CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

THE UNIVERSITY OF MICHIGAN

VOL. XVIII, No. 3, pp. 33–46 (3 pls.) MAY 3, 1963

PARACONULARIA NEWBERRYI (WINCHELL) AND OTHER LOWER MISSISSIPPIAN CONULARIIDS FROM MICHIGAN, OHIO, INDIANA, AND IOWA

BY

EGBERT G. DRISCOLL

FROM THE

EDWARD PULTENEY WRIGHT MEMORIAL VOLUME

Publication of this paper is made possible by the
Federal-Mogul-Bower Bearings, Inc.
Paleontology Research Fund

MUSEUM OF PALEONTOLOGY
THE UNIVERSITY OF MICHIGAN
ANN ARBOR

CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

Director: LEWIS B. KELLUM

The series of contributions from the Museum of Paleontology is a medium for the publication of papers based chiefly upon the collection in the Museum. When the number of pages issued is sufficient to make a volume, a title page and a table of contents will be sent to libraries on the mailing list, and to individuals upon request. A list of the separate papers may also be obtained. Correspondence should be directed to the Museum of Paleontology, The University of Michigan, Ann Arbor, Michigan.

VOLS. II–XVII. Parts of volumes may be obtained if available.

VOLUME XVIII

1. Morphology and Taxonomy of the Cystoid *Cheirocrinus anatiformis* (Hall), by Robert V. Kesling. Pages 1–21, with 4 plates.
2. Ordovician Streptelasmid Rugose Corals from Michigan, by Erwin C. Stumm. Pages 23–31, with 2 plates.
3. *Paraconularia newberryi* (Winchell) and other Lower Mississippian Conulariids from Michigan, Ohio, Indiana, and Iowa, by Egbert G. Driscoll. Pages 33–46, with 3 plates.

VOL. XVIII, No. 3, pp. 33–46 (3 pls.) MAY 3, 1963

PARACONULARIA NEWBERRYI (WINCHELL) AND OTHER LOWER MISSISSIPIAN CONULARIIDS FROM MICHIGAN, OHIO, INDIANA, AND IOWA

BY
EGBERT G. DRISCOLL

CONTENTS

INTRODUCTION

THE SPECIES *Paraconularia newberryi* (Winchell) occurs in rocks of Osagean age in Michigan, Ohio, and Indiana. An Ohio form, heretofore assigned to this species, is referred to *P. sciotovillensis,* sp. nov. *Conularia byblis* White, a Kinderhookian form previously confused with *Paraconularia newberryi* is made type species of *Adesmoconularia,* gen. nov.

In 1865 (p. 130) Alexander Winchell described, but did not illustrate, a new species of conulariid from Cuyahoga Falls, Ohio. In 1871 (p. 258) he revised this description, basing his revision upon a specimen from Sciotoville, Ohio. Again, no illustration was published. Comparison of Winchell's holotype and hypotype specimens has convinced the writer that they do not represent the same species. In the collections of the Museum of Paleontology, The University of Michigan, however, there are specimens from Ohio, Michigan, and Indiana which are conspecific with Winchell's holotype. Many of these have been preserved with the periderm intact. Information concerning the exact stratigraphic occurrence of these specimens is incomplete, but they were all collected from beds of Osagean age at approximately the same stratigraphic horizon.

It is noteworthy that the Michigan specimens were collected from the Michigan formation. Despite the fact that a fairly substantial collection of Michigan formation fossils is held by the Museum of Paleontology, The University of Michigan, the following description of specimens of *Paraconularia newberryi* (Winchell) constitutes the first detailed examination of forms from this interesting sequence of gypsiferous beds.

Sinclair's (1952, pp. 135–45) classification of the Conulariida was adopted by Moore and Harrington (1956), essentially without change, for the *Treatise on Invertebrate Paleontology*. This classification requires re-examination of *Conularia newberryi* Winchell and assignment of this species to the genus *Paraconularia.*

A comparison of *Paraconularia newberryi* with *Conularia byblis* White, a form with which it was confused by Winchell, made it necessary to erect a new genus, *Adesmoconularia,* for the latter species.

ACKNOWLEDGMENTS

I am indebted to Dr. L. B. Kellum, Dr. C. A. Arnold, and Dr. R. V. Kesling for critical reading of the manuscript of this paper. All type specimens illustrated here are held by the Museum of Paleontology, The University of Michigan.

Because of the questionable affiliation of Conulariids no classification of this group above the ordinal level is attempted here. Evidence supporting assignment of Conulariids to the Scyphozoa is marshaled by Moore and Harrington (F27–F38) in the *Treatise on Invertebrate Paleontology* (1956).

REGISTER OF LOCALITIES

1. Cuyahoga Falls, Summit Co., Ohio.
2. Wooster, Wayne Co., Ohio.
3. Sciotoville, Scioto Co., Ohio.
4. Crawfordsville, Montgomery Co., Indiana.
5. U. S. Gypsum Company's quarry, sec. 27, T. 21 N., R. 7 E., near Alabaster, Michigan.
6. Burlington, Iowa.

SYSTEMATIC DESCRIPTIONS

Order CONULARIIDA Miller and Gurley, 1896

Family Conulariidae Walcott, 1886

Subfamily Paraconulariinae Sinclair, 1952

Genus *Paraconularia* Sinclair, 1952

Paraconularia newberryi (Winchell)

(Pl. 1, Figs. 1–8; Pl. 2, Figs. 1–9)

Conularia newberryi Winchell. 1865, p. 130; *non* Winchell, 1871, p. 258; *non* Meek, 1875, pp. 316–17, Pl. 18, Figs. *2a, b.*

Original description.—(Winchell, 1865, p. 130) "Shell very small, in the form of a quadrangular pyramid, (the apex of which has been broken off the specimen described.) The pyramid is inclined over one of the angles. Angles of the pyramid slightly rounded, and marked by a shallow groove running longitudinally. Each side is marked by sharp, raised, transverse lines, which, instead of running directly across, are angulated in the middle, so that at this point they are nearer the base of the shell by a distance equal to once and a half the distance between two lines. The distance between the lines increases from above downwards, and is everywhere equal to about one-ninth the width of the side. These transverse lines have the appearance of the projecting edges of septa, and are continuous from the middle of one of the shorter sides of the pyramid around to the same point, though the ends do not join but alternate in position. The sides of the pyramid are inclined at an angle of 30°, and, if they met at a point in the perfect specimen, it must have been about half an inch in length, with a width at the base of about .17 inch.

"Collected by A. Winchell, at Cuyahoga Falls, Ohio, in the water limestone below the Conglomerate.

"Named in honor of Prof. J. S. Newberry, M.D., equally distinguished in the service of science and of his country."

Revised description.—Holotype (Pl. 1, Figs. 1–5) is fragment of poorly preserved specimen. Extension of sides apically indicates a total length of not less than 1.3 cm. Greatest length of any paratype 7.5 cm. Shell straight, tapering regularly or slightly more rapidly apically. Apical angle variable; from 25 degrees in holotype to 13 degrees in crushed specimen from Crawfordsville, Indiana. Section square or very slightly rhombic. Faces plane surfaces, equal. Midline indicated by surface sculpture and by pigmented line (Pl. 2, Fig. 3). Corners with a sharp longitudinal groove; bottom of groove angulated (Pl. 2, Figs. 4, 8). Apex not known. No apertural lobes observed. No attachment disc observed but sides taper to a distinct point apically.

Surface marked by prominent narrow transverse ridges. Ridges more crowded apically; vary in number from about 3 per mm apically to about 1 per mm aperturally; marked by small, distinct, subspherical pustules. Pustules vary from about 7 to about 15 per mm. Transverse ridges never cross corner furrows, and alternate, never being directly opposite one another at the furrows. Transverse ridges may or may not cross midline. At midline ridges form an apically directed angle of from about 123 degrees to about 136 degrees. This angle is greater on the apical portion and less on the apertural portion of the shell. Transverse ridges slightly sinuous, being bent somewhat aperturally at the corner furrows and

slightly apically at the midlines. Ridges appear most commonly to cross midline on the apical, and possibly on the apertural, part of the shell; they alternate on the middle part of the shell. On specimens examined, alternating ridges are more common than those crossing or opposite each other at the midline.

Flat or slightly concave interspaces separate the transverse ridges. No ornamentation present on interspaces.

Remarks.—Winchell's holotype of *Paraconularia newberryi* is a small, poorly preserved fragment. It shows, however, all important specific characteristics. Transverse ridges alternate at the corner furrows and either alternate or cross the midline. These ridges are pustulose and form midline angles of from 129 degrees to 133 degrees. The apical angle, though apparently larger on the holotype than on other specimens, is difficult to determine on such a small fragment. Although smaller than other specimens here included in the species, the holotype is broken at both the apical and apertural ends. It is therefore impossible to determine the original size of the shell.

Figure 1 illustrates the variation in the midline angle of the transverse ridges on individual specimens from localities 1–5. Note that the total range of this angle for *P. newberryi* is from 123 degrees to 136 degrees. Winchell's hypotype of *Conularia newberryi* (Winchell, 1871, p. 258) (= *Paraconularia sciotovillensis* sp. nov.) from Sciotoville, Ohio, illustrates a variation in this angle of from 108 degrees to 127 degrees. Other characteristics differentiating these two species are discussed under *P. sciotovillensis*.

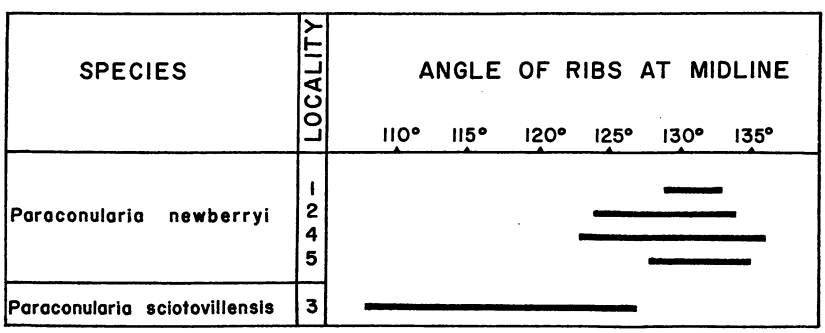


FIG. 1. Comparison of the angle made by transverse ribs at the midline of specimens of *Paraconularia newberryi* (Winchell) and *P. sciotovillensis*, sp. nov. Note that the angle was measured on a single specimen for each locality and that variation is due to change in the angle throughout the length of the specimen rather than to variation between specimens.

Occurrence.—Specimens of *P. newberryi* have been illustrated from localities 1 (Pl. 1, Figs. 1–5), 2 (Pl. 2, Figs. 1–5), 4 (Pl. 2, Figs. 6–9), and 5 (Pl. 1, Figs. 6–8). These are the only known occurrences of the species. Figure 2 is a map showing the localities from which *P. newberryi* and *P. sciotovillensis* have been reported.

Although precise information concerning the stratigraphic limits of *Paraconularia newberryi* is not available all reported occurrences are in the Osagean and appear to be Burlington Limestone equivalents. At localities 1 and 2 the species is found near the top of the Waverly group; either in the uppermost Cuyahoga formation or in the Logan formation. At locality 4 it is found near the middle of the Borden group. The specimens from the Michigan formation at locality 5 are recorded by the collector, Edward W. Hard, as occurring in a bed of gray, gypsiferous limestone approximately 3 feet thick. This bed is found about 27 feet above the base of the exposed section and 4 feet below a 16-foot bed of mottled white gypsum.

The Michigan formation has been considered to be, at least in part, of Osagean age (Weller, *et. al,* 1948). The occurrence of *Paraconularia newberryi* in this formation, as well as in other formations for which an Osagean age is more firmly established, supports this conclusion.

Types.—Holotype No. 245; hypotypes Nos. 802, 1180, 45499; unfigured hypotype No. 45500.

Paraconularia sciotovillensis, sp. nov.

(Pl. 1, Figs. 9–12)

Conularia newberryi Winchell. 1871, p. 258; *non* Winchell, 1865, p. 130; ?Meek, 1875, pp. 316–17, Pl. 18, Figs. 2*a, b.*

Description.—Holotype (Pl. 1, Figs. 9–12) is a well-preserved but incomplete specimen. Extension of sides apically indicates a total length of not less than 6.4 cm. Shell straight, tapering regularly apically. Apical angle about 20 degrees. Section indeterminate. On holotype the angle between two adjacent faces is 120 degrees but this specimen may well be crushed. Faces plane surfaces, probably equal. Midline indicated by strong surface sculpture and by weak longitudinal ridge (Pl. 1, Fig. 12). Corner with a sharp, deep, angular, longitudinal groove. Apex not known. Nature of apical extremity unknown; may taper to point, or may terminate bluntly.

Surface marked by strong, prominent, transverse ridges (Pl. 1, Fig. 10). Ridges more crowded apically; vary from about 1.2 per mm on apical part of specimen to about 0.9 per mm on apertural part of specimen; very weak grooves occasionally present on these ridges. At corner groove ridges

FIG. 2. Index map of localities from which *Paraconularia newberryi* and *P. sciotovillensis* have been reported. *P. newberryi* occurs at Cuyahoga Falls (locality 1), Wooster (locality 2), Crawfordsville (locality 4), and near Alabaster (locality 5). *P. sciotovillensis* has been found at Sciotoville (locality 3) and may occur at Loudonville.

alternate, never being directly opposite one another. Ridges do not cross corner groove. Transverse ridges either alternate or are directly opposite one another at midline and form an apically directed angle of from 108 degrees to 127 degrees (Fig. 1). This angle is greater on the apical part of the specimen and less on the apertural part. Transverse ridges sinuous, being nearly at right angles to midline near the midline, bending apically on the face, and curving aperturally near the corner grooves; in corner grooves they are sharply inflected toward the aperture (Pl. 1, Fig. 11).

Flat or slightly concave interspaces separate transverse ridges. No ornamentation present on interspaces.

Remarks.—Paraconularia sciotovillensis may be distinguished from *P. newberryi* by its stronger transverse ridges, the sharp apertural inflection of the ridges in the corner grooves, the deeper corner grooves, the absence of pustules on the ridges, the presence of a slight longitudinal ridge at the midline, and the greater angle of the transverse ridges at the midline (Fig. 1). These differences clearly require the removal of this specimen from *Conularia newberryi* (= *Paraconularia newberryi*) where it was placed by Winchell (1871, p. 258).

In 1875 (pp. 316–17, Pl. 18, Figs. 2*a, b*) Meek described a specimen of conulariid "from the same horizon [as the holotype of *Paraconularia newberryi*] at Loudonville, Ohio."

I have not examined specimens from this locality. Meek's illustrations and description indicate characteristics of both *Paraconularia newberryi* and *P. sciotovillensis*. The reported presence of ". . . finely-crenulate transverse costae . . . ." is a character similar to *P. newberryi*. However, the strong transverse ridges, the comparable angle of these ridges at the midline, the strong corner furrows, and the marked apertural inflection of the transverse ridges in the corner grooves has convinced me that the form should questionably be assigned to *P. sciotovillensis*.

It may be noteworthy that Alexander Winchell prepared an illustration of the holotype of this species. His illustrations, however, were never published but are in the files of the Museum of Paleontology, The University of Michigan. Winchell's illustration of the specimen is labeled *Conularia byblis* White & Whitfield. *Conularia byblis* (= *Adesmoconularia byblis*) is clearly distinct from *P. sciotovillensis*. Differentiating characteristics are outlined under the generic description of *Adesmoconularia,* gen. nov.

Occurrence.—Lower Mississippian, Waverly group, uppermost Cuyahoga formation, Black Hand member; or lowermost Logan formation, Byer member (on labels associated with holotype both bed No. 3½ and bed No. 4 are cited as the stratigraphic horizon. These numbers refer to

Andrews 1871 classification). Locality 3. It is noteworthy that the stratigraphic occurrence of *Paraconularia sciotovillensis* is the same, or nearly the same, as that of *P. newberryi.*

Type.—Holotype No. 26740.

Subfamily Paraconulariinae Sinclair, 1952

Adesmoconularia, gen. nov.

Type species.—Conularia byblis White.

Diagnosis.—Transverse ridges moderately strong, do not cross corner furrows. Corner furrows deep. Transverse ridges not tuberculate, may or may not cross midline. Longitudinal bars in interspaces. Apical extremity not pointed in adult forms; a thin, smooth, convex, chitinous diaphragm being present adapically.

Remarks.—Adesmoconularia is similar to *Calloconularia* Sinclair (1952, p. 140) in the possession of longitudinal bars in the interspaces. It may be differentiated by its larger size, and by the fact that the interspaces do not swell at the shoulders. Features distinguishing *Adesmoconularia* from *Paraconularia* Sinclair (1940, pp. 73–74) are the nontuberculate nature of the transverse ridges as well as the presence of a smooth convex diaphragm adapically in the former.

The prefix of the generic name is from the Greek *Adesmos,* unfettered; and is indicative of the mode of life which is believed to have been characteristic of adult members of this genus.

Adesmoconularia byblis (White)

(Pl. 3, Figs. 1–7)

Conularia byblis White. 1865, p. 22; Weller, 1900, pp. 118–19, Pl. 7, Fig. 7; *non* Winchell, 1871, p. 257.

Original description.—(White, 1865, p. 22) "Shell large, in the shape of a truncated pyramid, length twice ? the width of the base; apex broadly-rounded, smooth, sides depressed, convex; grooves at the angles narrow; a faint longitudinal depression along the middle of each side; transverse ridges narrow, distinctly raised, forty-five or fifty to the inch, but slightly curved in passing from the salient angles to the faint central depression, at which they meet with an obtuse angle and cross with slight interruption; sometimes, however, they alternate for a short distance, and then cross continuously as before. Space between the ridges finely crenulate.

"Locality and position, in the Chemung beds at Burlington, Iowa."

Revised description.—Apertural portion of holotype not preserved; original length in excess of 7.6 cm. Shell straight, tapering regularly or slightly more rapidly apically. Apical angle 27 degrees above apical diaphragm. Section indeterminate because of crushing of holotype; square or rhombic. Faces slightly convex, equal. Midline indicated by surface sculpture and by very faint groove (Pl. 3, Fig. 2). Corners with a sharp, narrow, longitudinal groove (Pl. 3, Fig. 3). Apex not known. Apically a smooth, thin, convex, chitinous diaphragm terminates shell (Pl. 3, Figs. 1, 2, 6, 7).

Surface marked by prominent, thin, closely spaced, transverse ridges. Ridges distributed evenly from apical to adapical extremities (exclusive of apical diaphragm which is smooth); about 1.8 per mm. Ridges reflected internally as well as externally, resulting in grooved surface on internal molds (Pl. 3, Fig. 5). Very fine longitudinal grooves present in the interspaces. Appearance of these grooves varies with preservation. On well-preserved surfaces grooves are most pronounced in apical portion of interspace, weaker in apertural portion (Pl. 3, Figs. 5, 7), on worn surfaces, where the transverse ridges have been somewhat abraided, longitudinal grooves appear to extend across transverse ridges as well as interspaces. A deceptive pustulose appearance of transverse ridges is occasionally developed but on well-preserved surfaces no pustules are present.

Transverse ridges never cross corner furrows and may either alternate or be directly opposite one another at the corner. Ridges may cross midline, or may be interrupted but directly opposite one another, or may alternate. All three of these conditions present on holotype. Ridges not inflected either apically or adapically at midline or corner groove; straight to very slightly sinuous between these two points; form apically directed angle of about 143 degrees at midline.

Remarks.—Winchell (1871, p. 257) identified a conulariid "From dark, bituminous shales, Hickman county, Tennessee." as conspecific with *Conularia byblis* White (= *Adesmoconularia byblis*). I have examined this specimen (Pl. 3, Fig. 8). The condition of preservation is such that no specific identification is possible. A longitudinal corner groove is present but no midline is preserved. The specimen is thoroughly crushed. As noted by Winchell, there are pronounced pustules on the transverse ridges. This characteristic, common to many conulariids, suffices to distinguish the species from *Adesmoconularia byblis*.

Occurrence.—English River sandstone, Kinderhook group, Locality 6.

Type.—Holotype No. 2167.

REFERENCES CITED

ANDREWS, E. B. 1873. Report on Second Geological District. Rept. Geol. Survey Ohio, Vol. 1, pp. 225–313.

MEEK, F. B. 1875. Invertebrate Fossils of the Waverly Group and Coal Measures of Ohio. *Ibid.*, Vol. 2, pp. 269–347, Pls. 10–19.

MILLER, S. A., and GURLEY, W. F. E. 1896. New Species of Palaeozoic Invertebrates from Illinois and Other States. Bull. Ill. State Mus. Nat. Hist., Vol. 11, pp. 5–50, Pls. 1–5.

MOORE, R. C., and HARRINGTON, H. J. 1956. Treatise on Invertebrate Paleontology (F) Coelenterata, Scyphozoa, Conulata; pp. F54–F66.

SINCLAIR, G. W. 1940. The Genotype of Conularia. Canadian Field-Naturalist, Vol. 54, No. 5, pp. 72–74.

——— 1952. A Classification of the Conularida. Fieldiana, Geology, Chicago Mus. Nat. Hist., Vol. 10, No. 13, pp. 135–45, Fig. 56.

WALCOTT, C. D. 1886. Studies on the Cambrian Faunas of North America. Bull. U. S. Geol. Survey, Vol. 30, pp. 731–1095, Pls. 1–33.

WELLER, J. M., and others. 1948. Correlation of the Mississippian Formations of North America. Bull. Geol. Soc. Amer., Vol. 59, pp. 91–196, 2 Pls. 7 Figs.

WELLER, STUART. 1900. Kinderhook Faunal Studies. II. The Fauna of the Chonopectus Sandstone at Burlington, Iowa. Trans. St. Louis Acad. Sci., Vol. 10, pp. 57–129, Pls. 1–9.

WHITE, C. A. 1865. Description of New Species of Fossils from the Devonian and Carboniferous Rocks of the Mississippi Valley. Proc. Boston Soc. Nat. Hist., Vol. 9, pp. 8–33.

WINCHELL, ALEXANDER. 1865. Descriptions of New Species of Fossils, from the Marshall Group of Michigan, and its Supposed Equivalents, in Other States; With Notes on Some Fossils of the Same Age Previously Described. Proc. Acad. Nat. Sci. Phila., pp. 109–33.

——— 1871. Notice and Description of Fossils, from the Marshall Group of the Western States, with Notes on Fossils from Other Formations. Proc. Amer. Phil. Soc., Vol. 11, pp. 245–60.

Manuscript submitted, November 3, 1962

PLATES

EXPLANATION OF PLATE I

PAGE

Paraconularia newberryi (Winchell) 34

FIG. 1. Corner view. Holotype, No. 245. Near top of Waverly group, locality 1. × 4.

FIG. 2. Facial view of same specimen. × 4.

FIG. 3. Surface sculpture of face of same specimen showing midline and fine nodes on transverse ridges. × 20.

FIG. 4. Facial view of same specimen showing midline. × 10.

FIG. 5. Apical view of same specimen. × 4.

FIG. 6. Corner view. Hypotype, No. 45499. Michigan formation, locality 5. × 4.

FIG. 7. Corner view of same specimen. × 1.

FIG. 8. Surface sculpture of face of same specimen showing midline and nodes on transverse ridges.

Paraconularia sciotovillensis, sp. nov. 37

FIG. 9. Corner view. Holotype, No. 26740. × 1.

FIG. 10. Surface sculpture of same specimen near midline. Note the absence of nodes on transverse ridges. × 10.

FIG. 11. Corner view of same specimen. Note that transverse ridges extend into corner groove. × 4.

FIG. 12. Facial view of same specimen showing midline. × 4.

PLATE I

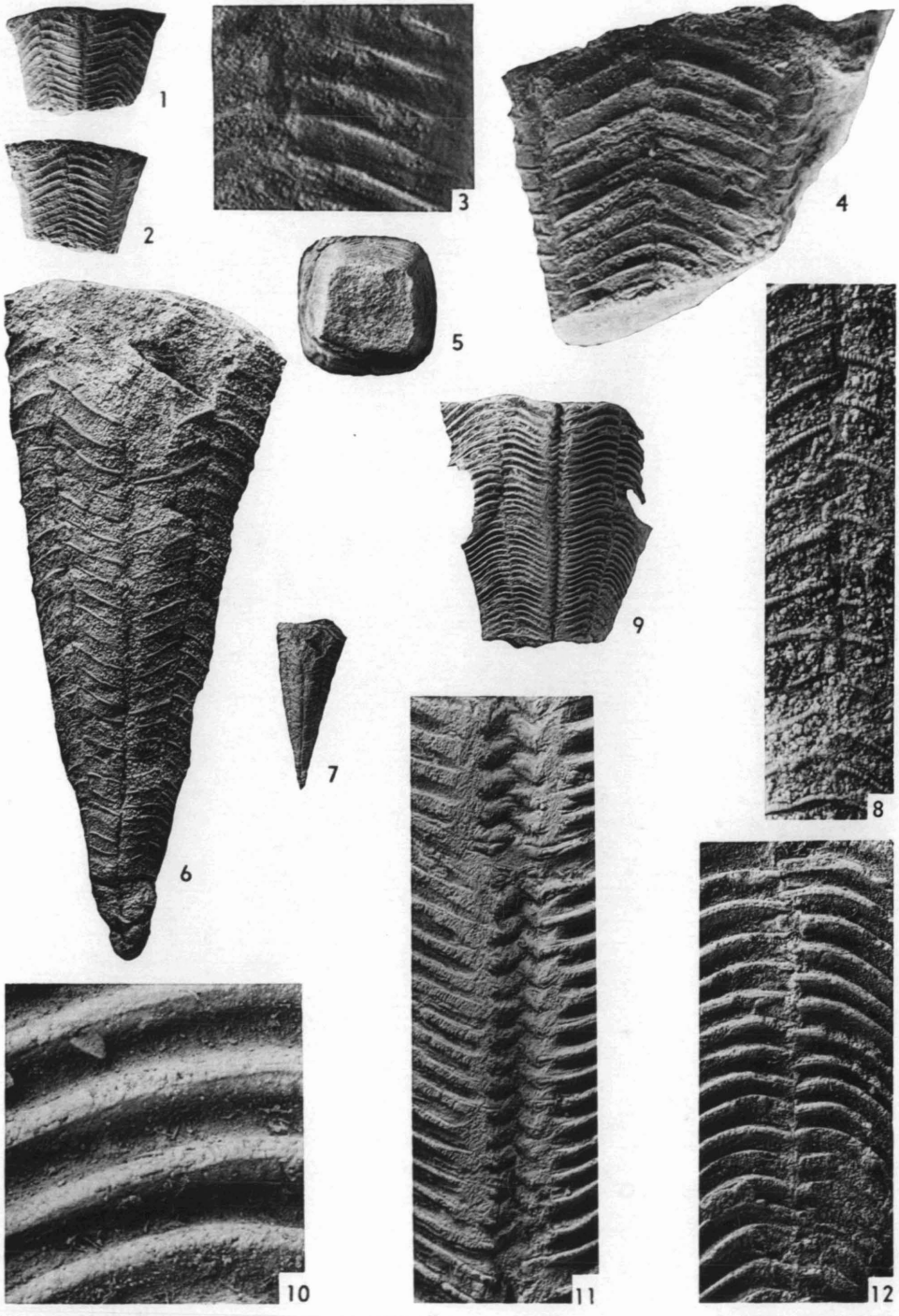
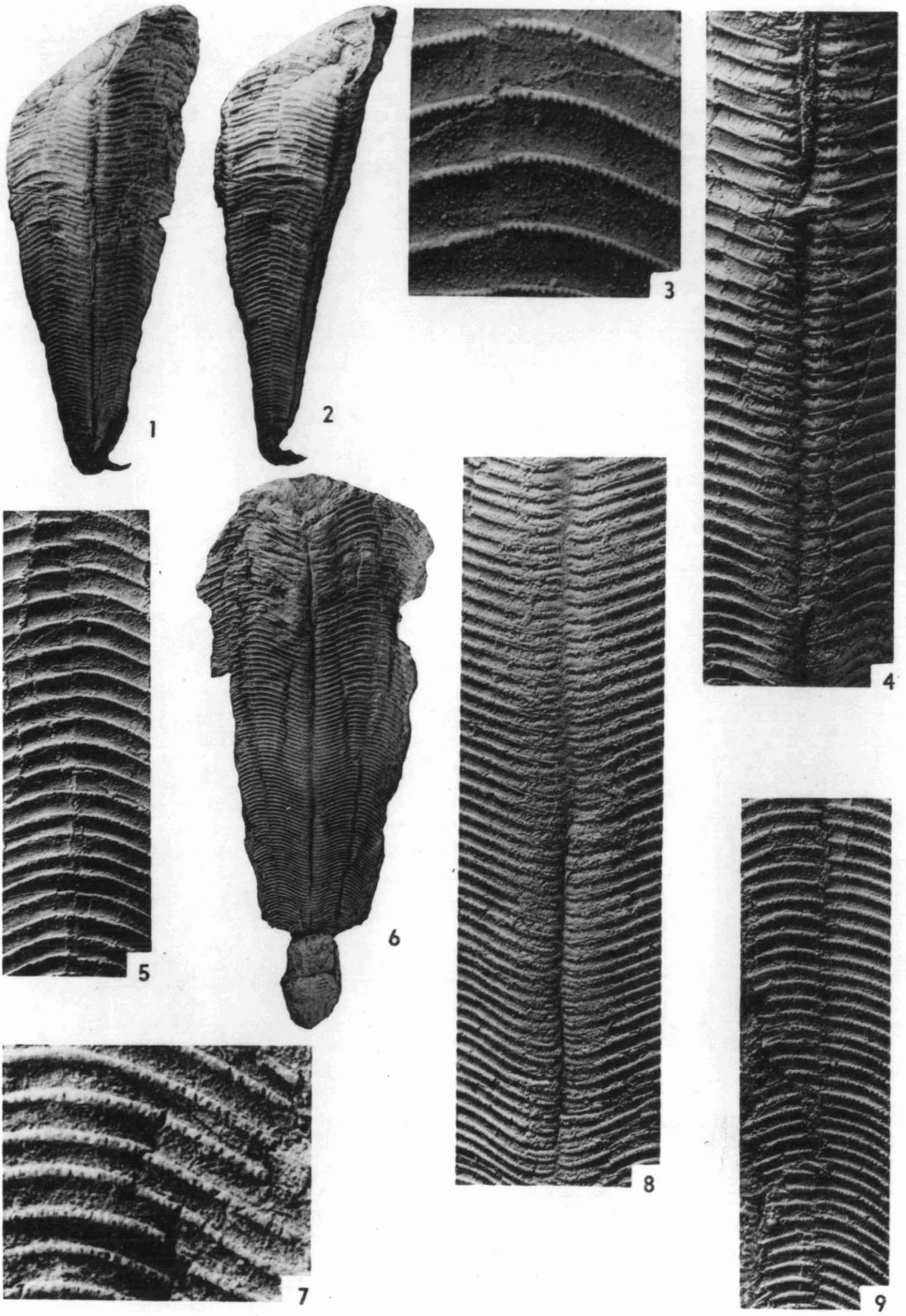


PLATE II



EXPLANATION OF PLATE II

FIG. 1. Corner view. Hypotype, No. 802. Near top of Waverly group, locality 2. Note that apex has been crushed. × 1.

FIG. 2. Facial view of same specimen. × 1.

FIG. 3. Surface sculpture of face of same specimen showing midline and nodes on transverse ridges. × 10.

FIG. 4. Corner view of same specimen showing corner groove. × 4.

FIG. 5. Facial view of same specimen showing midline. × 4.

FIG. 6. Corner view. Hypotype, No. 1180. Middle Borden group, locality 4. Note that this specimen has been crushed and that midlines as well as corner groove are shown in this figure. × 1.

FIG. 7. Surface sculpture near midline of same specimen showing weakly developed nodes on transverse ridges. × 10.

FIG. 8. Corner view of same specimen showing corner groove. × 4.

FIG. 9. Facial view of same specimen showing midline and nodes on transverse ridges. × 4.

EXPLANATION OF PLATE III

PAGE

Adesmoconularia byblis (White) 40

FIG. 1. Apical view. Holotype, No. 2167. English River sandstone, Kinderhook group, locality 6. Note that smooth apical diaphragm is only partly preserved. × 1.

FIG. 2. Corner view of same specimen. × 1.

FIG. 3. Corner view of same specimen showing corner groove. × 4.

FIG. 4. Facial view of same specimen showing midline. × 4.

FIG. 5. Surface of same specimen. In the upper right part of the figure external surface sculpture is shown; note the longitudinal grooves in the interspaces and absence of nodes on the transverse ridges. In the left and lower part of the figure a natural internal mold is shown; note the transverse grooves reflecting internal thickening of the transverse ridges. × 10.

FIG. 6. Oblique apical view of same specimen showing part of smooth apical diaphragm. × 1.

FIG. 7. Surface sculpture of same specimen. Note that the contact between the normal surface and the smooth apical diaphragm is shown, and that transverse ridges bear an angular relationship to this juncture. × 10.

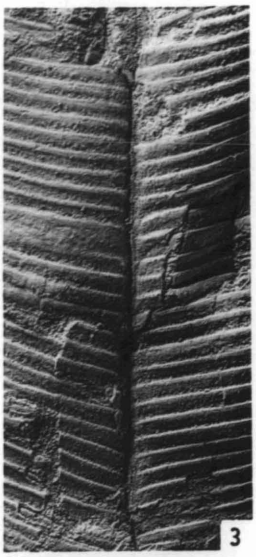
Conularia? sp. 41

FIG. 8. Corner view of crushed and poorly preserved specimen. "From dark, bituminous shales, Hickman county, Tennessee." (Winchell, 1871, p. 257.) This specimen was assigned to *Conularia byblis* (=*Adesmoconularia byblis*) by Winchell but is here removed from the species. × 2.

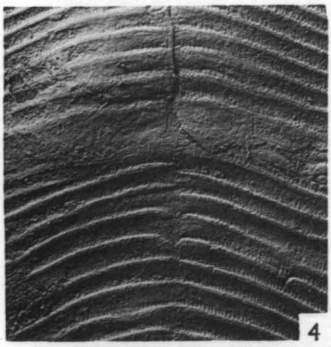
PLATE III

1

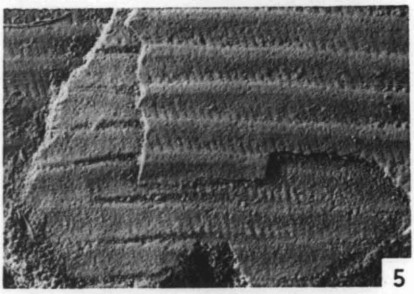
2



3

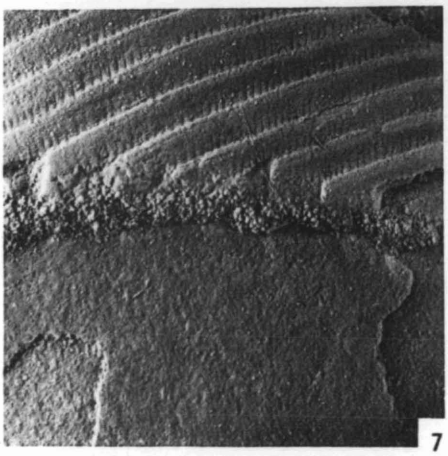


4



5

6



7

8