairdia laevigata* var. *nigrescens*. Both the species and the variety are considered by Jones and Kirkby (1875, p. 53) as varieties of *Leperditia okeni* (Münster), 1830. Bassler and Kellett (1934, p. 426, 427) refer to the species as *Paraparchites? laevigatus* (Eichwald) and to the variety as *Paraparchites laevigatus nigrescens* (Jones and Kirkby). Comparison of Eichwald's illustrations (pl. 52, figs. 5b–d) with those of Jones and Kirkby (1875, pl. 16, figs. 1, 2) suggests that two different genera are involved. Jones and Kirkby illustrate a *Paraparchites*, but Eichwald illustrates a genus with affinities to *Rishona*. Eichwald's figure 5b can be interpreted as a ventral view, in which case the "eye spot" would be on the ventroanterior part of the valve and would not belong to *Paraparchites*. Because of this protuberance on the valve surface, the species is here questionably referred to *Rishona*.

Geologic range.—Carboniferous.

Rishona magna (Roth), 1929

Plate 4, figures 18–21

Pontocypris smithi var. *magna* Roth, 1929, Jour. Paleontology, v. 3, p. 366, pl. 38, figs. 26a, b. Haragan marl, sec. 4, T. 2 N., R. 6 E., and SW¼NE¼ sec. 28, T. 3 N., R. 6 E., Pontotoc County, Okla.

The slide labeled "holotype" (USNM 80643) contains 3 left valves, 1 of which is the original of figure 26a that is presumed to be the type specimen. Because only single valves were available to Roth, the overlap is not discussed. Roth's specimens differ from *Pontocypris smithi* Jones, 1887, in size, lateral outline, and relative width; consequently, the variety is here elevated to specific rank. Material from the "White Mound" section of the Haragan shale contains complete carapaces that are the same species as Roth's left valves (pl. 38, figs. 26a, b) in which the characteristic overlap of the genus is developed.

Geologic range.—Lower Devonian.

Rishona? mawii (Jones), 1887

Pontocypris mawii Jones, 1887, Annals Mag. Nat. History, ser. 5, v. 19, p. 182, pl. 4, figs. 4a–d, 7. Wenlock shale, Bildwas bed no. 22, probably 2 miles west of Ironbridge, Shropshire, England.

?*Pontocypris mawii* Jones. Jones, 1888, idem, ser. 6, v. 1, p. 397, pl. 22, figs. 3a–c. Shale, brickyard at Fröjel, Gotland.

Geologic range.—Silurian.

Rishona? mawii var. gibbera (Jones), 1887

Pontocypris mawii var. *gibbera* Jones, 1887, Annals Mag. Nat. History, ser. 5, v. 19, p. 182, pl. 4, fig. 6. Wenlock shale, Bildwas bed no. 22, probably 2 miles west of Ironbridge, Shropshire, England.

Geologic range.—Silurian.

Rishona? protracta (Eichwald), 1860

Bairdia protracta Eichwald, 1860, Lethaea Rossica, v. 1, p. 1338, atlas pl. 52, figs. 19a–d. Coral limestone near Orynine, Kamenetz-Podolsk, Russia.

Geologic range.—Silurian.

Rishona? smithii (Jones), 1887

Pontocypris smithii Jones, 1887, Annals Mag. Nat. History, ser. 5, v. 19, p. 184, pl. 4, figs. 5a–d. Wenlock beds (no. 64), Dudley Castle, Shropshire, England.

Geologic range.—Silurian.

Rishona? viluensis (Ivanova), 1955

Bythocypris viluensis Ivanova, 1955, *in* Nikiforova, Vsesoyuz. Neft. Nauch.-Issled. Geol. Inst., Moscow (VSEGEI), new ser., p. 116, pl. 59, figs. 5a–c. Silurian, Vilua River, Sibir.

The illustrations are of a specimen that has the diagnostic overlap for this genus.

Geologic range.—Lower Silurian.

Rishona? sp. A

Gen. and sp. undet. "B" Stover, 1956, Jour. Paleontology, v. 30, p. 1139, pl. 119, figs. 35, 36. Windom member of the Moscow formation, type section, along Little Beards Creek, 0.5 mile east of New York Route 36, and 0.75 mile north of Leicester, Livingston County, N.Y.

Stover described 2 specimens and illustrates 1 of them as having the proper overlap for *Rishona*. It is possible that he is either dealing with steinkerns or that the overlap is reversed; that is, left over right on dorsum, right over left on venter.

Geologic range.—Devonian.

Genus SAMARELLA Polenova, 1952

Samarella Polenova, 1952, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy (VNIGRI), new ser., no. 60, pt. 5, p. 136. Middle Devonian, Russia.

?*Reversocypris* Přibyl, 1955, Czechoslovakia, Ustř. úst. geol., Sbornik, v. 21, 1954, Paleont., Praha, p. 189 (29), 240 (80), 285 (125). Lower Devonian, Bohemia. Type species by original designation *R. regularis* Přibyl, 1955, idem, p. 190 (30), 241 (81), 285 (125), pl. 4, figs. 8–14.

Type species.—Original designation *S. crassa* Polenova, 1952, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser. no. 60, pt. 5, p. 137, p. 15, figs. 1a–c, 2. Middle Devonian, Russia.

Diagnosis.—Translated from the Russian:

Thick shell; lateral outline irregularly rounded-rectangular. Right valve overlaps left along the venter; left valve overlaps right along the dorsum. The overlapping part of the valve bears a rounded swelling best expressed in anterior and posterior thirds of valve. Surface shagreen. Hinge observed only on left valve where the groove is developed. The muscle scar is oval-longitudinal with the long axis directed obliquely forward. The number of muscle tubercles situated in 2 rows is 7–10.

The genus is characterized by the overlap of opposing valves in the upper and lower parts of the shell and moldlike inflations in ventral and dorsal edges of the overlapping parts of the shell. These peculiarities have not been observed in known genera, which permitted the erection of the new genus. Close genera are unknown.

Přibyl (1955) described two species in the genus *Reversocypris* (type species *R. regularis* Přibyl, 1955) on the basis that the right valve overlaps the left along the dorsum and left valve overlaps the right along the venter. His drawing of a valve of *R. klukovicensis* Přibyl (1955, pl. 2, figs. 7, 8) suggests that this genus might belong in *Samarella*. His two species are here provisionally placed in synonymy with each other. The orientation of *Samarella* is here reversed 180°.

Geologic range.—Devonian.

Lithology.—Limestone.

Habitat.—Marine.

ASSIGNED SPECIES

Samarella crassa Polenova, 1952

Samarella crassa Polenova, 1952, Vsesoyuz, Neft. Nauch.-Issled. Geol.-Razv. Inst. Trudy (VNIGRI), new ser., v. 60, pt. 5, p. 137, pl. 15, figs. 1a–c, 2. Givetian, Central Devonian field, Russia.

Geologic range.—Middle Devonian.

Samarella? regularis (Přybil), 1955

Reversocypris regularis Přybil, 1955, Czechoslovakia Ústř. úst. geol., Sbornik, v. 21, 1954, Paleont., p. 190 (30), 241 (81), 285 (125), pl. 4, figs. 8–14. Řeporyje limestone. Middle part of old quarry on the left bank of Daleje stream, Klukovice near Prague, Czechoslovakia.

?*Reversocypris klukovicensis* Přybil, 1955, idem, p. 191 (31), 242 (82), 286 (126), pl. 2, figs. 7, 8; pl. 5, figs. 6, 9–18. Same locality as above.

The two species from the same collection are probably growth stages of the same species.

Geologic range.—Lower Devonian.

Family POSITION UNCERTAIN

Genus SPINOBAIRDIA Morris and Hill, 1952

Spinobairdia Morris and Hill, 1952, Bull. Am. Paleontology, v. 34, no. 142, p. 137 (11). Silurian, Tennessee.

Type species.—Original designation *S. kellettae* Morris and Hill, idem, p. 138 (12), pl. 1, figs. 2a–c. Newsom shale. Newsom, Tenn.

Diagnosis.—Differs from *Bairdia* s. s. by the presence of a subcentrolateral spine.

Discussion.—Morris and Hill established this genus for two species: the type species and *S. shideleri*. The holotypes of both species are in the U.S. National Museum (USNM 123226, 123227) and additional paratypes of *S. shideleri* are at the American Museum of Natural History and the Paleontological Research Institute. The comment by Morris and Hill (1952, p. 138 (12)): "The shape of the carapace is more like a typical Carboniferous *Bairdia* than are most early Paleozoic species assigned to that genus: indeed, if it were not for their possession of a large spine of each valve, neither of the two known species of *Spinobairdia* would look out of place in a Carboniferous fauna." is correct. However, as both species are based on steinkerns, it is not possible to determine the true characters of this genus.

Geologic range.—Middle Silurian.

Lithology.—Shale.

Habitat.—Marine.

ASSIGNED SPECIES

Spinobairdia kellettae Morris and Hill, 1952

Plate 6, figures 18, 19

Spinobairdia kellettae Morris and Hill, 1952, Bull. Am. Paleontology, v. 34, no. 142, p. 138 (12), pl. 1, figs. 2a–c. Newsom shale, small abandoned quarry in the side of a hill overlooking Newsom from the north-northwest, Davidson County, Tenn. The hill is just west of the road entering the town from the north and just south of the railroad tracks, in the southwest quadrant of their intersection.

Geologic range.—Middle Silurian.

Spinobairdia shideleri Morris and Hill, 1952

Spinobairdia shideleri Morris and Hill, 1952, Bull. Am. Paleontology, v. 34, no. 142, p. 138 (12), pl. 1, figs. 3a, b. Same collection and locality as above.

Geologic range.—Middle Silurian.

Genus BEKENA Gibson, 1955

Bekena Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 348 (18). Upper Devonian, Iowa.

Bairdia McCoy. Morey, 1935 [part], Jour. Paleontology, v. 9, p. 323. Reworked Devonian(?), Missouri.

?*Bairdia* McCoy. Polenova, 1952 [part], Microfauna SSSR, pt. 5, p. 127. Devonian, Russia.

Bairdiocypris Kegel, 1931 [part], Preuss Geol. Landesanstalt, Jahrb., v. 52, p. 246. Devonian, Germany.

Pokorný, 1950 [part], Czechoslovakia Stá. geol. úst. Sbornik, v. 17, Paleont., p. 553 (41), 614 (102). Devonian, Czechoslovakia.

Polenova, 1952, Microfauna SSSR, pt. 5, p. 135. Devonian, Russia.

Silenites Coryell and Booth. Kummerow, 1953 [part], Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie Jahrg. 2, Beih. 7, p. 54. Devonian, Poland.

Type species.—Original designation *B. diaphrovalvis* Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 349 (19), pl. 1, figs. 9a–d. Upper Devonian, Iowa.

Diagnosis.—Carapace skinny in dorsal outline; flattened areas, especially on the right valve, near end margins.

Discussion.—The holotype (USNM 123093) is slightly crushed, but the generic characters are exhibited by the specimen (pl. 6, fig. 32). Gibson's statement (1955, p. 349 (19)) ("*Bairdiocypris moravica* Kegel (1927) resembles closely the new species *Bekena diaphrovalvis* in possessing the anterior and posterior marginal depressions of the right valve and in general outline of the carapace") presumably refers to Pokorný's illustration (1950, pl. 2, figs. 7a–d, text figs. 12a, b.) of *Bairdiocypris moravica* (Kegel), 1928, and not to *Bythocypris eifliensis moravica* Kegel, 1928. The specimens illustrated by Pokorný belong to *Bekena* and differ significantly from the holotype of *Bairdiocypris* as illustrated by Kegel (1928, pl. 33, figs. 1a–d). Pokorný very generously sent two of his identified specimens to the U.S. National Museum; 1 of the 2 (USNM 133217) is almost identical in outline with the specimen that he illustrated by drawings (see pl. 6, fig. 22), but a part of the shell is missing along the dorsoposterior margin; the second specimen (USNM 133218) has the shell material along that margin and consequently has more symmetrical end margins and is here designated as *Bekena* sp. A (see pl. 6, figs. 23, 24).

Geologic range.—Middle and Upper Devonian, Lower Mississippian (?).

Lithology.—Limestone, sandstone (?).

Habitat.—Marine.

KEY TO THE SPECIES OF BEKENA

1. Dorsoposterior margin from one-third to one-half of greatest length 2
1a. Dorsoposterior margin as much as one-quarter of greatest length 6
2 (1). End margins approximately of the same size 3
2a. End margins not of the same size 5
3 (2). In lateral view, dorsal overhang is symmetrical, tapers towards ends .... *robusta* (p. 82)
3a. In lateral view dorsal overhang not symmetrical, wider in posterior half 4
4 (3a). In lateral view, posterior end higher .... sp. A (p. 83)
4a. In lateral view both ends approximately the same height .... *rhenana* (p. 82)
5 (2a). Greatest height at or in front of midlength .... *diaphrovalvis* (p. 82)
5a. Greatest height behind midlength .... *vastus* (p. 82)
6 (1a). In lateral view, height of anterior margin less than that of posterior margin .... *prantli* (p. 82)
6a. In lateral view, height of anterior margin greater than that of posterior margin 7
7 (6a). Junction of dorsal and dorsoanterior commissure smooth .... *pecki* (p. 82)
7a. Junction of dorsal and dorsoanterior commissure angular .... *plicatula* (p. 82)

ASSIGNED SPECIES

Bekena diaphrovalvis Gibson, 1955

Plate 6, figures 25–27, 32

Bekena diaphrovalvis Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 349 (19), pl. 1, figs. 9a–d. Calcareous clay of Cerro Gordo formation, pit operated by the Rockford Brick and Tile Co., Rockford, Iowa.

Geologic range.—Upper Devonian.

Bekena pecki (Morey) ,1935

Plate 6, figures 30, 31

Bairdia pecki Morey, 1935, Jour. Paleontology, v. 9, p. 323, pl. 28, fig. 20. Recorded from Bushberg formation (probably reworked Devonian, see Sohn, 1951, p. 34), friable quartz sandstone a few inches to 2 or 3 ft thick, outcrop about 20 ft long, in the bottom of a side valley of Clark's Branch, a tributary of Whetstone Creek, sec. 9, T. 48 N., R. 7 W., about 3 miles north of Williamsburg, Callaway County; and exposures along tracks of the Missouri, Kansas, and Texas Railroad bordering the Missouri River, near Easly Station, Boone County, Mo.

Only one specimen at the University of Missouri, Columbia, Mo., (colln. Os 1005–2) labeled "Syntypes" is apparently available. This specimen is here designated as the lectotype, the slide is labeled "Sylamore s. s. Williamsburg, Mo."

Geologic range.—Probably reworked Devonian in Lower Mississippian rocks.

Bekena? plicatula (Polenova), 1952

Bairdia plicatula Polenova, 1952, Micropaleontology SSSR, v. 5, p. 127, pl. 13, figs. 1, 2. Middle Devonian, Russia.

Geologic range.—Middle Devonian.

Bekena? prantli (Pokorný) 1950

Bairdiocypris prantli Pokorný, 1950, Czechoslovakia Stát. geol. úst. Sbornik, v. 17, Paleont., p. 558 (46), 619 (107), pl. 3, figs. 3, 4. Givetian, red marly coral limestone, abandoned Ruzička Quarry, Čelechovice, Czechoslovakia.

Although the dorsal outline of Pokorný's illustration (fig. 3b) does not show the diagnostic flattening of the end margins of the right valve, the lateral view of the same specimen (fig. 3a), and the lateral view of a paratype (fig. 4a) suggest such a flattening. The end view (fig. 4b) suggests *Bairdiocypris* rather than *Bekena.*

Geologic range.—Middle Devonian.

Bekena? rhenana (Kegel), 1932

Bythocypris (*Bairdiocypris*) *rhenana* Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrb. 1931, v. 52, p. 248, pl. 13, figs. 4a–e. Lower *Stringocephalus* beds, Dingdorf, Eifel, Germany.

Kegel's (1932) figure 4e shows the diagnostic furrow near the ventroposterior part of the valve; however, as pointed out by Pokorný (1950, p. 616 (104)) this feature is not of diagnostic value.

Geologic range.—Middle Devonian.

Bekena? robusta (Kummerow), 1953

Silenites robustus Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, p. 54, pl. 7, figs. 5a, b. Middle Devonian, Kamieniarnia near Pełcza, Wolhynia, Poland.

Geologic range.—Middle Devonian.

Bekena? vastus (Polenova), 1952

Bairdiocypris vastus Polenova, 1952, Microfauna SSSR, pt. 5, p. 135, pl. 14, figs. 1, 2. Givetian, Central Devonian field, Voronez region, and Saratov region, Russia.

Geologic range.—Middle Devonian.

Bekena? sp. Gibson, 1955

Bekena? sp. Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 20, pl. 1, fig. 13. Calcareous clay of Cerro Gordo formation, pit operated by the Rockford Brick and Tile Co., Rockford, Iowa.

The figured specimen (USNM 123095) is a broken steinkern.

Geologic range.—Upper Devonian.

Bekena sp. A

Plate 6, figures 22–24

Bairdiocypris moravica (Kegel). Pokorný, 1950, Czechoslovakia Stát. geol. úst., Sbornik, v. 17, Paleont., p. 553 (41), 614 (102), pl. 2, figs. 7a–d, text figs. 12a, b. Givetian, red, marly coral limestone, abandoned Ruzička quarry, Čelechovice, Czechoslovakia.

[not] *Bythocpyris eifliensis* var. *moravica* Kegel, 1928, Preuss. Geol. Landesanstalt, Jahrb. 1927, v. 28, p. 657, pl. 33, figs. 1a–d = undescribed genus. See discussion of the genus.

Geologic range.—Middle Devonian.

Genus BAIRDIOCYPRIS Kegel, 1932

Bythocypris (*Bairdiocypris*) Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrb. 1931, v. 52, p. 246.

Přibyl and Snajdr, 1950, Czechoslovakia, Stát. geol. úst., Sbornik, v. 17, Paleont., p. 119 (19), 161 (61).

Bairdiocypris Kegel. Pokorný, 1950 [part], Czechoslovakia Stát. geol. úst. Sbornik, v. 17, Paleont., p. 553 (41), 614 (102).

Krömmelbein, 1952 [part], Senckenbergiana, v. 32, p. 319–335.

Přibyl, 1953, Czechoslovakia, Stát. geol. úst., Sbornik, v. 20, Paleont., p. 262 (30), 305 (73), 337 (105).

[not] *Bythocypris* (*Bairdiocypris*) Kegel. Roth, 1933, Jour. Paleontology, v. 7, p. 401.

Harper and Sutton, 1935, Jour. Paleontology, v. 9, p. 627.

Loranger, 1951, Am. Assoc. Petroleum Geol., v. 35, p. 2359.

Type species.—Original designation *Bythocypris (Bairdiocypris) gerolsteinensis* Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrb. 1931, v. 52, p. 249, pl. 13, fig. 5. Middle Devonian, Germany.

Diagnosis.—Large robust smooth ostracodes; greatest width, however, less than greatest height; gently convex dorsal margin; straight, convex or sinuous ventral margin. Sides convex in dorsal outline; in end view the larger valve is angular near dorsum, so that it is almost subrectangular in outline.

Discussion.—Krömmelbein (1952, pl. 1, figs. 3a–d) illustrates for the first time with photographs the holotype of *Bairdiocypris gerolsteinensis* Kegel, 1932. The broken anterior part of his figure 3a and the muscle scar impression shown on his figure 3b suggest that the type is a steinkern, or at least a partly corroded specimen. Should this be true, it might belong to the *B. üxheimensis* Kegel, 1932, group (Krömmelbein, 1952, pl. 1, figs. 1a–d; pl. 3, figs. 2a–c; pl. 4, figs. 1–3). *B. üxheimensis* Kegel, 1932 and *B. rauffi* Krömmelbein, 1952, have a dorsal shallow indentation that is parallel to the hingeline but that does not extend to the posterior of the valve. It is therefore possible that the generic diagnosis of *Bairdiocypris* should be amended to include this feature. This might also be the reason for Krömmelbein's referring species of *Bairdiocypris* to *Pachydomella* Ulrich, 1891 (Krömmelbein, 1955).

Dr. Krömmelbein very generously sent me specimens of *Bairdiocypris clava* Kegel, 1932, a species he refers to *Pachydomella* and which was referred to *Microcheilinella* Geis, 1933, by Kummerow (1953, p. 60) and by Bouček and Přibyl (1955, p. 602 (26), 631 (55), 655 (79)). These specimens belong to *Tubulibairdia* Swartz, 1936. They differ from *Microcheilinella* by having tubules and a more incised hingeline.

Roth (1933, p. 401) misidentified a Jurassic nonmarine species as *Bairdiocypris morrisonensis* Roth, 1933; and as a result of this generic misidentification, several additional species from Mesozoic rocks have been assigned to *Bairdiocypris*. According to Swartz and Swain (1946, p. 366), Mrs. Nadeau (formerly Betty Kellett) is restudying the Morrison Ostracoda and expects to propose a new generic name for *B. morrisonensis* and its close relatives.

Geologic range.—Silurian(?), Devonian.

Lithology.—Shale, limestone.

Habitat.—Marine.

ASSIGNED SPECIES

Bairdiocypris biesenbachi Krömmelbein, 1952

Bairdiocypris biesenbachi Krömmelbein, 1952, Senckenbergiana, v. 32, p. 326, pl. 1, figs. 2a, d. Middle Devonian, Eifel, Germany.

?*Bairdiocypris biesenbachi* Krömmelbein. Přibyl, 1953, Czechoslovakia, Stát. geol. úst., Sbornik, v. 20, Paleont., p. 263 (31), 305 (73), 338 (106), pl. 7, figs. 4–10. Middle Devonian, Poland.

Geologic range.—Middle Devonian.

Bairdiocypris gerolsteinensis Kegel, 1932

Bythocpyris (*Bairdiocypris*) *gerolsteinensis* Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrg. 1931, v. 52, p. 249, pl. 13, figs. 5a–d. Middle Devonian, Eifel, Germany.

Bairdiocypris gerolsteinensis Kegel. Krömmelbein, 1952, Senckenbergiana, v. 32, p. 329, pl. 1, figs. 3a–d; pl. 3, figs. 3a–b. Same locality as above. See discussion under the genus.

Geologic range.—Middle Devonian.

Bairdiocypris? rauffi Krömmelbein, 1952

Bairdiocypris raufti Krömmelbein, 1952, Senckenbergiana, v. 32, p. 330, pl. 2, figs. 1a–d. Middle Devonian, Germany. See discussion under the genus.

Geologic range.—Middle Devonian.

Bairdiocypris? transversus (Roth), 1929

Plate 6, figures 20, 21, 28, 29

Bythocypris transversa Roth, 1929, Jour. Paleontology, v. 3, p. 365, pl. 37, figs. 24a–c. Haragan marl, NE. cor. sec. 20, T. 2 S., R. 3 E., Murray County, Okla.

Geologic range.—Lower Devonian.

Bairdiocypris? üxheimensis Kegel, 1932

Bythocypris (*Bairdiocypris*) *üxheimensis* Kegel, 1932, Preuss. Geol. Landesanstalt, Jahrb. 1931, v. 52, p. 250, pl. 13, figs. 6a–f. Middle Devonian, Germany.

Bairdiocypris üxheimensis Krömmelbein, 1952, Senckenbergiana, v. 32, p. 325, pl. 1, figs. 1a–d; pl. 3, figs. 2a–c. Middle Devonian, Germany. See discussion under the genus.

Geologic range.—Middle Devonian.

SPECIES REMOVED FROM BAIRDIOCYPRIS

albertensis Loranger, 1951 = Gen. indet.
celtiformis Harper and Sutton, 1935 = Gen. undescribed.
clava Kegel, 1932 = *Tubulibairdia clava* (Kegel), 1932.
clava var. *antecedens* Kegel, 1932 = *Tubulibairdia antecedens* var. *antecedens* (Kegel), 1932.
clava subsp. *tenuisculcata* Pokorný, 1950 = *Tubulibairdia? tenuisulcata* (Pokorný), 1950.
eifliensis (Kegel). Krömmelbein, 1952 = Gen. undescribed.
fecunda Přibyl and Snajdr, 1950 = *Tubulibaidia? fecunda* (Přibyl and Snajdr), 1950.
moravica (Kegel). Pokorný, 1950 = *Bekena* sp. A.
morrisonensis Roth, 1933 = Gen. undescribed.
morrisonensis var. *equalis* Harper and Sutton, 1935 = Gen. undescribed.
prantli Pokorný, 1950=*Bekena? prantli* (Pokorný), 1950.
rhenana Kegel, 1932 = *Bekena? rhenana* (Kegel), 1932.
trapezoidalis Roth, 1933 = Gen. undescribed.
vastus Polenova, 1952 = *Bekena? vastus* (Polenova), 1952.

SPECIES ASSIGNED TO GENERA NOT DESCRIBED IN THIS PAPER

The large number of species of Paleozoic age that were originally referred to *Bairdia* contain several taxons that are here considered to belong to other genera. Some of these genera are not within the scope of this paper; the other genera were described or discussed here. The following species are here listed in the genera to which they are now referred.

Genus BASSLERELLA Kellett, 1935

Basslerella Kellett, 1935, Jour. Paleontology, v. 9, p. 155.
[not] *Basslerella* Howe, 1935 = *Basslerites* Howe, 1937, *in* Coryell and Fields, [not *Basslerites* Teichert, 1937 = *Rayella* Teichert, 1939].
[not] *Basslerella* Bouček, 1936 = *Boucia* Agnew, 1942.

Type species.—Original designation *B. crassa* Kellett, 1935, Jour. Paleontology, v. 9, p. 156, pl. 17, figs. 1a–e. Permian, Kansas.

Basslerella? illinoiensis (Scott and Borger), 1941

Bairdia illinoiensis Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 367, pl. 49, figs. 10, 11, Macoupin cyclothem, along Embarass River, 1 mile east of Lawrenceville, Lawrence County, Ill.

Geologic range.—Pennsylvanian.

Basslerella? quadrispinosa (Scott and Borger), 1941

Bairdia quadrispinosa Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 357, pl. 50, figs. 12, 13. Macoupin cyclothem, along Embarrass River, 1 mile east of Lawrenceville, Lawrence County, Ill.

Geologic range.—Pennsylvanian.

Genus CAMDENIDEA Swain, 1953

Camdenidea Swain, 1953, Jour. Paleontology, v. 27, p. 279.

Type species.—Original designation *C. camdenensis* Swain, 1953, Jour. Paleontology, v. 27, p. 280, pl. 39, figs. 10a–g. Devonian, Tennessee.

According to Swain (1953, p. 279) the muscle scar pattern of this genus consists of numerous small slightly elevated spots.

Camdenidea? planoconvexa (Coryell and Williamson), 1936

Plate 6, figures 14–16

Bairdia planoconvexa Coryell and Williamson, 1936, Am. Museum Novitates, no. 870, p. 7, pl. fig. 13. Waldron shale, Indiana.

Geologic range.—Silurian.

Genus CAVELLINA Coryell, 1928

Cavellina Coryell, 1928, Jour. Paleontology, v. 2, p. 89.
[not] *Cavellina* (for *Clavelina* Savigny, 1816) Maitland, 1897, fide Howe, 1955, p. 30.

Type species.—Original designation *C. pulchella* Coryell, 1928, Jour. Paleontology, v. 2, p. 90, pl. 11, fig. 5. Pennsylvanian, Oklahoma.

Cavellina? sp.

Bairdia elongata (Münster). Jones, 1850, *in* King, Palaeontogr. Soc. London, p. 62, pl. 18, fig. 5. Magnesian limestone, dredged up near the Dogger Bank, England.

Jones, 1859, *in* Kirkby, Tyneside Naturalists' Field Club Trans., v. 4, p. 159, pl. 11, fig. 2. Same specimen as above.

Geologic range.—Permian.

Genus HAWORTHINA Kellett, 1935

Haworthina Kellett, 1935, Jour. Paleontology, v. 9, p. 161.

Type species.—Original designation *Bairdia bulleta* Harris and Lalicker, 1932, Am. Midland Naturalist, v. 13, p. 404, pl. 37, fig. 7. Permian, Texas.

Haworthina bulleta (Harris and Lalicker), 1932

Bairdia bulleta Harris and Lalicker, 1932, Am. Midland Naturalist, v. 13, p. 404, pl. 37, fig. 7. Lueders limestone, on north bank of Salt Fork of Brazos River, 2 miles southeast of Seymour, Baylor County, Tex.

Geologic range.—Permian.

Genus STEUSLOFFINA Teichert, 1937

Steusloffina Teichert, 1937, Fifth Thule Exped. Rept., v. 1, no. 5, p. 120.

Type species.—Original designation *S. ulrichi* Teichert, 1937, idem, p. 120, pl. 24, figs. 2–5. Ordovician, Arctic Canada.

Steusloffina cuneata (Steusloff), 1894

Plate 6, figure 17

Primitia cuneata Steusloff, 1894, Deutsch. Geol. Gesell. Zeitschr., v. 46, p. 782, pl. 58, fig. 5. Glacial drift, Germany.

Bairdia? cuneata (Steusloff). Kummerow, 1924, Preuss. Geol. Landesanstalt, Jahrb. 1923, v. 44, p. 435, pl. 21, figs. 17a–c. Middle and upper Lower Silurian drift, Germany.

Geologic range.—Ordovician.

SPECIES BELONGING TO UNDETERMINED GENERA

In this group belong those species previously assigned to *Bairdia* that belong either to new genera or to described genera the identity of which cannot be determined on the basis of available data. The distinction between these names and those considered in this paper as nomina dubia is that the names in this category are based on apparently adequate specimens. Although the species are valid, it is not possible at this stage of the study to refer them to their proper genera.

Bairdia aequalis Eichwald. Jones and Kirkby, 1875

Bairdia aequalis Eichwald. Jones and Kirkby, 1875, Annals Mag. Nat. History, ser. 4, v. 15, p. 56, pl. 6, fig. 4. Permian, Russia.

Eichwald's species is neither conspecific nor congeneric with the one ilustrated by Jones and Kirkby.

Bairdia anticostiensis Jones, 1890

Bairdia anticostiensis Jones, 1890, Geol. Soc. London Quart. Jour., v. 46, p. 548, pl. 21, figs. 3a, b. Gray limestone, Anticosti group, English Head, Anticosti.

The illustrations are of a right valve, which was later referred to *Krausella*. (See Bassler and Kellett, 1934, p. 369.) The shape of the posterior as shown in ventral profile (fig. 3b) raises doubt as to its belonging to *Krausella*. Silurian.

Cythere arcuata McCoy, 1844

Cythere arcuata McCoy, 1844, Synopsis characters Carboniferous Limestone fossils Ireland, p. 165, pl. 23, fig. 9. Shale, Ireland.

The illustrations are of an indeterminate genus. Bassler and Kellett (1934, p. 165) refer this species to *Bairdia* and also (p. 424) to *Paraparchites arcuatus* (McCoy). The lateral and dorsal outlines remove this species from both *Bairdia* and *Paraparchites*. Carboniferous.

Bairdia binodosa Polenova, 1952

Bairdia binodosa Polenova, 1952, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 60, pt. 5, p. 132, pl. 12, figs. 6, 7 a–c. Givetian, Russia

The holotype has two nodes near the dorsal margin of the larger valve. This species probably belongs to the same undescribed genus as the species described and illustrated by Krömmelbein as *Condracypris? circumvallata* (Kummerow), 1953. Middle Devonian.

Cythere cyclas Keyserling, 1854

Cythere cyclas Keyserling, 1854, *in* Schrenk, Reise Nordost. europaischen Russlands, pt. 2, p. 112, pl. 4, figs. 42, 43. Permian, Russia.

This species is referred to *Bairdia* by Eichwald, 1860. The shape is reminiscent of a healdiid. Permian.

Bairdia elongata Kummerow, 1924

Bairdia elongata Kummerow, 1924, Preuss. Geol. Landesanstalt, Jahrb. 1923, v. 44, p. 435, pl. 21, fig. 16. Glacial drift, east Prussia.

The illustration is of a specimen that cannot be assigned to any genus known at the present time. The name is a junior homonym of *B. elongata* (Münster), 1830 and *B. elongata* Lienenklaus, 1900. Silurian.

Bairdia jonesiana Kirkby, 1858

Bairdia jonesiana Kirkby, 1858, Annals Mag. Nat. History, ser. 3, v. 2, p. 432, pl. 11, figs. 1, 2, 2a. Tunstall Hill, Durham, England.

This species was later referred to *Macrocypris*. (See Bassler and Kellett, 1934, p. 405.) *Macrocypris* is based on a living species (*Cythere minna* Baird, 1850) that has a completely different carapace from the Permian species. Permian.

Bairdia kolwensis Glebovskaya, 1939

Bairdia kolwensis Glebovskaya, 1939, Neft. Geol.-Razv. Inst., Trudy, ser. A, no. 115, p. 171, 175, pl. 2, figs. 14, 14a. *Schwagerina* horizon, Northern Urals, Russia.

The description and illustration are of a specimen with concave dorsal outline. None of the species in *Bairdia* and related genera has a concave dorsal outline; consequently, this species is based either on a damaged specimen or belongs to an hitherto undescribed genus. Permian.

Bairdia occidentalis Girty, 1909

Bairdia occidentalis Girty, 1909, U.S. Geol. Survey Bull. 389, p. 116, pl. 8, figs. 6, 6a. Yeso formation, New Mexico.

Girty's type (USGS no. 1452) is a specimen with the right valve overlapping the left and is not referable to any genus discussed in this paper. Permian.

Bairdia ovata Eichwald, 1857

Bairdia ovata Eichwald, 1857, Soc. Imp. Nat. Moscou Bull. 30, no. 4, p. 308. Eichwald, 1860, Lethaea Rossica, v. 1, p. 1345. Russia. Illustration not seen. Carboniferous.

Bairdia phillipsiana Jones and Holl, 1869

Bairdia phillipsiana Jones and Holl, 1869, Annals Mag. Nat. History, ser. 4, v. 3, p. 213, pl. 14, figs. 7a–c. Wenlock limestone, Croft's quarry, near West Malvern, England.

This species very likely belongs with the same group as *Bairdiocypris eifliensis* (Kegel). Krömmelbein, 1952. Bassler and Kellett (1934, p. 230) list the synonymy of this species under *Bythocypris*. Silurian.

Bairdia pseudocestriensis Přibyl and Snaijdr, 1950

Bairdia pseudocestriensis Přibyl and Snaijdr, 1950, Czechoslovakia Stát. geol. úst. Sbornik, v. 17, Paleontol., p. 116 (16), 157 (57), pl. 1, figs. 8, 9. Choteč limestone, quarry of the former enterprise "Prastav," Holyně, near Prague, Czechoslovakia Middle Devonian.

Bairdia pyrrhae Eichwald, 1860

Bairdia pyrrhae Eichwald, 1860 (?), Lethaea Rossica, v. 1, p. 1344, pl. 62, figs. 3, 3a. Permian, Russia.

Bassler and Kellett (1934, p. 347) refer this to *Jonesina* and credit it to (Eichwald), 1844, without citing page or illustrations, Eichwald (1860, p. 1344) gives "Geogn. de la Russie, p. 466" as a synonym. The illustration is a specimen that cannot be assigned to *Jonesina* with any degree of certainty. Permian.

Bairdia qualeni Eichwald, 1857

Bairdia qualeni Eichwald, 1857, Soc. Imp. Nat. Moscou Bull. 30, no. 4, p. 311. Carboniferous, dolomite at Sterlitamak, Orenbourg Province, Russia.

Eichwald, 1860, Lethaea Rossica, v. 1, p. 1339, pl. 52, figs. 4a–c. Same locality as above. Carboniferous.

Bairdia salteriana Jones and Holl,1868

Bairdia salteriana Jones and Holl, 1868, Annals Mag. Nat. History, ser. 4, v. 2, p. 58, pl. 7, figs. 11a, b. Kildare, Ireland.

These data are inadequate for generic assignment. Ordovician.

Bairdia scapha Eichwald, 1860

Bairdia scapha Eichwald, 1860, Lethaea Rossica, v. 1, p. 1343, pl. 52, figs. 15a, b. Permian, Russia.

These data are inadequate for generic assignment. Permian.

Bairdia siliquoides Jones and Kirkby, 1879

Bairdia siliquoides Jones and Kirkby, 1879, Geol. Soc. London Quart. Jour., v. 35, p. 576, pl. 31, figs. 9–14. Carboniferous limestone, Scotland.

Bassler and Kellett (1934, p. 437) refer this species to *Pontocypris*. The original illustrations, particularly of the end view (Jones and Kirby, 1879, fig. 14), are not clear enough to determine whether or not, like some other Paleozoic species assigned to *Pontocypris*, this species belongs to *Rishona* Sohn, n. gen. Carboniferous.

Bairdia subcylindrica (Münster). Kummerow, 1939

Bairdia subcylindrica (Münster). Kummerow, 1939, Preuss. Geol. Landesanstalt Abh., n. f., no. 194, p. 43, pl. 4, figs. 14a, b. Lower Visé, Regnitzlosau, Germany.

These data are inadequate for generic assignment. Mississippian.

Bairdia subroundata Harlton, 1929

Bairdia subroundata Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 268, pl. 2, fig. 14. Fayetteville shale, just below limestone, northeast of Country Club, 5 miles east of Vinita, SW. cor. sec. 15, T. 25 N., R. 21 E., Craig County, Okla.

The holotype (USNM 79374) is a small specimen (published length 0.8 mm), with round end margins, the anterior of which is higher. This species does not fit any of the known genera; it is too thin in dorsal outline to fit *Bairdiocypris* and does not have the lateral ridge of *Healdia*. Upper Mississippian.

Bairdia tumida Kummerow, 1928

Bairdia tumida Kummerow, 1928, Preuss. Geol. Landesanstalt, Jahrb. 1927, v. 48, p. 42, pl. 2, figs. 18a, b. Glacial drift, Germany.

These data are inadequate for proper generic assignment. Silurian.

Bairdia? volaformis Polenova, 1952

Bairdia? volaformis Polenova, 1952, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy (VNIGRI), new ser., no. 60, pt. 5, p. 134, pl. 13, fig. 4. Givetian, Russia.

These data are inadequate for proper generic assignment. Middle Devonian.

Bairdia wabashensis Scott and Barger, 1941

Bairdia wabashensis Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 356, pl. 50, figs. 18, 19. Thin impure marine limestone in Macoupin cyclothem, 1 mile east of Lawrenceville, Ill.

These data are inadequate for generic assignment. Pennsylvanian.

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[Italic page numbers indicate descriptions]

PLATES 1–6

PLATE 1

[Except where noted, all magnifications are approximately × 30; except where noted, all photographs are by N. W. Shupe]

FIGURES 1–3. *Varicobairdia kettneri* Pokorný, 1950. (p. 12).

Right, dorsal, and left views of carapace. Topotype USNM 133206, red marly coral limestone, Middle Devonian, Czechoslovakia.

4, 5, 7, 8, 11–14. *Bairdia beedei* Ulrich and Bassler, 1906. (p. 23).

4, 5. Dorsal and right views of carapace. *B. ciscoensis* Harlton, 1927, "cotype," USNM 71719, shale below Sedwick limestone, Texas.

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Right view of carapace. Paratype USNM 72246, Cisco formation, Texas.

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9, 10. Right and ventral views of carapace. Holotype USNM 72243, Graham formation, Texas.

15, 16. Dorsal and right views of carapace. *B. menardensis* Harlton, 1929, "cotype" USNM 80587, Canyon group, Texas.

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Left, ventral, and right views of carapace; note broken posterior. Holotype USNM 41788, Hamilton group, New York.

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Dorsal and right views of carapace. Holotype USNM 110236, Middle Permian, Glass Mountains, Tex. All Hamilton's types are on a faunal slide with the same number.

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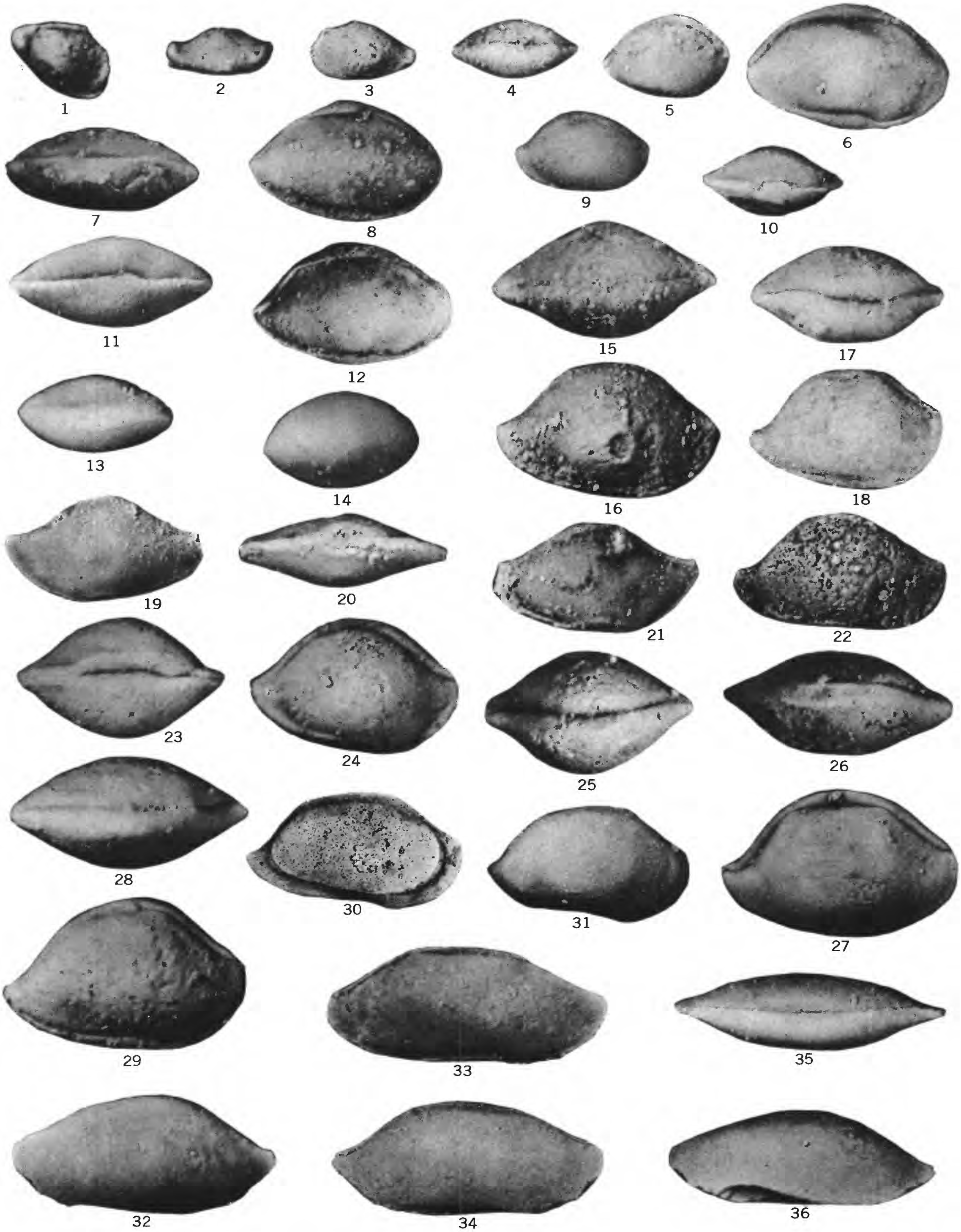
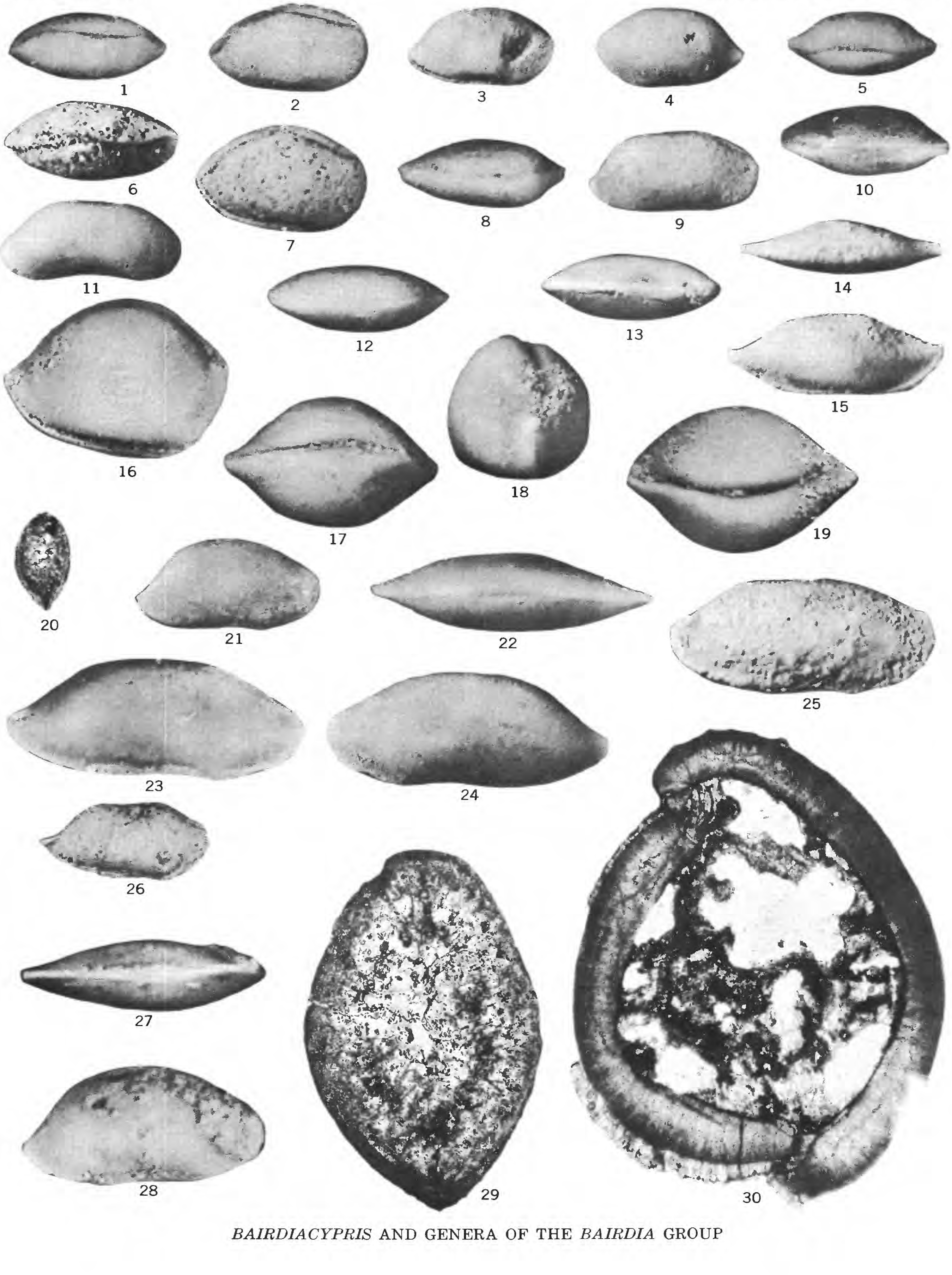


BAIRDIA AND *VARICOBAIRDIA*



BAIRDIACYPRIS AND GENERA OF THE *BAIRDIA* GROUP

PLATE 2

[Except where noted, all magnifications are approximately × 30; except where noted, all photographs are by N. W. Shupe]

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PLATE 3

[Except where noted, all magnifications are approximately × 30; except where noted, all photographs are by N. W. Shupe]

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27. Right view of carapace. *Bairdia cestriensis* var. *granulosa* Girty, 1910, type specimen USNM 119735, Basal Fayetteville shale, Arkansas. USGS loc. 5550A green.

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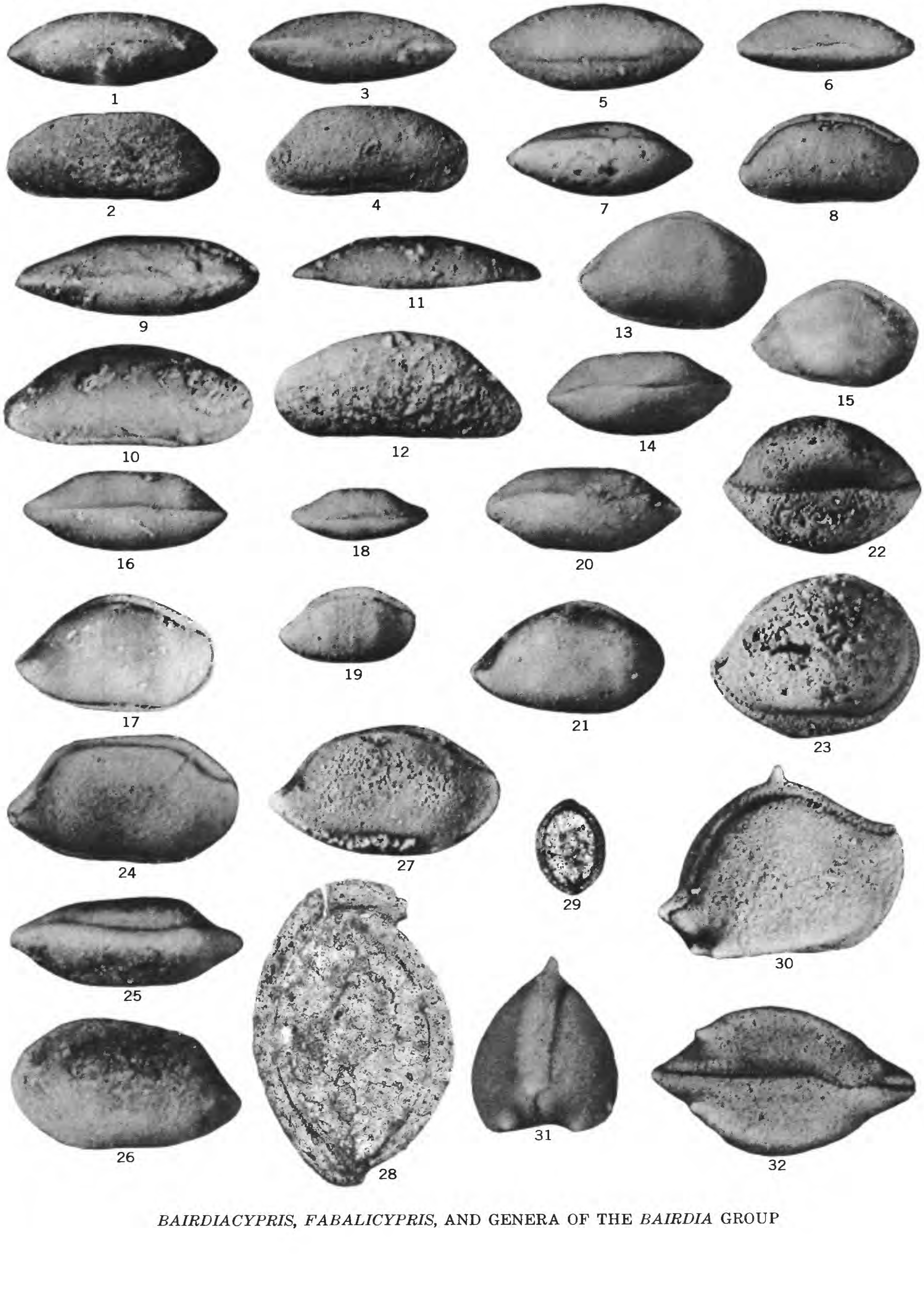
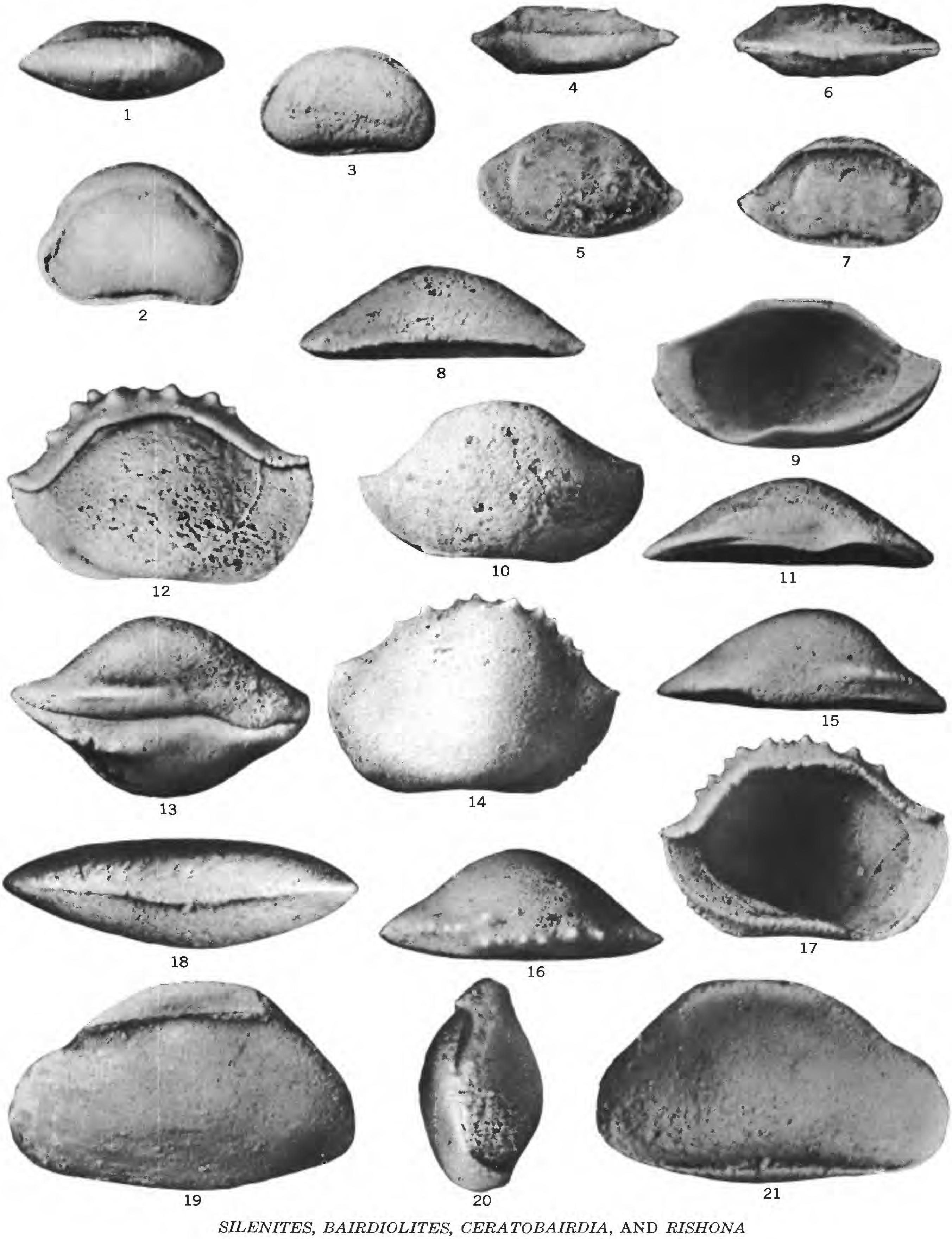


BAIRDIACYPRIS, FABALICYPRIS, AND GENERA OF THE *BAIRDIA* GROUP



SILENITES, BAIRDIOLITES, CERATOBAIRDIA, AND *RISHONA*

PLATE 4

[Except where noted, all magnifications are approximately × 30; except where noted, all photographs are by N. W. Shupe]

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Dorsal and right views of carapace. Holotype, Columbia Univ. colln. 27565, Wayland shale, Texas.

3. *Silenites lenticularis* (Knight), 1928 (p. 73).
Right view of carapace. Kellett's figured specimen pl. 17, fig. 9e, USNM 93532, Elmdale formation, Kansas.

4–7. *Bairdiolites ardmorensis* (Harlton), 1929 (p. 70).
Dorsal, left, ventral, and right views of carapace. Holotype USNM 79391, Dornick Hills formation, Oklahoma.

8–17. *Ceratobairdia wordensis* (Hamilton), 1942 (p. 69).
8–11. Dorsal, inside, outside, and ventral views of right valve. Topotype USNM 119738.
12, 13. Right and ventral views of carapace. Topotype USNM 119739.
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18–21. *Rishona? magna* (Roth), 1929 (p. 80).
Ventral, left, posterior, and right views of carapace. Figured specimen USNM 133208, Haragan shale, one-half a mile southeast of White Mound, Murphy County, Okla.

PLATE 5

[Except where noted, all magnifications are approximately $\times$ 30; except where noted, all photographs are by N. W. Shupe]

FIGURES 1–4. *Rishona bassleri* Sohn, n. sp. (p. 79).

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Radiograph through inside of a fragment of a left valve. Figured specimen USNM 133211, Henryhouse formation, Oklahoma. USNM loc. 482c.

6. *Tubulibairdia tubulifera* Swartz, 1936 (p. 74).

Outside view of a rubber squeeze of a left valve. Holotype USNM 941954, Middle Devonian, Pennsylvania.

7. *Tubulibairdia punctulata* (Ulrich), 1891 (p. 75).

Radiograph through interior of left valve. Topotype (?) USNM 133212, "Onondaga" limestone, Falls of the Ohio, Ky.

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Radiograph through interior of left valve. Topotype (?) USNM 133213, "Onondaga" limestone, Falls of the Ohio, Ky.

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Thin section through carapace; posterior view $\times$ 50; note tubules. Section made by J. M. Berdan, polaroid photograph by R. C. Douglass. Manlius limestone, New York. Yale Peabody Museum 5244/126k.

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Thin section through carapace; posterior view $\times$ 75. Polaroid photograph by writer. USNM 119741, Salem limestone, Indiana. USGS loc. 7697 green.

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Ventral, posterior, right, and dorsal views of a damaged carapace. Holotype USNM 41824, "Onondaga?" limestone, Falls of the Ohio, Ky.

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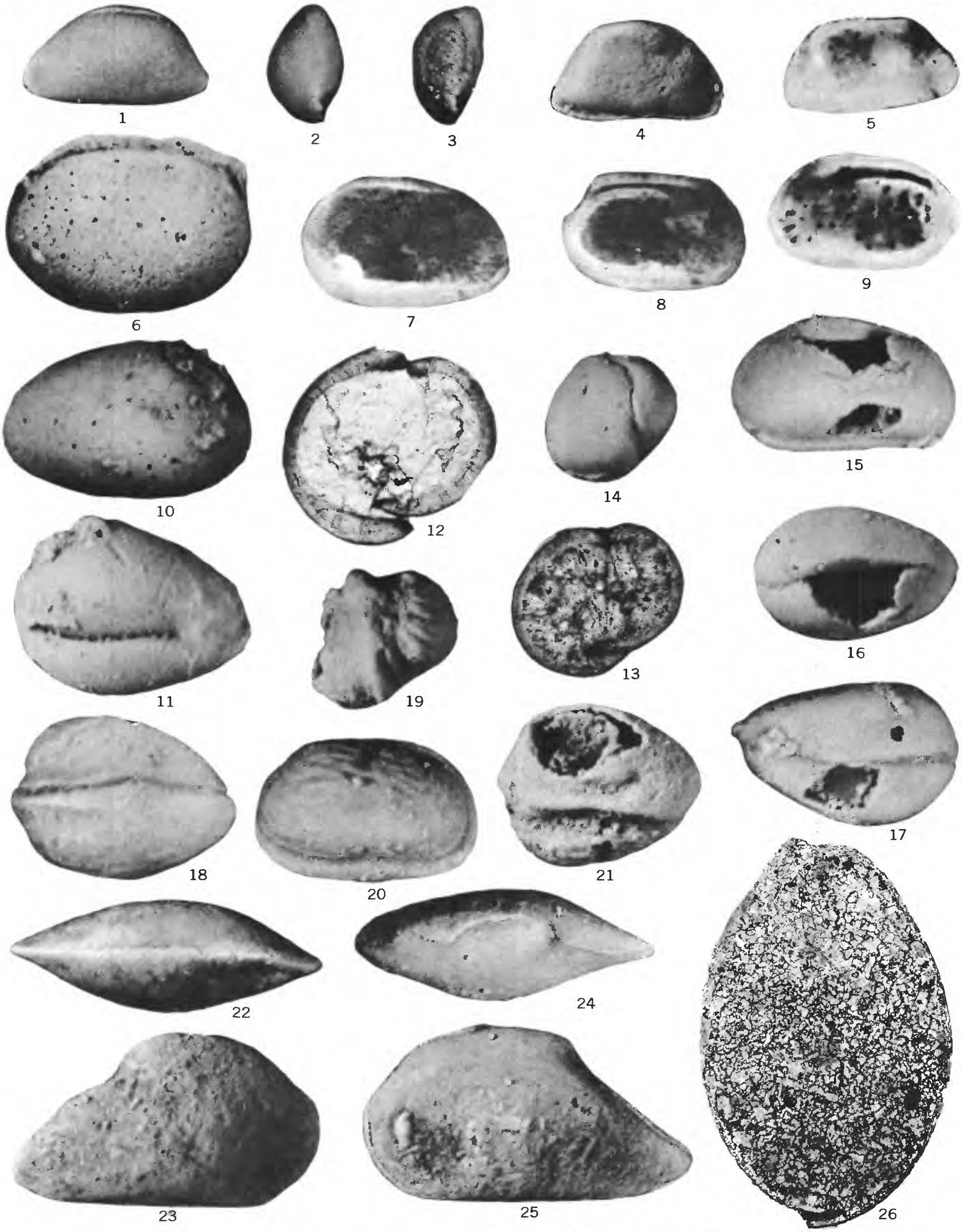
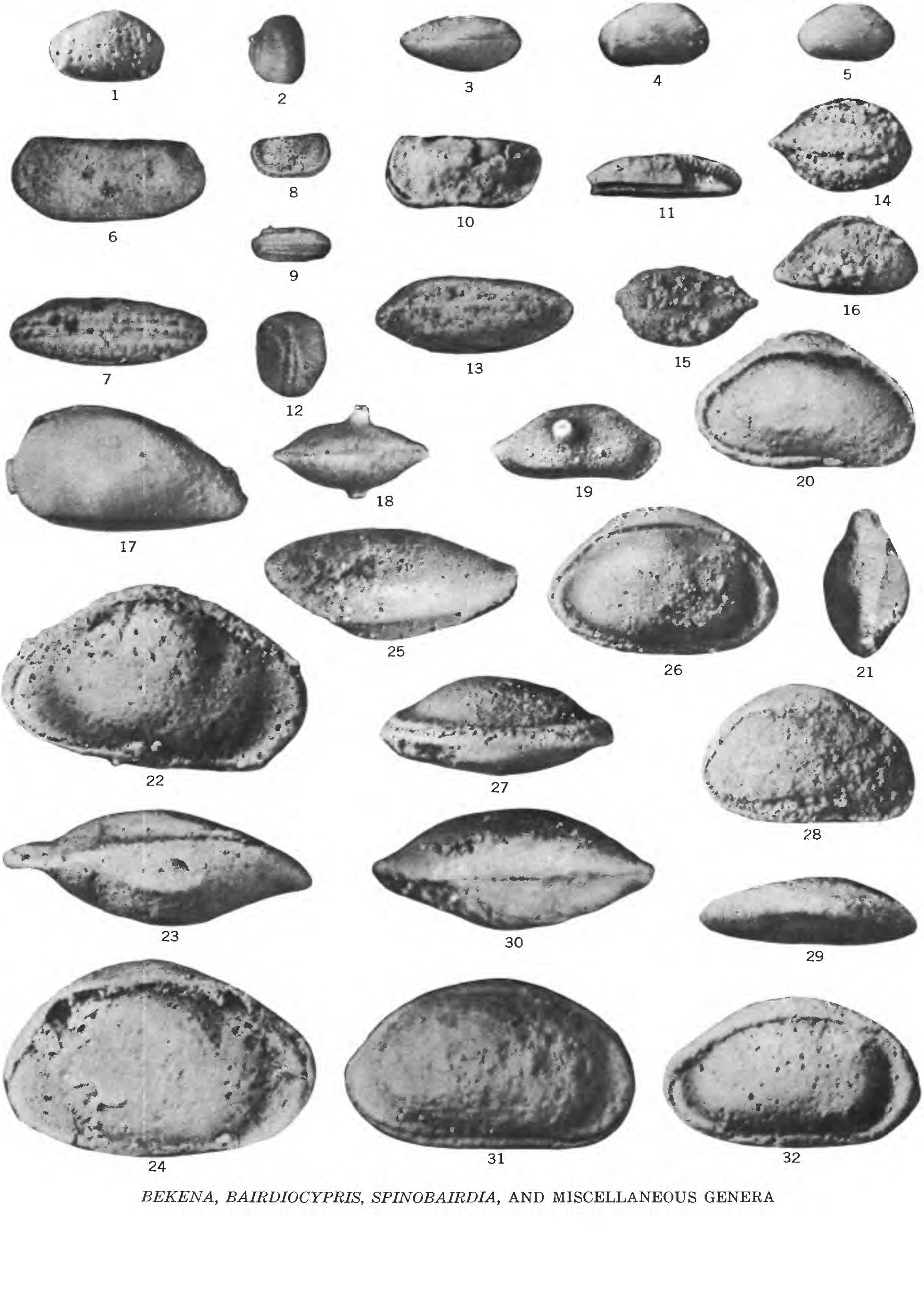


RISHONA, *PACHYDOMELLA*, AND RELATED GENERA



BEKENA, *BAIRDIOCYPRIS*, *SPINOBAIRDIA*, AND MISCELLANEOUS GENERA

PLATE 6

[Except where noted, all magnifications are approximately × 30; except where noted, all photographs are by N. W. Shupe]

FIGURES 1–5. *Cribroconcha* sp. (p. 7).

1–3. Right, posterior, and dorsal views of carapace. Figured specimen USNM 119742.

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5. Right view of carapace, originally the same size as fig. 1, with more shell material removed to form a specimen that would be called "*Bythocypris*." Figured specimen USNM 119744, Helms formation, Texas. USGS loc. 10890 blue.

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7. Ventral view of a second specimen converted to a steinkern × 60. Topotype USNM 119746.

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Right view of carapace. Topotype(?) USNM 82340, Ordovician drift, Germany.

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Dorsal and right views of carapace. Holotype USNM 123226. Newsom shale, Tennessee.

20, 21. *Bairdiocypris? transversus* (Roth), 1929 (p. 83).

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25–27. *Bekena diaphrovalvis* Gibson, 1955 (p. 82).

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28, 29. *Bairdiocypris? transversus* (Roth), 1929 (p. 83).

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Dorsal and right views of carapace. Lectotype Missouri Univ. colln. OS 1005–2, Sylamore sandstone, Missouri.

32. *Bekena diaphrovalvis* Gibson, 1955 (p. 82).

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