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A REVISION OF A. W. GRABAU'S SPECIES OF
MUCROSPIRIFER FROM THE MIDDLE
DEVONIAN TRAVERSE GROUP
OF MICHIGAN

BY
ERWIN C. STUMM



From the
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MUSEUM OF PALEONTOLOGY
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VOLUME XIII

1. The Type Species of *Spinocyrtia* Fredericks and New Species of this Brachiopod Genus from Southwestern Ontario, by George M. Ehlers and Jean D. Wright. Pages 1-32, with 11 plates.
2. Silurian Ostracods collected by Dr. Carl Ludwig Rominger from Glacial Deposits in Germany, Parts I-III, by Robert V. Kesling and Philip L. Wagner. Pages 33-79, with 8 plates.
3. A Revision of A. W. Grabau's Species of *Mucrospirifer* from the Middle Devonian Traverse Group of Michigan, by Erwin C. Stumm. Pages 81-94, with 3 plates.
4. Upper Cambrian Trilobites from Michigan, by Erwin C. Stumm. Pages 95-102, with 1 plate.

A REVISION OF A. W. GRABAU'S SPECIES OF *MUCROSPIRIFER*
FROM THE MIDDLE DEVONIAN TRAVERSE GROUP
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INTRODUCTION AND PREVIOUS WORK

AMONG the most common fossils in the Middle Devonian Traverse group of Michigan are specimens of various species of the well-known brachiopod genus *Mucrospirifer*. These so-called "butterfly shells" are especially numerous in the calcareous shales of the Traverse group and in equivalent beds in western New York, southwestern Ontario, and northern Ohio. Many species of *Mucrospirifer* are undescribed and most of the known forms have been referred to the type species, *Mucrospirifer mucronatus* (Conrad). The type species is unusually wide, with well-developed wings terminating in mucronate points, a dorsal fold with a medial groove, a ventral sulcus with a medial ridge, and over 20 costae on each side of the fold and sulcus. It appears to be confined to the Skaneateles formation of the Hamilton group of New York and the Appalachian region. Many specimens from the overlying Ludlowville and Moscow formations previously identified as *M. mucronatus* are specifically distinct.

In 1910 and 1912 A. W. Grabau and Margaret Reed, in an abstract in the *Proceedings of the Seventh International Zoological Congress*, named five species, varieties, and mutations of *Mucrospirifer* from the Traverse group. Each one is accompanied by a descriptive sentence and all five forms are accredited to Grabau. In 1915 Charles C. Mook, at that time a graduate student of Grabau's, made a statistical study of the length-width ratios in three of Grabau's forms and also named a sixth species, which he accredited to Grabau. Mook gave a brief description of each of the four forms he studied, but gave no adequate information regarding their stratigraphic range. Two he described in only a short sentence or clause and none was illustrated.

While examining the material that Grabau collected from the Traverse group, I found the specimens on which he established his new species. In the present paper revised descriptions of Grabau's species are given along with illustrations of their type specimens and a few hypotypes. In addition, specimens of *Mucrospirifer prolificus* (Stewart) from the Silica shale and the Traverse group are illustrated.

Most of Grabau's collections from Michigan are in the Museum of Paleontology at Ann Arbor, but some that were at Columbia University were borrowed for this study. Unless otherwise indicated, all type specimens are catalogued in the Museum of Paleontology, University of Michigan.

SYSTEMATIC DESCRIPTIONS

Phylum BRACHIOPODA

Class ARTICULATA

Order TELOTREMATA

Superfamily Spiriferacea

Family Spiriferidae

Genus *Mucrospirifer* Grabau, 1931

Type species.—By original designation, Grabau, 1931, pp. 247–48, *Delthyris mucronatus* Conrad, 1841, p. 54, Middle Devonian, Hamilton group, Skaneateles formation, Hamilton Township, Madison County, New York.

Original diagnosis.—"Transverse, with the hinge-line forming the greatest width, and often extended into mucronate points. The sinus is well-developed, smooth, or with a single low median plication, the fold corresponding. Lateral shell plicae well developed, rounded to subangular, simple throughout. Surface marked by lines of growth and irregular growth lamellae. The hinge area is low, without or with small supporting dental

plates, the muscular area is well developed, sometimes an incipient median septum in the pedicle valve.

Typically developed in the Middle and Upper Devonian of central North America."

Remarks.—Several species from the Ludlowville and Moscow formations of the Hamilton group of New York and the Appalachian regions have been referred to *Mucrospirifer mucronatus*, but they are not conspecific. This species name should only be used for the very short wide form having a distinct medial groove in the sulcus of the ventral valve, a well-developed medial ridge in the fold of the dorsal valve, and an average of 20 costae on either side of the fold or sulcus. G. A. Cooper (1944, Pl. 122, Figs. 4–6) has excellent illustrations of the restricted type species. It occurs only in strata of Skaneateles age.

Grabau's species of *Mucrospirifer* from the Traverse group can be divided into three distinct lineages, or species groups, that are distinguished by differences in the character of the fold in the brachial valve and of the sulcus in the pedicle valve. They are as follows (see Fig. 1):

1. *Mucrospirifer alpenensis* lineage.—Sulcus wide and shallow with a flat base and no medial ridge; fold low and relatively flat; typically without a medial groove, although one may be weakly preserved in the neanic stage on a few specimens.

Mucrospirifer prolificus (Stewart)

Mucrospirifer alpenensis (Grabau)

2. *Mucrospirifer multiplicatus* lineage.—Sulcus bears a distinct medial ridge; fold has a distinct medial groove.

Mucrospirifer multiplicatus (Grabau)

Mucrospirifer attenuatus (Grabau)

3. *Mucrospirifer profundus* lineage.—Fold low convex; sulcus deep and V-shaped.

Mucrospirifer profundus (Grabau)

Mucrospirifer grabaui Stumm, nom. nov.

Mucrospirifer latus (Grabau)

The species in the third lineage show an interesting evolutionary sequence in the middle and upper parts of the Traverse group. The earliest form, *M. latus*, first appearing in the Alpena limestone, has many relatively fine costae, and wings terminating in long mucronate points. *M. grabaui*, which first appears in the Gravel Point formation and the Four Mile Dam formation, has fewer, coarser costae and short mucronate points. *M. profundus*, which first appears in the Norway Point formation, has fewest, coarse, costae and no distinct wings or mucronate points

STRATIGRAPHIC RANGES OF A. W. GRABAU'S SPECIES OF MUCROSPIRIFER FROM THE MIDDLE DEVONIAN TRAVERSE GROUP OF MICHIGAN








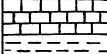
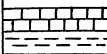

			Mucrospirifer alpenensis lineage	Mucrospirifer profundus lineage	Mucrospirifer multiplicatus lineage
MIDDLE DEVONIAN TRAVERSE GROUP	Thunder Bay limestone				
	Potter Farm formation			—	
	Norway Point shale			—	
	Four Mile Dam fm.			—	
	Alpena limestone			—	
	Newton Creek ls.			—	
	Genshaw formation			—	
	Ferron Point shale		—	—	—
	Rockport Quarry limestone			—	
	Bell shale		—	—	—
SPECIES OF MUCROSPIRIFER			<i>M. prolificus</i>	<i>M. alpenensis</i>	<i>M. latus</i>
					<i>M. grabau</i>
					<i>M. profundus</i>
					<i>M. multiplicatus</i>
					<i>M. attenuatus</i>

FIG. 1

Mucrospirifer alpenensis LINEAGE
Mucrospirifer alpenensis (Grabau)
(Pl. I, Figs. 13-18)

Spirifer mucronatus mut. *alpenense* Grabau in Mook, 1915, pp. 176-77.

Description.—Shell biconvex, ranging from 3 to 5 cm. in width and averaging 1.5 cm. in length and 1.2 cm. in thickness in average ephebic specimens. Greatest width along hinge line with wings terminating in mucronate points. Dorsal valve with broad, low convex or flat-topped fold on which the growth lamellae are well exposed. In a few specimens a faint medial groove present on fold in umbonal region. Costae of medium size, simple, averaging about 1.5 mm. in diameter, and ranging from 14 to 16 on either side of fold. Growth lamellae with distinct *en echelon* pattern on costae. Ventral valve with broad, shallow, flat-bottomed sulcus, with well-developed growth lamellae. No medial ridge present. Costae and *en echelon* growth lamellae as on dorsal valve. Interarea low, ranging from 1.5 to 1.8 mm. in width for entire distance between mucronate points, very faintly transversely striate. Delthyrium triangular with relatively narrow apical angle.

Remarks.—This is the most common species in the lower part of the Traverse group, in which it is confined to the gray calcareous shales. It is very similar in almost all structures to *Mucrospirifer prolificus* (Stewart), which occurs in the same beds. The two species can be distinguished only by the difference in the width of the interarea.

Occurrence.—Middle Devonian: Traverse group—Bell shale and Ferron Point shale, Thunder Bay region, Alpena and Presque Isle counties, Michigan.

Types.—Lectotype No. 31648; hypotype No. 31667.

Mucrospirifer prolificus (Stewart)
(Pl. I, Figs. 1-12)

Spirifer mucronatus var. *prolificum* Stewart, 1927, pp. 47-49, Pl. IV, Figs. 9-14.

Remarks.—This species, which is so abundant in the Silica shale of northwestern Ohio, is also present in the calcareous shales of the lower part of the Traverse group in association with *M. alpenensis* (Grabau). The structures of the two are identical except that the interarea in *M. prolificus* is wider than that in *M. alpenensis*. The interarea in *M. prolificus* is triangular with a maximum width of 4 mm. between the beaks, decreasing to about 1.5 mm. in the vicinity of the wings. The delthyrium in *M. prolificus* has a narrower apical angle than that in *M. alpenensis*. Many single valves exhibiting the internal structures are preserved in the Silica shale. Because they show no significant differences in this respect from the

few single valves available of the other species from the Traverse group, only the interior structures of *M. prolificus* are described in detail.

The interior of the brachial valve has faintly striated diductor muscle scars, a small, vertically striated myophore, hinge sockets, and a low but distinct median septum. The interior of the pedicle valve shows the hinge teeth and the adductor and diductor muscle scars. A short medial ridge is present under the umbonal region in many specimens.

Occurrence.—Middle Devonian: Silica shale, northwestern Ohio and southeastern Michigan; Traverse group—Bell shale and Ferron Point shale, Thunder Bay region, Alpena and Presque Isle counties, Michigan.

Types.—Syntypes No. 16262, Geological Museum, Ohio State Museum. Hypotypes Nos. 31643, 31644, 31646, 31665, 31666, and 33315.

Mucrospirifer multiplicatus LINEAGE
Mucrospirifer multiplicatus (Grabau)
(Pl. II, Figs. 1–11)

Spirifer mucronatus var. *multiplicatus* Grabau in Grabau and Reed, 1910, pp. 1–2.

Spirifer mucronatus var. *multiplicatus* Grabau in Grabau and Reed, 1912, pp. 767–68.

Spirifer mucronatus mut. *multiplicatus* Grabau in Mook, 1915, pp. 177–79.

Description.—Shell biconvex, ranging from 3 to 5 cm. in width, 1.5 to 2.5 cm. in length, and 1 to 1.5 cm. in thickness. Greatest width along hinge line with shell tapering peripherally to form elongate wings without mucronate points. Brachial valve with fold having a narrow to wide, deeply incised medial groove extending from beak to anterior margin. Costae simple, relatively coarse, ranging from 14 to 18 on each side of fold, and from 1.5 to 2 mm. in diameter. Pedicle valve with shallow to deep sulcus having a narrow to wide medial ridge. Costae as in brachial valve. Interior relatively narrow, averaging about 2 mm. in diameter from beak to extremity of wing. Delthyrium triangular with a wide apical angle. Both valves with growth lamellae in *en echelon* pattern on costae and relatively transverse over fold and sinus.

Remarks.—In the possession of a sulcus with a medial ridge and a fold with a medial furrow this species and its related form *Mucrospirifer attenuatus* (Grabau) are more closely related to the species from the Hamilton group of New York than to the species of the other two Traverse group lineages. *Mucrospirifer multiplicatus* can be distinguished from *M. mucronatus*, the type species, in having a much thicker shell with fewer and coarser costae and by not having distinct mucronate points on the wings.

Occurrence.—Middle Devonian: Traverse group—Genshaw formation, Thunder Bay region, Alpena and Presque Isle counties, Michigan.

Types.—Lectotype No. 31633; paratypes Nos. 31631, 31632, 31634; hypotypes Nos. 31668, 31684.

Mucrospirifer attenuatus (Grabau)

(Pl. II, Figs. 12-15)

Spirifer mucronatus var. *attenuatus* Grabau in Grabau and Reed, 1910, pp. 1-2.

Spirifer mucronatus var. *attenuatus* Grabau in Grabau and Reed, 1912, pp. 767-68.

Spirifer mucronatus mut. *attenuatus* Grabau in Mook, 1915, pp. 184-86.

Description.—Shell low biconvex, short and thin, ranging from 2.5 to 3 cm. in width, having a uniformly maximum length of about 1 cm. and an average thickness of about 7 mm. Greatest length along hinge line with shell extended to form very narrow and elongate wings with weakly defined mucronate points. Brachial valve with wide, relatively flat fold bearing a distinct medial groove. Costae simple, thin, averaging .5 mm. in width, about 16 to 18 on each side of fold. Pedicle valve with shallow to moderately deep sulcus bearing a pronounced medial ridge. Costae as on brachial valve. Interarea very low, ranging from .5 to 1 mm. in width. Growth lamellae as in *M. multiplicatus*.

Remarks.—This species differs from *M. multiplicatus* in having a much shorter and thinner shell with much finer costae, and in having a narrower interarea.

Occurrence.—Middle Devonian: Traverse group—Norway Point formation, Thunder Bay region, Alpena County, Michigan.

Types.—Lectotype No. 31658; paratype No. 31657.

Mucrospirifer profundus LINEAGE

Mucrospirifer profundus (Grabau)

(Pl. III, Figs. 1-7)

Spirifer profundus Grabau in Grabau and Reed, 1910, pp. 1-2.

Spirifer profundus Grabau in Grabau and Reed, 1912, pp. 767-68.

Spirifer mucronatus mut. *profundus* Grabau in Mook, 1915, pp. 179-82.

Description.—Shell small, strongly biconvex, slightly wider than long, wings rudimentary or absent, no mucronate points present. Average width 2 cm., length 1.4 cm., thickness 1 cm. Brachial valve with relatively narrow, low convex, flat-topped fold and from 8 to 12 simple coarse costae on each side. Pedicle valve with sulcus deep and V-shaped and costae as on dorsal valve. Interarea faintly transversely striate, low, averaging about 1.5 mm. in width. Delthyrium with a relatively narrow apical angle. Growth lamellae strongly developed, *en echelon* across costae, directed posteriorly on fold, anteriorly on sulcus.

Remarks.—This is a very distinct species differing greatly from others in the lineage by the lack of wings and mucronate points, the great reduction in relative width, and the small number of coarse costae.

Occurrence.—Middle Devonian: Traverse group, Norway Point and Potter Farm formations, Alpena and Presque Isle counties; lower Petoskey formation, Emmet County, Michigan.

Types.—Lectotype No. 31659; paratype No. 31635; hypotype No. 31653.

Mucrospirifer grabau Stumm, nom. nov.

(Pl. III, Figs. 8–17)

Spirifer profundus mut. *intermedia* Grabau in Grabau and Reed, 1910, p. 2 (*non Spirifer intermedius* Brongniart, 1829, p. 429, *nec Spirifer intermedia* Hall, 1859, p. 424.

Spirifer profundus mut. *intermedia* Grabau in Grabau and Reed, 1912, p. 768.

Description.—Shell biconvex, ranging from 3 to 3.5 cm. in width, 1 to 1.5 cm. in length, and .7 to 1 cm. in thickness. Greatest width along hinge line with wings drawn out into relatively long and thick mucronate points. Points produced by an abrupt angular deflection of the anterior shell margin. Brachial valve with fold as in *M. profundus* and with 10 to 12 simple, relatively coarse costae on each side. Costae with an average diameter of 1 mm. Pedicle valve with deep V-shaped sinus as in *M. profundus*. Costae as on brachial valve. Interarea of medium height, averaging about 2 mm. between the beaks. Growth lamellae prominent, arranged as on *M. profundus*.

Remarks.—This species differs from *M. profundus* in its greater size, its prominent mucronate points, and larger number of costae. The specimens from the Gravel Point formation and Four Mile Dam limestone (Pl. III, Figs. 13–17), are slightly shorter and have longer, more gradually sloping mucronate points than the typical forms of the species from the Potter Farm formation and the lower Petoskey limestone. If these differences are constant after study of large numbers of specimens, the specimens from the Gravel point formation and the Four Mile Dam formation may be regarded as a distinct variety or subspecies.

Occurrence.—Middle Devonian: Traverse group—Four Mile Dam formation and Potter Farm formation, Thunder Bay region, Alpena County; Gravel Point formation and lower Petoskey limestone, Emmet County, Michigan.

Types.—Holotype No. 33324; hypotypes Nos. 31654, 31639, and 31661.

Mucrospirifer grabau Stumm, var. A

(Pl. III, Figs. 18–20)

Remarks.—This variety is similar to typical *M. grabau* in the character of the fold and sulcus and in the size and number of costae, but differs in lacking the abrupt deflection of the anterior margin at the base of the mucronate points. Therefore the shells of this variety are alate rather than mucronate.

Occurrence.—Middle Devonian: Traverse group—Gravel Point formation, lower blue shale (zone 6, bed 1 of Pohl, 1930, p. 11), abandoned Bell quarry, NE. corner sec. 8, T.34 N., R.6 W., about 2 miles east of Bay Shore, Emmet County, Michigan.

Figured specimens.—Nos. 31655 and 31656.

Mucrospirifer latus (Grabau)

(Pl. III, Figs. 21–27)

Spirifer mucronatus mut. *lata* Grabau in Grabau and Reed, 1910, p. 2.

Spirifer mucronatus mut. *lata* Grabau in Grabau and Reed, 1912, p. 768.

Description.—Shell biconvex, ranging from 3 to over 4 cm. in width, 1 to 1.5 cm. in length, and from .5 to .8 cm. in thickness. Greatest width along hinge line with well-developed wings terminating in long, thin mucronate points. Deflection of anterior margin of shell at base of mucronate points not well developed. Brachial valve with a low convex fold. A faint medial groove present on umbonal part of fold in a few specimens. Costae simple, relatively fine, averaging about .7 mm. in thickness and ranging from 15 to 18 in number on each side of fold. Pedicle valve with deep, V-shaped sinus. Costae as on brachial valve. Interarea narrow, ranging from 1.5 to 2 mm. in width in different specimens. Delthyrium with a relatively wide apical angle. Growth lamellae as on *M. profundus*.

Remarks.—This species can be distinguished easily from its nearest relative, *M. grabau*, by the finer, more numerous costae, and more gradually tapering mucronate points.

Occurrence.—Middle Devonian: Traverse group—Alpena limestone, Norway Point formation, and Potter farm formation, Thunder Bay region, Alpena County, Michigan.

Types.—Lectotype No. 31649; hypotypes No. 31637 and 31642.

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PLATES

EXPLANATION OF PLATE I

(All figures $\times 1$)

- | | PAGE |
|--|------|
| <i>Mucrospirifer prolificus</i> (Stewart) | 85 |
| FIGS. 1-3. Ventral, posterior, and dorsal views of well-preserved specimen showing flat, smooth fold and sulcus, wide interarea, and delthyrium with narrow apical angle. Hypotype No. 31665. Middle Devonian: Silica shale, abandoned quarry of the Medusa Portland Cement Co., Silica, 1½ miles southwest of Sylvania, Lucas County, Ohio. | |
| FIG. 4. Interior of pedicle valve showing muscle scars and hinge teeth. Hypotype No. 31643. Same horizon and locality as original of Figures 1-3. | |
| FIG. 5. Interior of brachial valve showing myophore, hinge sockets, median septum and adductor muscle scars. Hypotype No. 31644. Same horizon and locality as original of Figures 1-3. | |
| FIG. 6. Posterior view of specimen with well-developed interarea. Hypotype No. 31666. Middle Devonian: Traverse group—Bell shale, abandoned quarry of the Kelley's Island Transport Co., Rockport, sec. 6, T.32 N., R.9 E., Alpena Co., Michigan. | |
| FIGS. 7-9. Ventral, posterior, and dorsal views of small specimen with faint medial groove on umbonal part of fold. Hypotype No. 33315. Same horizon and locality as original of Figure 6. | |
| FIGS. 10-12. Ventral, posterior, and dorsal views of relatively narrow, thick specimen. Hypotype No. 31646. Middle Devonian: Traverse group—Ferron Point shale, same locality as original of Figure 6. | |
| <i>Mucrospirifer alpenensis</i> (Grabau) | 85 |
| FIGS. 13-15. Ventral, posterior, and dorsal views of specimen with exceptionally well-preserved exterior, showing flattened fold and sinus, and narrow interarea. Hypotype No. 31667. Middle Devonian: Traverse group—Bell shale, same horizon and locality as original of Figure 6. | |
| FIGS. 16-18. Ventral, posterior, and dorsal view of a typical specimen with well-preserved mucronate points. Lectotype No. 31648. Middle Devonian: Traverse Group—Ferron Point shale, abandoned quarry of the Alpena Portland Cement Company, SE¼ sec. 18, T.32 N., R.9 E., 8 miles northeast of Alpena, Michigan. | |

PLATE I

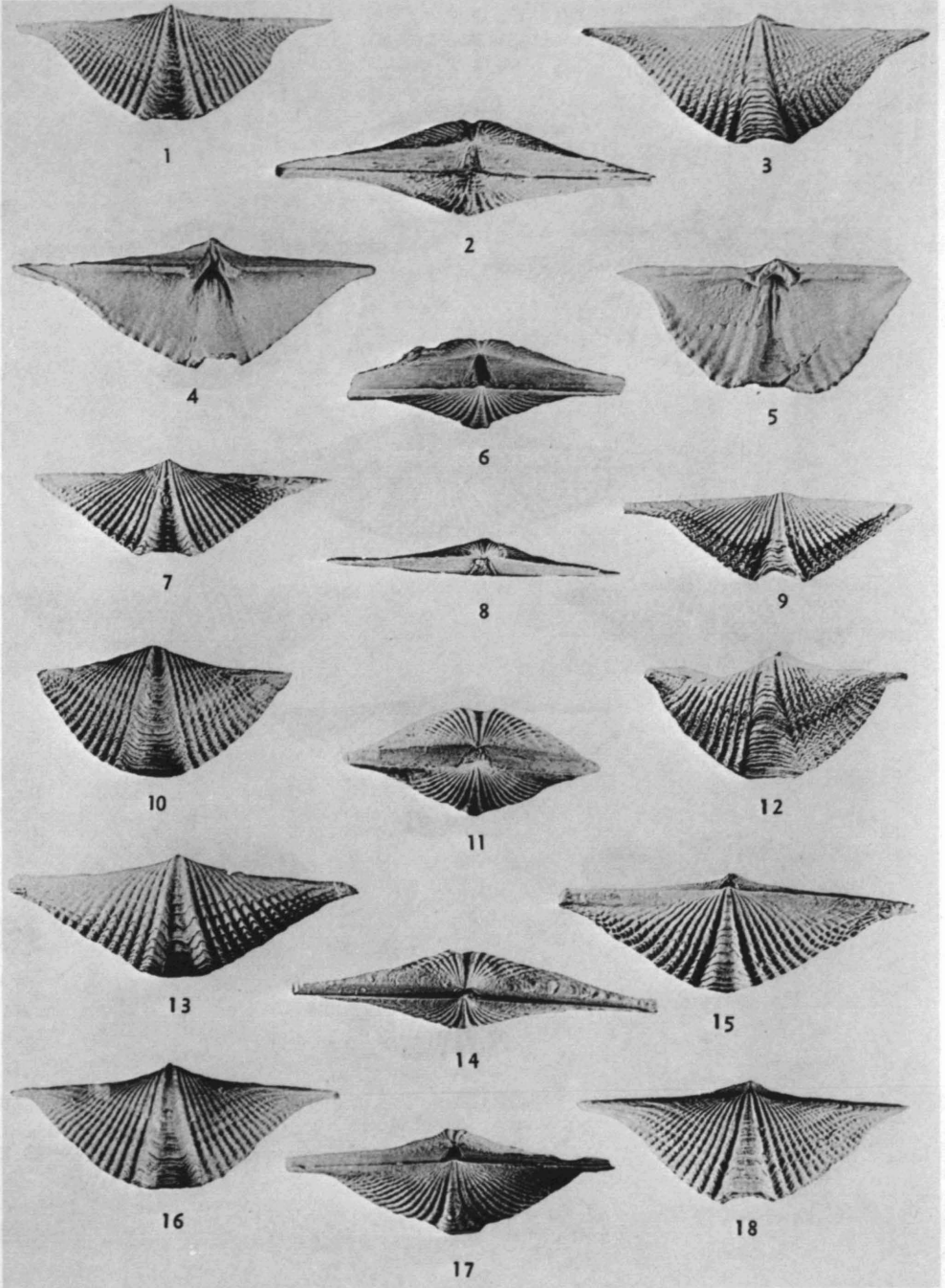
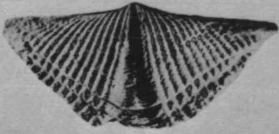


PLATE II



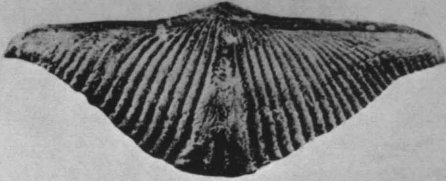
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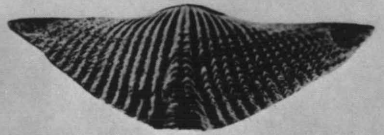
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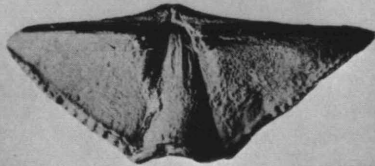
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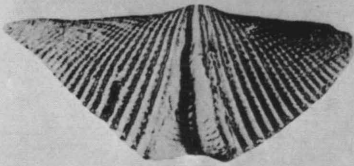
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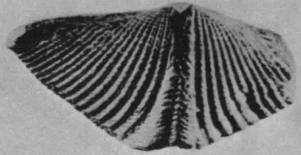
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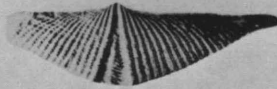
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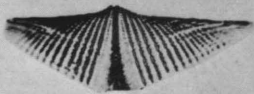
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11



12



13



14



15

EXPLANATION OF PLATE II

(All figures $\times 1$)

- | | PAGE |
|---|------|
| <i>Mucrospirifer multiplicatus</i> (Grabau) | 86 |
| FIG. 1. Ventral view of a specimen showing sulcus with medial ridge. Lectotype No. 31633. Middle Devonian: Traverse group—lower Genshaw formation, ledges along Long Lake Road, near junction with Bell Road, south end of Long Lake, sec. 22 T.32 N., R.8 E., Alpena Co., Michigan. | |
| FIGS. 2-3. Posterior and dorsal views showing interarea with wide apical angle and fold with medial groove. Paratype No. 31631. Same horizon and locality as original of Figure 1. | |
| FIGS. 4-6. Dorsal, ventral, and posterior views of an unusually large specimen having a wide medial groove on fold and medial ridge in sulcus. Hypotype No. 31668. Middle Devonian: Traverse group—lower Genshaw formation, cut on southwest side of county road 634, about $\frac{1}{4}$ mile southeast of LeRoy Resort, west side of Long Lake, S $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 31, T.33 N., R.8 E., Presque Isle Co., Michigan. | |
| FIGS. 7-9. Ventral and dorsal views of a specimen with well-preserved wings. Hypotype No. 31684. Same horizon and locality as original of Figures 4-6. | |
| FIGS. 9-10. Exterior and interior of pedicle valve showing characteristic sulcus, hinge teeth and striated muscle scars. Paratype No. 31634. Same horizon and locality as original of Figure 1. | |
| FIG. 11. Exterior of dorsal valve of specimen that may be the counterpart of the original of Figures 9-10. Paratype No. 31632. Same horizon and locality as original of Figure 1. | |
| <i>Mucrospirifer attenuatus</i> (Grabau) | 87 |
| FIG. 12. Ventral view of a specimen with characteristic sulcus and wing. Paratype No. 31657. Middle Devonian: Traverse group—Norway Point formation, Seven Mile Dam, on Thunder Bay River, 5 miles northwest of Alpena, Michigan. | |
| FIGS. 13-15. Ventral, posterior, and dorsal views of a specimen showing fine plications, narrow interarea, and characteristic fold and sulcus. Lectotype No. 31658. Same horizon and locality as original of Figure 12. | |

EXPLANATION OF PLATE III

(All figures $\times 1$)

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| <i>Mucrospirifer profundus</i> (Grabau) | 87 |
| <p>FIGS. 1-3. Ventral, posterior, and dorsal views of a well-preserved specimen showing angular sulcus, low convex fold, and coarse plications. Lectotype No. 31659. Middle Devonian: Traverse group—Norway Point formation, banks of Thunder Bay River at Seven Mile Dam, 5 miles northwest of Alpena, Michigan.</p> <p>FIG. 4. Pedicle valve of a large specimen with incipient wings. Hole on left produced by boring gastropod. Paratype No. 31635. Same horizon and locality as original of Figures 1-3.</p> <p>FIGS. 5-7. Ventral, posterior and dorsal views of a typical specimen with a well-preserved interarea and delthyrium. Hypotype No. 31653. Middle Devonian: Traverse group—Potter Farm formation, Stony Point on Thunder Bay, near Alpena, Michigan.</p> | |
| <i>Mucrospirifer grabau</i> Stumm, nom. nov. | 88 |
| <p>FIGS. 8-10. Ventral, posterior, and dorsal views of a specimen with well-developed mucronate points. Holotype No. 33324. Middle Devonian: Traverse group—Potter Farm formation, Stony Point, on Thunder Bay, near Alpena, Michigan.</p> <p>FIGS. 11-12. Dorsal and ventral views of another specimen. Hypotype No. 31639. Middle Devonian: Traverse group. Petoskey formation, abandoned Kegomic quarry, SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 27, T.35 N., R.5 W., 1 mile east of Bay View, Emmet Co., Michigan.</p> <p>FIGS. 13-15. Ventral, posterior, and dorsal views of a specimen with well-defined plications. Hypotype No. 31654. Middle Devonian: Traverse group—Four Mile Dam formation, cut along Long Rapids road, sec. 1, T.31 N., R.7 E., about $\frac{1}{2}$ mile northwest of Seven Mile Dam, Thunder Bay River, Alpena County, Michigan.</p> <p>FIGS. 16-17. Ventral and dorsal views of a specimen with unusually long mucronate points. Hypotype No. 31661. Middle Devonian: Traverse group—Gravel Point formation, zone 2, <i>Atrypa</i> bed, quarry of the Petoskey Portland Cement Co., SW. $\frac{1}{4}$ sec. 2, T.34 N., R. 6 W., $1\frac{1}{2}$ miles west of Petoskey, Emmet County, Michigan.</p> | |
| <i>Mucrospirifer grabau</i> Stumm, var. A | 89 |
| <p>FIGS. 18-19. Ventral and dorsal views of a specimen showing long, tapering wings. Figured Specimen No. 31656. Middle Devonian: Traverse group—Gravel Point formation, zone 6, bed 1, lower blue shale, abandoned Bell quarry, NE. corner sec. 8, T.34 N., R.6 W., 2 miles east of Bay Shore, Emmet Co., Michigan.</p> <p>FIG. 20. Ventral view of another specimen with well-developed V-shaped sulcus. Figured specimen No. 31655. Same horizon and locality as original of Figures 18-19.</p> | |
| <i>Mucrospirifer latus</i> (Grabau) | 89 |
| <p>FIGS. 21-22. Ventral and dorsal views of a specimen with unusually long mucronate points. Hypotype No. 31642. Middle Devonian: Traverse group—Alpena limestone, 1 foot shale bed 20 feet above base, quarry of the Michigan Alkali Co., Alpena, Michigan.</p> <p>FIGS. 23-24. Ventral and dorsal views of a specimen with typical fine costae. Lectotype No. 31649. Middle Devonian: Traverse group—Norway Point formation, ledges along Thunder Bay River at Seven Mile Dam, 5 miles northwest of Alpena, Michigan.</p> <p>FIGS. 25-27. Ventral, posterior, and dorsal views of a specimen showing typical fold and sulcus and low interarea with delthyrium having a wide apical angle. Hypotype No. 31637. Middle Devonian: Traverse group—Potter Farm formation, shale pit at northwest corner of Evergreen Cemetery, SW. $\frac{1}{4}$ sec. 21, T.31 N., R.8 E., west city limits of Alpena, Michigan.</p> | |

PLATE III

