Sohn—*AECHMINELLA, AMPHISSITES, KIRKBYELLA*, AND RELATED GENERA—Geological Survey Professional Paper 330-B

Aechminella, *Amphissites* *Kirkbyella*, and Related Genera

GEOLOGICAL SURVEY PROFESSIONAL PAPER 330-B

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By I. G. SOHN

REVISION OF SOME PALEOZOIC OSTRACODE GENERA

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Genera of the ostracode families Aechminellidae, Amphissitidae, Kirkbyellidae, Kirkbyidae, Placideidae, Arcyzonidae, and one genus of uncertain affinity are discussed

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REVISION OF SOME PALEOZOIC OSTRACODE GENERA

AECHMINELLA, AMPHISSITES, KIRKBYELLA, AND RELATED GENERA

By I. G. Sohn

ABSTRACT

The genera *Aechminella* and *Mammoides* are revised and assigned to the new family Aechminellidae. Species of *Amphissites* are critically revised, and many reassigned to the following revised genera: *Amphissella, Amphizona, Arcyzona, Doraclatum, "Ectodemites," Kegelites, Polytylites, Reticestus*, and *Roundyella*. The new genera *Reviya* and *Shleesha* are based on species previously assigned to *Amphissites*. The genus *Aurikirkbya* is revised. The genus *Kirkbyella* is revised and split into two subgenera: *K.* (*Kirkbyella*) and *K.* (*Berdanella*) n. subgen. These are assigned to the new family Kirkbyellidae. The new genus *Psilokirkbyella* is based on species previously assigned to *Kirkbyella*. A species described in *Roundyella* is referred to *Scrobicula*. These 18 genera are distributed in the following families: Aechminellidae, 2 genera; Amphissitidae, 5 genera; Arcyzonidae, 3 genera; Kirkbyidae, 2 genera; Kirkbyellidae, 2 genera; Placideidae, 2 genera; Scrobiculidae, 2 genera.

The genera *Balantoides, Boursella*, and *Kirkbyites* are considered junior synonyms. The new species *Amphissites subinsignis, A. truncatus, Kirkbyella stewartae, Mammoides cooperi*, and *M. dorsospinosa* are described and illustrated. Lectotypes are designated for the following species: *Amphissites bushi, A. robertsi, "Ectodemites" warei, Kegelites roundyi*, and *Reticestus planus*. *Polytylites brayeri* n. name is designated for a junior homonym.

INTRODUCTION

This paper deals with the plexa around the genera *Aechminella* Harlton, 1933, *Amphissites* Girty, 1910, and *Kirkbyella* Coryell and Booth, 1933. A previous paper (Sohn, 1960) deals with *Bairdia* McCoy, 1844, and related genera.

The project was begun as an inventory of available knowledge of all the late Paleozoic ostracode genera. *Bairdia* was chosen as a pilot study because of the large number of species in the genus, and also because it is a smooth-shelled genus and therefore difficult to handle. As work progressed, two facts became apparent. First that it is not practical to confine the study to late Paleozoic species because many of the genera and most of the families originated in the early Paleozoic. Second that many of the genera described during the last hundred years contain species properly assigned to several genera belonging to one or more families. The labor involved in unraveling the intricacies of classification of these species necessitates the limiting of the study to selected groups in order to gain broader knowledge of these groups.

Contrasted to *Bairdia*, which is a smooth-shelled genus, *Aechminella* has lobes, and *Amphissites* is a highly ornamented ostracode with numerous features for use in classification. In spite of these facts, more than 100 species have been assigned to *Amphissites* since its description, and many of these were subsequently referred to other established genera. Two additional new genera for species referred to *Amphissites* and one for species referred to *Kirkbyella* are described in this paper. The genus *Kirkbyella* is divided into the subgenera *K.* (*Kirkbyella*) and *K.* (*Berdanella*) n. subgen.

The methods of study and a bibliography of Upper Paleozoic ostracodes in North America are given in the previous paper (Sohn, 1960). References in this paper are limited to those cited in the text.

The stratigraphic ranges of the genera discussed in this paper are shown on figure 16.

Although showing the range, this chart indicates neither the number nor the frequency of occurrence of species in each genus. Figures 17 and 19 to 31 show the frequency of occurrence by geographic locality, or by stratigraphic levels at the same locality, of the species in more important genera.

These charts show the stratigraphic range of each genus as well as the known abundance and the stratigraphic range of each species in the genus. By means of these charts it is possible to evaluate the stratigraphic value of species in each genus; for example, the range of *Polytylites* (fig. 22) is from the Upper Devonian through Lower Permian. The chart indicates that the genus is most abundant both in number of species and in the frequency of occurrence of these species in the Upper Mississippian. It can therefore be inferred from the chart that the genus had its major development during the Upper Mississippian.

I am grateful to Dr. R. S. Bassler for making available a file of original sketches and correspondence, as well as a collection of ostracodes from Scotland and England that had belonged to T. R. Jones. This material, according to Bassler, was inherited from Jones by

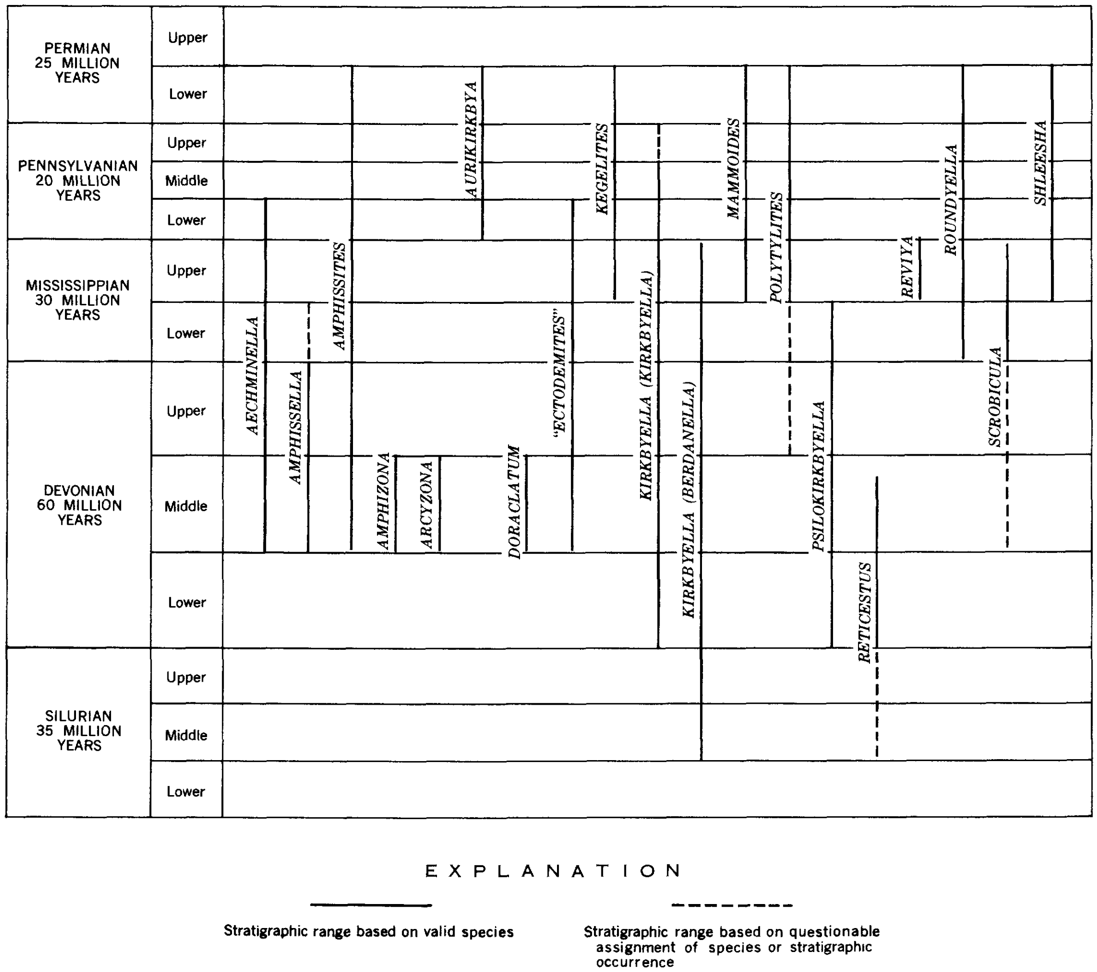

FIGURE 16.—Stratigraphic ranges of the genera discussed in this paper. Intervals for each period on this chart are proportional to the estimated length in millions of years as given in the U.S. Geological Survey version of the Holmes Time scale (Sohn, 1960, p. 16). Epochs within each period are divided into equal parts.

J. M. Clarke, New York Geological Survey, who, in turn, gave it to E. O. Ulrich. Specimens from this collection used in the study are referred to as "Jones collection." Jones' correspondence and sketches helped clarify conceptions of some of the classical genera and species.

DEFINITION OF TERMS

In addition to the terms defined in the previous study (Sohn, 1960, p. 6), the following terms are used: "Carina" is used for a raised structure on the surface of the valve, and "Ridge," for a similar structure along the margins of the valve. "Outer ridge" refers to the marginal ridge that is closest to the contact margins. "Inner ridge" is used for an additional marginal ridge removed from the outer ridge by the width of one or more reticulations.

STATUS OF OSTRACODE CLASSIFICATION

Neontologists postulate a hypothetical ancestral form, the Protostracode. Skogsberg (1920, p. 65–96) critically analyzed the inferred appendages of this animal, which has not yet been found in fossil form.

Until 1950, paleontologists used Bassler and Kellett's (1934) classification of Paleozoic Ostracoda. The classification of suprageneric categories followed in essence that of Ulrich and Bassler (1923, p. 287–322) in which the genera are classified into families and superfamilies without attempting to place them in zoological scheme that divided the order Ostracoda into suborders based on anatomical differences. Ulrich and Bassler (1923, p. 275) wrote that because the major classification of living forms is based principally upon appendages and soft parts not found in fossils, the relation of fossil to living forms is necessarily uncertain, and in many groups probably must remain undeterminable. By using analogous structures of the carapace, however, it is possible to infer the proper ordinal classification of some of the Paleozoic families. This method was used by Triebel (1950) in studying the Mesozoic genus *Ogmoconcha*.

According to Skogsberg (1920, p. 62–108) the neontological classification is based on the work of Sars (1866, table facing p. 8), who established 4 sections that were later considered to be suborders. Other biologists recognize only 2 suborders, while Skogsberg suggested that there may be 5 (1920, p. 101).

The following biological classification is modified from Sars (1866) with extracts from Klie (1929):

I. Second antenna uniramous
- Suborder Podocopa
  - Family Cypridae
  - Family Cytheridae
  - Family Bairdiidae

II. Second antenna biramous
- A. Carapace with anterior notch
  - 1. Four pairs of postmandibular appendages
    - Suborder Myodocopa
      - Family Cypridinidae
      - Family Conchoeciidae
- B. Carapace without anterior notch
  - 1. Two pairs of postmandibular appendages
    - Suborder Cladocopa
      - Family Polycopidae
  - 2. Three pairs of postmandibular appendages
    - Suborder Platycopa
      - Family Cytherellidae

Other anatomical differences are associated with each of these groups: Only the Myodocopa have a heart; the Podocopa have a styliform or vestigial caudal furca while the other three suborders have a platy, well-developed caudal furca; the Podocopa and Myodocopa have eyes. The main cause for difference in opinion among biologists as to the higher classification is the different interpretations of the homologies of the various appendages.

In order to attain greater uniformity in the use of zoological group names, Section F of the American Association for the Advancement of Science authorized in 1933 the formation of an informal committee to prepare a list of phyla, classes, and orders of animals. The late Prof. A. S. Pearse, Department of Zoology, Duke University, was chairman of that committee, and he edited four editions of this list. The most recent list (Pearse, 1949, p. 12, 13) gives the following classification:

- Phylum Arthropoda Siebold and Stannius, 1845
  - Subphylum Mandibulata McLeay, 1821
    - Superclass Crustacea Pennant, 1777
      - Class Eucrustacea Kingsley, 1894
        - Subclass Ostracoda Latreille, 1802
          - Order Myodocopa Sars, 1866
          - Order Cladocopa Sars, 1866
          - Order Podocopa Sars, 1866
          - Order Platycopa Sars, 1866

The ordinal affinities of most of the Paleozoic straight-hinged genera are at the present time not known. Henningsmoen's (1953, p. 188) suborder Paleocopa, erected to include the Beyrichiacea and Leperditiacea, is usable in so far as it supplies a convenient name for all the forms not referrable to the other suborders. His diagnosis follows: "Shell without frontal opening. Hinge line straight and usually long. Apparently no calcareous inner lamella. There is a tendency to develop lobes and sulci, and submarginal ridges. Animal unknown." This definition is, unfortunately, so broad and so indefinite as to make it a catchall for Paleozoic straight-hinged Ostracoda from which several equivalent categories eventually will be established.

In the same year, Pokorný (1953) independently published the following classification:

- Class Ostracoda
  - Order Beyrichiida Pokorný, 1953
    - Podocopida Pokorný, 1953
    - Myodocopida Pokorný, 1953
    - Leperditiida Pokorný, 1953

This classification is better than Henningsmoen's in that the superfamilies placed by Henningsmoen in the suborder Paleocopa are assigned by Pokorný to two orders: Beyrichiida and Leperditiida. The Podocopida and Myodocopida are not as acceptable as the previously listed neontological classification. Myodocopida includes Myodocopa and Cladocopa, the former with an anterior notch and 4 pairs of postoral appendages, and the latter without an anterior notch and only 2 pairs of postoral appendages. Podocopida include the Podocopa and Platycopa; the former has a uniramous second antenna, and the latter a biramous second antenna. These characters are of ordinal importance in neontological classification.

Based on the foregoing discussion, the following classification appears to be a more reasonable:

- Subclass OSTRACODA Latreille, 1802:
  - Order CLADOCOPIDA Sars, 1866 (Recent)
  - Order PODOCOPIDA Sars, 1866 (Paleozoic through Recent)
  - Order MYODOCOPIDA Sars, 1866 (Paleozoic through Recent)
  - Order PLATYCOPIDA Sars, 1866 (Paleozoic through Recent)
  - Order PALEOCOPIDA Henningsmoen, 1953 (Paleozoic, Recent(?))
  - Order LEPERDITIIDA Pokorny, 1953 (Paleozoic)

Classification of Paleozoic straight-hinged ostracodes presents a problem because there is as yet no valid basis for interpreting, even on the generic level, most of the structures used in classifying the group. The probable function of lobes, frills, ridges, spines and the various other "ornaments" used in assembling genera into higher categories should be reevaluated because most of them are inferences based on inadequate data.

Although it is universally accepted that these straight-hinged ornamented groups belong to the Ostracoda, this assignment is by inference, because there is no positive evidence to support this assumption. The assignment is based on the following evidence: The animals were bivalved with calcified shells; they had marginal overlap and were joined dorsally by a ligament with or without the development of dorsal hingement. Structures interpreted as muscle scars, the reflection of the place of attachment of adductor muscles, are present in some members of the group. They are found associated with animals that can be traced by analogous structures of the carapace through the Mesozoic and Tertiary to living ostracodes (Sylvester-Bradley, 1956; Pokorný, 1957). The environment in which they lived as interpreted from associated organisms is similar to the environment of modern ostracodes.

The exquisitely preserved silicified appendages of the fresh-water Carboniferous species from France, *Palaeocypris edwardsi* Brongniart, 1876, does not aid in this problem. This genus belongs to the order Podocopa (Brongniart, 1876, p. 2).

Cooper (1942, p. 765, fig. 1) shows that during the decade 1930–40 about 75 new Paleozoic genera were described; this represents between 20 percent and 25 percent of the total number of known genera in 1940. Levinson (1957, p. 367) states that 31 new Paleozoic genera were described in 1956. There is no indication that the rate of discovery of new genera will diminish within the next few decades. It is consequently reasonable to assume that at least half of the possible number of genera are yet to be described.

Gocht and Goerlich (1957) and Martin (1957, p. 292) report discovery of appendages in Mesozoic ostracodes. They decalcified closed carapaces with dilute hydrochloric acid using the method independently described by Sohn (1958, p. 733) and recovered the soft parts entombed within the carapaces. This method may provide clues to a more reasonable classification of Paleozoic Ostracoda.

Reexamination of the previously described genera may furnish additional data for the classification of the Paleozoic Ostracoda. The discovery by Hornibrook (1949) of shells of living ostracodes that resemble Paleozoic Beyrichiidae may be significant in the interpretation of Paleozoic forms.

COLLECTING LOCALITIES

The following are descriptions of U.S. Geological Survey and U.S. National Museum collecting localities from which fossils are illustrated for the first time.

U.S. Geological Survey localities

[SD after locality number indicates locality is in Silurian and Devonian catalog; PC indicates Upper Paleozoic catalog numbers]

4975–SD. Middle Devonian shale, roadcut, east side of road, on Route 82, west of Thedford for 1¼ miles then north for approximately 1 mile, Parkhill quadrangle, Ontario, Canada. Collected by J. M. Berdan, R. Boardman and Helen Duncan. Nov. 13, 1953.

2967–PC. Graham shale, below Jacksboro limestone horizon, near base of Cisco formation, one-half a mile southwest of Lacasa, Stephens County, Tex. Collected by C. S. Ross, Apr. 4, 1919.

5793–PC. Pella beds of Ste. Genevieve formation, weathered shale and dirt from piles of strippings of abandoned limestone quarry in SE. cor. sec. 9, T. 76 N., R. 18 W., about three-fourths of a mile south-southwest of city limits of Pella, along the road to Tracy, Marion County, Iowa. Collected by G. H. Girty and P. V. Roundy, Sept. 15, 1925.

5794–PC. Pella beds of Ste. Genevieve formation, abandoned limestone quarry in NE¼SE¼ sec. 35, T. 75 N., R. 18 W., about 1¾ miles south and three-fourths of a mile west of Tracy, Marion County, Iowa. Collected by G. H. Girty and P. V. Roundy, Sept. 15, 1925.

7047–PC. Wolfcamp formation, *Uddenites* member, basal Permian. Type locality, west end of Wolfcamp Hills, one-half a mile south of Wolfcamp, Marathon area, Texas. Collected by P. B. King and J. B. Knight, June 26, 1931.

10889-PC. Helms formation, El Paso quadrangle, Texas, 2½ miles west of Powwow Tanks, approximately lat. 30°50′17″ N., long. 106°04′40″ W. (See Sohn, 1953, p. 68).

10890–PC. Helms shale, 5 ft. below limestone bed 9, sec. "G" 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 U.S. Highway 62, El Paso quadrangle, El Paso County, Tex. Collected by C. C. Branson, November 1949.

11096–PC. Union Valley sandstone, outcrop along a small east-flowing creek, by fence line at Mr. Davis' farm buildings. NE¼ sec. 29, T. 3 N., R. 7 E. or SE¼ sec. 20, T. 3 N., Stonewall quadrangle, Pontotoc County, Okla. Collected by H. D. Miser and W. H. Hass, Nov. 7, 1949.

12395–PC. Brownwood shale member of Graford formation just below limestone conglomerate, bank just west of new rectangular kiln of Texas Brick Co., northwest part of city of Brownwood 1.2 miles, airline, west of courthouse, Brown County, Tex. Collected by K. A. Yenne, May 2, 1951.

12842–PC. Vienna shale, Illinois Central Railroad cut 0.4 mile N. of Franklin School, SE¼ sec. 12, T. 13 S., R. 4 E., Brownfield quadrangle, Johnson County, Ill. West side of cut about 16 ft. above coal that crops out on east side of cut. Shale from both sides of limestone bed. Collected by D. B. Saxby and I. G. Sohn, May 18, 1954.

12844–PC. Shetlerville member of Renault formation, Downeys Bluff section, shale in cliff above pump house NW¼SW¼ sec. 5, T. 13 S., R. 8 E., Hardin County, Ill. Collected by Saxby and Sohn, May 18, 1954.

12846–PC. Devils Kitchen member of Deese formation, (Tomlinson, 1930) slightly to the east of locality 12845. Bradfield's loc. 68, NW¼ sec. 4, T. 6 S., R. 2 E., Love County, Okla. Collected by C. A. Miller, March 1951.

12847–PC. Upper Kinderhook or lower Osage shale, below Ridge School, SE¼NW¼ sec. 3, T. 34 N., R. 13 E., Perry County, Mo. Collected by A. S. Warthin, Aug. 1942.

U.S. National Museum localities

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.

1086. Brownwood shale, Brownwood, Tex. Collected by A. R. Loeblich.

3069–2. Helms formation, 1.1 miles west of Powwow Tanks, approximately lat 31°50′16″ N., long 106°02′55″ W., El Paso quadrangle, Texas. Collected by A. L. Bowsher, 1948.

SYSTEMATIC DESCRIPTIONS

Subclass OSTRACODA Latreille, 1802

Latreille (1802, p. 17) originally used the word Ostrachoda to include genera of both the present-day Ostracoda and Cladocera. The spelling was later changed to Ostracoda (Latreille, 1804, p. 123; 1806, p. 9, 17) and used in the same sense as above. The group comprising the Ostracoda was separated from the Cladocera by Straus in 1821 under the name Ostrapoda. The fact that the Cladocera were removed from the plexus originally called Ostracoda leaves that name available for the remaining taxon. Because the 1804 spelling is an emendation of the 1802 word, the date of proposal is 1802.

The spelling of the vernacular word for the group is not consistent. Some spell it "ostracodes," and others, especially neontologists, spell it "ostracods." Latreille (1804, p. 123; 1806, p. 9, 17) cites in addition to the Latin name Ostracoda, the vernacular name "Ostracodes," and in 1802, he cites the vernacular word "Ostrachodes" (Latreille, 1802, p. 17). The ending is assumed to be from the Greek "oides," and the final "e" should be retained.

The rank of Ostracoda was raised from subclass to class by Lalicker and Moore (1952, p. 470, 471). It is here listed as a subclass because neontologists have not yet accepted this revision.

The family and superfamily classification in this group is at present in a state of flux. The classification in the Treatise on Invertebrate Paleontology (Moore, 1961) may establish a suitable framework.

Family AECHMINELLIDAE Sohn in Moore, 1961

Small straight-backed lobate or nodose ostracodes, some or all of the lobes terminating in spines; ridge and groove hinge; overlap slight; surface reticulated, pitted or smooth; no marginal rims or frills; dimorphism unknown.

Zaspelova (1952, p. 186) described the new Upper Devonian subfamily Nodellinae in Drepanellidae. The following translation of the Russian descriptions is by Miss Esther Samuels, U.S. Geological Survey:

The shell is small, truncate-oval, equivalved. The dorsal margin is straight, ventral margin convex. The anterior end is somewhat higher than the posterior, and both ends are even. The anterior end is sometimes just forward at the ventral margin; the posterior is sometimes strongly beveled towards the ventral edge. The dorsal part has 2 or 4 tubercles. Sometimes three anterior tubercles merge at the ventral margin; the posterior tubercle is separated by a deep furrow, or all the tubercles are smoothed and the shell becomes flattened. The tubercles are sometimes very pointed, variable in arrangement. The shell surface is smooth or reticulated. Below the medial tubercle, closer to the middle and the anterior end, there is a muscular imprint in the form of a round knob. The hinge is known only in representatives of one genus, *Schweyerina.*

The genus *Nodella* Zaspelova, 1952 (type species by original designation *N. svinordensis* Zaspelova, 1952) is described as follows:

Shell small, truncate oval, with straight dorsal and convex ventral margins. Shell provided with sharp tubercles, sometimes stretched parallel to the ends of the shell. Three anterior tubercles are close, confluent towards the ventral margin, where they form the greatest convexity. The posterior tubercle is separated by a deep sulcus, is frequently strongly elongated, and has on its ventral part a tubercle or spine. The marginal rim is roundish, not always developed. The shell surface is smooth. Muscular imprint—small roundish node—located below the medial tubercle.

Comparison. *Nodella* is described for a large group of species possessing tubercles, well developed, elongated, parallel to the end margins. Three tubercles are confluent ventrally, the posterior one is separated. The closest of known genera is *Balontoides* Morey, 1935, described from Carboniferous deposits of the United States. The latter is distinguished by valve overlap.

Distribution: Givetian and Frasnian formations of the Russian Platform.

Zaspelova described and illustrated 5 species and 2 varieties in *Nodella*, none having a true marginal rim which is diagnostic of Drepanellidae. The description of Nodellinae differs from Aechminellidae in three points: muscle scar, marginal rim, and hinge. The hinge as illustrated for *Schweyerina* (Zaspelova, 1952, p. 201, fig. 3) is taxodont, similar to that of *Youngiella* Jones and Kirkby, 1895, but evidence that this hinge is present in *Nodella* is lacking. The muscle scar is not illustrated in any of the genera in this subfamily, and as stated above, the marginal rim is not present in the type genus, although it is present in the other genera included in this subfamily.

It is possible that *Nodella* belongs to the Aechminellidae, and should further study prove this to be true, the family name based on *Nodella* would have priority. One, and possibly two new families would have to be erected for the remaining genera in Nodellinae.

Only those genera that have species in the Upper Paleozoic are considered here.

Geologic range.—Devonian(?), Mississippian through Permian.

Genus AECHMINELLA Harlton, 1933

Aechminella Harlton, 1933 [part], Jour. Paleontology, v. 7, p. 19.
Balantoides Morey, 1935, Jour. Paleontology, v. 9, p. 479. Type species original designation *B. quadrilobatus* Morey, 1935, ibid., p. 479, pl. 54, fig. 10. Amsden formation, Wyoming.
Boursella Turner, 1939, Bull. Am. Paleontology, v. 25, no. 88, p. 13. Type species original designation, *B. trilobata* Turner, 1939, ibid., p. 14, pl. 1, fig. 4. Subsurface, Middle Devonian, southwestern Ontario, Canada.

Type species.—Original designation, *A. trispinosa* Harlton, 1933, Jour. Palentology, v. 7, p. 20, pl. 6, figs. 9a, b. Johns Valley shale, Pushmataha County, Okla.

Diagnosis.—Straight-backed thin-shelled unfrilled quadrilobed or trilobed. Sulci vertical; lobes may extend into hollow spines; confined to dorsal two-thirds of valve. Terminal lobes subdued; central lobe larger. Hingement ridge and groove; left valve slightly overlaps right along free margins. Surface reticulated.

Discussion.—The orientation of this genus is herein reversed 180°. Harlton based this genus on two species from two separate localities in the Johns Valley shale. The type species, *A. trispinosa*, is represented by two left valves (USNM 85544). The second species, *A. buchanani*, is based on two corroded carapaces (USNM 85545) that are here referred to *Mammoides* Bradfield, 1935. *Balantoides* Morey, 1935 is based on a corroded carapace that belongs to *Aechminella*. *Boursella* Turner, 1939 is here considered a synonym of this genus.

Geologic range.—Middle Devonian-Lower Pennsylvanian. Figure 17 shows the stratigraphic range of species in *Aechminella*.

Lithology.—Shale, limestone.

Habitat.—Marine.

Aechminella multiloba (Jones and Kirkby), 1886

Plate 7, figures 27–29

Beyrichia multiloba Jones. Jones and Kirkby, 1867 [nomen nudum], Geol. Soc. Glasgow Trans., v. 2, p. 219 [list]. Jones and Kirkby, 1886, Annals Mag. Nat. History, ser. 5, v. 18, p. 258, pl. 8, figs. 9 a–c. Hosie Limestone series, Mousewater in Lanarkshire, Scotland.
Kloedenella multiloba (Jones and Kirkby). Latham, 1932, Royal Soc. Edinburgh Trans., v. 57, pt. 2, no. 12, p. 362. Mid and Main Hosie Limestone, Scotland.
Balantoides multilobus (Jones and Kirkby). Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 41, pl. 6, figs. 4, 4a. Lower Carboniferous, Russia.

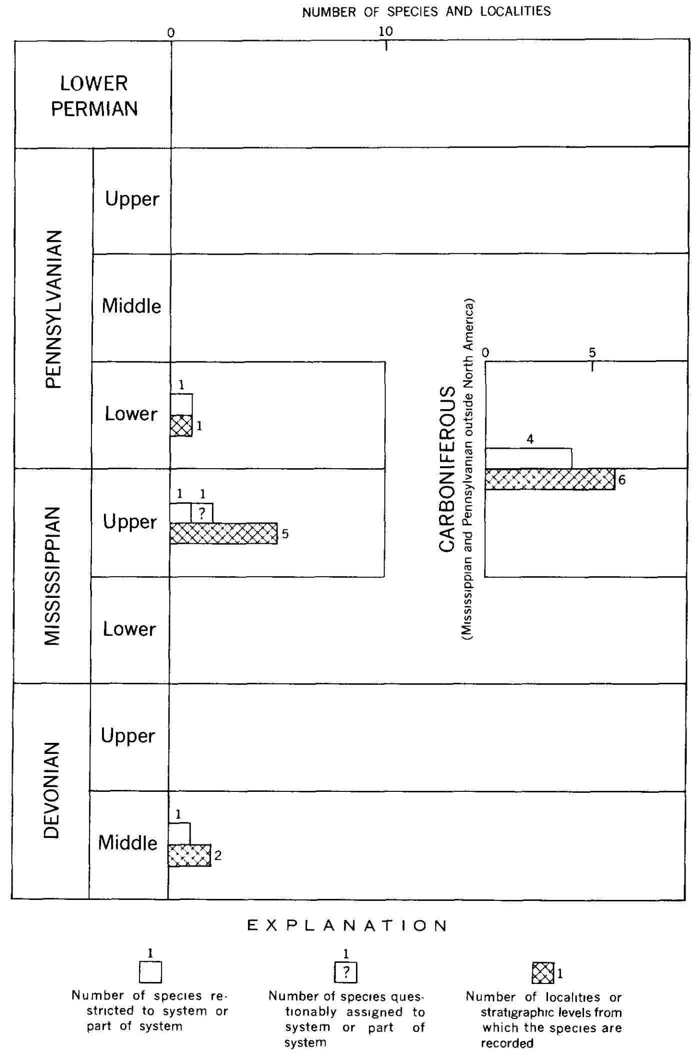

FIGURE 17.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Aechminella*.

Central lobe round, posterior to midlength.

Geologic range.—Carboniferous.

Aechminella nudilobata (Zanina), 1956

Balantoides nudilobatus Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, pt. 8, new ser. no. 98, p. 212, pl. 3, figs. 10a. b. Viséan, Russia.

Central lobe divided by horizontal sulcus into two rounded nodes, anterior lobe consists of two offset small hemispherical nodes. Differs from *B. prikschiana* (Posner), 1951, in that the lower median node is larger and the upper median node is rounded instead of pointed. Further study may prove the two to be conspecific.

Geologic range.—Carboniferous.

Aechminella prikschiana (Posner), 1951

Balantoides prikschianus Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser. no. 56, p. 42, pl. 6, figs. 9a–c, 10a, b. Lower Carboniferous, Russia.

Distinguished by two small nodes below the anterior lobe. See discussion under *A. nudilobata*.

Geologic range.—Carboniferous.

Aechminella quadrilobata (Morey), 1935

Plate 7, figure 30

Balantoides quadrilobatus Morey, 1935, Jour. Paleontology, v. 9, p. 479, pl. 54, fig. 10. Limestone, Amsden formation, Cherry Creek about 2 miles south of Little Popo Agie River, and Amsden Hill, Wyo., about 4 miles southeast of the same river, in float.

Central lobe round, at approximate center of valve.

Geologic range.—Upper Mississippian (?).

Aechminella reticulata (Croneis and Thurman), 1939

Balantoides reticulatus Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 316, pl. 8, fig. 17. Kinkaid formation, shale in draw three-fourths of a mile southeast of Glendale, Hope County, Ill.

?*Balantoides reticulatus* Croneis and Thurman. Cooper, 1947, Jour. Paleontology, v. 21, p. 86 [list], pl. 21, figs. 1–3. Kinkaid shale, north tributary of Lick Creek, sec. 31, T. 11 S., R. 2 E., Johnson County, Ill.

?*Balantoides moreyi* Croneis and Funkhouser, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 348, pl. 10, fig. 16. Clore shale, exposed in roadcut south of Love's store, 700 ft north of Philadelphia School, Hardin County, Ill.

Lobes pointed; central lobe posterior to midlength. Holotypes of both species here in synonymy are single valves; Cooper illustrates a carapace that has less pointed lobes.

Geologic range.—Upper Mississippian.

Aechminella trilobata (Turner), 1939

Boursella trilobata Turner, 1939, Bull. Am. Paleontology, v. 25, no. 88, p. 14, pl. 1, fig. 4. Subsurface, Middle Devonian, southwestern Ontario, Canada.

Kesling, 1953, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 8, p. 197, pl. 1, figs. 11–16. Arkona shale, 14 ft below Encrinal limestone. Near junction of Rock Glen and Ausable River, on east bank of river, Middlesex County, West Williams Township, Ontario, Canada.

Based on Kesling's illustrations of this species, it differs from *A. multiloba* (Jones and Kirkby) 1886, in that the posterior lobe is not as well defined and the central lobe has a wider base.

Geologic range.—Middle Devonian.

Aechminella trispinosa Harlton, 1933

Plate 7, figures 39, 40

Aechminella trispinosa Harlton, 1933, Jour. Paleontology, v. 7, p. 20, pl. 6, figs. 9a, b. Johns Valley shale, NE¼SE¼ sec. 10, T. 1 S., R. 16 E. Pushmataha County, Okla.

Posterior spine well developed. Harlton's photograph was retouched to show punctations that are not on the specimens.

Geologic range.—Lower Pennsylvanian.

Aechminella sp. No. 1 (Posner), 1951

Balantoides sp. No. 1 Posner, 1951, Vsesoyuz, Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser. no. 56, p. 42, pl. 6, fig. 6. Lower Carboniferous, Russia.

Characterized by extremely long and pointed median lobe. Illustration resembles the Lower Pennsylvanian *A. trispinosa* Harlton, 1933.

Geologic range.—Carboniferous.

SPECIES REJECTED

Aechminella buchanani Harlton, 1933=*Mammoides buchanani* (Harlton), 1933.

Aechminella fimbriata Gibson, 1955=*Waldronites*? *fimbriata* (Gibson), 1955.

Balantoides biltmorensus Loranger, 1954=*Waldronites*? *biltmorensus* (Loranger), 1954.

SPECIES TO BE INVESTIGATED

Balantoides fribourgellus Loranger, 1954, Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 198, pl. 1, figs. 3, 4. Upper Devonian, Alberta, Canada.

Genus MAMMOIDES Bradfield, 1935

Mammoides Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 37.

Aechminella Harlton, 1933 [part], Jour. Paleontology, v. 7, p. 19.

Type species.—Original designation, *Mammoides mammillata* Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 37, pl. 1, fig. 21. Pennsylvanian, Oklahoma.

Diagnosis.—Straight-backed inequivalved ostracodes with two mammillate lobes in dorsal half of valve and lateral pointing spine near posterior margin. Hinge ridge and groove.

Geologic range.—Upper Mississippian-Permian.

Lithology.—Shale.

Habitat.—Marine.

After this paper was completed it was discovered that the genus *Beyrichiana* Kellett, 1933, is probably a senior subjective synonym. Kellett based this genus on a single valve on which the posterior spine is broken, *B. permiana* Kellett, 1933, from the Wreford formation, Kansas. She stated (1933, p. 74) that her species looks very much like *Beyrichiana* (?) *gigantea* (Jones, Kirkby, and Brady), 1884. Latham (1932, p. 359) referred *Beyrichia gigantea* Jones, Kirkby, and Brady, 1884, to *Tribolbina* Latham, 1932. Since *Tribolbina* is exceptionally large, the type species *T. carnegiei* Latham, 1932, is recorded to have a length from 7.5 to 9.0 mm, and *T. gigantea* (Jones, Kirkby, and Brady), 1884, is recorded to be from 4.5 to 4.9 mm long, and because neither of the two species is illustrated to have a posterior spine, *Beyrichiana* Kellett, 1933, is probably not synonymous with *Tribolbina* Latham, 1932.

Mammoides buchanani (Harlton), 1933

Aechminella buchanani Harlton, 1933, Jour. Paleontology, v. 7, p. 20, pl. 7, figs. 1a, b. Johns Valley shale NE¼SE¼ SW¼ sec. 4, T. 1 S., R. 16 E. Pushmataha County, Okla.
Kellett, 1937, Jour. Paleontology, v. 11, p. 771.

Lateral outline subhemicircular. Harlton illustrated two specimens, both labeled as cotypes (USNM 65545). The original of his figure 1a is here designated as the lectotype, and the original of his figure 1b remains as a paratype. Both specimens are corroded.

Geologic range.—Lower Pennsylvanian.

Mammoides cooperi Sohn, n. sp.

Plate 7, figures 17–20

Differs from *M. buchanani* (Harlton) by less rounded ventral margin and by space between the two dorsal lobes. In *M. buchanani* the distance between the lobes is equal to the diameter of the trace of the larger posterior lobe on the surface of the valve; in *M. cooperi* this distance is less than the diameter of the trace of the larger lobe.

Measurements, in millimeters, follow:

	Holotype (USNM 119820)	*Unfigured paratype (carapace) (USNM 119821)*
Length	0.84	0.88
Height	.48	.51

Type locality.—Helms shale, Texas, USGS loc. 10890.

This species is named in honor of Dr. C. L. Cooper, U.S. Geological Survey.

Mammoides dorsospinosa Sohn, n. sp.

Plate 7, figures 15, 16

Differs from all other species of this genus in that the posterior lateral spine is at or slightly above midheight. The lateral lobes are drawn out into posterior pointing curved spines. All the 16 specimens on hand are crushed. Holotype USNM 119818, paratypes USNM 119819.

Measurements of the holotype are: length, 0.62 mm; height, 0.35 mm.

Type locality.—Brownwood shale, Texas, USNM loc. 1086.

Mammoides mammillata Bradfield, 1935

Plate 7, figure 34

Mammoides mammillata Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 37, pl. 1, fig. 21. Deese(?) formation, shale 150 ft above chert conglomerate, in gully, about 0.7 mile north, and 0.1 mile west of Deese School, near the center of NE¼NE¼ sec. 32, T. 3 S., R. 1 E., Carter County, Okla.
Aechminella mammillata (Bradfield). Kellett, 1936, Jour. Paleontology, v. 10, p. 771.

The holotype (Indiana Univ. 2004) is a corroded specimen. Kellett (1936, p. 771) considered *Mammoides* a synonym of *Aechminella* Harlton, 1933.

Geologic range.—Middle Pennsylvanian.

Mammoides n. sp. 1

Plate 7, figures 31–33

A single internal mold of a carapace from the Wolfcamp formation (USGS–loc. 7047–PC) with the posterior spine almost at the ventroposterior corner is available. This species is not named because of inadequate material. It is illustrated in order to show that the position of the posterior spine is not indicative of the geologic age as in *Coryellina.*

Measurements of the figured specimen (USNM 119826) are: length, 0.78 mm; height, 0.52 mm.

Type locality.—Wolfcamp formation, Texas, USGS loc. 7047–PC.

Geologic range.—Permian.

Family AMPHISSITIDAE Knight, 1928

Straight-backed small subquadrate ostracodes; with one or more nodes; well-developed kirkbyan pit, usually carved into or near subcentral node; one or more marginal rims. Dimorphism not observed.

Sohn (1954, p. 12) referred the following genera to this taxon:

Amphissites Girty, 1910
"*Ectodemites*" Cooper, 1941
Kegelites Coryell and Booth, 1933
Polytylites Cooper, 1941

The new genus *Shleesha* is here added to this family.

Geologic range.—Middle Devonian through Permian.

More than 100 species have been referred to *Amphissites*, and many of these have been referred to later established genera. Two additional genera are described in this study. The following key discriminates the more common genera.

KEY TO GENERA

The terms used in the following key are illustrated in figure 18, names in parentheses are synonyms.

1.	Central node present, either subdued or well developed	2
1a.	Central node absent	8
2(1).	One or more marginal ridges	3
2a.	No marginal ridges	*Doraclatum* (p. 149)
3(1).	Two or more marginal ridges	4
3a.	One marginal ridge	*Shleesha* n. gen. (p. 134)
4(3).	Dorsal shield present	7
4a.	Dorsal shield absent	5
5(4a).	Terminal nodes absent	"*Ectodemites*" (p. 126)
5a.	Terminal nodes or shoulders present	6
6(5a).	Two terminal nodes or shoulders	*Polytylites* (p. 130)
6a.	Anterior terminal node absent	*Kegelites* (p. 128) (*Kirkbyites*?)
7(4).	Surface of the valve without carinae	"*Ectodemites*" (p. 126)
7a.	Surface of the valve with carinae	9

8(1a). Dorsal shield present .... *Amphizona* (p. 137)
8a. Dorsal shield absent 10
9(7a). Horizontal carina above pit .... *Amphizona* (p. 137)
9a. Vertical carinae on each side of subcentral node, subparallel to end margins ..... *Amphissites* (p. 115)
10(8a). One or more marginal ridges 11
10a. No marginal ridges .... *Roundyella* (p. 149)
11(10). Two marginal ridges .... *Reviya* n. gen. (p. 141)
11a. One marginal ridge .... *Amphissella* (p. 148)

Genus AMPHISSITES Girty, 1910

Amphissites Girty, 1910, New York Acad. Sci. Annals, v. 20, pt. 2, p. 235.
Roundy, 1926, U.S. Geol. Survey Prof. Paper 146, p. 7.
Knight, 1928 [part], Jour. Paleontology, v. 2, no. 3, p. 246–252, 258–259.
Roth, 1929 [part], Wagner Free Inst. Sci Pub. 1, p. 31–36.
Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 63.
Geis, 1932 [part], Jour. Paleontology, v. 6, no. 2, p. 153–155, 162.
Kellett, 1933 [part], Jour. Paleontology, v. 7, no. 1, p. 93.
Upson, 1933 [part], Nebraska Geol. Survey Bull. 8, 2d ser., p. 41.
Bradfield, 1935 [part], Bull. Am. Paleontology, v. 22, no. 73, p. 54.
Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 48.
Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 12.
Binodella Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 140.
?*Albanella* Harris and Lalicker, 1932, Am. Midland Naturalist, v. 13, no. 6, p. 397.

Type species.—Original designation, *A. rugosus* Girty, 1910, New York Acad. Sci. Annals, v. 20, pt. 2, p. 236 [no illus.]; also Roundy, 1926, U.S. Geol. Survey Prof. Paper 146, p. 7, pl. 1, figs. 1a–c. Fayetteville shale, Fayetteville quadrangle, Arkansas.

Diagnosis.—Subquadrate essentially equivalved, reticulate ostracodes. Median node well developed to subdued, flanked on both sides by carinae that may or may not superpose elongated nodes. Carinae connected by a dorsal carina subparallel to hingeline that joins the hinge at cardinal angles, forming a shieldlike area in dorsal outline. Two marginal ridges parallel free margins and join at cardinal angles. Oval kirkbyan pit at base of median node. Ridge and groove hingement, larger valve ridged, has poorly to well developed terminal teeth that fit into open sockets in the opposing valve. Teeth terminate and are part of the rabbeted part of free margin.

Discussion.—Young growth stages in species of this genus have relatively well developed median nodes that tend to become broader in the adult. Fortuitous preservation on some specimens suggest that the carinae are really frills that stand out above the surface of the valve (pl. 7, figs. 44, 45). A reconstruction of the surface of *Amphissites* is shown in figure 18, in which two alternate hypothetical ornaments of the carinae and marginal ridges are shown.

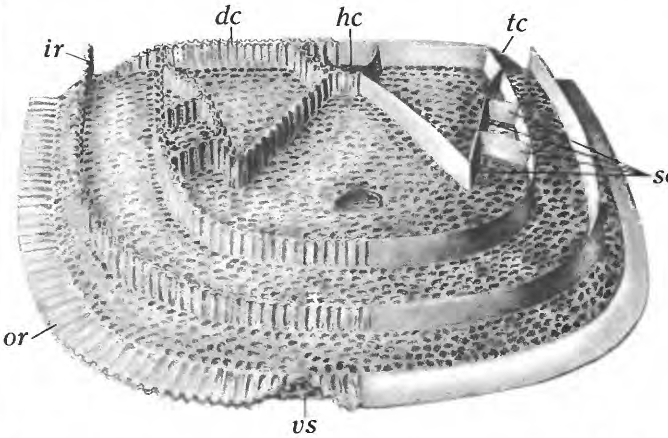

FIGURE 18.—*Amphissites costatus* Roth, 1929, a restoration by Miss Carolyn Bartlett, approximately ×72. The right and left halves of the valve show two possible forms of the ridges and carinae. This reconstruction is based on specimens of various species including those illustrated on pl. 7, figs. 44, 45; pl. 8, fig. 44. *dc,* dorsal carina, that forms the dorsal shield; *hc,* horizontal carina; *ir,* inner ridge; *or,* outer rim; *sc,* secondary carinae; *tc,* terminal carina; *vs,* ventral surface of valve below outer ridge.

The presence and position of these carinae are important criteria for specific discrimination. The size of the carinae—that is, whether they stand out above the surface of the valve or are preserved as smooth lines assumed here to be the traces on the surface of the valve—is probably the result of preservation. Consequently, species that have the same configuration of carinae but differ in the height or even width of these structures are considered here as synonyms. The development of the carinae during growth awaits study.

The reconstruction, as well as polished sections through species of Kirkbyidae (Kesling and Copeland, 1954, fig. 1; Sohn, 1954 pls. 2, 4), indicate that the marginal ridges have the same structures as the lateral carinae. Several genera previously removed from *Amphissites*, as well as the new genera *Reviya* and *Shleesha*, are based, in part, on the absence of marginal ridges and lateral carinae.

Geologic range.—Middle Devonian-Permian. Figure 19 shows the stratigraphic range of the species in *Amphissites*.

Lithology.—Shale, limestone.

Habitat.—Marine; Craig (1954, p. 111) suggests that *Amphissites* was not endemic to mud.

KEY TO SPECIES

In the following key, names in parentheses are synonyms.

1. Median node present, well defined 2
1a. Median node absent or undefined 18
2(1). Median node small, less than one-third of greatest length of valve 3
2a. Median node large, one-third or more of greatest length of valve 16

3(2). Median node without superposed or adjacent carinae ---------------------------------- 4
3a. Median node with superposed or adjacent carinae ---------------------------------- 11
4(3). Median node round ---------------------------------- 5
4a. Median node vertically elongate -------- *bushi* (p. 117)
5(4). Median node complete, without sinus or truncation ---------------------------------- 6
5a. Median node not complete ------------------ 10
6(5). Median node approximately at midlength ------ 7
6a. Median node anterior or posterior to midlength - 23
7(6). Terminal nodes carinate, about equal size ------ 8
7a. Terminal nodes not carinate, posterior larger *miseri* (p. 120)
8(7). Inner ridge to cardinal angles ---------------- 9
8. Inner ridge does not reach cardinal angles *cumingsi* (p. 119)
9(8). Inner ridge perpendicular to shell surface -- *centronotus* (p. 118), *marginiferus, mosquensis, nodosus, parvus, robustus, similaris, transversus, verrucosus.*
9a. Inner ridge at acute angle to shell surface *carinatus* (p. 118) (*exiguus*)
10(5a). Median node with dorsal sinus -- *nodosulcatus* (p. 120)
10a. Median node truncated in dorsoposterior quarter -------------------------- *truncatus* (p. 122)
11(3a). Median node with one carina ---------------- 12
11a. Median node with more than one carina, or with carina divided by node ------------------ 15
12(11). Carina superposed on node ------------------ 13
12a. Carina adjacent to node -------------------- 14
13(12). Vertical carina on center of node --*alticostatus* (p. 116)
13a. Vertical carina on posterior portion of node *carinodus* (p. 118)
14(12a). Carina trends anteroventrally ------ *deesensis* (p. 120)
14a. Carina trends horizontally toward the anterior *girtyi* (p. 120)
15(11a). Carina on both sides of node ---------------- 27
15a. Carina only on anterior side of node --- *beatus* (p. 117)
16(2a). Median node without superposed or adjacent carinae ---------------------------------- 17
16a. Median node with superposed or adjacent carinae ---------------------------------- 25
17(16). Terminal carina well developed -------------- 20
17a. Terminal carina weak -------------- *tumidus* (p. 122)
18(1a). Median node replaced by vertical carinae ------ 19
18a. Median node replaced by intersecting carinae *costatus* (p. 119), (*marginifera*)
19(18). Vertical carina straight *bernhageni* (p. 117), (*carmani, shafferi*)
19a. Carinae U-shaped ---------------------- *urei* (p. 122)
20(17). Greatest width equal or less than greatest height - 21
20a. Greatest width more than greatest height *vanniae* (p. 123)
21(20). Carina on posterior node straight ------------ 26
21a. Carina on posterior node curved -------------- 22
22(21a). Carinae curved parallel to inner rims - *pulcher* (p. 121)
22a. Carinae trend towards inner rim ------ *remeši* (p. 121)
23(6a). Median node anterior to midlength ---------- 24
23a. Median node posterior to midlength --- *planoventralis* (p. 121)
24(23). Median node very small; specimen very thin in dorsal outline -------------------- *robertsi* (p. 121)
24a. Median node large, about one-fourth of the greatest length; specimen robust - *altanodosus* (p. 116), (*armatus*)
25(16a). Vertical carina on median node ---- *reticulatus* (p. 121)
25a. Horizontal carina below median node to anterior carina -------------------------- *knighti* (p. 120)
26(21). Third inner ridge present ---------- *rugosus* (p. 121), (*chappelensis, congruens, golcondensis, latinodus, quadratus, weaveri*).
26a. Third inner ridge absent ------- *centronotoides* (p. 118)
27(15). Vertical carina on node below the horizontal carinae ---------------------- *subinsignis* (p. 122)
27a. No vertical carina on node ------------------ 28
28(27a). Horizontal carina crosses node ------ *insignis* (p. 120)
28a. Horizontal carina does not cross node -- n. sp. (p. 123)

SPECIES ACCEPTED

Amphissites altanodosus Geis, 1932

Plate 8, figures 20–22

Amphissites altanodosus Geis, 1932, Jour. Paleontology, v. 6, p. 166, pl. 24, figs. 4a–f. Salem limestone, railroad cut at Spergen Hill, Norris, Ind.

Amphissites altonodosus Geis. Sohn, 1940, Jour. Paleontology, v. 14, p. 155 [list].

Amphissites armatus Brayer, 1952, Jour. Paleontology, v. 26, p. 173, pl. 28, figs. 5a–c. Salem limestone, roadcut, west side of Missouri Highway 21, about one-fourth of a mile north of the Meramec River bridge in St. Louis County, Mo.

The position of the median node distinguishes this species.

Geologic range.—Upper Mississippian.

Amphissites alticostatus Bradfield, 1935

Plate 7, figures 1–4

Amphissites alticostatus Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 58, pl. 4, fig. 4. Dornick Hills formation, shale about 50 ft. below Otterville limestone, about 2 miles northwest of Berwyn, gulley NE¼ sec. 12, T. 3 S., R. 2 E., Carter County, Okla.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 97, pl. 15, figs. 9–11. Shale above Liverpool limestone, NW¼ sec. 17, T. 5 N., R. 4 E., Fulton County, Ill.

Differs from all other species except *A. reticulatus* Geis, 1932, by crest on center of median node. The holotype is an immature individual. A specimen from the Finis shale member of the Graham formation, Texas (USGS loc. 2967–PC) is illustrated (pl. 7, figs. 1–3). *A. reticulatus* is larger and has a larger median node, and the inner ridge is closer to the ventral margin. Should the study of growth series indicate that these differences are gradational with ontogenetic development, *A. alticostatus* would then become a junior synonym of *A. reticulatus*, and the geologic range of the species would be Upper Mississippian through Pennsylvanian.

Geologic range.—Lower and Middle Pennsylvanian.

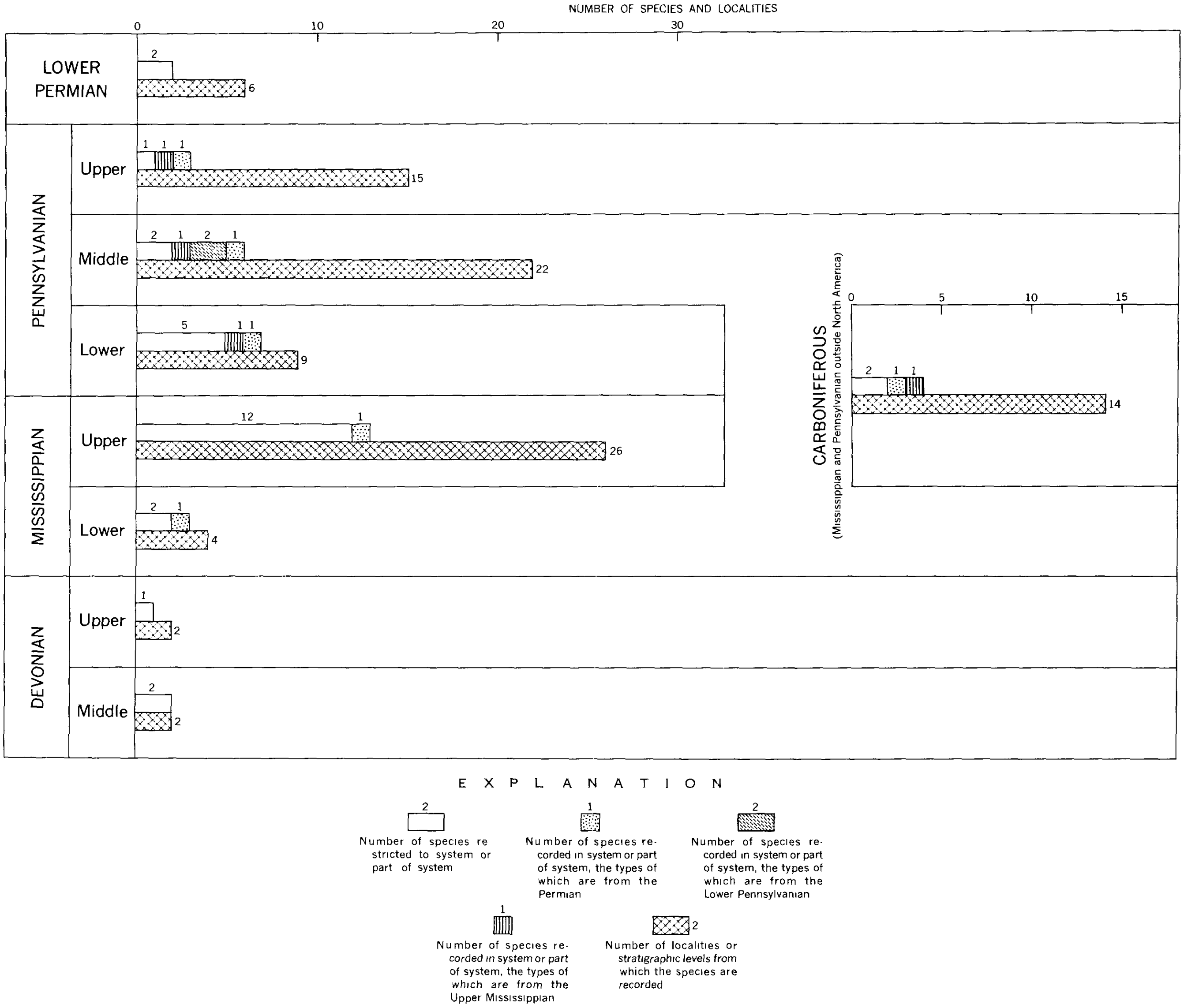

FIGURE 19.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Amphissites*.

Amphissites beatus Posner, 1951

Amphissites beatus Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 66, pl. 12, fig. 5. Lower Carboniferous, Russia.

Characterized by several carinae anterior to subcentral node.

Geologic range.—Lower Carboniferous.

Amphissites bernhageni Stewart and Hendrix, 1945

Amphissites bernhageni Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 104, pl. 11, figs. 19–21. Olentangy shale, 80 yd north of the confluence of the main tributaries of Bartholomew Run, E½SW¼ T. 3 N., R. 19 W., Dublin quadrangle, one mile north of the Franklin-Delaware County line, Delaware County, Ohio.

Amphissites carmani Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 106, pl. 11, figs. 22–24. Olentangy shale, same locality as above.

Amphissites shafferi Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 106, pl. 11, figs. 25–27. Olentangy shale, same locality as above.

?*Amphissites shafferi* Stewart and Hendrix. Loranger, 1954, Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 197, pl. 2, figs. 29, 30. Upper Devonian, Alberta, Canada.

[not] *Amphissites carmani*? Stewart and Hendrix. Gibson, 1955=species to be investigated.

The differences noted in the original description of the three concurrent species are due to preservation. The species is characterized by an elongate median node.

Geologic range.—Upper Devonian.

Amphissites bushi Harlton, 1933

Plate 7, figures 46, 47

Amphissites bushi Harlton, 1933, Jour. Paleontology, v. 7, p. 24, pl. 6, figs. 10a–d. Johns Valley shale, center of south line of NE¼SE¼ sec. 10, T. 1 S., R. 16 E., Pushmataha County, Okla.

USNM 85554 contains four cotypes. The original of Harlton's figure 10a is here designated as the lectotype.

Geologic range.—Lower Pennsylvanian.

Amphissites carinatus Cooper, 1941

Amphissites carinatus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 48, pl. 9, figs. 19–21. Glen Dean formation, NW¼NW¼ sec. 15, T. 11 S., R. 9 E., Hardin County, Ill.

Amphissites centronotus? (Ulrich and Bassler). Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 270, pl. 5, fig. 9. Golconda formation, limestone and shale in roadcut near Douglas School, Hardin County, Ill

Amphissites exiguus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 49, pl. 9, figs. 13–15. Kinkaid formation, NE¼ SW¼NE¼ sec. 20, T. 12 S., R. 3 E., one-half a mile south of Veatch School, Johnson County, Ill.

[not] *Amphissites carinatus* Cooper, 1946=*A. carinodus* Cooper, 1957.

According to Cooper (1941, p. 49), Croneis and Gale identified a crushed specimen of *A. carinatus* as *A. centronotus*. He further states that his species differs from *A. centronotus* in that in *A. carinatus* the inner ridge is closer to the ventral margin. This is probably due to the fact that in Cooper's species the inner ridge makes an acute angle with the surface of the valve, whereas in the former species it is perpendicular to the surface of the valve. This difference can be seen by comparing Cooper's figure 21 with Sohn's illustration (1954, pl. 3, fig. 17). *A. carinatus* Cooper, 1946 is a primary junior homonym, and the name has been replaced by *A. carinodus* Cooper, 1957. The holotype of *A. exiguus* is a partly exfoliated young individual.

Geologic range.—Upper Mississippian.

Amphissites carinodus Cooper, 1957

Amphissites carinodus Cooper, 1957, Jour. Paleontology, v. 31, p. 674, new name for *A. carinatus* Cooper, 1946, [not] Cooper, 1941.

Amphissites carinatus Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 97, pl. 15, figs. 15–18, 21, 22. Shale in Woodbury cyclothem, SE¼ sec. 32, T. 9 N., R. 8 E., Cumberland County; shale below limestone in Bogota cyclothem, NW¼ sec. 27, T. 7 N., R. 10 E., Jasper County; shale above Greenup limestone, NW¼ sec. 10, T. 9 N., R. 9 E., Cumberland County, Ill.

This species differs from *A. alticostatus* Bradfield, 1935, in that the crest is on the posterior part of the median node.

Geologic range.—Upper Pennsylvanian.

Amphissites centronotoides Geis, 1932

Plate 7, figures 25, 26

Amphissites centronotoides Geis, 1932, Jour. Paleontology, v. 6, p. 165, pl. 24, figs. 3 a–d. Salem limestone, railroad cut in Spergen Hill at Norris, Ind.

The holotype (Illinois Univ. M–325) is a poorly preserved specimen; 4 paratypes (Illinois Univ. M–326) consist of 3 single valves and the carapace of a very young instar. The right valve probably belongs to *A. altanodosus* Geis; the two left valves are better preserved than the holotype and have parts of the inner ridge preserved. This ridge is perpendicular to the valve surface.

Geologic range.—Upper Mississippian.

Amphissites centronotus (Ulrich and Bassler), 1906

Plate 7, figures 8–10

Kirkbya centronota Ulrich and Bassler, 1906, U.S. Natl. Mus. Proc., v. 30, p. 159, pl. 11, figs. 16, 17. Cottonwood shale, 2 miles east of Cottonwood Falls, Kans. For a discussion of the spelling of the specific name see R. C. Moore [ed.], Jour. Paleontology, v. 11, footnote p. 280, 1937.

Amphissites centronota (Ulrich and Bassler). Harlton, 1927, Jour. Paleontology, v. 1, p. 207, pl. 32, figs. 10a, b. Hoxbar formation, NW. cor. sec. 20, T. 5 S., R. 1 E., about 4½ miles southwest of Ardmore, Carter County, Okla.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 59, pl. 4, fig. 3. Deese formation, shale, 30 ft below chert conglomerate, in road 0.7 mile north of Deese, Carter County, Okla.

Amphissites centronotus (Ulrich and Bassler). Knight, 1928, Jour. Paleontology, v. 2, p. 259, pl. 32, figs. 6a–e, pl. 34, fig. 2. Shale parting in "Brown lime" in Labette shale exposed in south bank of creek east of Price Road and south of Ladue Road, and other localities, St. Louis County, Mo.

Delo, 1930, Jour. Paleontology, v. 4, p. 160, pl. 12, fig. 9, Pennsylvanian, Fort McKavett Oil Co., Tisdall No. 1 well, 1,730–1,750 ft center of River sec. 1499, Wilhelm Helm Survey, Schleicher County, Tex.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 66, pl. 5, figs. 4a–c. Wetumka formation, crinoidal layer 25 ft below top, 1,100 ft south of the center of the north line, sec. 24, T. 4 N., R. 7 E., Pontotoc County, Okla.

Latham, 1932, Royal Soc. Edinburgh Trans., v. 56, pt. 2, no. 12, p. 370, text fig. 17, Carboniferous, Scotland.

Coryell and Billings, 1932, Am. Midland Naturalist. v. 13, p. 184, pl. 18, fig. 9. Wayland shale, 5 miles east and 2,000 ft north of Cisco, along the highway leading from Cisco to Eastland, Eastland County, Tex.

Coryell and Sample, 1932, idem, v. 13, p. 258, pl. 25, fig. 1. East Mountain shale member of the Mineral Wells formation, near Mineral Wells, Palo Pinto County, Tex.

Coryell and Booth, 1933, idem, v. 14, p. 260, pl. 3, figs. 1, 2. Wayland shale member of the Graham formation west of Salt Creek, near the Graham-Throckmorton road, 1 mile west of Graham, Young County, Tex.

Kellett, 1933, Jour. Paleontology, v. 7, p. 95, pl. 16, figs. 16–22. Middle Pennsylvanian through Permian, Kansas.

Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 42, pl. 3, figs. 7a–c. Florena-Cottonwood contact, 2 miles southeast of Stockdale, Riley County, Kans.

Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 30, pl. 3, figs. 12–14. Island Creek shale, bluffs just south of the Burlington Railroad, between 2½ and 3¾ miles west of Oreapolis, sec. 32, T. 13 N., R. 13 E., Cass County, Nebr.

Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 354 [list], pl. 49, fig. 7. Macoupin limestone, along Embarrass River, 1 mile east of Lawrenceville, Lawrence County, Ill.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 98, pl. 15, figs. 19, 20. Shale below LaSalle limestone, NW¼ sec. 33, T. 16 N., R. 11 E., Bureau County, Ill.

Marple, 1952, Jour. Paleontology, v. 26, p. 934, pl. 134, fig. 15. Lower Mercer limestone, abandoned pit of Logan Clay Products Co., on south side of road three-fourths of a mile east of Route 75, sec. 31, Falls Gore Township, Hocking County, Ohio.

Amphissites cf. *A. centronotus* Kummerow, 1939, Preuss. Geol. Landesanstalt, Abh., n. f., no. 194, p. 29, pl. 3, fig. 4. Tournaisian-Viséan, Belgium and Germany.

Sohn, 1954, U.S. Geol. Survey, Prof. Paper 264–A, p. 13, pl. 3, figs. 15–21, pl. 3, figs. 1–3. Permian, Glass Mountains, Tex.

Amphissites centronota var. *transversa* Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 52, pl. 3, figs. 17a–c. Contact between the Hogshooter limestone and the Nellie Bly formation, SE¼SE¼ sec. 15, T. 19 N., R. 11 E., Tulsa County, Okla.

Amphissites centronotus elongatus Payne, 1937, Jour. Paleontology, v. 11, p. 280, pl. 38, figs. 2a–c. Hayden Branch formation, north-central part sec. 10, T. 8 N., R. 10 W., Sullivan County, Ind.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 98, pl. 15, figs. 23–25. Shale between limestone beds of Bogota cyclothem, NW¼ sec. 25, T. 8 N., R. 3 E., Fayette County, Ill.

?*Amphissites marginiferus* Roth. Harlton, 1933, Jour. Paleontology, v. 7, p. 23, pl. 6, figs. 3a, b. Johns Valley shale, SE. cor. sec. 1, T. 1 N., R. 13 E., one-half a mile southeast of Wesley, Pushmataha County, Okla. Plesiotypes USNM 85550.

?*Amphissites mosquensis* Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 65, pl. 13, figs. 5, 6, 7 a, b. Lower Carboniferous, Russia.

Zanina, 1956, Vsesoyuz. Neft. Nauch-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 231, pl. 5, fig. 6. Viséan, Russia.

?*Amphissites nodosus* Scott and Borger, 1941, Jour. Paleontology, v. 15, p. 356, pl. 49, fig. 12. Limestone, Macoupin cyclothem, along Embarrass River, 1 mile east of Lawrenceville, Lawrence County, Ill. The holotype is an internal impression of probably a young *A. centronotus*.

?*Amphissites parvus* Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 99, pl. 15, figs. 3–6. Shale below Seville limestone, NE¼ sec. 21, T. 17 N., R. 1 E., Henry County Ill. The holotype is a young individual.

Amphissites robustus Cooper, 1946, idem, p. 100, pl. 15, figs. 34–36. Shale parting in Macoupin limestone, NW¼ sec. 2, T. 9 N., R. 7 W., Macoupin County; shale from nodular zone in lower part of upper bench of Lonsdale limestone, NE¼ sec. 10, T. 8 N., R. 6 E., Peoria County, Ill.

Amphissites rugosus Girty. Marple, 1952, Jour. Paleontology, v. 26, p. 935, pl. 134, figs. 17, 18. Shale in the Lowellville limestone at Poverty Run, Hopewell Township, Muskingum County, Ohio.

Amphissites similaris Morey, 1936, Jour. Paleontology, v. 10, p. 115, pl. 17, fig. 6. Shale seams in lower part of the Chouteau limestone, Brown's Station, 3 miles northwest of the town, at the junction of Lost and Clear Fork creeks; along the Missouri, Kansas, and Texas Railroad tracks, 200–500 yd south of the station at Providence, Boone County; north edge of the town of Ozark, Greene County, Mo.

Amphissites transversus Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 100, pl. 15, figs. 1, 2. Shale below Seahorne limestone, NW¼ sec. 32, T. 1 N., R. 2 W., Brown County, Ill.

Amphissites verrucosus Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 235, pl. 5, fig. 13. Viséan, Russia.

?*Albanella gouldi* Harris and Lalicker, 1932, Am. Midland Naturalist, v. 13, p. 397, pl. 36, figs. 2a, b. Wreford limestone, 5 miles south of Dexter, Cowley County, Kans. Based on two specimens that appear to be internal impressions of *A. centronotus*. (See Cooper, 1946, p. 98.)

?*Binodella binoda* Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 140, pl. 13, figs. 7a, b. Shale in Deese formation, 102 ft. below Arnold limestone, 500 ft. south of road in gulley, NW¼NE¼ sec. 33, T. 3 S., R. 1 E., Carter County, Okla. Internal impression of *A. centronotus*?. (See Sohn, 1954, p. 13.)

?*Leperditia prominens* Chapman, 1920, New South Wales Geol. Survey Rec. 9, pt. 2, p. 102, pl. 17, figs. 8, 9. Permo-Carboniferous, New South Wales. Internal impression.

?*Polytylites trilobus* (Croneis and Gale). Marple, 1952, Jour. Paleontology, v. 26, p. 935, pl. 134, fig. 20. Same collection as *A. rugosus* Girty. Marple.

[not] *Amphissites centronotus*? (Ulrich and Bassler). Croneis and Gale, 1939=*A. carinatus* Cooper, 1941.

Geologic range.—Carboniferous; Mississippian through Permian.

Amphissites costatus Roth, 1929

Plate 8, figure 44

Amphissites costatum Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 37, pl. 2, figs. 10a–c. Wapanucka limestone, sec. 28, T. 3 N., R. 7 E., Pontotoc County, Okla.

Amphissites costatus Roth, 1929, Jour. Paleontology, v. 3, p. 292 [emendation].

Amphissites marginifera Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 45, pl. 3, figs. 14a–c. Wapanucka limestone, same collection as above.

Amphissites marginiferus Roth, 1929, Jour. Paleontology, v. 3, p. 292 [emendation].

[not] *Amphissites marginiferus* Roth. Harlton, 1933=*A. centronotus* (Ulrich and Bassler) 1906.

[not] *Amphissites marginiferus* Roth. Bradfield, 1935=*A. rugosus* Girty, 1910.

The holotypes of both of the above species are abraded, a paratype of *A. costatus* (USNM 80189A) is somewhat better preserved, and shows the characteristic costae.

Geologic range.—Lower Pennsylvanian.

Amphissites cumingsi Bradfield, 1935

Plate 7, figure 21

Amphissites cumingsi Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 56, pl. 3, fig. 13. Dornick Hills formation, shale, half way stratigraphically between the top of the Springer formation and the Otterville limestone, 0.9 mile north of south line of sec. 11, T. 4 S., R. 1 E., in road one-fourth of a mile west of east section line, Carter County, Okla.

The holotype (Indiana Univ. 2155), a left valve, has matrix on the posterior node that covers the carina and terminal part of the inner rim.

Geologic range.—Lower Pennsylvanian.

Amphissites deesensis Bradfield, 1935

Plate 7, figures 23, 24

Amphissites girtyi var. *deesensis* Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 61, pl. 4, fig. 5. Deese(?) formation, shale about 150 ft above chert conglomerate, in gully, about 0.7 mile north and 0.1 mile west of Deese School, center of NE¼NE¼ sec. 32, T. 3 S., R. 1 E., Carter County, Okla.

Differs from *A. girtyi* Knight in that the horizontal carina adjoining the median node trends towards the anteroventral area rather than the anterior area.

Geologic range.—Middle Pennsylvanian.

Amphissites girtyi Knight, 1928

Plate 7, figure 22

Amphissites girtyi Knight, 1928, Jour, Paleontology, v. 2, p. 260, pl. 32, figs. 7 a, b.; pl. 34, fig. 1. Shale parting in "Brown lime" in Labette shale, exposed in south bank of creek east of Price Road and south of Ladue Road, St. Louis County, Mo.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 65, pl. 5, fig. 3. Wetumka formation, 100 ft. below top of shale in roadcut on west slope of hill, SW. cor. sec. 29, T. 4 N., R. 7 E., Pontotoc County, Okla.

Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 259, pl. 25, fig. 4. Mineral Wells formation, shale pit 3 miles west of Mineral Wells, Palo Pinto County, Tex.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 99, pl. 15, figs. 12–14. Shale above and below St. David limestone, SW¼ sec. 21, T. 6 N., R. 3 E., Fulton County, Ill.

Amphissites mesocostata Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 48, pl. 3, figs. 15a–c. Wetumka formation, shale in center of south line of sec. 13, T. 4 N., R. 7 E., Pontotoc County, Okla.

[not] *Amphissites girtyi* var. *deesensis* Bradfield, 1935=*A. deesensis* Bradfield, 1935.

A specimen from the Wolfcamp formation, Texas, (USGS loc. 7047–PC) is illustrated. This species is distinguished by an horizontal carina from median node to anterior, so that the inner rim and the carina form a "G" on its side.

Geologic range.—Middle Pennsylvanian-Permian.

Amphissites insignis Croneis and Thurman, 1939

Plate 8, figures 9, 10, 12–15

Amphissites insignis Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 314, pl. 8, figs. 13–15. Kinkaid formation, yellow shale with white calcareous nodules, in road one-half a mile south of Veach School, Johnson County, Ill.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 17 [list], pl. 9, figs. 32–34. Kinkaid formation, NE¼SW¼NE¼ sec. 20, T. 12 S., R. 3 E., Johnson County, Ill. This is the same locality as above.

Present also in residue of limestone digested in acid, and in shale of the Helms formation, Texas (USGS loc. 10890–PC). Several specimens in the Helms formation exhibit a trace of what might represent a horizontal costa subparallel to the dorsal shield and located above the median node (pl. 8, fig. 14). This feature may indicate a new species but, because of inadequately preserved material, the specimens are tentatively referred to this species.

Geologic range.—Upper Mississippian.

Amphissites knighti Sohn, 1954

Amphissites knighti Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 14, pl. 3, figs. 13, 14. Leonard or Word formation, Glass Mountains, Tex.

Has larger and more subdued median node than *A. girtyi* Knight, horizontal carina from below median node to anterior carina.

Geologic range.—Permian.

Amphissites miseri Harlton, 1933

Plate 8, figures 27, 28

Amphissites miseri Harlton, 1933, Jour. Paleontology, v. 7, p. 24, pl. 6, fig. 7. Johns Valley shale, center of south line of NE¼SE¼ sec. 10, T. 1 S., R. 16 E. Pushmataha County, Okla.

?*Amphissites robustus* var. *flabelluli* McLaughlin, 1953, Jour. Paleontology, v. 27, p. 298. New name for *Amphissites robustus* var. *radiatus* McLaughlin, 1952 [not] *A. radiatus* (Jones and Kirkby), 1885.

?*Amphissites robustus* var. *radiatus* McLaughlin, 1952, Jour. Paleontology, v. 26, p. 618, pl. 28, fig. 10. Glen Eyrie formation, shallow cut on east side of Rampart Range road, 500 ft north of the turnoff of the Black Canyon Loop road, sec. 28, T. 13 S., R. 67 W., El Paso County, Colo.

This species is gradational with species of *Polytylites* in configuration of the lobes and nodes. The presence of a dorsal shield in the holotype, a right valve (USNM (85553), restricts the species to *Amphissites*.

Geologic range.—Lower and Middle Pennsylvanian.

Amphissites nodosulcatus Geis, 1932

Plate 8, figures 29, 30

Amphissites nodosulcatus Geis, 1932, Jour. Paleontology, v. 6, p. 167, pl. 24, figs. 6a–c. Salem limestone, railroad cut at Spergen Hill, Norris, Ind.

Brayer, 1952, idem, v. 26, p. 172, pl. 28, figs. 1a, b. Salem limestone, roadcut west side of Missouri Highway 21, about one-fourth of a mile north of Meramec River bridge, St. Louis County, Mo.

Differs from *A. centronotus* in that the median node has a dorsal sulcus. A specimen of this species (USNM 90963) has a median node that covers approximately the central third of the valve length.

Geologic range.—Upper Mississippian.

Amphissites planoventralis Geis, 1932

Plate 8, figures 45–47

Amphissites planoventralis Geis, 1932, Jour. Paleontology, v. 6, p. 165, pl. 24, figs. 2a, b. Salem limestone, railroad cut at Spergen Hill, Norris, Washington County, Ind.

Geis states that the anterior end is thicker than the posterior; this does not appear to be the case when the holotype is examined in dorsal outline (pl. 8, fig. 46). The orientation, as indicated by the outline of the dorsal shield, is with the anterior to the right.

Geologic range.—Upper Mississippian.

Amphissites pulcher Polenova, 1952

Amphissites (Amphissites) pulcher Polenova, 1952, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 115, pl. 9, figs. 2a, b, 3; pl. 10, fig. 1. Central Devonian field, Russia.

This species is differentiated by the fact that the inner and outer rims do not join at the cardinal angles.

Geologic range.—Middle Devonian.

Amphissites remeši Pokorný, 1950

Plate 11, figures 35, 36

Amphissites remeši Pokorný, 1950, Czechoslovakia Stát. geol. ùst., Sbornik, v. 17, Paleont., p. 542, 604, pl. 5, fig. 10. Middle Devonian limestone, Čelechovice, Czechoslovakia.

Geologic range.—Middle Devonian.

Amphissites reticulatus Geis, 1932

Plate 8, figures 16–19

Amphissites reticulatus Geis, 1932, Jour. Paleontology, v. 6, p. 168, pl. 24, figs. 5a, b. Salem limestone, Indiana.

This species has the same configuration of costae as the Pennsylvanian species *A. alticostatus* Bradfield, 1935. It differs in size of the median node, and in that the inner ridge is lower on the valve surface.

Geologic range.—Upper Mississippian.

Amphissites robertsi Morey, 1935

Plate 8, figures 23–26

Amphissites robertsi Morey, 1935, Jour. Paleontology, v. 9, p. 478, pl. 54, fig. 20. Amsden formation, red shale, float at Amsden Hill, Fremont County, Wyo.

The dorsal shield places this species in *Amphissites*; the very smallness of the nodes distinguishes this species. Three specimens labeled "Syntypes" are on deposit at the University of Missouri (OS 1027–3); the one illustrated is here designated as the lectotype. In the original description, Morey recorded the following measurements: Length 1.0 mm; height 0.4 mm; thickness 0.4 mm. Remeasurements of the specimens, in millimeters, are as follows:

	Length	*Height*	*Width*
Lectotype (pl. 8, figs. 23, 24)	1.04	0.59	0.32
Paratype	1.00	.51	.32

Geologic range.—Upper Mississippian.

Amphissites rugosus Girty, 1910

Plate 7, figures 35–38, 41, 43

Amphissites rugosus Girty, 1910, New York Acad. Sci. Annals, v. 20, no. 3, pt. 2, p. 236 [no illus.]. Fayetteville shale, in a persistent calcareous bed at the very base of the formation, near Fayetteville, Washington County, Ark.

Roundy, 1926, U.S. Geol. Survey Prof. Paper 146, p. 7, pl. 1, figs. 1a–c. First illustration of the holotype.

Harlton, 1933, Jour. Paleontology, v. 7, p. 22, pl. 6, figs. 5a–d. Shale in and under Wapanucka limestone, center south line sec. 8, T. 3 N., R. 15 E., 2 miles southeast of Blanco Choctaw fault, Pushmataha County, Okla.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 54, pl. 3, fig. 12. Dornick Hills formation, shale breaks in Otterville limestone, main gully, 200 yd south of north line and one-fourth of a mile west from east line, sec. 12, T. 3 S., R. 2 E., 2 miles northwest of Berwyn, Carter County, Okla.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 49, pl. 9, figs. 1–3. Kinkaid formation, one-half a mile south of Veatch School, NE¼SW¼NE¼ sec. 20, T. 12 S., R. 3 E., Johnson County, Ill.

?*Amphissites chappelensis* Roundy, 1926, U.S. Geological Survey Prof. Paper 146, p. 7, pl. 1, fig. 2. Barnett shale, from 25 to 30 ft. above base, 4 miles southwest of Chappel, on road to Cherokee, San Saba County, Tex.

Amphissites congruens Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 99, pl. 15, fig. 43. Shales below LaSalle limestone, NW¼ sec. 33, T. 16 N., R. 11 E., Bureau County, Ill.

McLaughlin, 1952, Jour. Paleontology, v. 26, p. 617, pl. 28, figs. 11, 12, 16, [not figs. 13, 14=*Shleesha geneae* (Roth), 1929]. Glen Eyrie formation, shallow cut on the east side of the Rampart Range road, 500 ft. north of the turnoff of the Black Canyon Loop road, sec. 28, T. 13 S., R. 67 W., El Paso County, Colo.

?*Amphissites* cf. *A. congruens* Cooper. Marple, 1952, Jour. Paleontology, v. 26, p. 934, pl. 134, fig. 16. Lowellville member, Vandusen cyclothem, Poverty Run, Hopewell Township, Muskingum County, Ohio.

Amphissites golcondensis Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 269, pl. 5, fig. 7. Golconda limestone and shale, roadcut near Douglas School, Hardin County, Ill.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 17 [list], pl. 9, fig. 18. Paint Creek formation, along Mississippi River bluffs, SW¼ sec. 4, T. 6 S., R. 8 W., Randolph County, Ill. Based on a crushed and filled left valve, approximately 0.5 mm in greatest length.

Amphissites latinodus Croneis and Bristol. Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 18 [list], pl. 9, figs. 5, 6. Menard formation, H. Forrester No. 1 well, W½SW¼ NW¼ sec. 5, T. 6 S., R. 1 W., Perry County, Ill.

Amphissites marginiferus Roth. Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 55, pl. 3, fig. 14. Dornick Hills formation, shale about half way up between top of Springer formation and Otterville limestone, 0.9 mile north of south line sec. 11, T. 4 S., R. 1 E. in road one-fourth of a mile west of east section line, Carter County, Okla.

Amphissites quadratus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 49, pl. 9, fig. 4, Kinkaid formation, NE¼SW¼NE¼ sec. 20, T. 12 S., R. 3 E., one-half a mile south of Veatch School, Johnson County, Ill. Based on a young growth stage.

?*Amphissites umbonatus* (Eichwald). Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 60, pl. 12, figs. 11 a, b. Lower Carboniferous, Russia.

Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 229, pl. 5, fig. 7. Viséan, Russia.

?*Amphissites weaveri* Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 39, pl. 2, figs. 11 a–c. Fayetteville formation, sec. 25, T. 20 N., R. 19 E., Mayes County, Okla.

[not] *Amphissites rugosus* Girty. Marple, 1952=*Amphissites centronotus*.

The holotype of *A. chappelensis* is a right valve of a young growth stage imbedded in matrix that is here illustrated on pl. 7, fig. 35 (USNM 119285). Harlton's specimens of *A. rugosus* from the Wapanucka limestone (USNM 85549) consist of a growth series of 8 carapaces that range in greatest length from 0.7 to 1.2 mm. The median node becomes larger in proportion to the valve length as the specimens increase in size. Consequently this, as well as several of the species listed above, are placed in synonymy with *A. rugosus.*

Geologic range.—Carboniferous; Upper Mississippian-Pennsylvanian.

Amphissites subinsignis Sohn, n. sp.

Plate 8, figures 6–8

Differs from *A. insignis* by absence of horizontal ridge above median node and presence of a vertical ridge on the median node.

Discussion.—This species is based on the holotype, a carapace, (USNM 119832) and a broken valve that retains the diagnostic vertical ridge on the median node (USNM 119833). It appears to be restricted to the shale facies of the Helms formation, because the limestone facies contains abundant specimens of *A. insignis*, which do not have the vertical ridge on the median node. Measurements of the holotype are as follows: Greatest length 0.76 mm, height 0.43 mm.

Occurrence.—Helms formation, shale underlying limestone 5 feet below bed 9 of section "C," U.S. Geological Survey Preliminary Oil and Gas Map 36, USGS loc. 10890–PC, El Paso quadrangle, Texas.

Amphissites truncatus Sohn, n. sp.

Plate 8, figures 40–43

Differs from *A. centronotus* in that the median node is truncated in the anterodorsal quarter.

Discussion.—This species is based on 2 right valves, 2 partly broken right valves, a broken left valve, a left valve of a young individual, and several fragments. Measurements, in millimeters, are as follows:

	Greatest length	*Height*
Holotype (USNM 119840)	1.2	0.69
Paratype (USNM 119841)	1.2	.62
Paratype (USNM 119842a)	Broken	.9
Paratype (USNM 119839)	.47	.3

Occurrence.—Upper Kinderhook or basal Osage shale, 12 to 14 feet below the Burlington limestone, SE¼NW¼ sec. 3, T. 34 N., R. 13 E., Perry County, Mo. Collected by A. S. Warthin, August 1942. USGS loc. 12847–PC.

Amphissites? tumidus (Cooper), 1941

Ectodemites tumidus Cooper, 1941. Illinois Geol. Survey Rept. Inv. 77, p. 51, pl. 10, figs. 1–3. Kinkaid formation, NE¼SW¼NE¼ sec. 20, T. 12 S., R. 3 E., Johnson County, Ill.

Cooper, 1947, Jour. Paleontology, v. 21, p. 90, pl. 21, figs. 14–16. Upper Kinkaid formation, north tributary of Lick Creek, sec. 31, T. 11 S., R. 2. E., Johnson County, Ill.

?*Polytylites crassus* Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, figs. 15–17. Kinkaid formation, NE¼SW¼NE¼ sec. 20, T. 12 S., R. 3 E., Johnson County, Ill.

The holotype of *Ectodemites tumidus* is a younger growth stage than the specimen illustrated by Cooper in 1947. The 1947 specimen has the diagnostic dorsal shield of *Amphissites. Polytylites crassus* is a very young growth stage that probably belongs to this species.

Geologic range.—Upper Mississippian.

Amphissites urei (Jones), 1859

Plate 8, figures 1–5

Kirkbya urei Jones, 1859, *in* Kirkby, 1859, Tyneside Naturalists' Field Club Trans., v. 4, p. 136 [no illus.]. Lower Carboniferous shale near Glasgow.

Jones, 1870, Monthly Micros. Jour., v. 4, p. 185 [expl. to pl.], pl. 61, figs. 15 a, b. First illustration.

Vogdes, 1889, New York Acad. Sci. Annals, v. 5, p. 38 [expl. to pl.], pl. 2, figs. 15 a, b. [Reproduction of Jones, 1870, pl. 61.]

Jones and Kirkby, 1885, Annals Mag. Nat. History, ser. 5, v. 15, p. 189, pl. 3, figs. 19 a, b. Carboniferous, England.

Batalina, 1924, Leningrad Comité Geol. Bull. 43, no. 10, p. 1329, 1336, pl. 22, figs. 17–19, pl. 23, figs. 15–17. Lower Carboniferous, Department of Novgorod, Russia.

Amphissites urei (Jones and Kirkby). Latham, 1932, Royal Soc. Edinburgh Trans. 57, pt. 2, no. 12, p. 369, text fig. 16. Calciferous sandstone, Lower Limestone series, Scotland.

Amphissites urei (Jones). Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 61, pl. 12, figs. 1, 2. Lower Carboniferous, Russia.

Differs from *A. bushi* by absence of median node, which is replaced by V-shaped ridge. Specimens with single median costa (pl. 8, figs. 1, 3) are here assigned to this species because they are concomitant with specimens that have V-shaped costae (pl. 8, figs. 4, 5).

These specimens differ from *A. bernhageni* in straight ventral margins.

Geologic range.—Carboniferous.

Amphissites vanniae Geis, 1932

Plate 8, figures 51, 52

Amphissites vanniae Geis, 1932, Jour. Paleontology, v. 6, p. 163, pl. 24, figs. 1 a–c. Salem limestone, railroad cut at Spergen Hill, Norris, Washington County, Ind.

Amphissites vanniae var. *missouriensis* Brayer, 1952, Jour. Paleontology, v. 26, p. 173, pl. 28, figs. 3a, b. Salem limestone, roadcut west side Missouri Highway 21, about one-fourth of a mile north of Meramec River bridge, St. Louis County, Mo.

Geologic range.—Upper Mississippian.

Amphissites n. sp.

Plate 8, figure 11

Differs from *A. insignis* Croneis and Thurman, 1939, in that the horizontal carina does not cross the subcentral node.

The illustrated specimen is from the Union Valley sandstone, Pontotoc County, Okla. (USGS loc. 11096). Dr. M. K. Elias showed me drawings of additional specimens of this species, which he plans to describe in a forthcoming paper on Lower Pennsylvanian fossils from Oklahoma.

Geologic range.—Lower Pennsylvanian.

SPECIES TO BE INVESTIGATED

The following species previously referred to *Amphissites* cannot be assigned to their proper genus either because of inadequate material, description or illustrations.

Amphissites albertensi Loranger, 1954, Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 196, pl. 1, figs. 13, 14. Upper Devonian. Ireton formation, Imperial Duvernay No. 2 well, 2,450–2,460 ft., Alberta, Canada.

Amphissites beaumontensi Loranger, 1954, Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 196, pl. 2, figs. 31, 32. Upper Devonian. Ireton formation, Bear Beaumont No. 1 well, 1,373–1,383 ft., Alberta, Canada.

Amphissites carmani? Stewart and Hendrix. Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 10, pl. 1, figs. 10 a, b. Upper Devonian. Cerro Gordo formation, upper 20 ft., at a clay pit operated by the Rockford Brick and Tile Co., Rockford, Iowa. Based on a young individual that cannot be identified (USNM 123082).

Amphissites clavatus Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 67, pl. 14, figs. 4 a–c. Lower Carboniferous, Russia. The lateral view (fig. 4a) indicates a dorsal shield which is not shown in dorsal outline (fig. 4b).

Amphissites decoratus Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, Berlin, p. 46, pl. 2, figs. 9 a, b. Middle Devonian, Poland.

Amphissites deltoideus Kummerow, 1953, Staat. Geol. Komm. Deutsch. Demokrat. Republik, Geologie, Jahrg. 2, Beih. 7, Berlin, p. 47, pl. 5, figs. 2 a, b. Middle Devonian, Germany.

Amphissites formosus Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 230, pl. 5, fig. 11. Viséan, Russia

Amphissites helenae Posner, 1951, Vsesoyuz, Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 67, pl. 14, figs. 1–3. Lower Carboniferous, Russia.

Zanina, 1956, Vsesoyuz, Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 232, pl. 6, figs. 4–6, ?7. Viséan, Russia.

Amphissites irinae Glebovskaya and Zaspelova. Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Filial, Moscow-Leningrad, p. 53, pl. 1, figs. 1a–c, 2, 3a, b, 4, 5, 6a, b, 7, 8. Frasnian, Russia. Because Egorov does not illustrate the holotype, it is not possible to determine the affinities of the species. Representatives of more than one species are illustrated.

Amphissites klarae Egorov, 1953, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Moscov. Filial. Moscow-Lengingrad, p. 54, pl. 2, figs. 1–6. Frasnian, Russia. A growth series is illustrated, the specimens included resemble *Kegelites* (figs. 3, 5), and *Polytylites* (fig. 6).

Amphissites nodosus Roth. Harlton, 1933, Jour. Paleontology, v. 7, p. 23, pl. 6, fig. 4. Johns Valley shale, Oklahoma. Specimen not in U.S. Natl. Mus. collections. (See Harlton 1933, p. 23.)

Kirkbya oblonga Jones and Kirkby, 1885, Annals Mag. Nat. History, ser. 5, v. 15, p. 181, pl. 3, figs. 3–6b. Carboniferous, England.

Kirkbya oblonga Jones and Kirkby. Yanichevsky, 1927, Leningrad Comité Géol. Bull. 46, p. 1023, pl. 51, figs. 15, 19. Carboniferous, Russia.

Kirkbya oblonga var. *transversa* Girty, 1910, New York Acad. Sci. Annals, v. 20, no. 3, pt. 2, p. 234 [no illus.] Fayetteville shale, near Fayetteville, Washington County, Ark.

Amphissites ornatus Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 63, pl. 12, figs. 4, 6. Lower Carboniferous, Russia. Based on two broken valves that do not appear to have lateral nodes. The vertical carina superposed on the central node resembles *A. alticostatus* Bradfield, 1935, from the Pennsylvanian of Oklahoma.

Amphissites ramicosus Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 233, pl. 5, fig. 5. Viséan, Russia. The illustration is of a broken valve with either adventitious material or a V-shaped horizontal ridge on top of the central node.

Amphissites? scitulus (Jones). Warthin, 1937, Wagner Free Inst. Sci., card 101.

Primitia scitula Jones, 1891, Contributions to Canadian Micropaleontology, pt. 3: Canada Geol. Nat. History Survey, 1891, p. 91, pl. 11, figs. 14a, b. Middle(?) Devonian, Hay River, about 40 miles above its mouth, Canada. According to Warthin, the type appears to be lost.

Amphissites sinensis Hou, 1954, Acta Paleont. Sinica, v. 2, no. 2, p. 232, 251, pl. 1, fig. 4. Shale, lower part of Chihsia limestone, at Maanshan of Changyang district, Hupei province, Manchuria. Lower Permian. The illustration suggests a cast of *Polytylites*.

Amphissites? *spinosus* Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 62, pl. 12, fig. 3. Lower Carboniferous, Russia. Based on a right valve with part of the posterior missing.

Amphissites subcentronotus Hou, 1954, Acta Paleont. Sinica, v. 2, no. 2, p. 232, 252, pl. 1, fig. 5. Shale, lower part of Chihsia limestone, at the Maanshan of Changyang district, Hupei province, Manchuria. Lower Permian. The type probably belongs to *Kirkbya*.

Beyrichia umbonata Eichwald, 1860, Lethaea Rossica, v. 1, p. 1347, atlas, pl. 52, fig. 10. Carboniferous, Russia.

Vine, 1884, Yorkshire Geol. and Polytech, Soc., Proc., new ser., v. 8, p. 237, pl. 12, fig. 13. Carboniferous, England.

Amphissites? sp. Stewart, 1950, Jour. Paleontology, v. 24, p. 662, pl. 86, fig. 12. Delaware formation, third bone bed, roadside exposure, 1 mile north of Fishinger Bridge, junction of McCoy Road and Scioto River Road, east side of Scioto River, Franklin County, Ohio.

Amphissites sp. Tscherdyntsev, 1937, Kazan Univ. Sci. Mem., v. 97, fasc. 3–4, Geol. nos. 8–9, p. 305 [list], figs. 2, 3. Permian, Kazan, Russia.

SYNONYMS, SPECIES TO BE INVESTIGATED, AND REJECTED SPECIES OF AMPHISSITES

adjunctio Cooper, 1946=*Kegelites adjunctio* (Cooper), 1946.

allerismoides Knight, 1928=*Knightina allerismoides* (Knight), 1928.

albertensi Loranger, 1954. Species to be investigated.

? *altireticulatus* Swartz and Swain, 1941=*Reticestus*? *altireticulatus* (Swartz and Swain), 1941.

? *altireticulella* Swartz and Swain, 1941=*Reticestus*? *altireticulatus* (Swartz and Swain), 1941.

altonodosus var. *missouriensis* Brayer, 1952=*Polytylites brayeri* Sohn, n. name.

amylosus Zanina, 1956="*Ectodemites*"? *amylosus* (Zanina), 1956.

armatus Brayer, 1952=*A. altanodosus* Geis, 1932.

batalinae Posner, 1951="*Ectodemites*" *batalinae* (Posner), 1951.

beaumontensi Loranger, 1954. Species to be investigated.

bellipunctus Van Pelt, 1933=*Kirkbyella bellipuncta* (Van Pelt), 1933.

bicarinatus Croneis and Thurman, 1939="*Ectodemites*" *bicarinatus* (Croneis and Thurman), 1939.

bicarinatus Croneis and Thurman. Cooper, 1941="*Ectodemites*" *primus* Cooper, 1941.

biforatus Croneis and Thurman, 1939="*Polytylites biforatus* (Croneis and Thurman), 1939.

bradfieldi Croneis and Funkhouser, 1939=*Polytylites quincollinus* (Harlton), 1929.

carinatus Cooper, 1946=*A. carinodus* Cooper, 1957.

carmani Stewart and Hendrix, 1945=*A. bernhageni* Stewart and Hendrix, 1945.

carmani Stewart and Hendrix. Gibson, 1955. Species to be investigated (young individual).

centronotus? (Ulrich and Bassler). Croneis and Gale, 1939=*A. carinatus* Cooper, 1941.

centronotus var. *elongatus* Payne, 1937=*A. centronotus* (Ulrich and Bassler), 1906.

centronota var. *transversa* Roth, 1929=*A. centronotus* (Ulrich and Bassler), 1906.

centronotoides Geis, 1932=*A. centronotus* (Ulrich and Bassler), 1906.

chappelensis Roundy, 1926=*A. rugosus* Girty, 1910.

ciscoensis Harlton, 1928=*Shleesha pinguis*? (Ulrich and Bassler), 1906.

clavatus Posner, 1951. Species to be investigated.

conatus Coryell and Malkin, 1936=*Doraclatum*? *conatus* (Coryell and Malkin), 1936.

concavus Croneis and Bristol, 1939=*Polytylites quincallinus* (Harlton), 1929.

concentricus (Ulrich and Bassler), 1913=*Reticestus*? *concentricus* (Ulrich and Bassler), 1913.

confluens Bradfield, 1935=*Knightina*? *confluens* (Bradfield), 1935.

congruens Cooper, 1946=*A. rugosus* Girty, 1910.

cf. *A. congruens* Cooper, Marple, 1952=*A. rugosus* Girty, 1910.

congruens Cooper. McLaughlin, 1956 [part]=*Shleesha pinguis* (Ulrich and Bassler), 1906.

corrensi Kummerow, 1953=*Macronotella*? *corrensi* (Kummerow), 1953.

costellifera Croneis and Bristol, 1939=*Reviya costellifera* (Croneis and Bistol), 1939.

dattonensis Harlton, 1927=*Kegelites dattonensis* (Harlton), 1927.

dattonensis Harlton. Warthin, 1930=*Kegelites roundyi* (Knight), 1928.

decipiens Croneis and Bristol, 1939=*Reviya costellifera* (Croneis and Bristol), 1939.

decoratus Kummerow, 1953. Species to be investigated.

deltoideus Kummerow, 1953=internal mold of unidentifiable species.

diadematus Van Pelt, 1933=*Arcyzona diademata* (Van Pelt), 1933.

duvernai Loranger, 1954. Species to be investigated.

edsonae Bradfield, 1935=*Knightina edsonae* (Bradfield), 1935.

elongatus Croneis and Bristol, 1939=*Polytylites*? *quincollinus* (Harlton), 1929.

exiguus Cooper, 1941=*A. carinatus* Cooper, 1941.

formosus Zanina. Polenova, 1952=nomen nudum.

formosus Zanina, 1956. Species to be investigated.

fossilis Croneis and Thurman, 1939=*Polytylites biforatus* (Croneis and Thurman), 1939.

geni Roth, 1929=*Shleesha pinguis* (Ulrich and Bassler), 1906.

geneae Roth, 1929=*Shleesha pinguis* (Ulrich and Bassler), 1906.

genetivus Morey, 1935=*Amphissella genetiva* (Morey) 1935.

gibbosus Zanina, 1956=*Reviya gibbosa* (Zanina), 1956.

girtyi var. *deesensis* Bradfield, 1935=*A. deesensis* Bradfield, 1935.

golcondensis Croneis and Gale, 1939=*A. rugosus* Girty, 1910.

gregeri Delo, 1931=*Shleesha pinguis*? (Ulrich and Bassler), 1906.

grovei Croneis and Gutke, 1939=*Polytylites biforatus* (Croneis and Thurman) 1939.

helenae Posner. Zanina, 1956. Species to be investigated.

? *hextensis* Harlton, 1929=*Knightina hextensis* (Harlton), 1929.

inornatus Kummerow, 1953=*Savagellites*? *inornatus* (Kummerow), 1953.

irinae Glebovskaya and Zaspelova. Polenova, 1952=nomen nudum.

irinae Glebovskaya and Zaspelova. Egorov, 1953. Species to be investigated.

irregularis Coryell and Sample, 1932=*Kegelites dattonensis* (Harlton), 1927.

kellettae Kummerow, 1939=*Polytylites*? *kellettae* (Kummerow), 1939.

klarae Egorov, 1953. Species to be investigated.
koehleri Delo, 1931=*Shleesha pinquis* (Ulrich and Bassler), 1906.
lacrimosus Swartz and Oriel, 1948=*Hibbardia lacrimosa* (Swartz and Oriel), 1948 (type).
latinodus Croneis and Bristol, 1939=*Kegelites monomastadis?* (Coryell and Sohn), 1938.
latinodus Croneis and Bristol. Cooper, 1941=*A. rugosus* Girty, 1910.
lineatus Croneis and Bristol, 1939=*Polytylites quincollinus* (Harlton), 1929.
lunatus Bassler, 1941=*Arcyzona? lunata* (Bassler), 1941.
lutkevichi Spizharsky, 1939 [part] (fig. 9)=*Placidea lutkevichi* (Spizharsky), 1939.
lutkevichi Spizharsky, 1939, fig. 10=*Roundyella?* sp.
marginifera Roth, 1929=*A. costatus* Roth, 1929.
marginiferus Roth. Harlton, 1933=*A. centronotus* (Ulrich and Bassler), 1906.
marginiferus Roth. Bradfield, 1935=*A. rugosus* Girty, 1910.
? *menardensis* Harlton, 1929=*Knightina menardensis* (Harlton), 1929.
mesocostata Roth, 1929=*A. girtyi* Knight, 1928.
mikhailovi Posner, 1951="*Ectodemites*"? *mikhailovi* (Posner), 1951.
mikhailovi Posner. Zanina, 1956="*Ectodemites*"? *batalinae* (Posner); 1951.
mimicus Geis, 1932=*Reviya mimicus* (Geis), 1932.
minuta Roth, 1929=*Shleesha pinguis* (Ulrich and Bassler), 1906.
minutus Roth. Upson, 1933=*Shleesha pinguis* (Ulrich and Bassler), 1906.
monomastadis Coryell and Sohn, 1938=*Kegelites? monomastadis* (Coryell and Sohn), 1938.
mosquensis Posner, 1951=*A. centronotus?* (Ulrich and Bassler), 1906.
nodosum Roth, 1929=*Polytylites? nodosus* (Roth), 1929.
nodosus Roth. Harlton, 1933. Species to be investigated.
nodosus Scott and Borger, 1941 (junior homonym)=*A. centronotus* (Ulrich and Bassler), 1906.
? *obesus* Croneis and Gale, 1939=*Reviya obesa* (Croneis and Gale), 1939.
oblonga (Jones and Kirkby), 1867. Species to be investigated.
oblongus transversus (Girty). Bassler and Kellett, 1934=nomen dubium.
ohioensis Stewart, 1950=*Reticestus? ohioensis* (Stewart), 1950.
ornatus Posner, 1951. Species to be investigated.
parallelus (Ulrich), 1891=*Arcyzona parallela* (Ulrich), 1891.
parvus Cooper, 1946=*A. centronotus?* (Ulrich and Bassler), 1906.
peculiaris Morey, 1935=*Amphissella genetivus?* (Morey), 1935.
permiana (Jones). Roth, 1929=*Knightina* sp. unnamed.
pinguis (Ulrich and Bassler), 1909=*Shleesha pinguis* (Ulrich and Bassler), 1906.
planoventralis Geis, 1932=*A. vanniae* Geis, 1932.
planus Wilson, 1935=*Reticestus planus* (Wilson), 1935.
primaevus Roth, 1929=*Reticestus? primaeus* (Roth), 1929.
quadratus Cooper, 1941=*A. rugosus* Girty, 1910.
radiata (Jones and Kirkby), 1885=*Polytylites? radiatus* (Jones and Kirkby), 1885.
ramicosus Zanina, 1956. Species to be investigated.
? *reticulosa* (Jones and Kirkby), 1886=*Roundyella? reticulosa* (Jones and Kirkby), 1886.
retiferus Roth, 1929=*Reticestus? retiferus* (Roth), 1929.
ringwoodensis Harris and Jobe, 1956=*Cardiniferella ringwoodensis* (Harris and Jobe), 1956.
robustus Cooper, 1946=*A. centronotus* (Ulrich and Bassler), 1906.
robustus var. *flabelluli* McLaughlin, 1953=*A. miseri?* Harlton, 1933.
robustus var. *radiatus* McLaughlin, 1952=*A. miseri?* Harlton, 1933.
rothi Bradfield, 1935=*Shleesha pinguis?* (Ulrich and Bassler), 1906.
rothi Bradfield. Cooper, 1946=*Kegelites roundyi?* (Knight), 1928.
rothi Bradfield, Croneis and Funkhouser, 1939=*Polytylites quincollinus* (Harlton), 1929.
rotundus Geis, 1932=*Reviya? rotunda* (Geis), 1932.
rotundus var. *missouriensis* Brayer, 1952=nomen dubium.
roundyi Knight, 1928=*Kegelites? roundyi* (Knight), 1928.
roundyi Knight. Warthin, 1930=*Amphissites?* sp. indet.
roundyi Knight. Johnson, 1936=*Shleesha pinguis* (Ulrich and Bassler), 1906.
rowei Coley, 1954=*Amphizona asceta* Kesling and Copeland, 1954.
? *scitulus* (Jones). Warthin, 1937=gen. indet.
semimuralis (Ulrich), 1891=*Arcyzona? semimuralis* (Ulrich), 1891.
shafferi Stewart and Hendrix, 1945=*A. bernhageni* Stewart and Hendrix, 1945.
similaris Morey, 1936=*A. centronotus* (Ulrich and Bassler), 1906.
similis Croneis and Gale, 1939=*Polytylites similis* (Croneis and Gale), 1939.
simplex (Girty), 1910=*Roundyella simplex* (Girty), 1910.
simplexus Roth, 1929=*Shleesha simplex* (Roth), 1929.
simplicissimus Knight, 1928=*Roundyella simplicissima* (Knight), 1928 (type species).
simplicissimus Knight. Coryell and Malkin, 1936=*Amphissella papillosa?* Stover, 1956.
sinensis Hou, 1954. Species to be investigated.
? *spinosus* Posner, 1951. Species to be investigated.
subcentronotus Hou, 1954. Species to be investigated.
subleneatus Croneis and Thurman. Sohn, 1940. Spelling error for *A. sublineatus*.
sublineatus Croneis and Thurman, 1939=*Polytylites trilobus* (Croneis and Gale), 1939.
subquadratus (Ulrich), 1891=*Arcyzona subquadrata* (Ulrich), 1891.
subquadratus (Ulrich). Warthin, 1934=*Arcyzona aperticarinata* Kesling and Weiss, 1953.
sullivanensis Payne, 1937=*Shleesha sullivanensis* (Payne), 1937.
superus Croneis and Gale, 1939=*Polytylites superus* (Croneis and Gale), 1939.
tenuis Warthin, 1934=*Amphissella? tenuis* (Warthin), 1934.
? *texanus* (Harlton), 1928=*Knightina texana* (Harlton), 1928.
transversus Roth. Cooper, 1946=*A. centronotus* (Ulrich and Bassler), 1906.
tricollina (Jones and Kirkby), 1886=*Polytylites tricollinus* (Jones and Kirkby), 1886.
tricollina (Jones and Kirkby). Zanina, 1956=*Polytylites* sp. A.
trilobus Croneis and Gale, 1939=*Polytylites trilobus* (Croneis and Gale), 1939.
ulrichi Bassler, 1941=*Arcyzona ulrichi* (Bassler), 1941.
umbonatus (Eichwald), 1860. Species to be investigated.
umbonatus (Eichwald). Zanina, 1956=*A. rugosus?* Girty, 1910.

vanniae var. *missouriensis* Brayer, 1952=*A. rugosus* Girty, 1910.
verrucosus Zanina, 1956=*A. centronotus* (Ulrich and Bassler), 1906.
wapanuckaensis Harlton, 1929=*Kegelites wapanuckaensis* (Harlton), 1929.
warei Morey, 1935="*Ectodemites*" *warei* (Morey), 1935.
weaveri Roth, 1929=*A. rugosus* Girty, 1910.
wewokanus Warthin, 1930=*Knightina*? *wewokana* (Warthin), 1930.
wilsoni Croneis and Gutke, 1939=*Polytylites wilsoni* (Croneis and Gutke), 1939.
sp. Harlton, 1933=*Kegelites*? *harltoni* (Cooper), 1946.
? sp. Stewart, 1950. Species to be investigated.
sp. Tscherdyntzev, 1937. Species to be investigated.

Genus "ECTODEMITES" Cooper, 1941

Ectodemites Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 49.
Amphissites [part] of authors.

Type species.—Original designation, *E. primus* Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 51, pl. 9, figs. 46, 47. Kinkaid formation (probably upper Clore limestone), Pope County, Ill.

Diagnosis.—Obese, with subdued posterior shoulder, subdued subcentral inflation, without terminal nodes or carinae and with two or more marginal ridges.

Discussion.—As stated by Cooper (1941, p. 49) this genus differs from *Knightina* by the absence of a prominent posterior shoulder; consequently, the greatest width is in front of the posterior quarter of the valve. This genus differs from *Kegelites* by the absence of a well-defined subcentral node in mature specimens. Cooper (1945) illustrated a growth series of *Ectodemites* that range in length from 0.1687 to 0.7250 mm. The holotype of this species, *E. plummeri*, is recorded as 0.75 mm long. All the instars, with the exception of the largest, have well-developed posterior shoulders and distinct subcentral nodes. These are referred to *Kegelites*? sp. C. The fact that *Kegelites adjunctio* (Cooper), 1946, illustrated here (see pl. 10, fig. 12), has a well-developed shoulder and a subcentral node in specimens much larger than Cooper's largest specimen of *E. plummeri* suggests that these characters are not reduced during growth.

The holotype has a very poorly preserved but distinct dorsal shield (pl. 10, fig. 16). Although this character is considered in this study as diagnostic of *Amphissites* s. s., the genus "*Ectodemites*" is provisionally retained for the few species that exhibit the generic features described by Cooper.

Geologic range.—Middle Devonian—Lower Pennsylvanian. Figure 20 shows the stratigraphic range of species in "*Ectodemites*."

Lithology.—Shale and shaly limestone.

Habitat.—Marine.

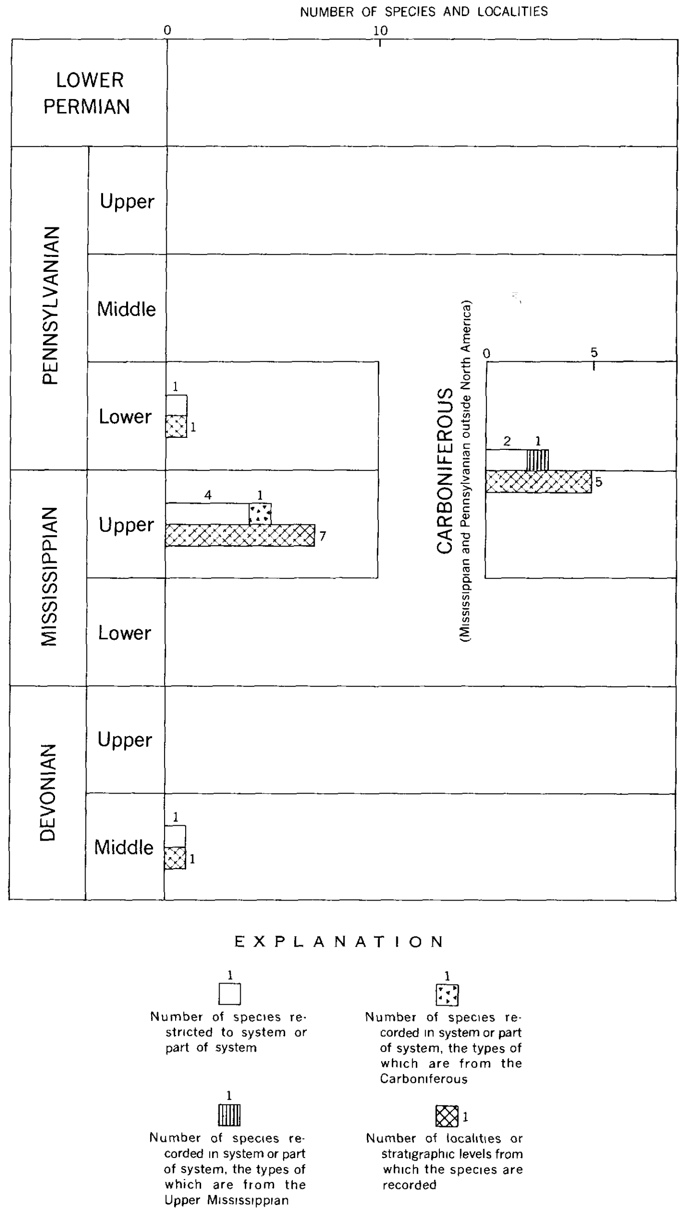

FIGURE 20.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality of species in "*Ectodemites*."

"Ectodemites" amylosus (Zanina), 1956

Amphissites amylosus Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 233, pl. 5, figs. 8, 12. Viséan, Russia.

Geologic range.—Carboniferous; Upper Mississippian.

"Ectodemites"? batalinae (Posner), 1951

Amphissites batalinae Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser. no. 56, p. 64, pl. 12, fig. 8, Lower Carboniferous, Russia.

Amphissites mikhailovi Posner. Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 231, pl. 5, figs. 9a, b, 10 [erroneously given as pl. 6]. Visćan, Russia.

[not] *Amphissites mikhailovi* Posner, 1951="*Ectodemites*"? *mikhailovi* (Posner), 1951.

?*Ectodemites warei* (Morey). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 51, pl. 10, fig. 22. Clore formation, SW¼SE¼ sec. 34, T. 11 S., R. 1 W., Union County, Ill.

Geologic range.—Carboniferous; Upper Mississippian.

"Ectodemites" bicarinatus (Croneis and Thurman), 1939

Amphissites bicarinatus Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 311, pl. 8, figs. 10–12. Kinkaid formation, gray clay shale, along road, 1¼ miles east of Bloomfield, Johnson County, Ill.

[not] *Ectodemites bicarinatus* (Croneis and Thurman). Cooper, 1941="*E*".? *primus* Cooper, 1941.

Geologic range.—Upper Mississippian.

"Ectodemites" janischewskyi Polenova, 1952

Amphissites (*Ectodemites*) *janischewskyi* Polenova, 1952, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser. no. 60, p. 118, pl. 10, figs. 2, 3a, b. Upper Givetian, Central Devonian Field, northeastern part Kursk Region; Saratov Region, Russia.

The large size, 1.00 to 2.35 mm in length distinguishes this species.

Geologic range.—Middle Devonian.

"Ectodemites"? mikhailovi (Posner), 1951

Amphissites mikhailovi Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser. no. 56, p. 64, pl. 12, figs. 7, 7a. Lower Carboniferous, Russia.

[not] *A. mikhailovi* Posner. Zanina, 1956="? *batalinae* (Posner), 1951.

Characterized by wavy lineation of the reticulations on both sides of subcentral pit.

Geologic range.—Carboniferous.

"Ectodemites" plummeri Cooper, 1945

Ectodemites plummeri Cooper, 1945 [part], Jour. Paleontology, v. 19, p. 368 [footnote], pl. 57, figs. 1–6, 21, 30 [not figs. 7–20, 22–29, 31–36=*Kegelites*? sp. C]. Marble Falls formation, San Saba County, Tex.

Cooper, 1946 [part], Illinois Geol. Survey Bull. 70, p. 103. pl. 15, figs. 37–39 [not figs. 40–42=*Kegelites*? sp. C). Marble Falls formation, San Saba County, Tex.

See discussion under the genus. The date of publication is ambiguous because in 1945 Cooper (p. 368 footnote, 374) referred to his 1946 paper as "1945 (in press)". Because the species was illustrated and discussed in 1945, it should not be considered a nomen nudum.

Geologic range.—Lower Pennsylvanian.

"Ectodemites" primus Cooper, 1941

Plate 8, figure 36; plate 10, figures 13–20

Ectodemites primus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 51, pl. 9, figs. 46, 47. Kinkaid formation (probably upper Clore), shale in railroad cut at Robbs, NE¼ NW¼ sec. 30 and SE¼SW¼ sec. 19, T. 12, S., R. 5 E., Pope County, Ill.

?*Ectodemites bicarinatus* (Croneis and Thurman). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 49, pl. 9, figs. 50, 51. Kinkaid formation, H. Forrester No. 1 well, 618 ft., W½SW¼NW¼ sec. 5, T. 6 S., R. 1 W., Perry County, Ill.

?*Kirkbya oblonga* var., fig. 4, Jones and Kirkby, 1885, Annals Mag. Nat. History, ser. 5, v. 15, p. 181, pl. 3, fig. 4. Carboniferous, near Seafield Tower, Scotland.

Specimens from the Pella beds, Iowa, (USGS loc. 5793–PC) are very close to the holotype but have a distinct dorsal shield. Cooper's type is a crushed specimen with some matrix on the left valve. A third ridge is suggested on the ventroposterior part of the left valve, and a similar ridge is seen on the right valve of the Iowa specimen. Specimens from the Carboniferous of West Scotland in the Jones Collection that is probably the same taxon considered by Jones and Kirkby (1885, p. 182) as a variety of *Kirkbya oblonga* may represent this species. One of them is illustrated here on plate 8, figure 36.

Geologic range.—Carboniferous; Upper Mississippian.

"Ectodemites"? warei (Morey), 1935

Plate 10, figures 21–26

Amphissites warei Morey, 1935, Jour. Paleontology, v. 9, p. 477, pl. 54, fig. 7. Amsden formation, Middle red member at Amsden Hill, about 4 miles southeast of the Little Popo Agie River, Fremont County, Wyo.

[not] *Ectodemites warei* (Morey). Cooper, 1941="*Ectodemites*"? *batalinae* (Posner), 1951.

The original of Morey's figure 7, is illustrated (pl. 10, figs. 23–26) and is designated as the lectotype. A crushed syntype, here designated as a paratype, is also illustrated (pl. 10, figs. 21, 22). This species is characterized by a shallow sulcus in the dorsoanterior third of the valve. Because the left valve has a very faint lateral carina near the posterior margin, the generic designation is queried.

Geologic range.—Upper Mississippian.

SYNONYMS AND REJECTED SPECIES OF "ECTODEMITES"

bicarinatus (Croneis and Thurman). Cooper, 1941="*E.*"? *primus* Cooper, 1941.

dattonensis (Harlton). Cooper, 1946=*Kegelites dattonensis* (Harlton), 1927.

edsonae (Bradfield). Cooper, 1946=*Knightina edsonae*? (Bradfield), 1935.

elongatus Cooper, 1941=*Kegelites*? *monomastadis* (Coryell and Sohn), 1938.

geneae (Roth). Cooper, 1946=*Shleesha pinguis* (Ulrich and Bassler), 1906.
harltoni Cooper, 1946=*Kegelites harltoni* (Cooper), 1946.
obesus (Croneis and Gale). Cooper, 1941=*Reviya obesa* (Croneis and Gale), 1939.
parvus Cooper, 1941=*Kegelites*? *monomastadis*? (Coryell and Sohn), 1938.
plummeri Cooper, 1945 [part] =*Kegelites*? sp. C.
sullivanensis (Payne). Cooper, 1946=*Knightina fidlari* Payne, 1937.
tumidus Cooper, 1941=*Amphissites tumidus* (Cooper), 1941.
warei (Morey). Cooper, 1941="*E*."? *batalinae* (Posner), 1951.

Genus KEGELITES Coryell and Booth, 1933

Kegelites Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 4 of table of contents.
Girtyites Coryell and Booth, 1933 [not Wedekind, 1914], Am. Midland Naturalist, v. 14, p. 261.
Kirkbyites Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 35. Type species *K. upsoni*, p. 36, pl. 3, figs. 4–6. Missouri series, Nebraska.
Amphissites [in part, of authors].
Ectodemites Cooper, 1946 [part], Illinois Geol. Survey Bull. 70, p. 101.
Polytylites Cooper, 1946 [part], idem, p. 108.

Type species.—Original designation, *Girtyites spinosus* Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 261, pl. 3, figs. 4–6. Wayland shale, Texas=*Kegelites dattonensis* (Harlton), 1927.

Diagnosis.—Differs from *Amphissites* by having a well-developed posterior node or shoulder, distinct to subdued small median node, and no anterior node. Has two marginal rims, and with or without an incomplete marginal ridge.

Discussion.—This genus was originally described as *Girtyites*. That name is a junior homonym of a genus in Mollusca proposed by Wedekind, 1914; consequently, *Kegelites* was substituted for the ostracode genus. Through the courtesy of Dr. Coryell, I have specimens from the original sample of *Kegelites spinosus* (Coryell and Booth), 1933, which I compared with the holotype of *Amphissites dattonensis* Harlton, 1927 (USNM 71406), and a paratype (USNM 71403), and concluded that *K. spinosus* is based on a very young specimen of *K. dattonensis* (Harlton), 1927. Cooper (1946, p. 101) placed *Amphissites dattonensis* in *Ectodemites* and in the same paper (p. 108) assigned *A. wapanuckensis* Harlton, 1929, and other species of *Kegelites* to *Polytylites*. *Kirkbyites upsoni* Johnson, 1936, type species of *Kirkbyites* Johnson, 1936, is here assigned to *Kegelites* (paratypes USNM 99437).

Geologic range.—Upper Mississippian-Permian. Figure 21 shows the stratigraphic range of species in *Kegelites*.

Lithology.—Shale, limestone, sandstone.

Habitat.—Marine.

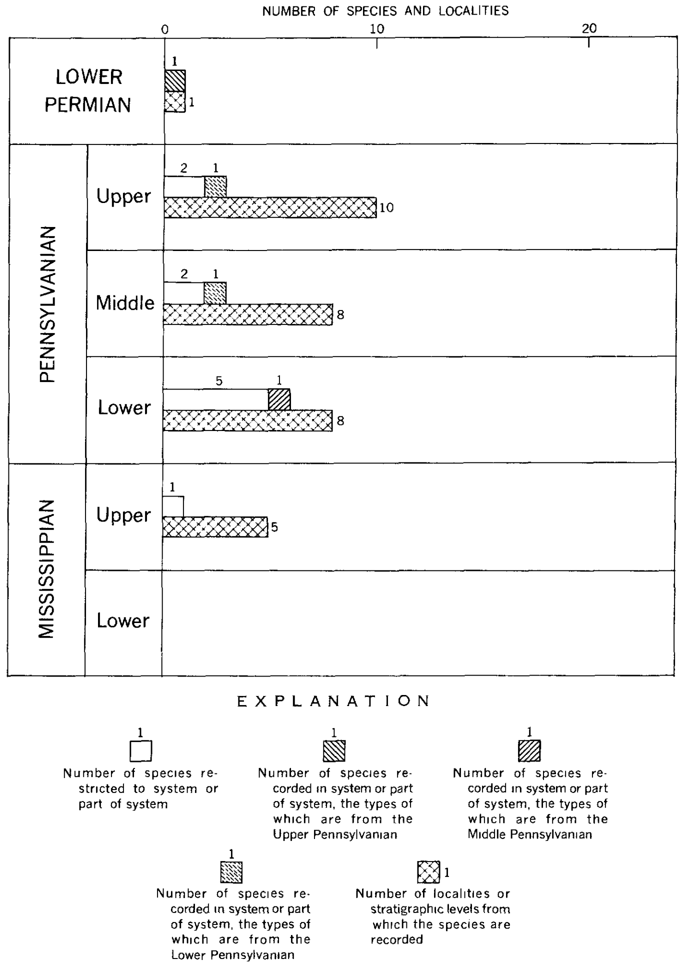

FIGURE 21.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Kegelites*.

Kegelites adjunctio (Cooper), 1946

Plate 10, figures 1–12

Amphissites adjunctio Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 97, pl. 15, figs. 29–31. Shale below and within the Livingston(?) limestone, NE¼ sec. 12, T. 7 S., R. 9 E., White County, Ill.

Distinguished by the short carina ventroanterior to median node. This species is abundant in the Wolfcamp formation of Texas (USGS loc. 7047–PC) and in the Brownwood shale, Texas (USGS loc. 12395–PC).

Geologic range.—Upper Pennsylvanian–Lower Permian.

Kegelites dattonensis (Harlton), 1927

Plate 9, figures 1–7, 16–18, 26

Amphissites dattonensis Harlton, 1927, Jour. Paleontology, v. 1, p. 206, pl. 32, figs. 9a–c. Upper Glenn formation, NW¼NW¼NW¼ sec. 18, T. 5 S., R. 2 E., Carter County, Okla.

Harlton, 1929, Texas Univ. Bull. 2901, p. 149, pl. 1, figs. 9a, b. Canyon Series, marly shale and limestone, San Saba River valley, near Hext, Menard County, Tex.

Coryell and Billings, 1932, Am. Midland Naturalist, v. 13, p. 184, pl. 18, fig. 8. Wayland shale member of Graham formation, 5 miles east and 2,000 ft north of Cisco on highway to Eastland, Eastland County, Tex.

Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 260, pl. 25, fig. 2. Mineral Wells formation, East Mountain Shale member, escarpment near the eastern border of Mineral Wells, Palo Pinto County, Tex.

Coryell and Booth, 1933, idem, v. 14, p. 260, pl. 3, fig. 3. Wayland shale member of the Graham formation, 1 mile west of Graham, near the Graham-Throckmorton road, west of Salt Creek, Young County, Tex.

Kellett, 1933, Jour. Paleontology, v. 7, p. 93, pl. 14, figs. 40–42. Howard formation, Wabaunsee group, brick plant cut in field, north of Gage Park, Topeka, Shawnee County, Kans.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 63, pl. 4, figs. 9a–c. Hoxbar formation, sandstone, 2 ft above outcrop of Daube limestone, east side of road, SW. cor. sec. 26, T. 5 S., R. 2 E., 6 miles south and 3 miles east of Ardmore, Carter County, Okla.

Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 29, pl. 3, figs. 16–19. Chanute shale formation and Lane shale formation, Kansas City group, National quarry, along the Burlington railroad, south of the Platte River, sec. 12, T. 12 N., R. 11 E., about 2 miles northwest of Louisville, Cass County, Nebr.

Kellett, 1936, Jour. Paleontology, v. 10, p. 772 [discussion].

Amphissites irregularis Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 261, pl. 25, fig. 5. East Mountain shale member of Mineral Wells formation, eastern border of Mineral Wells, Palo Pinto County, Tex.

Girtyites spinosus Coryell and Booth, 1933, idem, v. 14, p. 261, pl. 3, figs. 4–6. Wayland shale member of Graham formation, 1 mile west of Graham, on Throckmorton road west of Salt Creek, Young County, Tex.

Kegelites spinosus Coryell and Sample, 1933, idem, bottom of p. 4 of table of contents, new name for *Girtyites.*

Ectodemites dattonesis (Harlton). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 101, pl. 16, figs. 1, 2. Shale parting in Macoupin limestone, NW¼ sec. 2, T. 9 N., R. 7 W., Macoupin County, Ill.

[not] *Amphissites dattonesis* Harlton. Wartin, 1930=*Kegelites? roundyi* (Knight), 1928.

Johnson (1936, p. 29) and Kellett (1936, p. 773) demonstrated that the holotype of *Kegelites spinosus* is a very young instar of *K. dattonesis*. This specimen is here illustrated (pl. 9, figs. 16–18), as well as a growth series of duplicates made available by Dr. H. H. Bradfield. Several of the identifications of this species are here questioned because the illustrations do not show the diagnostic vertical ridge on the median node.

Geologic range.—Pennsylvanian and Permian.

Kegelites harltoni (Cooper), 1946

Plate 7, figures 50, 51

Ectodemites harltoni Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 102, pl. 15, fig. 44. Shales between Seville limestone beds, SW¼ sec. 32, T. 14 N., R. 2 W., Mercer County, Ill.

?*Ectodemites harltoni* Cooper, 1946. Marple, 1952, Jour. Paleontology, v. 26, p. 298 [list], pl. 134, fig. 19. Poverty Run member of the Vandusen cyclothem, Hopewell Township, Muskingum County, Ohio.

Amphissites sp. Harlton, 1933, Jour. Paleontology, v. 7, p. 23, pl. 5, fig. 6. Johns Valley shale, center of north line NE¼ SE¼ sec. 10, T. 1 S., R. 16 E., Pushmataha County, Okla.

Geologic range.—Lower Pennsylvanian.

Kegelites? monomastadis (Coryell and Sohn), 1938

Amphissites monomastadis Coryell and Sohn, 1938, Jour. Paleontology, v. 12, p. 602, pl. 69, figs. 10a, b. Dark calcareous shale, Reynolds member of Mauch Chunk shale, Greer quarry, 6½ miles southeast of Morgantown, W. Va.

Ectodemites cf. *E. monomastadis* (Coryell and Sohn). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 50, pl. 9, fig. 35. Menard formation, SE¼SW¼ sec. 2, T. 7 S., R. 7 E., Randolph County, Ill.

?*Amphissites latinodus* Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 82, pl. 4, fig. 7. Menard Formation, Ill. The holotype is a crushed specimen.

?*Ectodemites elongatus* Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 50, pl. 9, figs. 24, 25. Kinkaid formation, abandoned quarry, NE½SW½ sec. 35, T. 8 S., R. 4 W., Jackson County, Ill. The holotype is a steinkern.

?*Ectodemites parvus* Cooper, 1941, idem, p. 50, pl. 9, figs. 30, 31. Menard formation, SE¼SW¼ sec. 28, T. 11 S., R. 1 W., Union County, Ill. Based on a steinkern.

The holotypes of all these species are either steinkerns or abraded specimens. They all have an inner third ridge that reaches below the posterior node to the posterior margin.

Geologic range.—Upper Mississippian.

Kegelites? roundyi (Knight), 1928

Plate 9, figures 13–15

Amphissites roundyi Knight, 1928, Jour. Paleontology, v. 2, p. 262, pl. 32, figs. 8a, b, pl. 34, fig. 5. Fort Scott limestone (="Brown lime" in Labette shale) at three localities in and near St. Louis, Mo.

Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 100, pl. 15, figs. 7, 8. Shale above and below St. David limestone, SW¼ sec. 21, T. 6 N., R. 3 E., Fulton County, Ill.

? *Amphissites dattonensis* Harlton. Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 64, pl. 4, fig. 15. Wetumka to Holdenville formations; Shale in creek valley, 10 ft. to 20 ft. above base of Holdenville formation, 600 ft. west of road, corner NE¼NW¼ sec. 1, T. 3 N., R. 6 E.; Wewoka formation, 75 ft. above base, shale in hill 1,300 ft. north and 200 ft. east of SW. corner sec. 4, T. 3 N., R. 7 E.; Wewoka formation, 100 ft. below top, shale in roadcut on west slope of hill, SW. corner sec. 29, T. 4 N., R. 7 E.; Wetumka formation, 25 ft. below top, crinoid layer, 1,100 ft. south of center of the north line sec. 24, T. 4 N., R. 7 E., Oklahoma.

[not] *Amphissites roundyi* Knight. Warthin, 1930=*Amphissites?* sp. indet.

[not] *Amphissites roundyi* Knight. Johnson, 1936=*Shleesha pinguis* (Ulrich and Bassler), 1906.

Knight illustrated three specimens without designating a holotype. A slide in the USNM (USNM 116708) from Knight's locality 38 is labeled "paratypes," and one of these specimens is here illustrated and designated as the lectotype. The subdued elongate central node characterizes this species. Johnson's specimens have circular central nodes that compare closely with Kellett's plesiotypes of *Shleesha pinguis* (pl. 11, figs. 1–11). The inner rim is subdued but present in this species; consequently, the generic assignment is questioned.

Geologic range.—Middle Pennsylvanian.

Kegelites upsoni (Johnson), 1936

Plate 10, figures 28–30

Kirkbyites upsoni Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 36, pl. 3, figs. 4–6. Eudora shale member of the Stanton formation, Lansing group of the Missouri series, Dyson Hollow, 1½ miles west of LaPlatte, sec. 28, T. 13 N., R. 13 E., Douglas County, Nebr.

Geologic range.—Upper Pennsylvanian.

Kegelites wapanuckaensis (Harlton), 1929

Plate 7, figures 48, 49

Amphissites wapanuckaensis Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 257, pl. 1, figs. 4a, b. Shale near base of Wapanucka limestone, quarry 2 miles south of Hartshorne, NW¼ sec. 18, T. 4 N., R. 17 E., Pittsburg County, Okla.

[not] *Amphissites wapanuckaensis* Harlton. Harlton, 1933= *Kegelites* sp. A.

[not] *Polytylites wapanuckaensis* (Harlton). Cooper, 1946= *Kegelites* sp. B.

[not] *Polytylites wapanuckaensis* (Harlton). McLaughlin, 1952=*Kegelites* sp. B.

The holotype (USNM 79359) has a rounded posterior node in the posterior third of the greatest length. Harlton's 1933 specimen (USNM 85552) is a single valve in which the rounded posterior node is closer to the central node, both of which are in the central third of the valve. Cooper's 1946 specimen is described and illustrated as having an elongate posterior node.

Geologic range.—Lower Pennsylvanian.

Kegelites sp. A

Amphissites wapanuckaensis Harlton. Harlton, 1933, Jour. Paleontology, v. 7, p. 23, pl. 6, fig. 8. Johns Valley shale, NE¼SE¼ sec. 4, T. 1 S., R. 16 E., north of Baskett farm house, from 60-ft. hand dug well, Pushmataha County, Okla.

The position of the posterior node in the central third of the valve length suggests that this may be a different species. However, it is possible that the valve is deformed.

Geologic range.—Lower Pennsylvanian.

Kegelites sp. B

Polytylites wapanuckaensis (Harlton). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 108, pl. 16, figs. 21, 22. Shale on top of "Fulda" limestone, Mansfield group of Pottsville series, NW¼ sec. 11, T. 5 S., R. 4 W., Spencer County, Ind.

McLaughlin, 1952, Jour. Paleontology, v. 26, p. 618, pl. 82, fig. 15. Glen Eyrie formation, gray shale, 6 ft. above contact with Madison limestone, shallow cut on east side of Rampart Range Road, 500 ft. north of the turnoff of the Black Canyon Loop Road, sec. 28, T. 13 S., R. 67 W., El Paso County, Colo.

The pointed posterior node distinguishes this species.

Geologic range.—Lower and Middle Pennsylvanian.

Kegelites? sp. C

Ectodemites plummeri Cooper, 1945, Jour. Paleontology, v. 19, p. 368–375, pl. 57, figs. 7–20, 22–29, 31–36 [not figs. 1–6, 21, 30="*Ectodemites*" *plummeri* Cooper, 1945]. Marble Falls formation, San Saba County, Tex.

Cooper, 1946 [part], Illinois Geol. Survey Bull. 70, p. 103, pl. 15, figs. 40–42 [not figs. 37–39="*Ectodemites*" *plummeri*]. Ferdinand formation, shale below Ferdinand limestone, NW¼ sec. 20, T. 6 S., R. 4 W., Spencer County, Ind.

Geologic range.—Lower Pennsylvanian.

Genus POLYTYLITES Cooper, 1941

Polytylites Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 51.

Amphissites [in part, of authors].

Mauryella Harlton, 1929 [not Ulrich and Bassler, 1923], Am. Jour. Sci., ser. 5, v. 18, p. 257.

Type species.—Original designation, *P. geniculatus* Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, figs. 34–37. Renault formation, Vienna formation, Illinois.

Diagnosis.—Differs from *Amphissites* by absence of dorsal shield, and by presence of terminal nodes or shoulders.

Discussion.—The anterior node, well developed in *P. geniculatus* (pl. 9, figs. 8–12), is variable in development. In species like *P. superus* (Croneis and Gale), 1939, the anterior node is subdued.

Geologic range.—Upper Devonian (?), Mississippian-Permian. Figure 22 shows the stratigraphic range of species in *Polytylites*.

Lithology.—Limestone, shale.

Habitat.—Marine.

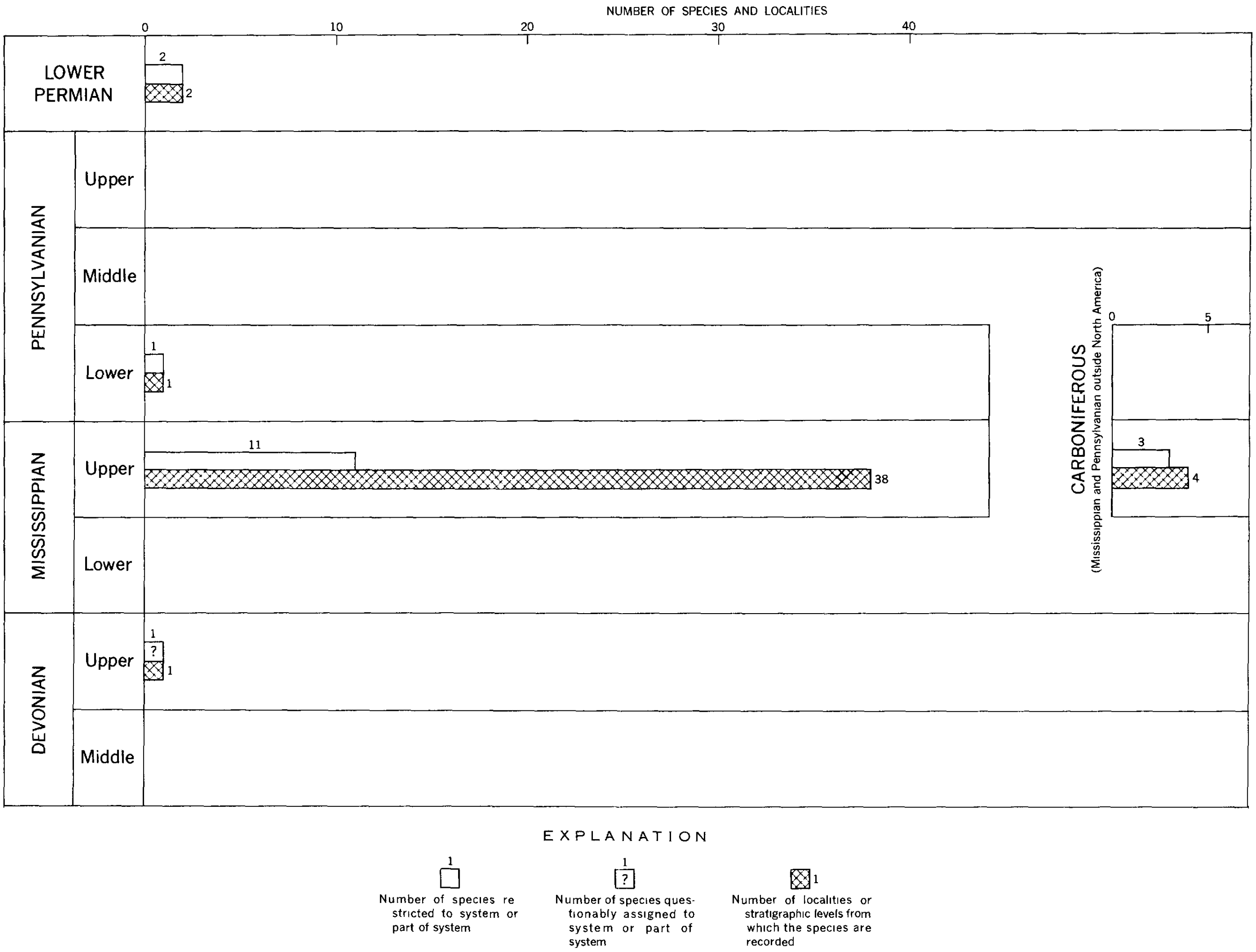

FIGURE 22.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Polytylites*.

KEY TO SPECIES

In the following key, names in parentheses are synonyms.

1. Central node elongate 2
1a. Central node round or elliptical 3
2(1). Axis of central node perpendicular to hingeline 12
2a. Axis of central node makes acute angle with hingeline 15
3(1a). Central node large, diameter one-fourth or more of greatest length 4
3a. Central node small, diameter less than one-fourth of greatest length 5
4(3). Ventral margin straight 13
4a. Ventral margin curved .... *ambitus* (p. 132)
5(3a). Inner rim removed from ventral margin on lateral surface .... *geniculatus* (*reticulatus*) (p. 132)
5a. Inner rim coincides with ventral margin 6
6(5a). Ventral margin concave .... *digitatus* (p. 132)
6a. Ventral margin straight or convex 7
7(6a). Central node extends to or almost to dorsal margin 8
7a. Central node well below dorsal margin 10
8(7). Posterior node larger than central node .... *kellettae*? (p. 132)
8a. Posterior node smaller than central node 9
9(8a). Posterior node removed from posterior cardinal angle by a distance equal to the diameter of the node; central node round 14
9a. Posterior node at posterior cardinal angle; central node elliptical .... *wilsoni* (p. 134)
10(7a). Swelling near venter below anterior node .... *quincollinus* (p. 133), (*bradfieldi*?, *concavus*?, *elogatus*, *lineatus*)
10a. No swelling near venter below anterior node 11
11(10a). Central node approximately at midlength; anterior node does not curve .... *tricollinus* (p. 134)
11a. Central node anterior to midlength; anterior node curved .... *trilobus* (p. 134) (*sublineatus*)
12(2). Central node anterior to midlength 17
12a. Central node approximately at midlength .... *similis* (p. 133) (*lobatus*)
13(4). Anterior node straight .... *nodosus* (p. 133)
13a. Anterior node curved .... *biforatus* (p. 132) (*fossilis*, *grovei*)
14(9). Central node to dorsal margin .... *superus* (p. 133)

14a. Central node does not quite reach dorsal margin 16
15(2a). Ventral margin convex .... *radiatus* (p. 133)
15a. Ventral margin straight .... *nodobliquus* (p. 133)
16(14a). Terminal nodes approximately equal ... sp. A. (p. 134)
16a. Terminal nodes not equal; posterior larger *simplex* (p. 133)
17(12). Posterior node straight .... *directus* (p. 132)
17a. Posterior node curved .... *brayeri* (p. 132)

SPECIES ACCEPTED

Polytylites ambitus Cooper, 1941

Plate 9, figures 40–43

Polytylites ambitus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 51, pl. 10, fig. 46. Renault formation NW¼NW¼ sec. 3, T. 14 S., R. 3 E., Massac County, Ill.

Geologic range.—Upper Mississippian.

Polytylites biforatus (Croneis and Thurman), 1939

Amphissites biforatus Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 312, pl. 8, fig. 9. Kinkaid shale, outcrop in road one-half a mile southeast of Robbs, Pope County, Ill.

Polytylites biforatus (Croneis and Thurman). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, fig. 23. Golconda formation, east side of highway bridge, NE¼NW¼ sec. 20, T. 5 S., R. 8 W., Randolph County, Ill.

Amphissites fossilis Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 312, pl. 8, fig. 18. Kinkaid shale, same locality as above.

Polytylites fossilis (Croneis and Thurman). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, figs. 51, 52. Paint Creek formation, along Mississippi River bluffs, SW¼ sec. 4, T. 6 S., R. 8 W., Randolph County, Ill.

Amphissites grovei Croneis and Gutke, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 46, pl. 2, figs. 28, 29. Renault formation, Shetlerville member, sec. 5, T. 13 S., R. 8 E., Hardin County, Ill.

Polytylites? nodobliquus (Croneis and Gale). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 53, pl. 10, figs. 38–41. Renault formation, NW¼NW¼ sec. 3, T. 14 S., R. 3 E., Massac County; Golconda formation, east side of highway bridge, NE¼NW¼ sec. 20, T. 5 S., R. 8 W., Randolph County, Ill.

The holotype of *P. biforatus* is an immature specimen with a recorded length of 0.69 mm, while the holotype of *P. fossilis*, from the same locality, is a larger specimen with a recorded length of 1.00 mm. The central node of *P. biforatus* is recorded as relatively smaller than of *P. fossilis*. The percentage of diameter of the central node of the greatest length as measured on the original illustrations are 33 percent for *P. biforatus*, 31 percent for *P. fossilis* and 32 percent for *P. grovei* (length 0.93 mm). The three species are here considered as stages of growth of the same species.

Geologic range.—Upper Mississippian.

Polytylites brayeri Sohn, n. name

Amphissites altonodosus var. *missouriensis* Brayer, 1952, Jour. Paleontology, v. 26, p. 173, pl. 28, figs. 4a, b. Shale partings in Salem limestone. Roadcut, west side of Missouri Highway 21, one-half a mile north of Meramec River bridge, St. Louis County, Mo.

[not] *A. vanniae* var. *missouriensis* Brayer, 1952, idem, p. 173, pl. 28, figs. 3a, b=*A. rugosus* Girty, 1910.

[not] *A. rotundus* var. *missouriensis* Brayer, 1952, idem, p. 173, pl. 28, figs. 6a, b=*Amphissites* nomen dubium.

Because Brayer erected 3 varieties with the same name, 2 of them are junior homonyms and require new names. *A. altonodosus* var. *missouriensis* is the third listed; consequently it is ruled out on line precedence. The name "*missouriensis*" is preoccupied by *A. vanniae* var. *missourinesis* which is here considered a junior synonym. Future work may prove *A. rotundus* var. *missouriensis* to be a valid species in *Amphissites*, and a new name is in order for that species.

Although the holotype and only specimen is an abraded left valve, the shape and curved terminal lobes distinguish this species from all others in *Polytylites*.

Geologic range.—Upper Mississippian.

Polytylites digitatus Sohn, 1954

Polytylites digitatus Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 14, pl. 3, figs. 34–36. Uppermost Leonard or lowermost Word formation, silicified limestone, Glass Mountains, Brewster County, Tex.

Geologic range.—Permian.

Polytylites directus Cooper, 1941

Polytylites directus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, fig. 43. Glen Dean formation, shale(?) just below upper ledge of Okaw limestone, SW¼NW¼ sec. 30, T. 7 S., R. 6 W., Randolph County, Ill.

Geologic range.—Upper Mississippian.

Polytylites geniculatus Cooper, 1941

Plate 9, figures 8–12

Polytylites geniculatus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, figs. 24–27. Vienna formation, SE¼SW¼ sec. 26, T. 11 S., R. 1 W., Union County; Renault formation, (main Shetlerville shale) SE¼SW¼ sec. 11, T. 12 S., R. 7 E., one-half a mile south of Eichorn, road ditch, west side below top of knob, north-trending road, 500 ft north of south section line, one-half a mile south of Eichorn (not recoverable in 1954 because of road construction), Hardin County, Ill.

?*Polytylites reticulatus* Cooper, 1941, idem, p. 53, pl. 10, fig. 10. Clore formation, SE¼SW¼ sec. 15, T. 7 S., R. 6 W., Randolph County, Ill.

Polytylites tricollinus (Jones and Kirkby). Cooper, 1941, idem, p. 54, pl. 11, figs. 1–4. Glen Dean formation, SW¼NW¼ sec. 30, T. 7 S., R. 6 W., Randolph County, Ill.

Geologic range.—Upper Mississippian.

Polytylites? kellettae (Kummerow), 1939

Amphissites kellettae Kummerow, 1939, Preuss. Geol. Landesanstalt, Abh., n. f., no. 194, pt. A, p. 30, pl. 2, figs. 5a, b, 6. Uppermost Upper Devonian, E_b, Steinloch bei Velbert, Rheinland, Germany.

This species is based on an internal mold and an impression of the exterior and may represent an entirely different genus.

Geologic range.—Upper Devonian.

Polytylites nodobliquus (Croneis and Gale), 1939

Plate 9, figures 22, 23

Knightina nodobliqua Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 274, pl. 5, fig. 1. Golconda formation, limestone and shale in roadcut near Douglas School, Hardin County, Ill.

[not] *Polytylites nodobliquus* (Croneis and Gale). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 53, pl. 10, figs. 38–41=*P. biforatus* (Croneis and Thurman), 1939.

The oblique central node and straight ventral margin distinguishes this species.

Geologic range.—Upper Mississippian.

Polytylites? nodosus (Roth), 1929

Plate 9, figures 46–48

Amphissites nodosum Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 50, pl. 3, figs. 16a–c. Wapanucka limestone, sec. 28, T. 3 N., R. 7 E., Pontotoc County, Okla.

Amphissites nodosus Roth, 1939, Jour. Paleontology, v. 3, p. 292 [emendation].

[not] *Amphissites nodosus* Roth. Harlton, 1933=species to be investigated.

[not] *Amphissites nodosus* Scott and Borger, 1941=*A. centronotus*? (Ulrich and Bassler), 1906.

Geologic range.—Lower Pennsylvanian.

Polytylites quincollinus (Harlton), 1929

Plate 9, figures 24, 25

Mauryella quincollina Harlton, 1929, Am. Jour. Sci., ser. 5, v. 18, no. 105, p. 257, pl. 1, fig. 5. Fayetteville shale, railroad cut at Fayetteville, Washington County, Ark.

Polytylites quincollinus (Harlton). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 53, pl. 10, fig. 45. Renault formation (main Shetlerville shale), SE¼SW¼ sec. 11, T. 12 S., R. 7 E., road ditch, west side, below top of knob, 500 ft north of south section line on north-trending road, one-half a mile south of Eichorn (not recoverable in 1954 because of road construction), Hardin County, Ill.

Cooper, 1947, Jour. Paleontology, v. 21, p. 35 [list], pl. 23, fig. 25. Kinkaid formation, north tributary of Lick Creek, sec. 31, T. 11 S., R. 2 E., Johnson County, Ill.

Amphissites elongatus Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 81, pl. 4, fig. 10. Menard formation, SE¼SW¼ sec. 28, T. 11 S., R. 1 W., Union County, Ill.

Polytylites elongatus (Croneis and Bristol). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, fig. 44. Kinkaid formation (probably upper Clore shale), NE¼ NW¼ sec. 30 and SE¼SW¼ sec. 19, T. 12 S., R. 5 E., railroad cut at Robbs, 3 miles east of Simpson, Pope County, Ill.

Amphissites lineatus Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 83, pl. 4, figs. 1, 2. Menard formation, Illinois Geol. Survey loc. P51A, 0803.49, Illinois.

Amphissites bradfieldi Croneis and Funkhouser, 1939, *in* Croneis, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 29, new name for *Amphissites rothi* Croneis and Funkhouser, 1939 [not Bradfield, 1935].

Amphissites rothi Croneis and Funkhouser, 1939 [not Bradfield, 1935], Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 346, pl. 10, fig. 15. Clore formation, limestone and shale in ravine north of road one mile east of Whiteside School, Johnson County, Ill.

?*Amphissites concavus* Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 79, pl. 4, figs. 8, 9. Menard formation, Illinois.

[not] *Polytylites bradfieldi* (Croneis and Funkhouser). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, figs. 24–26=*P. trilobus* (Croneis and Gale), 1939.

The holotype (pl. 9, figs. 24, 25) has the ventral swellings unequally developed on both valves. Cooper states (1941, p. 53) that specimens from the lower Fayetteville shale vary in size and extent of ventral swellings. The anterior ventral swelling appears to be better developed and more constant than the posterior; consequently, species erected on the lack of a posterior ventral swelling are here placed in synonymy.

Geologic range.—Upper Mississippian.

Polytylites? radiatus (Jones and Kirkby), 1885

Kirkbya umbonata var. *radiata* Jones and Kirkby, 1885, Annals Mag. Nat. History, ser. 5, v. 15, p. 180, pl. 3, fig. 2. Carboniferous, Scotland and England.

Amphissites radiata (Jones and Kirkby). Latham, 1932, Royal Soc. Edinburgh Trans., v. 57, pt. 2, no 12, p. 371, text fig. 18. Lower Limestone Series, Scotland.

Geologic range.—Carboniferous.

Polytylites similis (Croneis and Gale), 1939

Amphissites similis Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 269, pl. 5, fig. 6. Golconda formation, old quarry west of railroad tracks in SE¼ sec. 26, T. 13 S., R. 6 E., 3½ miles southeast of Waltersburg, Pope County, Ill.

?*Polytylites lobatus* Harris and Jobe, 1956, Oklahoma Geol. Survey Circ. 39, p. 14, pl. 3, fig. 3. "Manning" zone, well core 6,801–6,820 ft., Superior 61–2 Early, NE¼NW¼NE¼ sec. 2, T. 21 N., R. 10 W., Ringwood Pool, Major County, Okla.

The holotype of *P. lobatus* is almost twice the length of the holotype of *P. similis*.

Geologic range.—Upper Mississippian.

Polytylites simplex Hou, 1954

Polytylites simplex Hou, 1954, Acta Paleont. Sinica, v. 2, no. 2, p. 234, 254, pl. 1, figs. 8a, b. Chihsia limestone, black shale, at Maanshan of Changyany district, Hupei province, Manchuria.

Geologic range.—Lower Permian.

Polytylites superus (Croneis and Gale), 1939

Plate 9, figures 27, 28

Amphissites superus Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 272, pl. 5, figs. 13, 14. Golconda formation, shaly limestone with thin shale layers, roadcut 1½ miles northeast of Gross, Hardin County, Ill.

Polytylites superus (Croneis and Gale). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 53, pl. 11, figs. 6, 17. Menard formation, SE¼SW¼ sec. 28, T. 11 S., R. 1 W.: Golconda formation, SW¼NW¼ sec. 13, T. 12 S., R. 1 W., Union County, Ill.

The small terminal nodes above the central node distinguish this species.

Geologic range.—Upper Mississippian.

Polytylites tricollinus (Jones and Kirkby), 1886

Kirkbya tricollina Jones and Kirkby, 1886, Annals Mag. Nat. History, ser. 5, v. 18, p. 261, pl. 8, fig. 19. Scar limestone at Arnside, Westmoreland, England (not listed in directory of British fossiliferous localities).

Amphissites tricollina (Jones and Kirkby). Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 8 [discussed].

[not] *Kirkbya tricollina* Jones and Kirkby. Ulrich, 1891=*Polytylites trilobus* (Croneis and Gale), 1939.

[not] *Polytylites tricollinus* (Jones and Kirkby). Cooper 1941=*P. geniculatus* Cooper, 1941.

[not] *Amphissites tricollina* (Jones and Kirkby). Zanina, 1956=*Polytylites* sp. A.

Geologic range.—Carboniferous.

Polytylites trilobus (Croneis and Gale), 1939

Plate 9, figures 29, 31; plate 11, figure 34

Amphissites trilobus Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 271, pl. 5, fig. 5. Golconda formation, limestone and shale in roadcut near Douglas School, Shawneetown quadrangle, Hardin County, Ill.

Polytylites trilobus (Croneis and Gale). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 54, pl. 11, fig. 5. Golconda formation, SW¼NW¼ sec. 13, T. 12 S., R 1 W., Union County, Ill.

Amphissites sublineatus Croneis and Thurman, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 315, pl. 8, fig. 16. Kinkaid formation (probably upper Clore) shale, railroad cut, 3 miles east of Simpson, Pope County, Ill.

Polytylites sublineatus (Croneis and Thurman). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 53, pl. 11, fig. 24. Same locality as above.

Polytylites bradfieldi (Croneis and Funkhouser). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, figs. 24–26. Clore formation, SE¼SW¼ sec. 15, T. 7 S., R. 6 W., Randolph County, Ill. Lists this species from 5 localities and formations from Renault to Kinkaid.

Kirkbya tricollina Jones and Kirkby. Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 207, pl. 18, figs. 8a, b. Shaly limestone of Chester group near Grayson Springs Station, Ky.

[not] *Polytylites trilobus* (Croneis and Gale). Marple, 1952=*Amphissites centronotus*? (Ulrich and Bassler), 1906.

This species is present also in the Vienna shale, Ill. (USGS loc. 12842–PC).

Geologic range.—Upper Mississippian.

Polytylites wilsoni (Croneis and Gutke), 1939

Plate 9, figures 19–21

Amphissites wilsoni Croneis and Gutke, 1939 Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 47, pl. 2, figs. 24, 25. Renault formation, Illinois.

Polytylites wilsoni (Croneis and Gutke). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 54, pl. 11, figs. 22, 23. Renault formation (main Shetlerville shale), SE¼SW¼ sec. 11, T. 12 S., R. 7 E., road ditch, west side, below top of knob, 500 ft north of south section line on north-trending road one-half a mile south of Eichorn (not recoverable in 1954 because of road construction), Hardin County, Ill.

The diagnostic elliptical central node distinguishes the species. Common in the Pella Beds, Iowa (USGS loc. 5793–PC, 5794–PC), and in Middle Renault or Shetlerville formation, Illinois (USGS loc. 12844–PC).

Geologic range.—Upper Mississippian.

Polytylites sp. A

Amphissites tricollina (Jones and Kirkby). Zanina, 1956, Vsesoyuz. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, p. 236, pl. 6, figs 1–3 Stalingradski horizon, Viséan, Russia.

Differs from *P. superus* (Croneis and Cale), 1939, in that the central node does not extend up to the dorsal margin, in outline of ventral margin, and in that the terminal nodes are approximately the same size.

Geologic range.—Carboniferous.

SYNONYMS AND REJECTED SPECIES OF POLYTYLITES

bradfieldi (Croneis and Funkhouser). Cooper, 1941=*P. trilobus* (Croneis and Gale), 1939.

crassus Cooper, 1941=*Amphissites tumidus* (Cooper), 1941.

diversus Cooper, 1941=*Reviya diversa* (Cooper), 1941.

elongatus (Croneis and Bristol), 1939=*P. quincollinus* (Harlton), 1929.

fossilis (Croneis and Thurman), 1939=*P. biforatus* (Croneis and Thurman), 1939.

lobatus Harris and Jobe, 1956=*P. similis* (Croneis and Gale), 1939.

? *nodobliquus* (Croneis and Gale). Cooper, 1941=*P. biforatus* (Croneis and Thurman), 1939.

reticulatus Cooper, 1941=*P. geniculatus* Cooper, 1941.

sublineatus (Croneis and Thurman), 1939=*P. trilobus* (Croneis and Gale), 1939.

tricollinus (Jones and Kirkby). Cooper, 1941=*P. geniculatus* Cooper, 1941.

wapanuckaensis (Harlton). Cooper, 1946=*Kegelites* sp. B.

wapanuckaensis (Harlton). McLaughlin, 1952=*Kegelites* sp. B.

Genus SHLEESHA Sohn, n. gen.

Type species.—*Kirkbya pinguis* Ulrich and Bassler, 1906, U.S. Natl. Mus. Proc., v. 30, p. 159, pl. 11, figs. 13–15. Cottonwood shale, Kansas.

Diagnosis.—Differs from all the genera previously assigned to *Amphissites* by the absence of a dorsal shield, and by the presence of only one marginal ridge. The lobation consists of a reduced subcentral node, an undefined posterior shoulder, and with or without a vestigial anterior shoulder.

Discussion.—This genus differs from "*Ectodemites*" Cooper, 1941, in that the latter has a well-defined second or inner ridge subparallel to the ventral margin, *Knightina* Kellett, 1933, does not have a subcentral node.

Geologic range.—Upper Mississippian-Permian. Figure 23 shows the stratigraphic range of species in *Shleesha.*

Lithology.—Shale and limestone.

Habitat.—Marine.

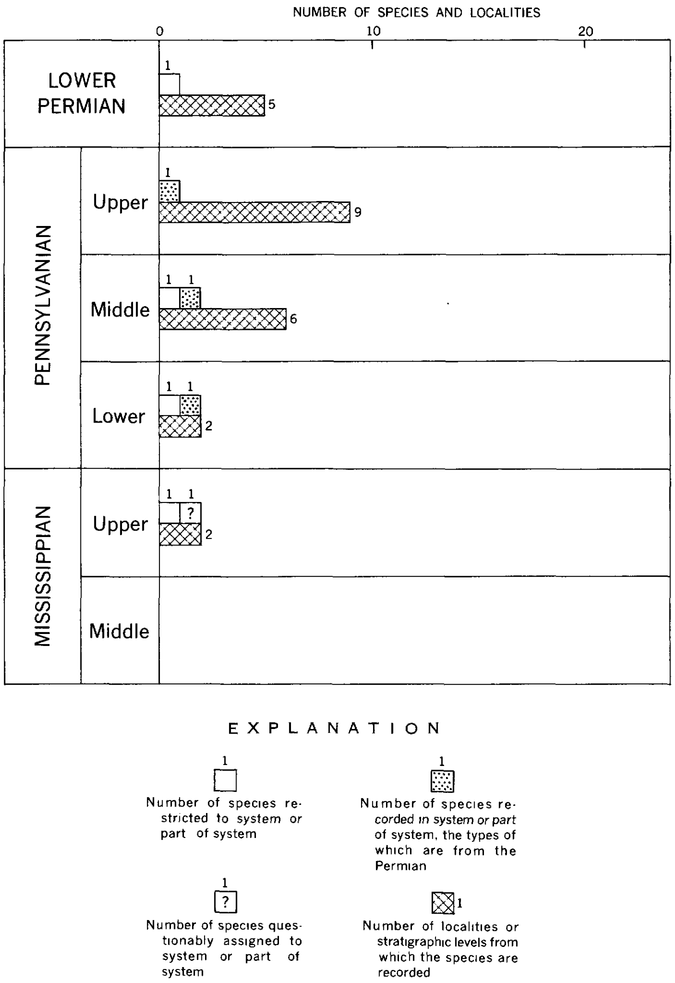

FIGURE 23.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic level at the same locality, of species in *Shleesha.*

Shleesha pinguis (Ulrich and Bassler), 1906

Plate 11, figures 1–11, 15–18, 37

Kirkbya pinguis Ulrich and Bassler, 1906, U.S. Natl. Mus. Proc. v. 30, p. 159, pl. 11, figs. 13–15. Cottonwood shale, 2 miles east of Cottonwood Falls, Chase(?) County, Kans.

Amphissites pinguis (Ulrich and Bassler). Knight, 1928, Jour. Paleontology, v. 2, p. 263, pl. 32, fig. 9, pl. 34, fig. 3. Shale parting in "Brown lime" in Labette shale exposed in south bank of creek east of Price Road and south of Ladue Road; approximately the same horizon in creek south of Ladue Road under McNight Road bridge (Knight loc. 47), St. Louis County, Mo.

Delo, 1931. Washington Univ. [St. Louis] Studies, new ser., Sci. Tech. 5, p. 46, pl. 4. figs. 7a–c. Pennsylvanian limestone cuttings, 4,100 ft, Ransom No. 1 Well, Wood Oil Co., NW. cor. sec. 5, T. 26 S., R. 41 W., Hamilton County, Kan.

Coryell and Sample, 1932, Am. Midland Naturalist, v. 13, p. 260, pl. 25, fig. 3, East Mountain Shale, near Mineral Wells, Palo Pinto County, Tex.

Kellett, 1933, Jour. Paleontology, v. 7, p. 94, pl. 15, figs. 12–22, 41. Dover to Wreford formations, Kansas, at 16 localities.

Upson 1933, Nebraska Geol. Survey Bull. 8, p. 43, pl. 3, figs. 11a, b. Shale above lower zone of the Eiss limestone, Eiss Hill, near southeast corner SE¼ sec. 3, T. 1 N., R. 13 E., Richardson County, Nebr.

Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 61, pl. 4, fig. 6. Union Dairy member of Hoxbar formation, limestone, top part, railroad cut, about center of north line of SW¼ sec. 6, T. 5 S., R. 2 E.; shale, about 150 ft below Confederate limestone, about one-half a mile north of Deese School, center of east line of sec. 32, T. 3 S., R 1 E., Carter County, Okla.

?*Amphissites ciscoensis* Harlton, 1928, Jour. Paleontology, v. 2, p. 134, pl. 21, figs. 5 a, b. Cisco formation, below Camp Colorado limestone, on Harpesville Road 3 miles east of Moran, Shackelford County, Tex.

Harlton, 1929, Texas Univ. Bull. 2901, p. 150, pl. 1, fig. 10. Canyon group, marly shale and limestone, San Saba River valley, near Hext, Menard County, Tex.

?*Amphissites congruens* Cooper. McLaughlin, 1952 [part], Jour. Paleontology, v. 26, p. 617, pl. 82, figs. 13, 14 [not figs. 11, 12, 16=*Amphissites rugosus* Girty, 1910]. Glen Eyrie formation, gray shale, sec. 28, T. 13 S., R. 67 W., El Paso County, Colo.

Amphissites geni Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 42, pl. 2, figs. 12a–e. Francis formation, SE. cor. sec. 4, T. 3 N., R. 6 E., Pontotoc County, Okla.

Amphissites geneae Roth, 1929, Jour. Paleontology, v. 3, p. 292 [corrected name].

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 64, pl. 5, fig. 2. Holdenville formation, 10 ft. above Sasakwa member, shale in gully, 1,250 ft. east of SW. cor., sec. 18, T. 4 N., R. 7 E., Pontotoc County, Okla.

?*Amphissites gregeri* Delo, 1931, Washington Univ. [St. Louis] Studies, new ser., Sci. Tech. 5, p. 48, pl. 4, figs. 8a–c. Pennsylvanian limestone cuttings at 4,100 ft., Ranson No. 1 Well, Wood Oil Co., in NW. corner sec. 5, T. 26 S., R. 41 W., Hamilton County, Kans.

Cythere? haworthi Ulrich and Bassler, 1906, U.S. Natl. Mus. Proc., v. 30, p. 160, pl. 11, fig. 12. Cottonwood shale, 2 miles east of Cottonwood Falls, Chase County, Kans.

Amphissites koehleri Delo, 1931, Washington Univ. [St. Louis] Studies, new ser., Sci. Tech., no. 5, p. 45, pl. 4, figs. 6a–c. Pennsylvania limestone, associated with *A. pinguis*.

Amphissites minuta Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 44, pl. 2, figs. 13a–c. Francis formation, center sec. 24, T. 5 N., R. 6 E., Pontotoc County, Okla.

Amphissites minutus Roth. Upson, 1933. Nebraska Geol. Survey Bull. 8, p. 43, pl. 3, figs. 12a–c. Florena-Cottonwood contact, 2 miles southeast of Stockdale, Kans.

?*Amphissites rothi* Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 57, pl. 4, fig. 1. Shale, Dornick Hills formation, in Jolliff(?) limestone, about 200 ft. below Otterville formation, about 100 yd south of north line of sec. 12, T. 3 S., R. 2 E., main gully in NE¼, Carter County, Okla.

Amphissites roundyi Knight. Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 31, pl. 3, figs. 29–31. Either the Meadow limestone member of the Plattsburg limestone formation of the Lansing group, or the Bethany Falls limestone member of the Swope limestone formation of the Bronson group, Dyson Hollow, about 1½ miles west of LaPlatte, sec. 28, T. 13 N., R. 13 E., Douglas County, Nebr.

Ectodemites geneae (Roth). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 102, pl. 15, figs. 32, 33. Weathered lower part of Millersville limestone, NE¼ sec. 28, T. 12 N., R. 1 W., Christian County, Ill.

The holotype is based on an immature individual and was originally illustrated by drawings. It is here reillustrated by photographs (pl. 11, figs. 15–18). An adult specimen from the Brownwood shale, Texas, is here illustrated (pl. 11, figs. 10, 11). Kellett (1933, p. 94) published a growth series of this species and demonstrated that the size and shape of the central node varies with individuals and also that it becomes more subdued in larger specimens. In the original description it was stated: "Surface of the valve with a subcentrally situated, rather small, and only moderately prominent node, and behind this, with a small sulcus intervening, two less conspicuous nodes placed one above the other, the larger of the two being near the post cardinal angle." The larger node refers to the undefined posterior shoulder, and examination of plate 11, figure 17, the same view as the original illustration, shows that the smaller lower "node" is probably a sand grain. This feature is absent on Kellett's specimens and on other specimens illustrated on plate 11. A similar grain farther removed from the central node than in the holotype is shown on a right view of an adult specimen (pl. 11, fig. 11). The specimen shows also an incipient anterior shoulder that appears to vary with individuals of *S. pinguis*. *Amphissites rothi* Bradfield is questionably referred to this species.

Bradfield's specimen (Indiana Univ. 2020) is lost, and a duplicate from his collection is here illustrated (pl. 11, fig. 9). The single marginal ridge, characterising this genus, is shown on the holotype (pl. 11, fig. 16) as well as on a specimen from the Brownwood shale, Texas (pl. 11, fig. 8).

Geologic range.—Pennsylvanian and Permian.

Shleesha pinguoides (Croneis and Gale), 1939

Plate 11, figures 12–14

Knightina pinguoides Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 273, pl. 5, fig. 15. Golconda formation, limestone and shale in roadcut near Douglas School, Hardin County, Ill. Walker Mus. slide 44422 contains two left valves; the holotype originally illustrated as a right valve, and a paratype that has a part of the dorsoposterior margin missing.

Sohn, 1940, Jour. Paleontology, v. 14, p. 158 [list].

The presence of a subcentral node removes this species from *Knightina* Kellett, 1933, and places it in this genus. It differs from all other species in *Shleesha* in dorsal outline, which has the greatest width toward the anterior.

Geologic range.—Upper Mississippian.

Shleesha simplex (Roth), 1929

Plate 11, figs. 40–43

Amphissites simplexus Roth, 1929, Wagner Free Inst. Sci. Pub. 1, p. 36, pl. 2, figs. 9a, b. Wapanucka limestone, sec. 28, T. 3 N., R. 7 E., Pontotoc County, Okla.

Amphissites simplus Roth, 1929, Jour. Paleontology, v. 3, p. 292 [emendation].

This is the largest species in this genus—recorded length 1.32 mm. The median node is completely absent. The pronounced shoulder shown in the original illustration on the dorsoposterior of the left valve was caused by a quartz grain that was removed for the present illustration.

R. W. Brown (1958, oral communication) pointed out the fact that Roth's emendation is incorrect and that it should be *simplex*, as used here.

Geologic range.—Lower Pennsylvanian.

Shleesha sullivanensis (Payne), 1937

Plate 11, figures 23, 24

Amphissites sullivanensis Payne, 1937, Jour. Paleontology, v. 11, p. 281, pl. 38, figs. 3a–c, 4. Hayden Branch formation, 1 in. of gray shale, north-central part sec. 10, T. 8 N., R. 10 W., Sullivan County, Ind.

[not] *Ectodemites sullivanensis* (Payne). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 104, pl. 16, figs. 9, 10= *Knightina fidlari*? Payne, 1937.

This species is narrower in dorsal outline than either *S. pinguis* and *S. simplex*. It differs from *S. pinguoides* by having a rounded ventroposterior margin and in dorsal outline.

Geologic range.—Middle Pennsylvanian.

Shleesha? sp.

Kirkbya oblonga Jones and Kirkby. Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 206, pl. 18, figs. 4a–c, 5a, b. Chester group, shaly limestone near the middle of the Chester group, at Chester, Ill., and near Grayson Springs, Ky.

Family ARCYZONDIDAE Kesling, 1961

This family was named and described by R. V. Kesling in the Treatise on Invertebrate Paleontology, Part Q, Ostracoda (Moore, 1961). It includes *Amphizona* and related genera.

Genus AMPHIZONA Kesling and Copeland, 1954

Amphizona Kesling and Copeland, 1954, Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 7, p. 154.

Type species.—Original designation, *A. asceta* Kesling and Copeland, 1954, Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 7, p. 154, pl. 1, figs. 1–31, pl. 2, figs. 1–4, 8–40. Wanakah shale member of Ludlowville formation, Genesee County, N.Y.

Diagnosis.—Distinguished from *Amphissites* Girty by the absence of terminolateral nodes.

Discussion.—This genus was originally described as having a low node immediately in front of the kirkbyan pit. This node is illustrated by drawings of polished surfaces (Kesling and Copeland, 1954, figs. 1b, f). Unfortunately, this node is obscured on the surface of the valves because of the deep reticulations. Because the node is not readily observed, the genus is discriminated in the key to genera in two places, one with and the other without a subcentral node. The type species has a horizontal ridge subparallel to the dorsal margin and just above the pit. Whether this is a generic or specific character cannot be determined at the present time. The only other known species, *A. pseudocarinata* Smith, 1956, does not have this ridge, but the types appear to be corroded. It is possible that Smith's specimens are undeterminable.

Geologic range.—Middle Devonian. Figure 24 shows the stratigraphic range of species in *Amphizona.*

Lithology.—Shale.

Habitat.—Marine.

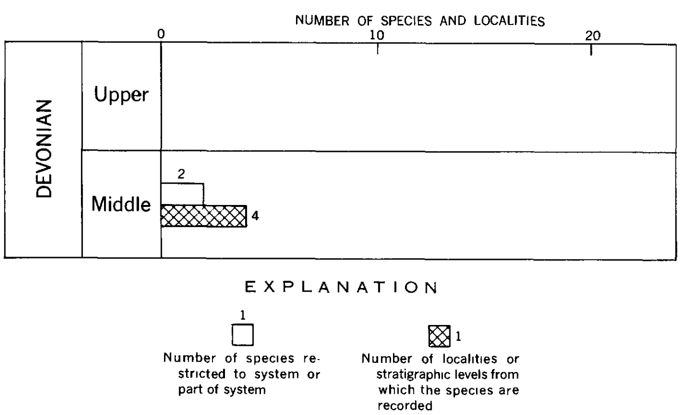

FIGURE 24.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Amphizona.*

Amphizona asceta Kesling and Copeland, 1954

Plate 8, figures 31–35

Amphizona asceta Kesling and Copeland, 1954, Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 7, p. 154, pl. 1, figs. 1–31, pl. 2, figs. 1–4, 8–40. Wanakah shale member of Ludlowville formation, roadside exposure, 2 miles southeast of East Bethany, Genesee County, N.Y.

Stover, 1956, Jour. Paleontology, v. 30, p. 1135, pl. 119, fig. 6, Windom shale, western New York.

Kesling, 1957, Michigan Univ., Mus. Paleontology, Contr., v. 14, no. 2, p. 20, fig. 2.

Amphissites rowei Coley, 1954, Jour. Paleontology, v. 28, p. 462, pl. 53, figs. 4, 5. Middle Devonian, New York.

Although the descriptions of *Amphizona asceta* and *Amphissites rowei* were both published in 1954, the species described by Kesling and Copeland has priority because its description was published in March, while Coley's paper was published in the July 1954 issue of the Journal of Paleontology.

Geologic range.—Middle Devonian.

Amphizona? pseudocarinata Smith, 1956

Amphizona pseudocarinata Smith, 1956, Jour. Paleontology, v. 30, p. 5, pl. 1, figs. 5–7. Wanakah shale, White Creek, 750 yds southwest of intersection of railroad tracks and Transit Road, Bethany Township, Genesee County, N.Y.

The types of this species are corroded and may belong to an unidentifiable genus.

Geologic range.—Middle Devonian.

Genus ARCYZONA Kesling, 1952

Arcyzona Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 30.

Amphissites Girty [of authors].

Type species.—Original designation, *Amphissites diadematus* Van Pelt 1933 [part], Jour. Paleontology, v. 7, p. 329, pl. 39, figs. 11, 14, 15. Bell shale, Michigan.

Diagnosis.—Straight-backed subquadrate or subelliptical, coarsely reticulated ostracodes, with large subcentral pit, and robust inner ridge.

Discussion.—According to the original description, the pit is reflected inside of the valve as an internal node that has muscle scars. Species of this genus examined in the present study are devoid of lateral nodes. Certain ridges of the reticulations are thickened and high on the valve surface. This genus differs from *Reviya* n. gen. in that the inner rim is very thick.

Geologic range.—Middle Devonian. Figure 25 shows the stratigraphic range of species in *Arcyzona.*

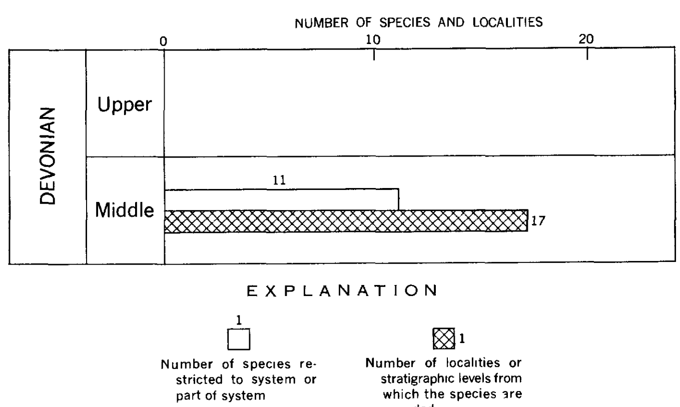

FIGURE 25.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Arcyzona.*

Lithology.—Shale.

Habitat.—Marine.

SPECIES ACCEPTED

Arcyzona aperticarinata Kesling and Weiss, 1953

Plate 10, figure 27

Arcyzona aperticarinata Kesling and Weiss, 1953, Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 3, p. 51, pl. 3, figs. 42–49. Norway Point shale, Alpena County, Mich.

Amphissites subquadratus (Ulrich). Warthin, 1934, idem, v. 4, no. 12, p. 214, pl. 1, fig. 12. Same locality as above.

This species may be the same as *A. bythiclimacota* Kesling, 1952.

Geologic range.—Middle Devonian.

Arcyzona apobathorta Kesling, 1952

Arcyzona apobathorta Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 33, pl. 5, fig. 19. Bell formation, Alpena County, Mich.

Geologic range.—Middle Devonian.

Arcyzona bythiclimacota Kesling, 1952

Arcyzona bythiclimacota Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 32, pl. 2, fig. 10; pl. 5, figs. 12–16. Bell formation, shale, Presque Isle County, Mich.

Amphissites diadematus Van Pelt, 1933 [part], Jour. Paleontology, v. 7, p. 329, pl. 39, fig. 8. Bell shale, Michigan.

Geologic range.—Middle Devonian.

Arcyzona campylactinota Kesling, 1952

Arcyzona campylactinota Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 34, pl. 2, figs. 11–13; pl. 5, figs. 7–11. Bell formation, Presque Isle County, Mich.

Amphissites subquadratus (Ulrich). Stewart, 1936, Jour. Paleontology, v. 10, p. 751, pl. 101, figs. 5, 6. Silica shale, Ohio.

Geologic range.—Middle Devonian.

Arcyzona diademata (Van Pelt), 1933

Plate 7, figures 11, 12

Amphissites diadematus Van Pelt, 1933, Jour. Paleontology, v. 7, p. 329, pl. 39, figs. 11, 14, 15 [not fig. 8=*A. bythiclimacota*]. Bell shale, Michigan.

?*Amphissites diadematus* Van Pelt. Coryell and Malkin, 1936, Am. Mus. Novitates, no. 891, p. 4, fig. 10. Hamilton shale, near Arkona, Ontario, Canada.

Arcyzona diademata (Van Pelt). Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 31, pl. 2, fig. 14; pl. 4, figs. 34–38; pl. 5, fig. 1. Bell shale, Presque Isle County, Mich.

Kesling and Weiss, 1953, idem, v. 11, no. 3, p. 51, pl. 3, figs. 39–41. Norway Point shale, Alpena County, Mich.

Stewart (1936, p. 751) states that she examined Van Pelt's types, including this species, at the Walker Museum, University of Chicago. Neither Kesling nor I have been able to find these types. It should be noted that Van Pelt's illustrations (1933, pl. 39, figs. 9, 10, 13) are not accounted for by either Kesling or Kesling and Weiss.

Geologic range.—Middle Devonian.

Arcyzona? lunata (Bassler), 1941

Amphissites lunatus Bassler, 1941, Washington Acad. Sci. Jour., v. 31, p. 24, fig. 16. Camden chert, quarries along Nashville, Chattanooga & St. Louis Railway, near Camden, Benton County, Tenn.

Swain, 1953, Jour. Paleontology, v. 27, p. 271, pl. 39, figs. 2a–c. Same locality as above.

Geologic range.—Middle Devonian.

Arcyzona? parallella (Ulrich), 1891

Kirkbya parallela Ulrich, 1891, Cincinnati Soc. Nat. History Jour., v. 13, p. 192, pl. 15, figs. 2a, b. Onondaga formation, Falls of the Ohio, Louisville, Ky.

Amphissites parallelus (Ulrich). Bassler and Kellett, 1934, Geol. Soc. America Spec. Paper 1, p. 152 [list].

Warthin (1937, card 102) incorrectly placed this species in synonymy with *Amphissites subquadratus* (Ulrich), 1891 (=*Arcyzona subquadrata*).

Geologic range.—Middle Devonian.

Arcyzona rhabdota Kesling, 1952

Arcyzona rhabdota Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 31, pl. 2, figs. 8, 9; pl. 5, figs. 2–6. Bell shale, Michigan Limestone and Chemical Co. at Calcite, near Rogers City, Presque Isle County, Mich.

Geologic range.—Middle Devonian.

Arcyzona? semimuralis (Ulrich), 1891

Kirkbya semimuralis Ulrich, 1891, Cincinnati Soc. Nat. History, v. 13, p. 193, pl. 15, figs. 3a, b, 4a–c. Onondaga formation, Falls of the Ohio, Louisville, Ky.

Amphissites semimuralis (Ulrich). Bassler and Kellett, 1934, Geol. Soc. America Spec. Paper 1, p. 154 [list].

Geologic range.—Middle Devonian.

Arcyzona subquadrata (Ulrich), 1891

Plate 8, figures 37–39

Kirkbya subquadrata Ulrich, 1891, Cincinnati Soc. Nat. History, Jour., v. 13, p. 192, pl. 15, figs. 1a–c. Onondaga formation, Falls of the Ohio, Louisville, Ky.

Amphissites subquadratus (Ulrich). Van Pelt, 1933, Jour. Paleontology, v. 7, p. 331, pl. 39, figs. 18–20. Bell shale, Presque Isle County, Mich.

Warthin, 1937, Wagner Free Inst. Sci., card 102. Same locality as above.

[not] *Amphissites subquadratus* (Ulrich). Warthin, 1934=*Arcyzona aperticarinata* Kesling and Weiss, 1953.

Geologic range.—Middle Devonian.

Arcyzona? ulrichi (Bassler), 1941

Amplissites ulrichi Bassler, 1941, Washington Acad. Sci. Jour., v. 31, p. 24, pl. 1, fig. 15 (upper right corner of plate, not below fig. 20). Camden chert, quarries along Nashville, Chattanooga & St. Louis Railway near Camden, Benton County, Tenn.

There are 15 specimens on the slide labeled holotype (USNM 101033). Swain (1953) does not mention the species in his revision of this faunule.

Geologic range.—Middle Devonian.

SPECIES REMOVED

Arcyzona homalosagenota Kesling, 1952=*Reticestus? homalosagenota* (Kesling), 1952.

Genus RETICESTUS Kesling and Weiss, 1953

Reticestus Kesling and Weiss, 1953, Michigan Univ., Mus. Paleontology, Contr., v. 11, p. 52.

Amphissites Girty. Roth, 1929, Jour. Paleontology, v. 3, p. 346.
Wilson, 1935, Jour. Paleontology, v. 9, p. 638.
Warthin, 1937, Wagner Free Inst. Sci., card 98.
Stewart, 1950, Jour. Paleontology, v. 24, p. 662.

Type species.—*R. acclivitatus* Kesling and Weiss, 1953, Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 3, p. 53, pl. 3, fig. 36. Norway Point formation, Michigan.

Diagnosis.—Subovate straight-backed reticulated ostracodes, with a subscentral pit, without velae or carinae. Ridge and groove hingement, and, according to original description, poorly developed teeth and sockets. Dorsum and marginal surface separated from lateral surface by a distinct bend.

Discussion.—Several species originally described in *Amphissites* belong to this genus. Some of the species do not have a flat platformlike area on the posterior part of the valve that is ascribed to the genus. This feature is here considered of specific value, as only one other species, *R. planus* (Wilson), shows that character.

Geologic range.—Middle or Upper Silurian(?)—Lower and Middle Devonian. Figure 26 shows the stratigraphic range of species in *Reticestus*.

Lithology.—Limestone, shale and marl.

Habitat.—Marine.

Reticestus acclivitatus Kesling and Weiss, 1953

Reticestus acclivitatus Kesling and Weiss, 1953, Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 3, p. 53, pl. 3, fig. 36. Norway Point formation, shale on southwest bank of Thunder Bay, about 1 mile downstream from Four Mile Dam, Alpena County, Mich.

Geologic range.—Middle Devonian.

Reticestus? altireticulatus (Swartz and Swain), 1941

Amphissites (?) *altireticulatus* Swartz and Swain, 1941, Geol. Soc. America Bull., v. 52, p. 429, pl. 4, figs. 3a–i; pl. 8, fig. 2. Onondaga formation, Pennsylvania.

?*Amphissites* (?) *altireticulella* Swartz and Swain, 1941, idem, p. 430, pl. 8, fig. 3. Same locality as above.

The two species placed in synonymy are based on molds and casts of specimens that have the internal node but not the rims of *Arcyzona*. *A.* (?) *altireticulella* is questionably referred to *Reticestus altireticulatus* (Swartz and Swain), 1941.

Geologic range.—Middle Devonian.

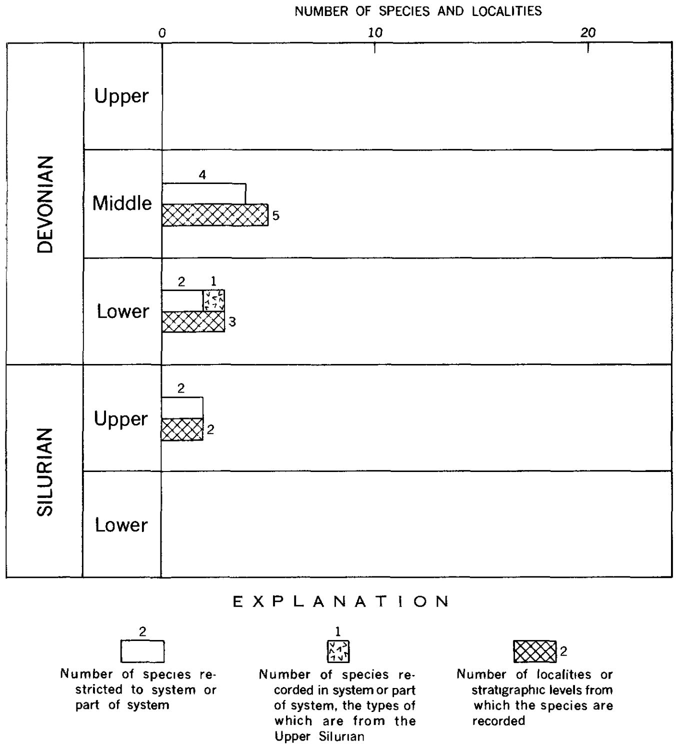

FIGURE 26.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Reticestus*.

Reticestus? concentricus (Ulrich and Bassler), 1913

Plate 11, figure 33

Primitia? concentrica Ulrich and Bassler, 1913, Maryland Geol. Survey Devonian volume: p. 517, pl. 95, figs. 6–8. Shriver chert, 21st Bridge, W. Va.

Amphissites concentricus (Ulrich and Bassler). Warthin, 1937. Wagner Free Inst. Sci., card 98, same illustrations and locality as above.

Geologic range.—Lower Devonian.

Reticestus? homalosagenota (Kesling), 1952

Arcyzona homalosagenota Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 34, pl. 5, figs. 17, 18. Bell shale, Presque Isle County, Mich.

The absence of an inner ridge probably places this species in *Reticestus* Kesling and Weiss, 1953.

Geologic range.—Middle Devonian.

Reticestus? ohioensis (Stewart), 1950

Amphissites ohioensis Stewart, 1950, Jour. Paleontology, v. 24, p. 662, pl. 86, figs. 10, 11. Upper part of the Delaware formation, bone bed no. 3, limestone, junction of McCoy Road and Scioto River Road, east side of the Scioto River, 1 mile north of Fishinger Bridge, Franklin County, and quarry, Miami Stone Co., west side of Olentangy River, 2 miles north of Bartholomew Run, Delaware County, Ohio.

This species does not have the flat platformlike area on the posterior part of the valve that is present in the type species.

Geologic range.—Middle Devonian.

Reticestus planus (Wilson), 1935

Plate 11, figures 19–22, 38–39

Amphissites planus Wilson, 1935, Jour. Paleontology, v. 9, p. 638, pl. 77, figs. 11a–d. Upper part of Birdsong formation, soft bluish calcareous shale, under western end of State Highway bridge over Tennessee River, just north of Perryville, Decatur County, Tenn.

Differs from the type species, *R. acclivitatus* Kesling and Weiss, by narrower anterior margin. Wilson's types consist of two cotypes (USNM 112892), a corroded carapace and a right valve. The right valve is here designated as the lectotype.

Geologic range.—Lower Devonian.

Reticestus? primaevus (Roth), 1929

Plate 11, figures 29–32

Amphissites primaevus Roth, 1929, Jour. Paleontology, v. 3, p. 346, pl. 36, fig. 10a. Upper Haragan marl (possibly Henryhouse), sec. 4, T. 2 N., R. 6 E., Pontotoc County, Okla.

?*Amphissites primaevus* Roth. Wilson, 1935, Jour. Paleontology, v. 9, p. 638 [list]. Birdsong formation, same locality as *R. planus*.

The slide (USNM 80658) contains with the holotype also a badly corroded carapace as well as five shell fragments. The dorsoposterior part of the holotype is broken, and none of the five shell fragments appear to fit the missing part. According to Amsden (1956, p. 49) the Haragan formation, if present at all, is very thin at the type locality of this species, and the specimens quite possibly come from the marlstone of the Henryhouse formation.

Geologic range.—Silurian, Lower Devonian (?).

Reticestus? retiferus (Roth), 1929

Plate 9, figures 49–51

Amphissites retiferus Roth, 1929, Jour. Paleontology, v. 3, p. 348, pl. 36, fig. 11a. Horizon and locality in doubt (see discussion).

? Wilson, 1935, Jour. Paleontology, v. 4, p. 638 [list].

This species is based on a right valve (USNM 80659) that has a vertical crack from the pit to the ventral margin (pl. 9, fig. 50). The slide has two localities: upper Haragan marl, sec. 4, T. 2 N., R. 6 E., Pontotoc County (see discussion of *R. primaevus*), and lower Haragan marl, "White Mound," sec. 20, T. 2 S., R. 3 E., Murray County, Okla. According to Amsden (1956, p. 49) both the Haragan marl and the Henryhouse formation are present in this area, and it is not certain from which formation this specimen was collected.

Geologic range.—Silurian (?)—Lower Devonian.

Family KIRKBYIDAE Ulrich and Bassler, 1906

Kirkbyinae Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 47.

Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 9.

Because Amphissitinae is raised to family rank; Kirkbyinae also is raised to family rank. The third subfamily, Kellettininae Sohn, 1954, based on the absence of a well-defined "kirkbyan" pit, becomes Kellettinidae. Sohn (1954, p. 9) referred *Aurikirkbya* Sohn, 1950, *Coronakirkbya* Sohn, 1954, and *Kirkbya* Jones, 1859, to this taxon. He tentatively placed in this family *Kirkbyites* Johnson, 1936, *Knightina* Kellett, 1933, and *Sinusuella* Spizharsky (1939?).

Kirkbyites is considered in this revision as a junior synonym of *Kegelites* Coryell and Booth, 1933, and removed to Amphissitidae. The new genus *Reviya* is added to Kirkbyidae.

Geologic range.—Mississippian through Permian.

Genus AURIKIRKBYA Sohn, 1950

Aurikirkbya Sohn, 1950, U.S. Geol. Survey Prof. Paper 221–C, p. 35.

Sohn, 1954, idem, 264–A, p. 9.

Type species.—Original designation, *Kirkbya wordensis* Hamilton, 1942, Jour. Paleontology, v. 16, p. 713, pl. 110, fig. 13. Permian, Glass Mountains, Tex.

Diagnosis.—Differs from *Kirkbya* Jones, 1859, by the presence of two well-defined lobes that connect ventrally by a lobe and by a very thick shelled venter.

Discussion.—*Kirkbya canyonensis* was originally assigned to this genus. Later study disclosed that the shell wall of the venter in this species is not thicker than the rest of the shell wall. It was therefore referred back to *Kirkbya* (Sohn, 1954, p. 9). Cooper (1946, p. 105) referred *K. canyonesis* and *K. knighti* to *K. kellettae* because he assumed all three to be growth stages of the same species. His inference is based on the fact that they all were described from one horizon and locality and that the greatest lengths of the three species are published as 0.76 mm, 0.92 mm, and 1.66 mm, respectively. Cooper's synonymy is not valid because my study of growth series of *A. wordensis* and *A. barbarae* (Sohn, 1950) demonstrates that the lobation is constant within the growth series that range in length from 0.8 to 1.76 mm and from 0.9 to 2.07 mm. The three species differ in lobation.

Geologic range.—Lower and Upper Pennsylvanian–Permian. Figure 27 shows the stratigraphic range of species in *Aurikirkbya*.

Lithology.—Limestone and shale.

Habitat.—Marine, probably bottom crawling form.

Aurikirkbya auriformis Sohn, 1950

Aurikirkbya auriformis Sohn, 1950, U.S. Geol. Survey Prof. Paper 221–C, p. 37, pl. 7, figs. 21a, d, 22a. Uppermost

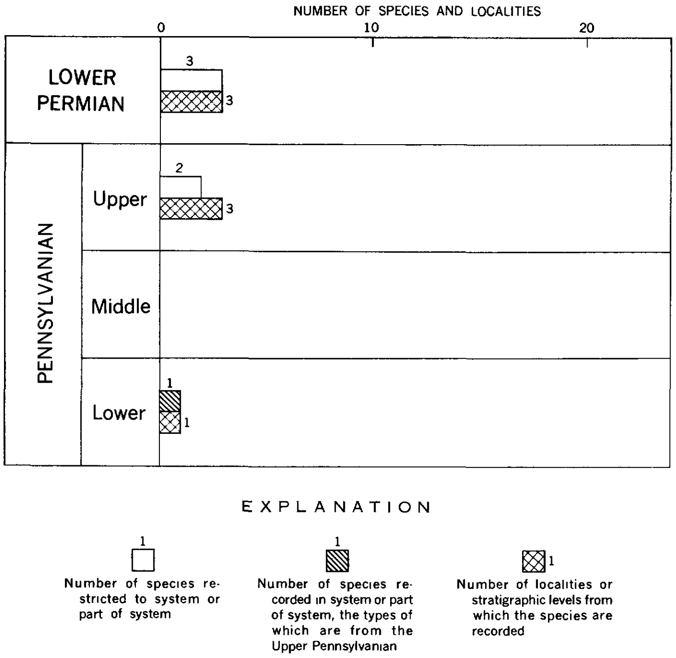

FIGURE 27.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Aurikirbya*.

Leonard or lowermost Word formation, silicified limestone, Glass Mountains, Hess Canyon quadrangle, Brewster County, Tex.

Geologic range.—Lower Permian.

Aurikirkbya barbarae Sohn, 1950

Aurikirkbya barbarae Sohn, 1950, U.S. Geol. Survey Prof. Paper 221–C, p. 36, pl. 7, figs. 14–20. Uppermost Leonard or lowermost Word formation, silicified limestone, Glass Mountains, Hess Canyon quadrangle, Brewster County, Tex.

Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, pl. 4, figs. 10, 11. Same locality as above.

Geologic range.—Lower Permian.

Aurikirkbya kellettae (Harlton), 1929

Plate 8, figures 48–50

Kirkbya kellettae Harlton, 1929, Texas Univ. Bull. 2901, p. 152, pl. 2, figs. 2a–d. Canyon group, Menard County, Tex.

Knightina kellettae Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 65, pl. 4, fig. 10. Shale, 1 ft below Otterville limestone, main gully, 200 yd south of north line, and one-fourth of a mile west of east line of sec. 12, T. 3 S., R. 2 E., Carter County, Okla.

[not] *Kirkbya kellettae* Harlton. Cooper, 1946=*Kirkbya canyonensis* Harlton, 1929.

It is a coincidence that Bradfield chose the same specific name that Harlton gave to the senior subjective synonym.

Geologic range.—Lower and Upper Pennsylvanian.

Aurikirkbya knighti (Harlton), 1929

Kirkbya knighti Harlton, 1929, Texas Univ. Bull. 2901, p. 153, pl. 2, figs. 4a, b. Canyon group. Menard County, Tex. Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 27, pl. 3, figs. 9–11. Eudora shale member, Stanton formation, Dyson Hollow, sec. 28, T. 13 N., R. 13 E., about 1½ miles west of La Platte, Douglas County, Nebr.

This species is characterized by a horizontal sulcus on the posterior lobe.

Geologic range.—Upper Pennsylvanian.

Aurikirkbya wordensis (Hamilton), 1942

Kirkbya wordensis Hamilton, 1942, Jour. Paleontology, v. 16, p. 713, pl. 110, fig. 13. Uppermost Leonard or lowermost Word formation, silicified limestone, Glass Mountains, Hess Canyon quadrangle, Brewster County, Tex.

Aurikirkbya wordensis (Hamilton). Sohn, 1950, U.S. Geol. Survey Prof. Paper 221–C, p. 236, pl. 7, figs. 1–13. Same locality as above.

Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 9, pl. 4, figs. 9, 21. Same locality as above.

Geologic range.—Middle Permian.

Genus REVIYA Sohn, n. gen.

Amphissites [in part of authors].

Ectodemites Cooper, 1941 [part], Illinois Geol. Survey Rept. Inv. 77, p. 49.

Polytylites Cooper, 1941 [part], Idem, p. 51.

Type species.—*Amphissites? obesus* Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 270, pl. 5, figs. 2, 3. Golconda formation, Illinois.

Diagnosis.—Straight-backed subelliptical tumid reticulated ostracodes without nodes or carinae and with elongate subcentral pit.

Discussion.—*Reviya* differs from *Knightina* Kellett, 1933, by the absence of a dorsoposterior shoulder, and from *Arcyzona* Kesling, 1952, in that the inner ridge is not thickened.

Geologic range.—Upper Mississippian. Figure 28 shows the stratigraphic range of species in *Reviya*.

Lithology.—Limestone and shale.

Habitat.—Marine.

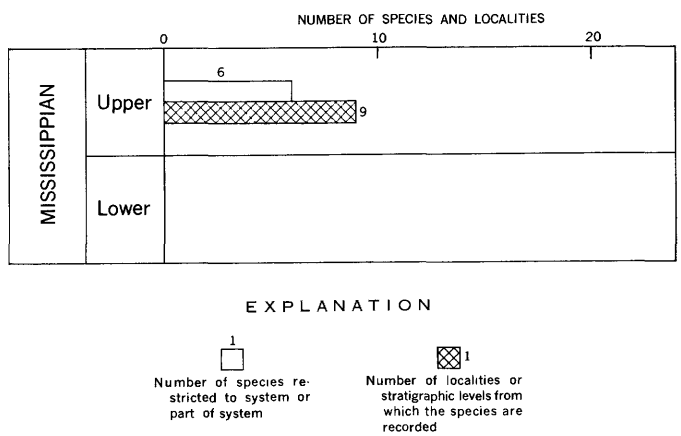

FIGURE 28.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Reviya*.

Reviya costellifera (Croneis and Bristol), 1939

Plate 9, figures 32–35

Amphissites costellifera Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 80, pl. 4, fig. 5. Menard formation, Illinois. (See discussion for locality.)

Amphissites decipiens Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 81, pl. 4, fig. 4. Menard formation, same locality as above.

Ectodemites costelliferus (Croneis and Bristol). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 50, pl. 9, fig. 22. Vienna formation, SE¼SW¼ sec. 26, T. 11 S., R. 1 W., Union County, Ill.

Ectodemites oblongus (Jones and Kirkby). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 50, pl. 9, fig. 23. Vienna formation, SE¼SW¼ sec. 26, T. 11 S., R. 1 W., Union County, Ill.

Discussion.—I am indebted to C. W. Collinson, Illinois Geological Survey, for the following description of the type locality of *R. costellifera* (Croneis and Bristol): "Sec. 18/RC/M=0218.27. Shale, dark gray, very fossiliferous with *Productus* and *Spirifer* in NW¼ SE¼ sec. 18, T. 11 S, R. 9 E., Hardin County, Illionis."

Geologic range.—Upper Mississippian.

Reviya? diversa (Cooper), 1941

Polytylites diversus Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 52, pl. 10, fig. 4. Vienna formation, SE¼SW¼ sec. 26, T. 11 S., R. 1 W., Union County, Ill.

Based on an immature specimen.

Geologic range.—Upper Mississippian.

Reviya gibbosa (Zanina), 1956

Amphissites gibbosus Zanina, 1956, Vsesoyus. Neft. Nauch.-Issled. Geologorazv. Inst. Trudy, new ser., no. 98, p. 234, pl. 6, figs. 8, 9a, b. Viséan, Russia.

Geologic range.—Carboniferous.

Reviya mimicus (Geis), 1932

Plate 9, figures 52–54

Amphissites mimicus Geis, 1932, Jour. Paleontology, v. 6, p. 164, pl. 23, figs. 12a–c. Salem limestone, railroad cut at Spergen Hill, Norris, Ind.

Brayer, 1952, Jour. Paleontology, v. 26, p. 173, pl. 28, figs. 2a, b. Salem limestone, roadcut west side of Missouri Highway 21, about one-fourth of a mile north of Meramec River bridge, St. Louis County, Mo.

Geologic range.—Upper Mississippian.

Reviya obesa (Croneis and Gale), 1939

Plate 9, figures 36–39

Amphissites? obesus Croneis and Gale, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 33, p. 270, pl. 5, figs. 2, 3. Golconda formation, limestone and shale in roadcut near Douglas School, Shawneetown quadrangle, sec. 25, T. 11 S., R. 8 E., Hardin County, Ill.

Ectodemites obesus (Croneis and Gale). Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 50, pl. 9, figs. 28, 29. Golconda formation, W½SW¼NW¼ sec. 5, T. 6 S., R. 1 W. Perry County, Ill., H. Forrester No. 1 well.

Carapace subquadrate; dorsal margin straight; ventral margin slightly convex; ends rounded; tumid, greatest width at midlength, approximately equal to height; reticulated, reticulations on periphery formed by anastomising ridges subparallel to free margins; central part of valve covered by smaller and more regular reticules. Horizontally elongated pit below and behind midpoint of valve. Two weakly developed marginal ridges parallel to free margins.

Geologic range.—Upper Mississippian.

Reviya? rotunda (Geis), 1932

Plate 11, figures 25–28

Amphissites rotundus Geis, 1932, Jour. Paleontology, v. 6, p. 162, pl. 23, figs. 11a, b. Salem limestone, Spergen Hill at Norris, Ind.

The holotype as well as topotype material (Alexander colln. 0.1505.1 now at the U.S. Natl. Mus.) are poorly preserved with an undeterminate thickness of shell material removed. The outline in dorsal view is more lanceolate than other species in *Reviya;* consequently its generic designation is tentative.

Geologic range.—Upper Mississippian.

Family KIRKBYELLIDAE Sohn, n. fam.

Diagnosis.—Subquadrate small essentially equivalved reticulated sulcate ostracodes with a distinct to subdued subventral horizontal lobe that terminates in a posterior spine, and with or without one marginal rim. Narrow ridge and groove hingement with minute terminal teeth.

Description.—This family is erected for *Kirkbyella*, *Berdanella* n. subgen. and *Psilokirkbyella* n. gen. It differs from Kirkbyidae by the absence of two marginal ridges and by having a sulcus instead of a kirkbyan pit.

Kirkbyella was originally assigned to Kirkbyidae. Henningsmoen (1953, p. 243) transferred the genus to the subfamily Kloedenellinae. The hinge structure of *Kirkbyella* excludes it from Kloedenellidae. Stover (1956, p. 1133) classified this genus under "Family incertae sedis."

Geologic range.—Silurian - Lower Pennsylvanian, Upper Pennsylvanian (?).

Genus KIRKBYELLA Coryell and Booth, 1933

Kirkbyella Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 262.

Warthin, 1937, Wagner Free Inst. Sci. card 80.

Shimer and Shrock, 1944, Index fossils of North America, p. 671.

Amphissites Girty. Van Pelt, 1933 [part], Jour. Paleontology, v. 7, p. 332.

Halliella Ulrich. Warthin, 1934, Michigan Univ., Mus. Paleontology, Contr., v. 4, no. 12, p. 208.

Stewart, 1936, Jour. Paleontology, v. 10, p. 746.

Turner, 1939, Bull. Am. Paleontology, v. 25, no. 88, p. 12.

Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, p. 25.
Kesling and Weiss, 1953, idem, v. 11, p. 35.

Type species.—Original designation, *K. typa* Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 262, pl. 3, fig. 7. Wayland shale, Texas.

Diagonsis.—Small straight-backed sulcate reticulate ostracodes; reticulated horizontal lobe with posterior pointing spine below sulcus. Narrow ridge and groove hingement; minute terminal teeth on right valve fit into sockets below groove of left valve. Essentially equivalved; free margin rabbeted at contact.

Discussion.—The original description of *Kirkbyella* is as follows: "Carapace small, subquadrate to suboblong; hingeline straight; free margin bordered; valves apparently equal; pronounced subcentral sulcus extending up to near the dorsal margin; surface reticulate; differs from *Kirkbya* in having a sulcus instead of a pit."

Upon examination of numerous specimens including the holotypes of species of *Kirkbyella*, and of polished cross sections, I conclude that the genus does not have the marginal ridges of *Kirkbya* (Sohn, 1954, pl. 2, figs. 9, 10) and that the statement "free margin bordered" is not correct.

Turner (1939, p. 12) commented on the close resemblance between *Kirkbyella bellipuncta* (Van Pelt), 1933, from Devonian rocks in Michigan and *K. typa* Coryell and Booth from Upper Pennsylvanian rocks in Texas. She based her opinion on the descriptions and illustrations of the species. The type material of *Kirkbyella typa* consists of a right and a left valve (Columbia Univ. Paleo. Colln. Cat. No. 27545). These two specimens are similar to specimens of *Kirkbyella bellipuncta* (Van Pelt) from the Devonian at Thedford, Ontario and western New York (compare pl. 12, figs. 13–15, with figs. 1–12). Except for the original description, there is no subsequent published record of *K. typa*, and a search through samples of Wayland shale failed to produce additional representatives of this or any other species of *Kirkbyella*. Pending future discovery of additional specimens in the Wayland shale, I propose to list the age of *Kirkbyella typa* as Pennsylvanian(?), and to recognize *K. bellipuncta* as a valid name for Middle Devonian specimens.

It seems possible that the originals of Coryell and Booth's Pennsylvanian species from Texas may have come from a sample of Devonian rocks in New York, Michigan, or Ontario. Were it possible to prove this, then *Kirkbyella bellipuncta* (Van Pelt) would be a junior synonym of *K. typa* Coryell and Booth because Coryell and Booth's paper was published in May 1933 and Van Pelt's paper is dated September 1933.

Most of the species assigned to *Kirkbyella* do not have the elevated subventral lobe; these are here removed to the new subgenus *Berdanella* and the new genus *Psilokirkbyella.*

Geologic range. — Silurian - Lower Pennsylvanian, Upper Pennsylvanian(?).

Lithology.—Shale, chert.

Habitat.—Marine.

Subgenus KIRKBYELLA Coryell and Booth, 1933

Diagnosis.—*Kirkbyella* with ventral lobe that merges with surface of the valve in anterior part, diverges from valve surface posteriorly where it is bounded by smooth, unreticulated, narrow rim.

Discussion.—The bordered ventral lobe elevated above the surface of the valve distinguishes species in this subgenus from species in the new subgenus *Berdanella.*

Geologic range.—Lower Devonian–Lower Pennsylvanian, Upper Pennsylvanian(?).

Lithology.—Shale, chert.

Habitat.—Marine.

SPECIES ACCEPTED

Kirkbyella (Kirkbyella) bellipuncta (Van Pelt), 1933

Plate 12, figures 1–12, 24

Amphissites bellipunctus Van Pelt, 1933, Jour. Paleontology, v. 7, p. 332, pl. 39, figs. 37–40. Bell shale, Michigan, possibly from a roadcut near the town of Bell.

Halliella bellipuncta (Van Pelt). Stewart, 1936, Jour. Paleontology, v. 10, p. 746, pl. 100, figs. 15, 16. Silica shale, 2½ ft of blue shale (zone 1) at the base of the quarry of the Sandusky Cement Co., at Silica, Lucas County, Ohio.

?*Halliella bellipuncta* (Van Pelt). Turner, 1939, Bull. Am. Paleontology, v. 25, no. 88, p. 12, pl. 1, fig. 3. Middle Devonian oil wells, Southwestern Ontario.

?*Halliella bellipuncta* (Van Pelt). Loranger, 1954, Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 199, pl. 2, figs. 21, 22. Ireton member of Woodbend formation, Bear Biltmore No. 1 well, 638–664 ft, Alberta, Canada.

Kesling, 1952, Michigan Univ., Mus. Paleontology, Contr., v. 10, p. 26, pl. 1, figs. 16–20. Bell shale, sink filling in Rogers City limestone, quarry of the Michigan Limestone and Chemical Co. at Calcite, near Rogers City, Presque Isle County, Mich., and basal 10 ft of Bell shale overlying Rogers City limestone in the south wall of the same quarry, NW¼NE¼ sec. 1, T. 34 N., R. 5 E.

Kesling and Weiss, 1953, idem, v. 11, p. 35, pl. 3, figs. 21, 22. Norway Point formation, shale exposures on southwest bank of Thunder Bay River, about 1 mile downstream from Four Mile Dam (also called Fletcher Dam, Three Mile Dam, and Broadwell's Saw Mill), Alpena County, Mich.

[not] *Halliella bellipuncta* Warthin, 1934, Michigan Univ., Mus. Paleontology, Contr., v. 4, no. 12, p. 208, pl. 1, fig. 2= *Psilokirkbyella* sp.

Kirkbyella bellipuncta transversa Stewart and Hendrix, 1945, Jour. Paleontology, v. 19, p. 90, pl. 10, figs. 12–14. Plum Brook shale, about 2 miles northeast of Prout Station on the Baltimore and Ohio Railroad, along the creek SW¼SE¼ of T. 6 N., R. 23 W., Sandusky quadrangle. Erie County, Ohio.

Kirkbyella tora Stover, 1956, Jour. Paleontology, v. 30, p. 1133, pl. 119, figs. 17–21 [not fig. 22=*Psilokirkbyella* sp.]. Windom shale, small exposure 0.3 mile south of the intersection of New York Route 63 and Starr road. Sample from upper 10 ft. of weathered Windom shale, along the north bank of a pond. Genesee County, N.Y.

The striking similarity between *K. bellipuncta* and *K. typa* Coryell and Booth, 1933, was pointed out in the discussion of the genus. Stewart and Hendrix (1945, p. 90) based their variety *K. bellipuncta transversa* on specimens that fall within the range of individual variations of *K. bellipuncta* (pl. 12, figs. 1–10). *K. tora* Stover, 1956, is based on specimens that have a well-developed node at the end of the longitudinal ridge. This feature (pl. 12, figs. 2, 9, 10) is variable, and is considered here as not of specific value, consequently it is placed in synonymy with *K. bellipuncta.*

Geologic range.—Middle Devonian.

Kirkbyella (Kirkbyella) typa Coryell and Booth, 1933

Plate 12, figures 13–17

Kirkbyella typa Coryell and Booth, 1933, Am. Midland Naturalist, v. 14, p. 262, pl. 3, fig. 7. Wayland shale, near Graham, Young County, Tex.

The striking similarity of this Upper Pennsylvanian species to Middle Devonian species is discussed under the genus. Compare plate 12, figures 13, 16, with figures 1–10, and figure 15 with figures 11, 24.

Geologic range.—Upper(?) Pennsylvanian.

Kirkbyella (Kirkbyella) ventricosa (Swartz), 1936

Plate 10, figure 41

Primitiella? ventricosa Swartz, 1936, Jour. Paleontology, v. 10, p. 568, pl. 87, figs. 1a–d. Middle part of Shriver chert, *Metaplasia plicata* zone, Curtin, Dauphin(?) County, Pa.

Kirkbyella ventricosa (Swartz). Warthin, 1937, Beyrichiacea *in* Type invertebrate fossils in North America (Devonian), unit 9A: Wagner Free Inst. Sci. card 84.

The type material consists of three specimens (USNM 94196), two external molds and one internal cast. The holotype is a squeeze of an external mold of a left valve that does not show any surface reticulation. A rubber cast of a paratype (pl. 10, fig. 41) shows the recticulations, and the raised horizontal lobe of *Kirkbyella.* The sulcus in this species is slightly more anterior than in the other species of *Kirkbyella.* One of the paratypes, the original of Swartz's figure 1b, is an internal cast of a left valve, and has small triangular spines along the ventral margin at the angulation between the lateral and ventral surfaces. Swartz (1936, p. 568) suggested that these might represent coarse internal openings at the ventral angulation. This feature has not been noted in any other species of *Kirkbyella* or *Berdanella.*

Geologic range.—Lower Devonian.

Kirkbyella (Kirkbyella) sp. indet.

Kirkbyella cf. *K. gutkei* Croneis and Bristol. Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 19 [list], 21 [list], 106, pl. 17, fig. 9. Shale on top of Fulda limestone, NW¼ sec. 11, T. 5 S., R. 4 W., Spencer County, Ind.

Cooper (1946, p. 107) states that he found a single distorted and broken valve. The illustration is of a specimen that does not have the characteristic ornamentation of *K. gutkei*; consequently it is listed here as an indeterminate species.

Geologic range.—Lower Pennsylvanian.

SYNONYMS AND REJECTED AND TRANSFERRED SPECIES OF KIRKBYELLA

bellipuncta (Van Pelt). Warthin, 1934=*Psilokirkbyella* sp.

bellipuncta transversa Stewart and Hendrix, 1945=*K.* (*Kirkbyella*) *bellipuncta* (Van Pelt), 1933.

devonica Gibson. 1955=*K.*? (*Berdanella*?) *devonica* (Gibson), 1955.

? *dubia* Morey, 1936, Jour. Paleontology, v. 10, p. 118, pl. 17, fig. 5. Chouteau formation, near Brown's Station, Mo. Only one specimen of this species was found. This specimen, here illustrated on pl. 10, figs. 44–46, is more closely related to *Knoxina* than to any other Upper Paleozoic genus.

gutkei Croneis and Bristol, 1939=*K.* (*Berdanella*) *gutkei* (Croneis and Bristol), 1939.

cf. *K. gutkei* Croneis and Bristol. Cooper, 1946=*K.* sp. indet.

magnopunctata Wilson, 1935=*Psilokirkbyella magnopunctata* (Wilson), 1935.

obliqua Coryell and Cuskley, 1934=*K.* (*Berdanella*) *verticalis* (Coryell and Cuskley), 1934.

ozarkensis Morey, 1936=*Psilokirkbyella ozarkensis* (Morey), 1936.

perplexa Wilson, 1935=*K.* (*Berdanella*) *verticalis* (Coryell and Cuskley), 1934.

quadrata Croneis and Gutke, 1939=*K.* (*Berdanella*) *quadrata* (Croneis and Gutke), 1939.

rhomboidalis Swartz and Swain, 1941=*K.* (*Berdanella*) *rhomboidalis* (Swartz and Swain), 1941.

scapha Morey, 1935, Jour. Paleontology, v. 9, p. 320, pl. 28, fig. 14. Basal Mississippian sandstone, 3 miles north of Williamsburg, Mo. The type slide (Missouri Univ. colln. OS 1001–4) is labeled Sylamore sandstone, it contains four specimens that are definitely not *Kirkbyella.* One of these specimens is here illustrated on pl. 10, fig. 40. Their proper generic assignment is at present unknown.

sulcata Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 47, pl. 10, figs. 13, 14. Paint Creek formation, along Mississippi River bluffs, SW¼ sec. 4, T. 6 S., R. 8 W., Randolph County, Ill. The type of this species was examined at the Illinois Geological Survey in 1954. At that time it was decided that the specimen does not belong to *Kirkbyella* and may represent an internal mold of an undetermined genus.

tora Stover, 1956=*K.* (*Kirkbyella*) *bellipuncta* (Van Pelt), 1933.

truncata Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 47, pl. 10, figs. 8, 9. Menard formation, SE¼SW¼ sec. 2, T. 7 S., R. 7 E., Randolph County, Ill. The same conclusion as for *K. sulcata*.

(?) *undulata* Zanina, 1956, Vsesoyus. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., v. 98, p. 227, pl. 5, fig. 4. Viséan, Moscow Basin, Russia. The lack of a ventural lobe excludes this species from *Kirkbyella*, the species might possibly belong to the same genus as Cooper's *K. truncata* and *K. sulcata*.

unicornis Coryell and Malkin, 1936=*K.* (*Berdanella*) *unicornis* (Coryell and Malkin), 1936.

unicornis Coryell and Malkin. Stewart, 1950=*K.* (*Berdanella*) *stewartae* Sohn, n. sp.

verticalis Coryell and Cuskley, 1934=*K.* (*Berdanella*) *verticalis* (Coryell and Cuskley), 1934.

Subgenus BERDANELLA Sohn, n. subgen.

Type species.—*Kirkbyella perplexa* Wilson, 1935, Jour. Paleontology, v. 9, p. 639, pl. 77, figs. 12a–d. Birdsong shale, Tennessee.

Diagnosis.—Subventral lobe, except posterior pointing spine, indistinct, merges with lateral surface of valve.

Discussion.—This subgenus is established for species previously assigned to *Kirkbyella* that do not have a distinctly bordered horizontal lobe. The reticulations of the lateral surface of the valve continue uninterrupted over the lobe.

This subgenus is named in honor of my colleague Jean M. Berdan, U.S. Geological Survey.

Geologic range.—Silurian-Upper Mississippian. Figure 29 shows the stratigraphic range of the species in *Berdanella*.

Lithology.—Shale.

Habitat.—Marine.

Kirkbyella? (Berdanella?) devonica (Gibson), 1955

Plate 12, figures 25–28, 34

Kirkbyella devonica Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 10, pl. 1, fig. 15. Upper Devonian, Cerro Gordo formation. Clay pit operated by the Rockford Brick and Tile Co., Rockford, Iowa.

The species is distinguished by the pointed ventral ridge that joins the posterior margin and by the position of the sulcus, which is posterior to midlength. The presence of a marginal rim (pl. 12, fig. 34) makes uncertain the assignment of this species to *Kirkbyella*. The reticulated ventral lobe excludes it from *Psilokirkbyella*.

Geologic range.—Upper Devonian.

Kirkbyella (Berdanella) gutkei (Croneis and Bristol), 1939

Kirkbyella gutkei Croneis and Bristol, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 84, pl. 4, figs. 14, 15. Menard formation, Illinois.

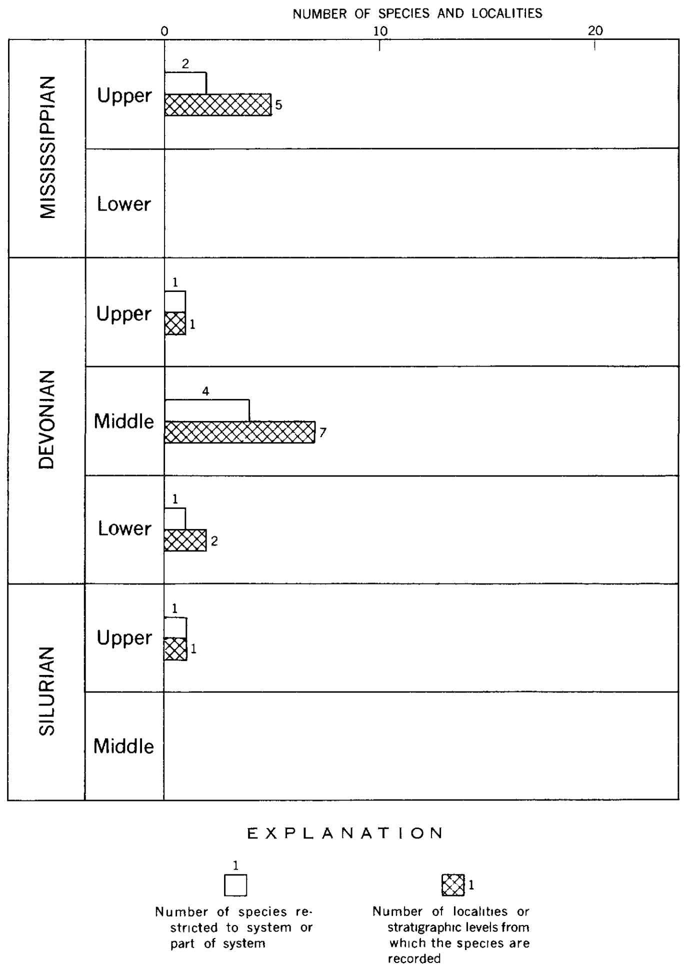

FIGURE 29.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic level at the same locality, of species in *Kirkbyella* (*Berdanella*).

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 18 [list], pl. 10, figs. 20, 21. Menard formation, SE¼SW¼ sec. 28, T. 11 S., R. 1 W. Union County, Ill.

[not] *Kirkbyella* cf. *K. gutkei* Croneis and Bristol. Cooper, 1946=*Kirkbyella* sp. indet.

The wavy reticulation pattern, especially along the ventral lobe, distinguishes this species. Cooper (1941, p. 18) records this species also from the Glen Dean and Clore formations.

Geologic range.—Upper Mississippian.

Kirkbyella (Berdanella) quadrata (Croneis and Gutke), 1939

Plate 10, figures 31–33

Kirkbyella quadrata Croneis and Gutke, 1939, Denison Univ. Bull., Jour. Sci. Lab., v. 34, p. 48, pl. 1, fig. 12. Renault formation, Illinois.

Cooper, 1941, Illinois Geol. Survey Rept. Inv. 77, p. 18 [list], pl. 10, figs. 18, 19. Renault formation (Shetlerville?), SW¼SE¼ sec. 5, T. 13 S., R. 8 E., at loading docks for fluorspar southwest of Rosiclare, Hardin County, Ill.

Differs from *K.* (*B.*) *gutkei* (Croneis and Bristol), 1939, in pattern of reticulations. Cooper (1941, p. 18) lists this species also in the Golconda and Vienna formations. The illustrated specimen is probably from Cooper's locality (USGS loc. 12844).

Geologic range.—Upper Mississippian.

Kirkbyella (Berdanella?) rhomboidalis (Swartz and Swain), 1941

Kirkbyella rhomboidalis Swartz and Swain, 1941, Geol. Soc. America Bull. 52, p. 430, pl. 4, figs. 4a–c. Onondaga beds, weathered calcareous shale and argillaceous limestone, along highway on the west side of Kishacoquillas Creek, opposite Mount Rock village, Cumberland County; weathered fossiliferous slabs of Onondaga formation, along the highway to Markelville, 1.9 miles by map northwest of the New Bloomfield square, about 200 ft north of the old Clarks Mill building, and about one-fourth of a mile north of McKee crossroads, Pennsylvania.

This species is based on casts and molds in weathered slabs and may prove to be conspecific with one of the several Middle Devonian species of *K.* (*Berdanella*).

Geologic range.—Middle Devonian.

Kirkbyella (Berdanella) stewartae Sohn, n. sp.

Plate 10, figures 34–36

Kirkbyella unicornis Coryell and Malkin. Stewart, 1950, Jour. Paleontology, v. 24, p. 662, pl. 86, figs. 13, 14. Third Bone bed, Delaware formation, roadside exposure, junction of McCoy Road and Scioto River Road, east side of Scioto River, 1 mile north of Fishinger Bridge, Franklin County, Ohio.

This species differs from *K.* (*B.*) *unicornis* by having an acute dorsoposterior angle and by having a horizontal pattern of reticulation covering the entire carapace.

In addition to the holotype, a right valve, the type slide (Ohio State Univ., Geol. Mus. No. 19594) contains a smaller, poorly preserved left valve.

Geologic range.—Middle Devonian.

Kirkbyella (Berdanella) unicornis (Coryell and Malkin), 1936

Plate 10, figure 43

Kirkbyella unicornis Coryell and Malkin, 1936, Am. Mus. Novitates, no. 891, p. 5, pl. 1, fig. 13. Coral zone of the Widder Beds in the Hamilton group, just above the Encrinal Limestone, on the Ausable River, about 1½ miles east of Arkona, in the southeastern part of Bosanquet Township, Lambton County, Ontario, Canada.

Stover, 1956, Jour. Paleontology, v. 30, p. 1133, pl. 119, fig. 26. Windom shale, type section of the Moscow formation along Little Beards Creek, 0.5 mile east of New York Route 36 and 0.75 mile north of Leicester, Livingston County, N.Y.

[not] *Kirkbyella unicornis* Coryell and Malkin. Stewart, 1950= *Kirkbyella* (*Berdanella*) *stewartae* n. sp.

This species is distinguished by its fine reticulation, and lateral outline which is truncated ventroposteriorly.

Geologic range.—Middle Devonian.

Kirkbyella (Berdanella) verticalis (Coryell and Cuskley), 1934

Plate 10, figure 42; plate 12, figures 18–23, 29–33

Kirkbyella verticalis Coryell and Cuskley, 1934, Am. Mus. Novitates no. 748, p. 2, fig. 1. Haragan shale. "White Mound," Murray County, Okla.

Warthin, 1937, Wagner Free Inst. Sci. card 85.

Stover, 1956, Jour. Paleontology, v. 30, p. 1134, pl. 119, figs. 23–25. Type section of the Moscow formation, along Little Beards Creek, 0.5 mile east of New York Route 36 and 0.75 mile north of Leicester, Livingston County, N.Y.

Kirkbyella obliqua Coryell and Cuskley, 1934, Am. Mus. Novitates, no. 748, p. 2, fig. 2. Hargan shale, "White Mound," Murray County, Okla.

Kirkbyella perplexa Wilson, 1935, Jour. Paleontology, v. 9, p. 639, pl. 77, figs. 12a–d. Birdsong shale, north side of road which crosses small glades, 2½ miles northeast of Parsons, Decatur County, Tenn.

Wilson distinguished his species from *K.* (*B.*) *verticalis* because his species does not have a narrow unreticulated border around the free margins. A growth series from the Haragan formation of more than 30 specimens suggests that the unreticulated border is due to abrasion (compare pl. 10, fig. 42, with pl. 12, fig. 22). A specimen of *K.* (*B.*) *verticalis* from the Haragan formation was converted to one that resembles *K.* (*B.*) *obliqua* by painting the margins with dilute hydrochloric acid and thereby removing the reticulations. The holotype of *K.* (*B.*) *verticalis* is lost, and the holotype of *K.* (*B.*) *obliqua* is illustrated on plate 10, figure 42. Both Warthin (1937, card 85) and Stover (1956, p. 1134) place Coryell and Cuskley's two species in synonymy.

Geologic range.—Lower and Middle Devonian.

Kirkbyella (Berdanella) n. sp.

Plate 10, figures 37–39

A single left valve from the Henryhouse formation, Oklahoma, has random distributed reticulations like *K.* (*B.*) *unicornis* (Coryell and Malkin), 1936, from which it differs in lateral outline. This oldest known species in the genus is not named because it is represented by only a single specimen.

Geologic range.—Silurian, Henryhouse formation (USNM loc. 472–C).

Genus PSILOKIRKBYELLA Sohn, n. gen.

Type species.—*Kirkbyella magnopunctata* Wilson, 1935, Jour. Paleontology, v. 9, p. 639, pl. 77, figs. 13a, b. Birdsong shale, Tennessee.

Diagnosis.—Differs from *Kirkbyella* Coryell and Booth, 1933, by possessing an unreticulated subventral lobe and a distinct marginal ridge.

Discussion.—Species in *Kirkbyella* and *Berdanella* have a wide reticulated ventral lobe, while those in *Psilokirkbyella* have a smooth narrow lobe. The single marginal ridge is not reticulated nor does it have any reticulations between it and the contact margin as do the ridges in *Kirkbya.* This ridge extends along the dorsal margin to the sulcus, while in *Kirkbya* the two ridges terminate at the cardinal angles. Stover (1956, pl. 119, fig. 22) illustrates a paratype of *Kirkbyella tora* Stover, 1956=*K. bellipuncta* (Van Pelt), 1933, that has a smooth subventral lobe diagnostic of this genus. It is here referred to *Psilokirkbyella* sp.

Geologic range.—Devonian-Lower Mississippian.

Lithology.—Shale.

Habitat.—Marine.

Psilokirkbyella magnopunctata (Wilson), 1935

Plate 10, figure 47

Kirkbyella magnopunctata Wilson, 1935, Jour. Paleontology, v. 9, p. 639, pl. 77, figs. 13a, b. Birdsong shale, soft bluish calcareous, in the river bank at the steel bridge 4½ miles above the mouth of the Big Sandy River, 1½ miles east of Antioch Church, Henry County, Tenn.

Warthin, 1937, Wagner Free Inst. Sci. card 81.

The original of Wilson's figure 13b, a right valve, is here designated as the lectotype. Warthin (1937, card 87) states that this species is present also in the Haragan marl at White Mound, Murray County, Okla.

Geologic Range.—Lower and Middle(?) Devonian.

Psilokirkbyella ozarkensis (Morey), 1936

Plate 10, figure 48

Kirkbyella ozarkensis Morey, 1936, Jour. Paleontology, v. 10, p. 118, pl. 17, fig. 1. Chouteau formation, shale seams, north edge of the town of Ozark, Christian County, Mo.

Differs from *P. magnopunctata* (Wilson) in lateral outline and by the ventral lobe terminating in a blunt spine and by the marginal ridge being narrower. Morey lists this species also from the lower Chouteau formation near Brown's Station, Boone County, Mo.

Geologic range.—Lower Mississippian.

Psilokirkbyella sp.

Halliella bellipuncta (Van Pelt). Warthin, 1934, Michigan Univ., Mus. Paleontology, Contr., v. 4, p. 208, pl. 1, fig. 2. Traverse Group, lower Thunder Bay series, blue shale on south side of Thunder Bay River, at base of Seven-Mile Dam, sec. 12, T. 31 N., R. 7 E., Alpena County, Mich.

Kirkbyella tora Stover, 1956 [part], Jour. Paleontology, v. 30, p. 1133, pl. 119, fig. 22 [not figs. 17–21=*Kirkbyella* (*Kirkbyella*) *bellipuncta* (Van Pelt), 1933]. Windom shale, small exposure 0.3 mile south of the intersection of New York Route 63 and Starr road. Sample from upper 10 ft. of weathered Windom shale, along the north bank of a pond. Genesee County, N.Y.

The illustration and the description of this specimen exclude it from *K.* (*K.*) *bellipuncta.* Warthin states that "a strong smooth ridge, parallel to the dorsal margin crosses each valve from the posterior border nearly to the anterior end, where it ends in a knob or anteriorly directed blunt spine * * *." The orientation should be reversed 180°.

Geologic range.—Middle Devonian.

Family PLACIDEIDAE Schneider, 1956

Placideidae 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., Paleont., no. 12, p. 95.

Miss Inna V. Poiré very kindly translated the original description of this taxon as follows:

Diagnosis.—Valves elongate oval, moderately convex. Anterior and posterior ends are of the same height, usually rounded. Dorsal and ventral margins parallel. Surface definitely reticulated.

Adductor muscle scars in center of valve forming an irregularly rounded rosette, consisting of minute irregularly angular spots, numbering up to 40.

The representatives of this family are known from upper Permian deposits, which occur on the Russian platform.

Miss Poiré translates the original description of *Placidea* as follows:

GENUS PLACIDEA Schneider, 1956

Placidea 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, new ser., Paleant., no. 12, p. 95.

Type species.—*Amphissites lutkevichi* Spizharsky [1939], Upper Permian, Tatarian stage, basin of the Sukhona River.

Diagnosis.—Valves are subrectangular, elongated; posterior dorsal and anterior dorsal angles are usually well developed; valves are flattened and thin. Dorsal margin straight; ventral margin slightly concave in the medial part. Ends rounded, equal in height, or anterior is slightly lower. The margins of the valves, except for the dorsal, are flattened [frilled?]. Pore canal zone slightly transparent; canals thin, straight, and distributed in pairs. Surface of valves finely reticulated, occasionally has from 1 to 3 well-developed small tubercles. Hinge margin thin and simple: in the left valve, the hinge consists of a groove in the dorsal margin into which fits the sharp knifelike margin of the right valve. Muscle scars (fig. 18) of the family Placideidae.

Basis for separating this genus.—The genus *Placidea* is characterized by very definite marks which separate this genus from all other known genera. This genus is similar to *Volganella*, from which it differs by the outline of the valves and by the sculpture of the shells.

The genus *Volganella* Sharapova and Mandelstam, 1956(?), family Volganelidae Mandelstam, 1956, is described by Mandelstam on page 94 of the same publication as *Placidea.* There is some inconsistency about the date of publication because Kim (1955, p. 35) lists *Volganella lutkevitchi* (Spizharsky), suggesting that the genus was available prior to 1956.

Placideidae as based on the type genus may include the Devonian genera *Amphissella* Stover, 1956, and *Doraclatum* Stover, 1956. Both of these genera have thin marginal ridges and subcentral pits. However, the number and shape of muscle spots in these pits, are not known. Cooper (1946, pl. 17, figs. 30, 33) illustrates the muscle scar roseatte of *Roundyella* Bradfield, 1935. *Roundyella* is excluded from this family because it does not have marginal ridges (Sohn, 1954, p. 19, pl. 4, figs. 14, 16, 19, 22).

Genus AMPHISSELLA Stover, 1956

Amphissella Stover, 1956, Jour. Paleontology, v. 30, p. 1134.

Amphissites Girty. Coryell and Malkin, 1936 [part], Am. Mus. Novitates, no. 891, p. 4.

?*Roundyella* Bradfield. Přibyl, 1953, Czechoslovakia, Stát. Ustř. úst. geol., Sbornik, v. 20, Paleont, p. 254, 296, 329.

Type species.—Original designation, *A. papillosa* Stover, 1956, Jour. Paleontology, v. 30, p. 1134, pl. 119, figs. 11, 12. Windom shale, New York.

Diagnosis.—Small straight-backed subelliptical to subquadrate reticulated or papillose ostracodes, with subcentral smooth spot and marginal ridge.

Discussion.—This genus differs from *Roundyella* Bradfield, by possessing a marginal ridge that is illustrated as gen. undet. aff. *Roundyella* by Sohn (1954, p. 19, pl. 4, fig. 8).

Geologic range. — Middle and Upper Devonian, Lower Mississippian(?). Figure 30 shows the stratigraphic range of species in *Amphissella.*

Lithology.—Shale, limestone, sandstone(?).

Habitat.—Marine.

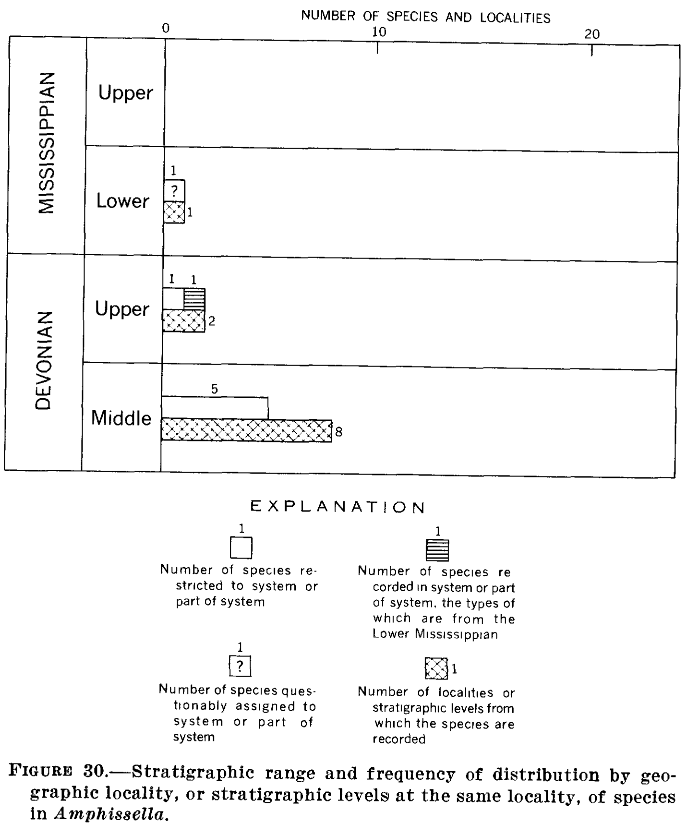

FIGURE 30.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Amphissella.*

Amphissella? angustai (Pokorný), 1950

Roundyella angustai Pokorný, 1950, Czechoslovakia Stát Ústř. úst. geol., Sbornik, v. 17, Paleont. p. 544, 607, pl. 2, figs. 4a–c. Givetian, red, marly coral limestone, abandoned Rizicka quarry, Czechoslovakia.

The channeled dorsum and nonreticulated area around the margins suggest that this may belong to an undescribed genus.

Geologic range.—Middle Devonian.

Amphissella? calceolae (Gürich), 1896

Primitia calceolae Gürich, 1896, Russ. K. min. Gesell., St. Petersburg, Verh., ser. 2, v. 32, p. 384, pl. 14, figs. 6a, b. Middle Devonian, Skaly, Poland.

Roundyella calceolae (Gürich). Přibyl, 1953, Czechoslovakia Stát. Ústř. úst. geol., Sbornik, v. 20, Paleont, p. 255, 297, 330, pl. 5, figs. 1–13, text fig. 4. Givetian, Grzegorzewice-Skaly, St. Croix Mountains, Poland.

Characterized by large size, 1 mm in length.

Geologic range.—Middle Devonian.

Amphissella fimbriamarginata (Gibson), 1955

Roundyella fimbriamarginata Gibson, 1955, Bull. Am. Paleontology, v. 35, no. 154, p. 11, pl. 2, fig. 11. Cerro Gordo formation, clay pit. Rockford Brick and Tile Co., Rockford, Iowa.

Geologic range.—Upper Devonian.

Amphissella genetiva (Morey), 1935

Plate 7, figures 5–7, 13, 14

Amphissites genetivus Morey. Jour. Paleontology, v. 9, p. 320, pl. 28, fig. 4. Basal Mississippian sandstone (may be reworked Devonian), 3 miles north of Williamsburg, Mo.

?*Amphissites genetivus* Morey, 1935. Loranger, 1954, Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 197, pl. 2, figs. 25, 26. Ireton shale member, Woodbend formation, Imperial Egremont No. 1 well, 3,200–3,209 ft., Alberta, Canada.

?*Amphissites peculiaris* Morey, 1935, idem, p. 319, pl. 28, fig. 3. Same locality as above.

Both species are from the same locality and are very likely conspecific. The type of *A. peculiaris* is not as well preserved as that of *A. genetiva.*

Geologic range.—Upper Devonian or Lower Mississippian.

Amphissella papillosa Stover, 1956

Amphissella papillosa Stover, 1956, Jour. Paleontology, v. 30, p. 1134, pl. 119, figs. 11, 12. Windom shale, western New York.

?*Amphissites simplicissimus* Knight. Coryell and Malkin, 1936, Am. Mus. Novitates, no. 891, p. 4, figs. 11, 11a. Widder beds, Hamilton group, Arkona, Ontario, Canada.

?Genus undet. aff. *Roundyella* Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 19, pl. 4, fig. 8. Devonian, Thedford, Ontario, Canada.

Geologic range.—Middle Devonian.

Amphissella? tenuis (Warthin), 1934

Amphissites tenuis Warthin, 1934, Michigan Univ., Mus. Paleontology, Contr., v. 4, no. 12, p. 215, pl. 1, fig. 13. Upper Gravel Point stage, zone 6, bed 3, calcareous shale, Charlevoix Rock Products Co., sec. 33, Charlevoix County, Mich.

The subquadrate outline suggests that the type of this species might be an immature individual of some other genus.

Geologic range.—Middle Devonian.

Amphissella? sp. A

Roundyella? sp. A. Krömmelbein, 1954, Senckenbergiana, v. 43, p. 256, pl. 2, fig. 12. Givetian, Paffrather Mulde, Germany.

The single specimen is corroded, but the illustration suggests a marginal frill.

Geologic range.—Middle Devonian.

Genus DORACLATUM Stover, 1956

Doraclatum Stover, 1956, Jour. Paleontology, v. 30, p. 1136.
Amphissites Girty. Coryell and Malkin, 1936 [part], Am. Mus. Novitates, no. 891, p. 5.

Type species.—Original designation, *D. compandium* Stover, 1956 (=*D. conatus?* (Coryell and Malkin), 1936), Jour. Paleontology, v. 30, p. 1136, pl. 119, figs. 1–5. Windom shale, New York.

Diagnosis.—Differs from *Amphissella* Stover, 1956, by possessing a dorsocentral node.

Discussion.—As stated by Stover (1956, p. 1137), the type of this species is very close to, and may be conspecific with, *Amphissites conatus* Coryell and Malkin, 1936. Unfortunately, the type of *A. conatus* is not available for comparison; consequently, Stover made a new species for his specimens. In this revision, the former species is given priority, and Stover's species is recorded as a possible junior synonym.

Geologic range.—Middle Devonian.

Lithology.—Shale.

Habitat.—Marine.

Doraclatum conatus (Coryell and Malkin), 1936

Amphissites conatus Coryell and Malkin, 1936, Am. Mus. Novitates, no. 891, p. 5, figs. 12, 12a. Widder beds in the Hamilton group, Ausable River, 1½ miles east of Arkona, southeastern part of Bosanquet township, Lambton County, Ontario, Canada.
?*Doraclatum compandium* Stover, 1956, Jour. Paleontology, v. 30, p. 1136, pl. 119, figs 1–5. Windom shale, western New York.

So far as can be determined from the descriptions and the illustrations, the two are conspecific.

Geologic range.—Middle Devonian.

Family SCROBICULIDAE Posner, 1951

Scrobiculidae Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no 56, p. 52.

Diagnosis.—Subquadrate or suboval small straight-hinged inequivalved, reticulated ostracodes. Tongue and groove hingement slightly impressed. Subcentral roseate muscle scar. No marginal ridges.

Discussion.—This family was described to include only the Lower Carboniferous genus *Scrobicula* Posner, 1951. Based on the position of the muscle scar, the orientation of *Scrobicula* should be reversed 180°. One of the species, *Scrobicula cincinnata* Posner, 1951, belongs in *Roundyella* Bradfield, 1935. The North American Middle Devonian species *Roundyella? concentrica* Stover, 1956, belongs to *Scrobicula.*

Geologic range.—The stratigraphic range of this family is Middle Devonian (?), Mississippian-Permian.

Genus ROUNDYELLA Bradfield, 1935

Roundyella Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 66.
Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 108.
Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 19.
Amphissites Knight, 1928 [part], Jour. Paleontology, v. 2, p. 258.
Scaberina Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 67.

Type species.—Original designation, *Amphissites simplicissimus* Knight, 1928, Jour. Paleontology, v. 2, p. 266, pl. 32, figs. 11a–d; pl. 34, fig. 6. Middle Pennsylvanian, Missouri.

Diagnosis.—Straight-backed, reticulated or papillose small ostracodes with subcentral smooth muscle spot, and without marginal ridges.

Discussion.—See Sohn (1954, p. 19).

Geologic range.—Mississippian-Permian. Figure 31 shows the stratigraphic range of species in *Roundyella.*

Lithology.—Shale, limestone.

Habitat.—Marine.

Roundyella bellatula Bradfield, 1935

Roundyella bellatula Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 66, pl. 4, fig. 11. Dornick Hills formation, shale below Otterville limestone, main gully, 200 yd south of north line, and one-fourth of a mile west of east line of sec. 12, T. 3 S., R. 2 E., 2 miles northwest of Berwyn, Carter County, Okla.

Geologic range.—Lower Pennsylvanian.

Roundyella cincinnata (Posner), 1951

Scrobicula cincinnata Posner, 1951, Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 56, pl. 7, fig. 5. Lower Carboniferous, Russia.

Differs from all other species by having scattered spines restricted to the periphery of the valves.

Geologic range.—Lower Carboniferous.

Roundyella dorsopapillosa Sohn, 1954

Roundyella dorsopapillosa Sohn, 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 19, pl. 1, figs. 20–26; pl. 4, figs. 14, 22.

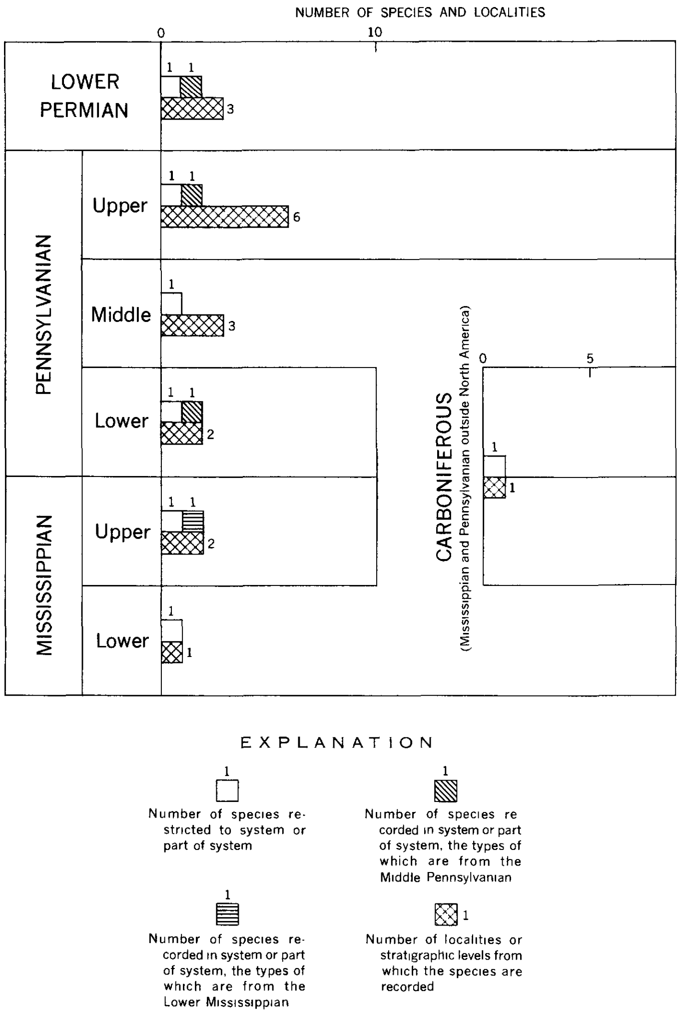

FIGURE 31.—Stratigraphic range and frequency of distribution by geographic locality, or stratigraphic levels at the same locality, of species in *Roundyella*.

Upper Leonard or lower Word formation, silicified limestone, Hess Canyon quadrangle, Glass Mountains, Brewster County, Tex.

Geologic range.—Permian.

Roundyella mopacifa Benson, 1955

Roundyella mopacifa Benson, 1955, Jour. Paleontology, v. 29, p. 1037, pl. 107, figs. 4–6, 8, 10. Fern Glen formation, railroad cut near Fern Glen Station, SE¼SE¼ sec. 14, T. 44 N., R. 4 E., St. Louis County, Mo.

?*Roundyella simplicissima* (Knight). Brayer, 1952, Jour. Paleontology, v. 26, p. 172, pl. 28, figs. 8a, b. Salem limestone, roadcut, west side Missouri Highway 21, about one-fourth of a mile north of Meramec River bridge, St. Louis County, Mo.

Geologic range.—Mississippian.

Roundyella nodomarginata (Bradfield), 1935

Plate 9, figure 45

Scaberina nodomarginata Bradfield, 1935, Bull. Am. Paleontology, v. 22, no. 73, p. 67, pl. 4, figs. 12a, b. Union Dairy member of Hoxbar formation, railroad cut, about center of north line of SW¼ sec. 6, T. 5 S., R. 2 E., Carter County, Okla.

Roundyella nodomarginata (Bradfield). Sohn 1954, U.S. Geol. Survey Prof. Paper 264–A, p. 19, pl. 1, fig. 19; pl. 4, fig. 23. Union Dairy member of Hoxbar formation, SE¼SE¼NW¼ sec. 6, T. 5 S., R. 2 E., Carter County, Okla.

Geologic range.—Upper Pennsylvanian.

Roundyella reticulosa (Jones and Kirkby), 1886

Cytherella (?) *reticulosa* Jones and Kirkby, 1886, Annals Mag. Nat. History, ser. 5, v. 18, p. 262, pl. 8, figs. 22a, b, 23. Scar limestone, north of Storr Moss, Westmoreland, England.

Amphissites? *reticulosa* (Jones and Kirkby). Bassler and Kellett, 1934, Geol. Soc. America Spec. Paper 1, p. 153 [list].

Geologic range.—Carboniferous.

Roundyella? simplex (Girty), 1910

Plate 9, figure 44

Kirkbya simplex Girty, 1910, New York Acad. Sci. Annals, v. 20, no. 3, pt. 2, p. 235 [no illus.]. Fayetteville shale, Fayetteville quadrangle, Arkansas.

Amphissites simplex (Girty). Bassler and Kellett, 1934, Geol. Soc. America Spec. Paper 1, p. 154 [list].

The only specimen of this species is an immature individual in matrix. The apparent marginal rim may be due to preservation, as stated in the original description (Girty, 1910, p. 235): "Surface strongly and finely reticulate, except marginally, where the shell seems smooth and dense." Should topotype material reveal a marginal rim, this species would properly belong in *Amphissella* Stover, 1956, thereby increasing the stratigraphic range of Stover's genus to the Mississippian.

Geologic range.—Upper Mississippian.

Roundyella simplicissima (Knight), 1928

Amphissites simplicissimus Knight, 1928, Jour. Paleontology, v. 2, p. 266, pl. 32, figs. 11a–d; pl. 34, fig. 6. Shale parting in "Brown lime" in Labette shale, south bank of creek east of Price Road and south of Ladue Road; same horizon in railroad cut, 500 yd north of Manchester Ave., and 200 yd west of Macklind Ave., Cheltenham district, St. Louis, St. Louis County, Mo.

Warthin, 1930, Oklahoma Geol. Survey Bull. 53, p. 67, pl. 5, figs. 1a, b. Wetumka formation, 25 ft below top, crinoid layer, 1,100 ft south of center of the north line, sec. 24, T. 4 N., R. 7 E., Pontotoc County, Okla.

Coryell and Billings, 1932, Am. Midland Naturalist, v. 13, p. 183, pl. 18, fig. 10. Wayland shale, 5, miles east and 2,000 ft north of Cisco, along the Cisco-Eastland highway, Eastland County, Tex.

Upson, 1933, Nebraska Geol. Survey Bull. 8, p. 41, pl. 3, fig. 6a. Fourmile limestone, cut on U.S. Highway 36, 3½ miles east of Home City, Marshall County, Kans.

Amphissites? *simplicissimus* Knight. Harlton, 1929, Texas Univ. Bull. 2901, p. 151, pl. 1, figs. 13a–c. Canyon group, marly shale and limestone, San Saba River Valley, near Hext, Menard County, Tex.

Delo, 1930, Jour. Paleontology, v. 4, p. 158, pl. 12, figs. 8a, b. Pennsylvanian or Permian, C. Cromwell, Winslow No. 1 well 760–790 ft, center SE¼ sec. 32, Texas & New Orleans Survey, Menard County, Tex.

Kellett, 1933, Jour. Paleontology, v. 7, p. 97, pl. 15, fig. 8. Elmdale formation, shale, near Cottonwood River Bridge, east of Elmdale, Chase County, Kans.

[not] *Amphissites simplicissimus* Knight. Coryell and Malkin, 1936=*Amphissella papillosa*? Stover, 1956.

Roundyella simplicissimus (Knight). Johnson, 1936, Nebraska Geol. Survey Paper 11, p. 32, pl. 3, figs. 7, 8. Eudora shale member, Stanton formation, bluffs just south of the Burlington R.R. west of Oreapolis, sec. 32, T. 13 N., R. 13 E., Cass County, Nebr.

Roundyella simplicissima (Knight). Cooper, 1946, Illinois Geol. Survey Bull. 70, p. 108, pl. 17, figs. 29–36. Shale in Wiley cyclothem, SW¼ sec. 36, T. 17 N., R. 9 W., Vermilion County, Ind.; shale at base of Brereton limestone, NE¼ sec. 8, T. 14 N., R. 5 E., Henry County, Ill.

Sohn 1954, U.S. Geol. Survey Prof. Paper 264–A, p 20, pl. 4, figs. 16, 19. Knight's topotypes.

[not] *Roundyella simplicissima* (Knight). Brayer, 1952=*R. mopacifa*? Benson, 1955.

Geologic range.—Pennsylvanian-Permian.

Roundyella? sp.

Amphissites lutkevichi Spizharsky, 1939 [part], *in* Licharew, B. [ed.] The Atlas of the leading forms of the fossil fauna USSR, v. 6, Permian: Leningrad, Central Geol. and Prospecting Inst., p. 195, pl. 46, fig. 10 [not fig. 9= *Placidea lutkevichi*]. Permian, Russia.

SYNONYMS, SPECIES TO BE INVESTIGATED AND REJECTED SPECIES OF ROUNDYELLA

angustai Pokorný, 1950=*Amphissella angustai* (Pokorný), 1950.

calceolae (Gürich). Přibyl, 1953=*Amphissella*? *calceolae* (Gürich), 1896.

? *concentrica* Stover, 1956=*Scrobicula concentrica* (Stover), 1956.

fimbriamarginata Gibson, 1955=*Amphissella fimbriamarginata* (Gibson), 1955.

klukovicensis Přibyl, 1955, Czechoslovakia, Ústř. úst. geol., Sbornik, v. 21, Paleont., p. 180, 275, pl. 2, figs. 9–11; pl. 3, fig. 12. Branik limestone, quarry in the valley of the Daleje stream, near Klukovica, Bohemia. The original description states that it does not have a marginal rim which eliminates the species from *Amphissella* Stover, 1956. The presence of a posterodorsal wing suggests affinity with *Nezamyslia* Přibyl, 1955, of Middle Devonian age. Geologic range. Lower Devonian.

simplicissima (Knight). Brayer, 1952=*R. mopacifa*? Benson, 1955.

? sp. A. Krömmelbein, 1954=*Amphissella*? sp. A (Krömmelbein), 1954.

Genus SCROBICULA Posner, 1951

Scrobicula Posner, 1951, Vsesoyuz. Neft. Nauch. Issled, Geol.-Razv. Inst., Trudy, new ser., no. 56, p. 53.

Type species.—Original designation, *Cytherella*? *scrobiculata* Jones, Kirkby and Brady, 1884. Carboniferous, Great Britain.

Differs from *Roundyella* in that the larger valve has a curved dorsal margin.

Geologic range.—Middle Devonian(?), Carboniferous.

Lithology.—Limestone, shale.

Habitat.—Marine.

Scrobicula concentrica (Stover), 1956

Roundyella? *concentrica* Stover, 1956, Jour. Paleontology, v. 30, p. 1138, pl. 119, figs. 13–16. Windom shale, western New York.

The description and illustration of this species places it in *Scrobicula*.

Geologic range.—Middle Devonian.

REFERENCES

Amsden, T. W., 1956, Catalog of fossils from the Hunton Group, Oklahoma: Oklahoma Geol. Survey Circ. 38, 63 p.

Bassler, R. S., and Kellett, Betty, 1934, Bibliographic index of Paleozoic Ostracoda: Geol. Soc. America Spec. Paper 1, 500 p.

Batalina, M. A., 1924, On the Lower Carboniferous Ostracoda from the Borovitchi District of Department of Novgorod: Leningrad Comité Géol. Bull. 43, no. 10, p. 1315–1338, pls. 22, 23 [Russian with English summary].

Bradfield, H. H., 1935, Pennsylvanian ostracodes of the Ardmore Basin, Oklahoma: Bull. Am. Paleontology, v. 22, no. 73, 172 p., 13 pls.

Brongniart, Charles, 1876, Note sur un nouveau genre d'entomostracé fossile provenant du Terrain Carbonifère des environs de Saint-Étienne (*Palaeocypris edwardsii*): Annales Sci. Géol., v. 7, art. 3, p. 1–6, pl. 6.

Cooper, C. L., 1941, Chester ostracodes of Illinois: Illinois Geol. Survey Rept. Inv. 77, 101 p., 14 pls.

———1942, Occurrence and stratigraphic distribution of Paleozoic ostracodes: Jour. Paleontology, v. 16, p. 764–776, 9 text figs.

———1945, Moult stages of the Pennsylvanian ostracode *Ectodemites plummeri:* Jour. Paleontology, v. 19, p. 368–375, pl. 57.

———1946, Pennsylvanian ostracodes of Illinois: Illinois Geol. Survey Bull. 70, 177 p., 21 pls.

———1947, Upper Kinkaid (Mississippian) microfauna from Johnson County, Illinois: Jour. Paleontology, v. 21, p. 81–94, pls. 21–23.

———1957, New Names for species of *Bairdia* and *Amphissites:* Jour. Paleontology, v. 31, p. 674.

Coryell, H. N., and Booth, R. T., 1933, Pennsylvanian Ostracoda: a continuation of the study of the Ostracoda fauna from the Wayland shale, Graham, Texas: Am. Midland Naturalist, v. 14, no. 3, p. 258–278, pls. 3–5.

Coryell, H. N., and Malkin, D. S., 1936, Some Hamilton ostracodes from Arkona, Ontario: Am. Mus. Novitates, no. 891, 20 p., 2 pls.

Craig, G. Y., 1954, The palaeoecology of the top Hosie shale (Lower Carboniferous) at a locality near Kilsyth: Geol. Soc. London, Quart. Jour., v. 110, p. 103–119.

Egorov, V. G., 1953, Егоров, В. Г., Остракоды Франского Яруса Русской Платформы. II, Bairdiidae, Hollinidae, Kirkbyidae [Ostracoda of the Frasnian strata of the Russian platform. II, Bairdiidae, Hollinidae, Kirbyidae]

Всесоюзного Нефтяного Научно-Исследовательского Геолого-Разведочного Института, Московский Филиал, Москва-Ленинград [Vsesoyuz. Neft, Nauch.-Issled. Geol.-Razv. Inst., Moscow. Filial, Moscow-Leningrad], 79 p., 27 pls.

Eichwald, Edward von, 1860, Lethaea Rossica, ou Paléontologie de la Russe, 1, Premiere section de l'ancienne période, p. 1328–1350; Atlas période ancienne, pls. 52, 53. Stuttgard.

Geis, H. L., 1932, Some ostracodes from the Salem limestone, Mississippian of Indiana: Jour. Paleontology, v. 6, p. 149–188, pls. 22–26.

Gibson, L. B., 1955, Upper Devonian Ostracoda from the Cerro Gordo formation of Iowa: Bull. Am. Paleontology, v. 35, no. 154, 38 p., 2 pls.

Girty, G. H., 1910, New genera and species of Carboniferous fossils from the Fayetteville shale of Arkansas: New York Acad. Sci. Annals, v. 20, no. 3, pt. 2, p. 189–238 [no illus.].

Gocht, Hans, and Goerlich, Franz, 1957, Reste des Chitin-Skelettes in fossilen Ostracodes-Gehausen: Geol. Jahrb., v. 73, p. 205–214, pl. 14, 3 text figs.

Gürich, George, 1896, Das Palaeozoicum im Polnischen Mittelgebirges: Russ. K. min. Gesell. Verh., St. Petersburg, ser. 2, v. 32, p. 374–391, pls. 10, 14, 15.

Harlton, B. H., 1933, Micropaleontology of the Pennsylvanian Johns Valley shale of the Ouachita Mountains, Oklahoma, and its relationship to the Mississippian Caney shale: Jour. Paleontology, v. 7, p. 3–29, pls. 1–7.

Harris, R. W., and Jobe, T. C., 1956, Chester Foraminifera and Ostracoda from Ringwood Pool: Oklahoma Geol. Survey Circ. 39, 41 p., 4 pls.

Henningsmoen, Gunnar, 1953, Classification of Paleozoic straight-hinged ostracods: Norsk geol. tidsskr., v. 31, p. 185–288, 2 pls.

Hornibrook, N. de B., 1949, A new family of living Ostracoda with striking resemblance to some Paleozoic Beyrichiidae: Royal Soc. New Zealand Trans., v. 77, pt. 4, p. 469–471, pls. 50, 51.

Hou, Y. T., 1954, Some Lower Permian ostracodes from Western Hupeh: Acta Paleont. Sinica, v. 2, no. 2, p. 227–266, 2 pls. [Chinese with English translation.]

Johnson, W. R., 1936, The Ostracoda of the Missouri series in Nebraska: Nebraska Geol. Survey Paper 11, 52 p., 5 pls.

Jones, T. R., 1891, Contributions to the Canadian micro-paleontology. Part 3: On some Ostracoda from the Cambro-Silurian and Devonian rocks: Canada Geol. and Nat. History Survey, 1891, p. 59–99, pls. 10–13.

Jones, T. R., and Kirkby, J. W., 1885, Notes on the Paleozoic bivalved Entomostraca, No. 19. On some Carboniferous species of the ostracodous genus *Kirkbya*: Annals Mag. Nat. History, ser. 5, v. 15, p. 174–190, pl. 3.

——— 1886, Notes on the Paleozoic bivalved Entomostraca, No. 22. On some undescribed species of British Carboniferous Ostracoda: idem, ser. 5, v. 18, p. 249–269, pls. 6–9.

———1895, Notes on the Paleozoic bivalved Entomostraca, No. 32. Some Carboniferous Ostracoda from Yorkshire: idem., ser. 6, v. 16, p. 452–460, pl. 21.

Kellett, Betty, 1933, Ostracodes of the Upper Pennsylvanian and the Lower Permian strata of Kansas: I. The Aparchitidae, Beyrichiidae, Glyptopleuridae, Kloedenellidae, Kirkbyidae and Youngiellidae: Jour. Paleontology, v. 7, p. 59–108, pls. 13–16.

———1936, Carboniferous ostracodes: Jour. Paleontology, v. 10, p. 769–784.

Kesling, R. V., 1952, Ostracods of the families Leperditellidae, Primitiidae, Drepanellidae, Aechminidae, and Kirkbyidae from the Middle Devonian Bell Shale of Michigan: Michigan Univ., Mus. Paleontology, Contr., v. 10, no. 2, p. 21–44, 5 pls.

———1957, A chart useful for study of ostracod carapaces: idem, v. 14, no. 2, p. 17–20, 2 figs.

Kesling, R. V., and Copeland, M. J., 1954, A new Kirkbyid ostracod from the Wanakah member of the Middle Devonian Ludlowville formation in western New York; Michigan Univ., Mus. Paleontology, Contr., v. 11, no. 7, p. 155–165, 2 pls., 1 fig.

Kesling, R. V., and Weiss, Martin, 1953, Ostracods from the Norway Point formation of Michigan: idem, v. 11, no. 3, p. 33–76, 5 pls.

Kim, I. A., 1955, Ким, И. А., К вопросу о расчленении Вехнепермских Красноцветов по остракодам [On the problem of differentiation of the upper Permian of Krasnotzvet through ostracodes]: Геологический Сборник (Доклады и Статьи.). Всесоюзный Нефтяной Научно-Исследовательский Геолого-Разведочный Институт (ВНИГРИ), III (VI), Ленинград [Geol. Sbornik (Doklady i Statei). Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst. (VNIGRI), v. 3 (6)], p. 33–37.

Kiparisovoi, L. D., Markovskogo, B. P., and Radchenko, G. P., 1956, Кипарисовой, Л. Д., Марковского, Б. П., Радченко, Г. П., Новые Семейства и Роду. Материалы по Палеонтологии [New families and genera. Data on paleontology]: Всесоюзный Научно-Исследовательский Геологический Институт (ВСЕГЕИ), Министерства Геологии и Охраны Недр СССР, новая серия, Палеонтология, Вып. 12, Москва [Vsesoyuz. Nauch.-Issled. Geol. Inst. (VSEGEI), Ministerstva Geologii i Okrany Nedr SSSR, new. ser. Paleont no. 12, Moscow], 354 p., 43 pls., 53 text figs.

Klie, Walter, 1929, Beitrag zur Kenntnis der Ostracoden der Südlichen und Westlichen Ostsee, der Festländischen Nordseeküste und der Insel Helgoland: Zeitschr. Wiss. Zool., Leipzig, v. 132, p. 270–306, 34 figs.

Kummerow, E. H., 1939, Die Ostracoden und Phyllopoden des deutschen Unterkarbons: Preuss. Geol. Landesanstalt, Abh., n. f., no. 194, p. 6–107, 6 pls.

Lalicker, C. G., and Moore, R. C., 1952, *in* Moore, R. C., Lalicker, C. G., and Fisher, A G., Invertebrate Fossils. New York, McGraw-Hill, 766 p.

Latham, M. A., 1932, Scottish Carboniferous Ostracoda: Royal Soc. Edinburgh Trans., v. 57, pt. 2, no. 2, p. 351–395, 25 text figs.

Latreille, P. A., 1802 [An. X de R.], Histoire Naturelle, générale et particulière des crustacés et des insectes. Ouvrage faisant suite à l'Histoire Naturelle générale et particulière, composée par Leclerc de Buffon, et redigée par C. S. Sonnini, membre de plusieurs Sociétés savantes: Paris, v. 3, p. 17; v. 4, p. 232–254.

———1804 [An. XII de R.], Tableau méthodique des crustacés *in* Nouveau dictionnaire d'histoire naturelle appliqué aux arts * * * Par une société de naturalistes et d'agriculteurs 1803–04, v. 24: Paris, p. 124 of third section in volume which consists of 258 p.

———1806, Genera Crustaceorum et Insectorum, v. 1: 303 p.

Levinson, S. A., 1957, Bibliography and index to new genera and species of Ostracoda for 1956: Micropaleontology, v. 3, p. 367–392.

Loranger, D. M., 1954, Ireton microfossil zones of central and northeastern Alberta *in* Clark, L. M., ed., Western Canada sedimentary basin: Am. Assoc. Petroleum Geologists, p. 182–203, 2 pls.

McCoy, Frederick, 1844, A synopsis of the characters of the Carboniferous limestone fossils of Ireland: Dublin, University Press, 207 p., 29 pls.

Mandelstam, M. I., 1956, see Kiparisovoi and others, 1956.

Martin, G. P. R., 1957, A new method of recovering remains of the chitinous integument of fossil Ostracoda: Micropaleontology, v. 3, no. 3, p. 291–292.

Moore, R. C., ed., 1961, Treatise on invertebrate paleontology, Part Q, Ostracoda: Lawrence, Kans., Kansas Univ. Press, 442 p., 334 figs.

Pearse, A. S., 1949, Zoological names. A list of phyla, classes and orders. Section F: Durham, N. C., Am. Assoc. Adv. Sci., 24 p.

Pokorný, Vladimír, 1953, A contribution to the taxonomy of the Paleozoic ostracods: Czechoslovakia, Ústř. úst. geol., Sbornik, v. 20, Paleont., p. 213–232.

———1957, The phylomorphogeny of the hinge in Podocopida (Ostracoda, Crustacea) and its bearing on the taxionomy: Acta Univ. Carolinae, Prague, ser. Nat. Sci., Geol., 22 p., 4 text figs.

Posner, V. M., 1951, Lower Carboniferous Ostracoda of the western part of the Moscow Kettle Valley: Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy. [All-Union Petroleum Explor. and Geol. Research Inst. Trans., Leningrad-Moscow], new ser., no. 56, p. 5–108, 21 pls.

Přibyl, Alois, 1953, The ostracodes of the Middle Devonian (Givetian) of Poland in the profile Grzegorzewice-Skaly in the St. Croix Mountains: Czechoslovakia, Ústř. úst. geol., Sbornik, v. 20, Paleont., p. 233–344, 8 pls.

———1955, A contribution to the study of ostracods of the Bohemian Devonian and their stratigraphic significance: idem, v. 21, 1954, p. 161–301, 5 pls.

Sars, G. O., 1866, Oversigt af Norges Marine Ostracoder: Norske Vidensk.-akad., Förh. 1865, 130 p.

Schneider, G. F., 1956, see Kiparisovoi and others, 1956.

Sharapava, E. G., and Mandelstam, M. I., 1956, see Kiparisovoi and others, 1956.

Shimer, H. W., and Shrock, R. R., 1944, Index fossils of North America. New York, John Wiley, 837 p.

Skogsberg, Tage, 1920, Studies on marine ostracods. Part 1. Cypridinids, Halocyprids, and Polycopids: Zool. Bidrag fran Uppsala, suppl. ed. 1, 784 p., 153 figs.

Sohn, I. G., 1950, Growth series of ostracodes from the Permian of Texas: U.S. Geol. Survey Prof. Paper 221–C, p. 33–39, pls. 7, 8.

———1953, *Cardiniferella*, n. gen., the type of a new family of Carboniferous Ostracoda: Washington Acad. Sci. Jour., v. 43, p. 66–68.

———1954, Ostracoda from the Permian of the Glass Mountains, Texas: U.S. Geol. Survey Prof. Paper 264–A, p. 12–23, 5 pls.

———1958, Chemical constituents of ostracodes; some applications to paleontology and paleoecology: Jour. Paleontology, v. 32, p. 730–736.

———1960, Paleozoic species of *Bairdia* and related genera: U.S. Geological Survey Prof. Paper 330–A, 105 p., 6 pls. [1961]

Spizharsky, T. N., 1939, Ostracoda, *in* Licharew, B., [ed.], The Atlas of the leading forms of the fossil fauna USSR, v. 6, Permian. Leningrad, p. 193–196, pl. 44.

Stewart, G. A., 1936. Ostracodes of the Silica shale, Middle Devonian of Ohio: Jour. Paleontology, v. 10, p. 739–763, pls. 100–102.

———1950, Ostracoda from Middle Devonian Bone beds in Central Ohio: idem, v. 24, p. 652–666, pls. 85, 86.

Stewart, G. A., and Hendrix, W. E., 1945, Ostracoda of the Plumbrook shale, Erie County, Ohio: Jour. Paleontology, v. 19, p. 87–95, pl. 10.

Stover, L. E., 1956, Ostracoda from the Windom shale (Hamilton) of western New York: idem, v. 30, p. 1092–1142, pls. 111–119, 8 text figs.

Straus, H. E., 1821, Memoiré sur les Cypris, de la classe des crustacés: Mus. histoire. Nat., Paris, Mém., v. 7, p. 33–66, pl. 1.

Swain, F. M., 1953, Ostracoda from the Camden chert, western Tennessee: Jour. Paleontology, v. 27, p. 257–284, pls. 37–39, 21 text figs.

Swartz, F. M., 1936, Revision of the Primitiidae and Beyrichiidae, with new Ostracoda from the Lower Devonian of Pennsylvania: Jour. Paleontology, v. 10, p. 541–586, pls. 78–89.

Swartz, F. M., and Oriel, S. S., 1948, Ostracoda from the Middle Devonian Windom beds of western New York: idem, v. 22, p. 541–566, pls. 79–81.

Swartz, F. M., and Swain, F. M., 1941, Ostracodes of the Middle Dovonian Onondaga beds of central Pennsylvania: Geol. Society America Bull., v. 52, p. 381–458, 8 pls., 2 figs.

Sylvester-Bradley, P. C., 1946, Some ostracod genotypes: Annals Mag. Nat. History, ser. 11, v. 13, no. 99, p. 192–199 [1947].

———1956, The structure, evolution and nomenclature of the ostracod hinge: British Mus. (Nat. History) Geol. Bull., v. 3, no. 1, 21 p., 4 pls., 2 text figs.

Triebel, Erich, 1950, Die taxonomische Stellung der Ostracoden-Gattung *Ogmoconcha* und der Lectotypus von *O. amalthei:* Senckenbergiana, v. 31, p. 113–120, pls. 1, 2.

Tscherdyntsev, V. A., 1937, Чердынцев, В. А., Материалы по микрофауна Казанского Яруса Пермской Системы [Data on the microfauna of the Kazanian layers in the Permian System]: Казанского Государственного Университета, Ученые Записки, том 97, книга 3–4, Геология, вып. 8–9 [Kazan Univ. Sci. Mem., v. 97, fasc. 3–4, Geol. nos. 8–9], p. 303–312, 1 pl. [in Russian, English summary].

Turner, M. C., 1939, Middle Devonian Ostracoda from oil wells in southwestern Ontario: Bull. Am. Paleontology, v. 25, no. 88, 32 p., 1 pl.

Ulrich, E. O., and Bassler, R. S., 1913, On the Ostracoda: Maryland Geol. Survey, Lower Devonian volume, p. 100–171, 513–542, pls. 95–98.

———1923, Paleozoic Ostracoda: Their morphology, classification, and occurrence: idem, Silurian volume, p. 271–391, 500–704, pls. 36–65, figs. 11–27.

Van Pelt, H. L., 1933, Some ostracodes from the Bell shale, Middle Devonian of Michigan: Jour. Paleontology, v. 7, p. 325–342, pl. 39.

Vine, G. R., 1884, Notes on the Carboniferous Entomostraca and Foraminifera of the North Yorkshire shales: Yorkshire Geol. and Polytechnic Soc. Proc., new ser., v. 8, p. 226–239, pl. 12.

Vogdes, A. W., 1889, A catalogue of North American Paleozoic Crustacea confined to the non-trilobitic genera and species: New York Acad. Sci. Annals, v. 5, p. 1–37, pl. 2.

Warthin, A. S., Jr., 1934, Common Ostracoda of the Traverse group: Michigan Univ., Mus. Paleontology, Contr., v. 4, no. 12, p. 205–226, 1 pl.

———1937, Unit 9–A, Beyrichiacea, *in* Type invertebrate fossils of North America (Devonian): Wagner Free Inst. Sci., 106 cards, figs.

Wilson, C. W., Jr., 1935, The ostracode fauna of the Birdsong shale, Helderberg, of western Tennessee: Jour. Paleontology, v. 9, p. 629–646, pls. 77–78.

Yanichevsky, M., 1927, Sur quelques Pelecypoda et Ostracoda des terraines houillers du bassin de Kouznetzk: Leningrad Comité Géol. Bull. 46, no. 9, p. 1009–1029, pl. 51.

Zanina, I. E., 1956, Занина, И. Е., Остракоды Визейского Яруса Подмосковного Бассейна [Viséan ostracodes of the Moscow basin] Микрофауна СССР, сб. 8 [Microfauna SSSR, pt. 8]: Труды Всесоюзного Нефтяного Научно-Исследовательского Геологоразведочного Института (ВНИГРИ), нов. сер., вып. 98, Ленинград [Vsesoyus. Neft. Nauch.-Issled. Geologorazv. Inst., Trudy, new ser., no. 98, Leningrad], p. 185–310, 8 pls.

Zaspelova, V. S. 1952, Заспелова, В. С., Остракоды семейства Drepanellidae из отложений вехнего Девона Русской Платформы [Ostracodes of the family Drepanellidae from the Upper Devonian of the Russian platform]. Микрофауна СССР, сб. 5 [Microfauna SSSR, pt. 5]: Труды Всесоюзного Нефтяного Научно-Исследовательского Геолого-Разведочного Института (ВНИГРИ), нов. сер., вып. 60, Ленинград-Москва [Vsesoyuz. Neft. Nauch.-Issled. Geol.-Razv. Inst., Trudy, new ser., no. 60, Leningrad-Moscow], p. 157–216, 11 pls.

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[Italic numbers indicate descriptions]

PLATES 7–12

PLATE 7

[Except where noted, all magnifications are approximately × 30; photographs are by N. W. Shupe]

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1–3. Right, dorsal and dorsal views of carapace with the specimen tilted. Figured specimen USNM 119817, Graham formation, Texas. USGS loc. 2967–PC.

4. Left valve. Holotype Indiana Univ. 2153, Dornick Hills formation, Okla.

5–7, 13, 14. *Amphissella genetiva* (Morey), 1935 (p. 148).

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AECHMINELLA, AMPHISSELLA, AMPHISSITES, ARCYZONA, KEGELITES, MAMMOIDES

AMPHISSITES, *AMPHIZONA*, *ARCYZONA*, *AURIKIRKBYA*, "*ECTODEMITES*"

PLATE 8

[Except where noted all magnifications are approximately ×30; photographs are by N. W. Shupe]

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42, 43. Dorsal and lateral views of right valve. Holotype, USNM 119840, upper Kinderhook or lower Osage formation, Missouri. USGS loc. 12847–PC.

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Left and dorsal views of carapace. Holotype Illinois Univ. M–323, Salem limestone, railroad cut at Spergen Hill, Norris, Ind.

PLATE 9

[Except where noted all magnifications are approximately × 30; photographs are by N. W. Shupe]

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12. Right valve, paratype, original of Cooper's fig. 37. Illinois Geol. Survey (no number), Renault formation, Illinois.

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13, 14. Dorsal and lateral views of left valve. Topotype USNM 83958A, "Brown lime" in Labette shale, Missouri.

15. Lateral view of left valve. Lectotype USNM 116708A, "Brown lime" in Labette shale, Missouri.

19–21. *Polytylites wilsoni* (Croneis and Gutke), 1939 (p. 134).

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22, 23. *Polytylites nodobliquus* (Croneis and Gale), 1939 (p. 133).

Dorsal and right views of carapace. Holotype Walker Mus. 44424, Golconda formation, Illinois.

24, 25. *Polytylites quincollinus* (Harlton), 1929 (p. 133).

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27, 28. *Polytylites superus* (Croneis and Gale), 1939. (p. 133).

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31. Left view of Ulrich's specimen of *Kirkbya tricollina* Jones and Kirkby. Figured specimen USNM 41357, Chester group, Kentucky.

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32. Right view of holotype of *Amphissites decipiens* Croneis and Bristol. Walker Mus. 45119, Menard formation, Illinois.

33–35. Inside, dorsal, and lateral views of left valve. Holotype Walker Mus. 45117, Menard formation, Illinois.

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40–43. *Polytylites ambitus* (Cooper), 1941 (p. 132).

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42, 43. Ventral and lateral views of a right valve. Figured specimen USNM 119853, silicified material, Helms formation, Texas. USNM loc. 3070–2.

44. *Roundyella? simplex* (Girty), 1910 (p. 150).

Lateral view of left valve × 60. Holotype USNM 119854, Fayetteville shale, Arkansas.

45. *Roundyella nodomarginata* (Bradfield), 1935 (p. 150).

Lateral view of right valve. Holotype Indiana Univ. 2019, Hoxbar formation, Oklahoma.

46–48. *Polytylites? nodosus* (Roth), 1929 (p. 133).

Dorsal, right, and posterior views of carapace. Holotype USNM 80195, Wapanucka limestone, Oklahoma.

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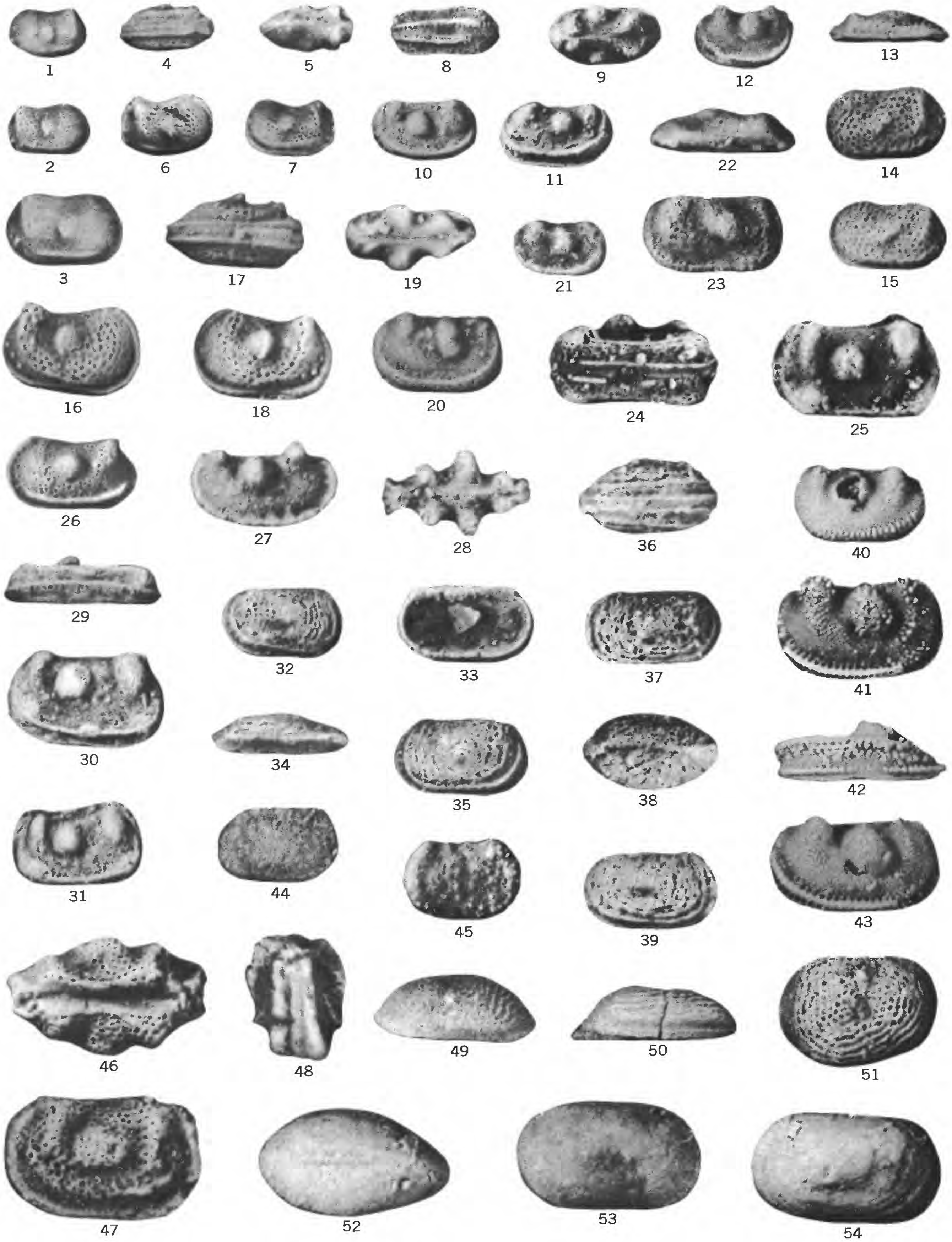
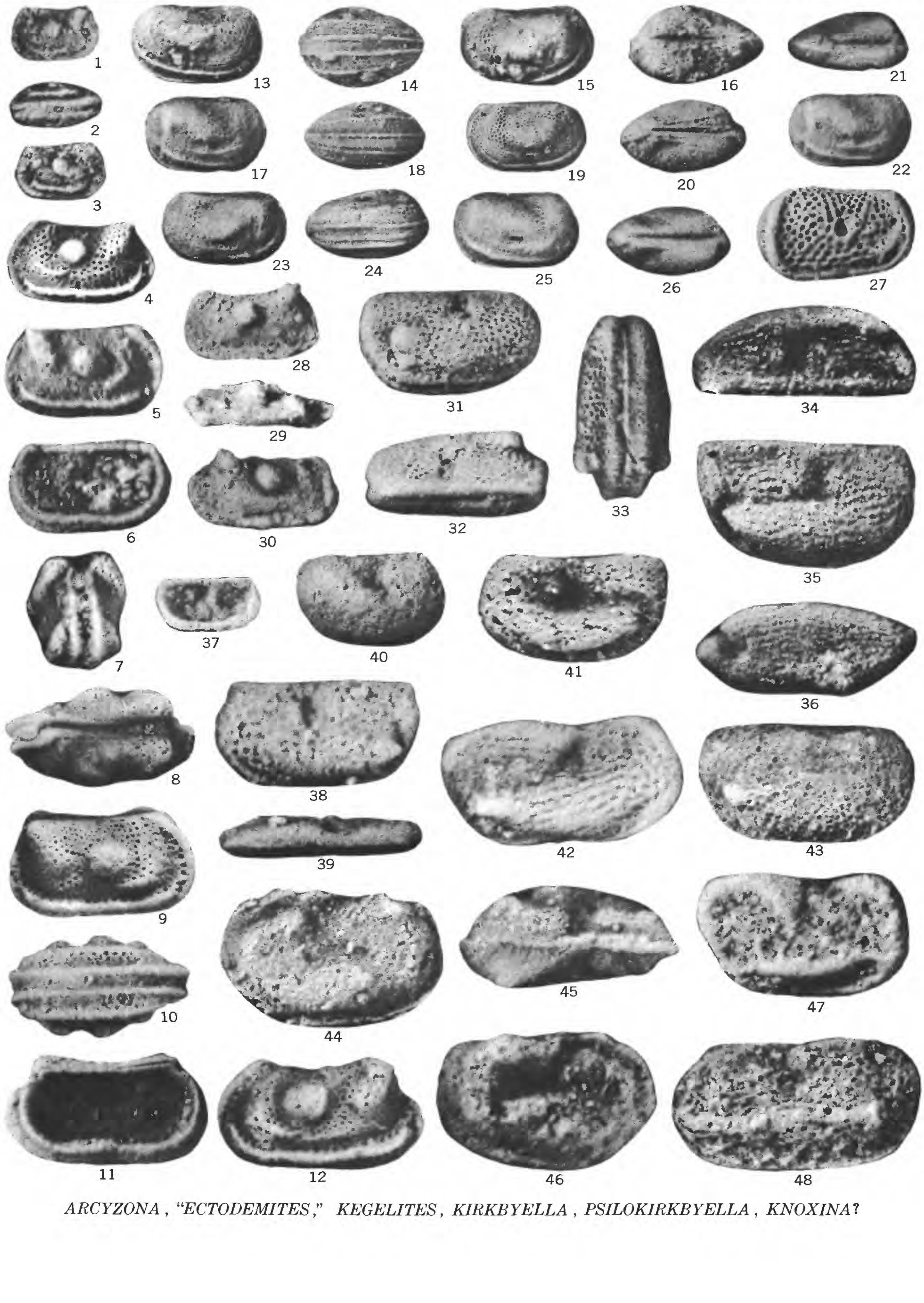


KEGELITES, POLYTYLITES, RETICESTUS, REVIYA, ROUNDYELLA



ARCYZONA, *"ECTODEMITES,"* *KEGELITES*, *KIRKBYELLA*, *PSILOKIRKBYELLA*, *KNOXINA*?

PLATE 10

[Except where noted all magnifications are approximately × 30; photographs are by N. W. Shupe]

FIGURES 1–12. *Kegelites adjunctio* (Cooper), 1946 (p. 128).

1–3. Left, ventral, and right views of carapace, young growth stage. Figured specimen USNM 119857, *Uddenites* zone, Permian, Texas. USGS loc. 7047–PC.

4. Left valve, slightly larger growth stage. Figured specimen USNM 119858, Brownwood shale, Texas. USGS loc. 12395–PC.

5, 6. Inside and outside views of right valve, still larger growth stage. Figured specimen USNM 119859, same locality as figs. 1–3.

7–10. Posterior, dorsal, right and ventral views of an adult carapace. Figured specimen USNM 119860, same locality as above.

11–12. Inside and outside views of left valve, adult individual. Figured specimen USNM 119861, same locality as above.

13–16. "*Ectodemites*" *primus* Cooper, 1941 (p. 127).

Right, ventral, left, and dorsal views of carapace. Holotype Illinois Geol. Survey (no number), Kinkaid formation (probably Upper Clore formation), Illinois.

17–20. "*Ectodemites*" *primus*? Cooper, 1941 (p. 127).

17–20. Right, ventral, left, dorsal views of a carapace with a dorsal shield. Figured specimen USNM 119855, Pella Beds, Iowa. USGS loc. 5793–PC.

21–26. "*Ectodemites*" *warei* (Morey), 1935. (p. 127).

21, 22. Dorsal and right views of carapace. Paratype, Missouri Univ. 0.1027–1, Amsden formation, Wyoming.

23–26. Left, ventral, right, dorsal views of carapace. Lectotype, original of Morey's illustrated syntype, Missouri Univ. 0.1027–1, Amsden formation, Wyoming.

27. *Arcyzona aperticarinata* Kesling and Weiss, 1953. (p. 138).

Right valve, paratype, Michigan Univ. 29833, Norway Point shale, Michigan.

28–30. *Kegelites upsoni* (Johnson), 1936. (p. 130).

28. Lateral view of left valve. Holotype Nebraska Univ. colln. (unnumbered), Eudora shale, Nebraska.

29, 30. Dorsal and lateral views of right valve, Paratype, USNM 99437, Eudora shale, Nebraska.

31–33. *Kirkbyella* (*Berdanella*) *quadrata* (Croneis and Gutke), 1939 (p. 145).

Right, dorsal, and ventral views of carapace × 60. Figured specimen USNM 119816, Shetlerville member of the Renault formation, Hardin County, Ill. USGS loc. 12844–PC.

34–36. *Kirkbyella* (*Berdanella*) *stewartae* Sohn, n. sp. (p. 146).

Dorsal, lateral, and ventral views of right valve × 60. Holotype Stewart's specimen of *Kirkbyella unicornis* Coryell and Malkin, original of Stewart (1950, pl. 86, fig. 14). Ohio State Univ. Geol. Mus. 19594.

37–39. *Kirkbyella* (*Berdanella*) n. sp. (p. 146).

Interior of left valve × 30, lateral and dorsal of the same valve × 60. Figured specimen USNM 137541, Henryhouse formation, Pontotoc County, Okla. USNM loc. 472c.

40. Gen. indet. (p. 144).

Right view of carapace, syntype of *Kirkbyella scapha* Morey, 1935. Missouri Univ. OS–1001–4, Sylamore sand stone, Missouri.

41. *Kirkbyella* (*Kirkbyella*) *ventricosa* (Swartz), 1936 (p. 144).

Rubber cast. Paratype × 60, USNM 94196, Shriver chert, Pennsylvania.

42. *Kirkbyella* (*Berdanella*) *verticalis* (Coryell and Cuskley), 1934 (p. 146).

Right valve. Holotype of *Kirkbyella obliqua* Coryell and Cuskley, 1934, × 60, Haragan shale, Murray County, Okla. Neotype, Am. Mus. Nat. History, Cat. No. 24217.

43. *Kirkbyella* (*Berdanella*) *unicornis* (Coryell and Malkin), 1936 (p. 146).

Lateral view. Holotype × 60. Am. Mus. Nat. History, Cat. No. 24619, Hamilton group, Ontario, Canada.

44–46. *Knoxina*? *dubia* (Morey), 1936 (p. 144).

Right, dorsal, and left views. Holotype, × 60, Missouri Univ. 0.1009.2, Chouteau formation, Brown's Station, Mo.

47. *Psilokirkbyella magnopunctata* (Wilson), 1935 (p. 147).

Right view. Lectotype, × 60, USNM 112902, Birdsong shale, Henry County, Tenn.

48. *Psilokirkbyella ozarkensis* (Morey), 1936 (p. 147).

Left view. Holotype, × 60, Missouri Univ. 0.1010.3, Chouteau formation, Christian County, Mo.

PLATE 11

[Except where noted all magnifications are approximately ×30; photographs are by N. W. Shupe]

FIGURES 1–11, 15–18, 37. *Shleesha pinguis* (Ulrich and Bassler), 1906 (p. 135).

1–11. Growth series. Figs. 1–5, Growth series of *Amphissites pinguis* (Ulrich and Bassler). Kellett, 1933. Figured specimens USNM 85456, Cottonwood limestone, Kansas. 1, 5, Right valves; 2–4, left valves. Fig. 6, Right valve, figured specimen USNM 119862, Brownwood shale, Texas. USGS loc. 12395–PC. Fig. 7, Left valve of holotype of *Amphissites ciscoensis* Harlton, 1928. USNM 72237, Cisco formation, Texas. Fig. 8, Ventral view of adult carapace. Figured specimen, USNM 119863, Brownwood shale, Texas. USGS loc. 12395–PC. Fig. 9, Left view of *Amphissites pinguis* (Ulrich and Bassler). Bradfield 1935. This specimen was identified by Bradfield to replace, his figured specimen that is lost. Indiana Univ. 2020A, Hoxbar formation, Oklahoma. Figs. 10, 11, Dorsal and right views of adult. Figured specimen USNM 119864, Brownwood shale, Texas. USGS loc. 12395–PC.

15–18. Dorsal, ventral, left, and right views. Holotype USNM 35629, Cottonwood shale, Kansas.

37. Right view of holotype of *Amphissites rothi* Bradfield, 1935. Indiana Univ. 2119, Dornick Hills formation, Oklahoma.

12–14. *Shleesha pinguoides* (Croneis and Gale), 1939 (p. 136).

12, 13. Dorsal and lateral views of left valve. Holotype Walker Mus. 44422. Golconda formation, Illinois.

14. Left valve, younger growth stage. Paratype, same slide as above.

19–22. *Reticestus planus* (Wilson), 1935 (p. 140).

Ventral, dorsal, lateral, and inside views of right valve. Lectotype USNM 112892A, Birdsong formation, Tennessee.

23, 24. *Shleesha sullivanensis* (Payne), 1937 (p. 136).

Left and dorsal views of carapace. Holotype Indiana Univ. 3205, Hayden Branch formation, Indiana.

25–28. *Reviya*? *rotunda* (Geis), 1932 (p. 142).

Dorsal, ventral, right, and left views of carapace. Holotype Illinois Univ. M–317, Salem limestone, Spergen Hill, Norris, Ind.

29–32. *Reticestus*? *primaevus* (Roth), 1929 (p. 140).

Dorsal, ventral, right, and left views of carapace. Figured specimen USNM 136374, Henryhouse formation, Oklahoma. USNM loc. 472C.

33. *Reticestus*? *concentricus* (Ulrich and Bassler), 1913 (p. 138).

Lateral view of right valve. Holotype USNM 53300, Shriver chert, West Virginia.

34. *Polytylites trilobus* (Croneis and Gale), 1939 (p. 134).

Right view of carapace. Figured specimen USNM 119865, Vienna shale, Illinois. USGS loc. 12842–CP.

35–36. *Amphissites remeši* Pokorný, 1950 (p. 121).

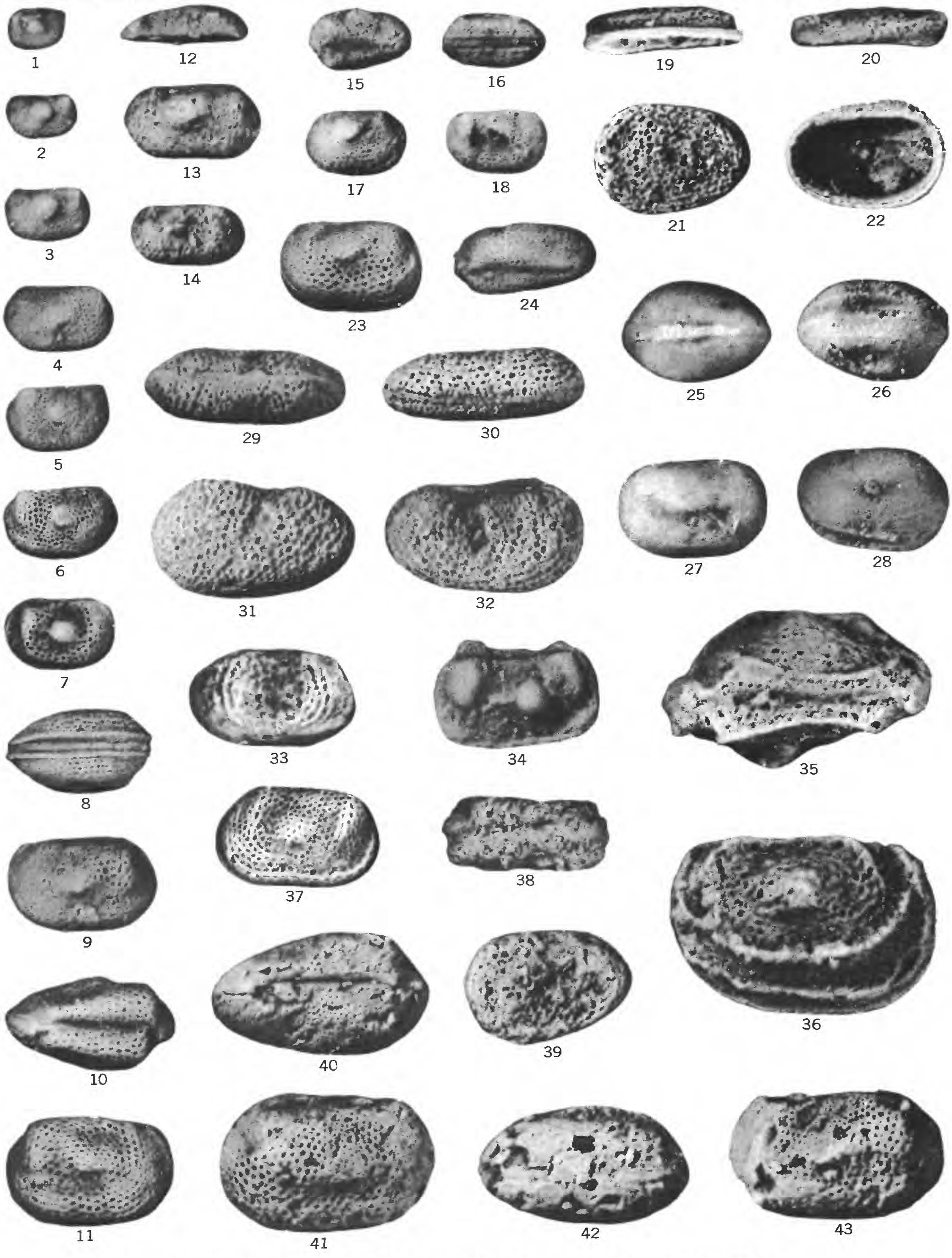
Dorsal and left views of carapace. Topotype USNM 135917a, Middle Devonian limestone, Czechoslovakia.

38–39. *Reticestus planus* (Wilson), 1935 (p. 140).

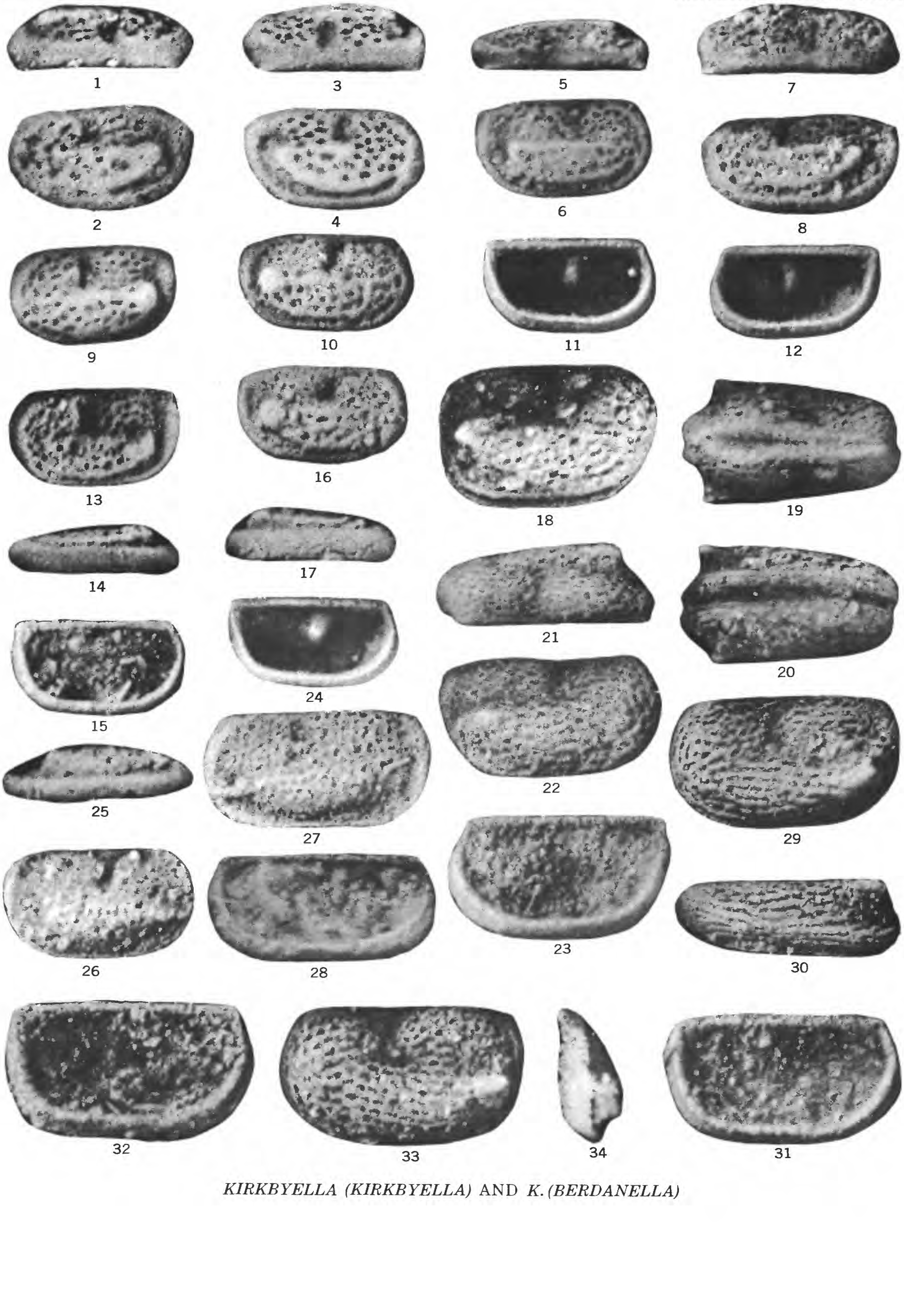
Dorsal and right views of carapace. Paratype USNM 112892, Birdsong formation, Tennessee.

40–43. *Shleesha simplex* (Roth), 1929 (p. 136).

Dorsal, right, ventral, and left views of carapace. Holotype USNM 80188, Wapanucka limestone, Oklahoma.



AMPHISSITES, POLYTYLITES, RETICESTUS, REVIYA, SHLEESHA



KIRKBYELLA (KIRKBYELLA) AND *K. (BERDANELLA)*

PLATE 12

[All magnifications are approximately × 60; photographs are by N. W. Shupe]

FIGURES 1–12, 24. *Kirkbyella* (*Kirkbyella*) *bellipuncta* (Van Pelt), 1933 (p. 143).

1–4. Dorsal and lateral views of left and right valves of Stewart's specimens, Ohio State Univ. Cat. No. 18176, Silica shale, Lucas County, Ohio.

5–8. Dorsal and lateral views of right and left valves of *Kirkbyella bellipuncta* var *transversa* Stewart and Hendrix, 1945. Syntypes, Ohio State Univ. Cat No. 18892, Plum Brook shale, Erie County, Ohio.

9–12, 24. Outside and inside views of left and right valves, and inside of left valve converted to fluorite. Figured specimens USNM 137542, 137543, 137544, 137545, 137546, Middle Devonian shale, near Thedford, Ontario, Canada. USGS loc. 4975–SD.

13–17. *Kirkbyella* (*Kirkbyella*) *typa* Coryell and Booth, 1933 (p. 138).

Lateral, ventral, and inside views of holotype; lateral and ventral views of paratype. Columbia Univ. Paleont. Colln., Cat. No. 27545, Wayland shale, Young County, Tex.

18–23, 29–33. *Kirkbyella* (*Berdanella*) *verticalis* (Coryell and Cuskley), 1934 (p. 146).

18–20. Right, dorsal, and ventral views of carapace. Holotype of *K. perplexa* Wilson, USNM 112903, Birdsong shale, Decatur County, Tenn.

21–23. Dorsal, outside, and inside of right valve. Figured specimen USNM 135747, Haragan shale, Murray County, Okla.

29–31. Lateral, ventral, and inside of left valve. Figured specimen USNM 135748, Haragan shale, Murray County, Okla.

32, 33. Inside and outside of left valve. Paratype of *K. perplexa* Wilson, USNM 112904, Birdsong shale, Decatur County, Tenn.

25–28, 34. *Kirkbyella*? (*Berdanella*?) *devonica* (Gibson), 1955 (p. 145).

25, 26. Ventral and lateral views of left valve. Paratype USNM 123105. Cerro Gordo formation, Iowa.

27, 28, 34. Outside, inside, and anterior of right valve. Holotype USNM 123104, Cerro Gordo formation, Iowa.

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GEOLOGICAL SURVEY PROFESSIONAL PAPER 330

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