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NEW UNCOILED GASTROPODS FROM THE MIDDLE DEVONIAN OF MICHIGAN AND MANITOBA

BY

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CONTENTS

INTRODUCTION

A GROUP of fossils from the Middle Devonian strata of Lake Winnipegosis, Manitoba, was described by Whiteaves (1892, pp. 342–43) as *Hyolithes alatus*. The fragmentary character of Whiteaves' material prevented him from recognizing the correct generic position of his species. Better-preserved material of two related species from the Rogers City limestone of Michigan shows that these peculiar fossils are not pteropods but uncoiled gastropods of the family Euomphalidae.

I am indebted to Dr. G. M. Ehlers of the Museum of Paleontology, University of Michigan, for calling the Michigan material to my attention and for much valuable information and criticism; to Dr. Alice E. Wilson of the Geological Survey of Canada for the loan of Whiteaves' types; and to Dr. J. Brookes Knight of the United States National Museum, Dr. Henry van der Schalie of the Museum of Zoology, University of Michigan, and Dr. Ralph Hile of the United States Fish and Wildlife Service for many helpful suggestions.

SYSTEMATIC DESCRIPTIONS

CLASS GASTROPODA

Mastigospira, gen. nov.

Description.—Shell large, 96 mm. or more long, tusk-shaped, uncoiled, gently and irregularly curved, triangular in cross section, with three more or less developed, unequally spaced, winglike processes, two of them basal, the other apical, the latter less pronounced than the former; interior circular in cross section. Shell thick, especially at the bases of the processes. Aperture flaring at the two basal angles, much less so at the apical one. Sculpture of fine growth lines curving backward along the base and forward from the apical angle. Nuclear whorls not preserved. Apical part terminating abruptly in a convex surface which suggests that the earliest part of the shell had been broken off at a point marked by a septum or plug.

Genotype.—Hyolithes alatus Whiteaves.

Remarks.—The reasons for removing *Hyolithes alatus* from the Pteropoda and for considering it an uncoiled gastropod are summarized in the following comparison of the structures of *Hyolithes* and *Mastigospira:*

Hyolithes Eichwald	*Mastigospira,* gen. nov.
Shell a triangular pyramid, either straight or somewhat curved	Shell a triangular pyramid, somewhat curved, the edges of the pyramid *prolonged into winglike processes**
Edges of the pyramid rounded; the sides slightly arched outward	*Edges acute;* sides of pyramid curving either outward or inward
Exterior and interior cross sections both triangular	Exterior cross section triangular; *interior circular*
Aperture not expanded or very slightly so, oblique to the longitudinal axis of the shell, base without notch	Aperture *greatly expanded,* not oblique to the longitudinal axis of the shell, *deeply notched on the base*
Shell thin (0.5 mm. or less)	*Shell thick* (1 mm. or more)

* Characters thought to be diagnostic are in italics.

The structural characters which usually serve as criteria for differentiation, the apex, spire, and umbilicus, are lacking in gastropods

of this type. Consequently, it was decided to follow the method employed by Knight (1941, p. 209) as far as possible. In this method the face of the whorl bearing two carinae is regarded as the outer face of the whorl, and the other parts of the shell are then oriented as in a dextral gastropod.

Among the Gastropoda loose coiling of the spire is not particularly rare. Occasional scalariform examples occur in genera in which the whorls are usually tightly coiled. In certain Paleozoic genera, such as *Eccyliopterus, Loxoplocus, Lytospira, Ecculiomphalus, Serpulospira, Tubina, Orthonychia,* and *Leptozyga,* loose coiling is the rule rather than the exception. In the Mesozoic, Tertiary, and Recent members of the Vermetidae, the spire is at first coiled, but soon loses all semblance of regular coiling and becomes an irregularly curved tube. Continued development of the uncoiling of the shell would eventually produce a long, slightly curved cone, a stage which seems to have been reached in *Mastigospira.*

In some marine gastropods in which the shell has many whorls (e.g., *Turritella*) the walling off of the earlier whorls is fairly common; in some modern land snails (*Rumina, Coelocentrum,* and others) the earlier whorls are broken off and the opening sealed by a calcareous plug.

The only Paleozoic genus which is comparable to *Mastigospira,* as far as degree of uncoiling is concerned, seems to be *Odontomaria* C. F. Roemer (Wenz, 1938, p. 159; Knight, 1941, p. 208). It is a rather remarkable coincidence that *Odontomaria* should be found in the Middle Devonian of Gerolstein, which yielded *Modiomorpha attenuata* and other mollusks present also in the Middle Devonian of Michigan and Manitoba. Nevertheless, *Mastigospira* is easily distinguished from *Odontomaria; Mastigospira* has a triangular cross section and lacks a selenizone, whereas *Odontomaria* has a quadrangular cross section and a well-defined selenizone.

Mastigospira was placed in the family Euomphalidae on the basis of the following characters: the uncoiled shell; the tendency to formation of septa which wall off the earlier part of the shell; the presence of a notch giving rise to nodes in at least one species;

A

the triangular cross section of the shell; the similarity of the aperture; and the absence of a true selenizone.

Within the family Euomphalidae it resembles two genera, *Lytospira* and *Ecculiomphalus,* with loosely coiled shells. The uncoiling in these genera has not been carried as far as it has in *Mastigospira.* The cross section of the whorl and the nodes of the upper part of the shell of *Mastigospira* are similar to those of many Pennsylvanian euomphalids figured by Knight (1934, Pls. 20, 22). The formation of septa in the earlier part of the shell has been previously noted. *M. ingens,* described in this paper, shows especially well the nodes on the upper angle of the whorl. These nodes seem to have developed from blunt spines, the concave anterior surface of which formed a notch in the aperture.

In addition to the species described in this paper it is possible that other species assigned to *Hyolithes* are in reality uncoiled gastropods possibly referable to *Mastigospira. Hyolithes richardi* Clarke (1909, p. 143) from the Grand Grève limestone of the Gaspé Peninsula, Quebec, Canada, is especially suggestive of *Mastigospira,* to judge by Clarke's illustration.

Mastigospira alata (Whiteaves)

(Pl. I, Figs. 1, 3–4)

Hyolithes alatus Whiteaves, 1892. *Contrib. Can. Palaeontol.,* Vol. 1, Pt. IV, No. 6, pp. 342–43, pl. 46, figs. 2–4

Hyolithes alatus Tyrrell, 1893. *Ann. Rept. Geol. Surv. Canada,* Vol. 5, Pt. I, Rept. E (1890–91), p. 174.

Hyolithes alatus? Cleland, 1911. *Wis. Geol. and Nat. Hist. Surv. Bull.,* No. XXI, pp. 18, 131–32, pl. XXVI, figs. 9, 10.

Hyolithes alatus Sinclair, 1946. *Journ. Paleontol.,* Vol. 20, p. 73.

Description.—Shell tusk-shaped, irregularly but only slightly curved, outer cross section triangular, inner wall of shell conical. The three sides of the pyramidal exterior of the shell prolonged into thin, lamellar processes about 20 mm. wide; areas between the processes gently concave. Lip flaring widely at the base, less so at the upper angle; base of lip with a deep but gently rounded notch. Basal

wings prolonged forward into spinelike processes; upper wing ending just above the beginning of the basal notch. Ornamentation of close, fine, crowded lines prolonged on the wings, where they curve forward near the base of the wing and backward near its outer edge. Apical part of shell terminated abruptly in a convex surface suggesting the presence of a septum or plug.

Remarks.—The most complete syntype (Geological Survey of Canada No. 4099*a*, see Pl. I, Fig. 4) is a partly exfoliated specimen showing the two basal processes, a mold of the interior of the shell, and its irregular curvature. The beginning of the flaring aperture is partly shown; the apical part of the shell is not preserved. This is the specimen figured by Whiteaves (1892, Pl. 46, Fig. 2). The dimensions are as follows: Length, 110 mm.; width of aperture, 26 mm.; width of right process, 18 mm.

The second syntype (Geological Survey of Canada No. 4099) is an incomplete specimen showing the underside of the left basal process and an indication of the notch in the base of the lip. It was figured by Whiteaves (1892, Pl. 46, Fig. 3). Length of preserved shell, 62 mm.; width of aperture, 28 mm.

The third syntype (Geological Survey of Canada No. 4099*b*) is a small part of a shell showing an oblique cross section which indicates the position and thickness of the lamellar processes. This was not figured by Whiteaves.

A hypotype (Geological Survey of Canada No. 4100), collected by J. B. Tyrrell in 1889, is from Station 815, Dawson Bay, Lake Winnipegosis. It shows a mold of the interior and parts of the exterior. This may be the specimen from which Whiteaves' Figure 4 (1892, Pl. 46) was prepared. Length, 78 mm.; width of aperture, 20 mm.; width from tip to tip of basal wings, about 32 mm. Another hypotype (Geological Survey of Canada No. 6364) is part of a mold of the interior of another specimen from the north bank of the Red Deer River, Manitoba, at Limestone Knoll one mile below Long Rapids. This specimen was collected by Edward M. Kindle on September 1, 1912. The length is 44 mm.

One other hypotype in the collection of the Geological Survey of

Canada, No. 6465, is a mold of the interior. It is from Dawson Bay, Lake Winnipegosis, Manitoba. This specimen is 111 mm. in length and bears the impression of the apical septum or plug.

Mastigospira alata differs from *M. intermedia* and *M. ingens,* described below, in the much greater width of its winglike processes; these are very wide even in the earliest part of the shell preserved in the type, No. 4099*a,* Geological Survey of Canada. The winglike processes are difficult to reconcile with the conventional idea of a gastropod shell, but other characters of the shell and especially the type of ornamentation in *M. intermedia* and *M. ingens* indicate that *Mastigospira* belongs to the Gastropoda.

The specimens figured by Cleland (1911, Pl. XXVI, Figs. 9, 10) probably should be placed in the genus *Mastigospira,* but their assignment to *M. alata* (Whiteaves) must remain in doubt until better specimens are forthcoming. The presence of a member of the genus in the Lake Church formation of Wisconsin is nevertheless interesting from a stratigraphic standpoint, for it may provide a further link between the Middle Devonian of Manitoba, the Rogers City formation of Michigan, and the Lake Church formation of Wisconsin.

Occurrence.—Middle Devonian of Manitoba: Lake Winnipegosis; Lake Manitoba; Red Deer River (Whiteaves, 1892, p. 343). ?Middle Devonian, Lake Church formation, of Wisconsin; identification doubtful.

Types.—Geological Survey of Canada, syntypes Nos. 4099, 4099*a,* 4099*b;* hypotypes Nos. 4100, 6364, 6365.

Mastigospira intermedia, sp. nov.

(Pl. I, Fig. 2; Pl. II, Figs. 1–4)

Description.—Shell tusk-shaped, uncoiled, gently curved, triangular in cross section on the outside, the three apices of the triangle gently rounded, with blunt winglike processes. Lip flaring widely at the base, less so at the upper angle. Base of lip having a deep but gently rounded notch with two spinelike processes at the base of the aperture. Upper angle of lip less produced than the two basal ones.

Ornamentation of fine, crowded growth lines directed forward from the upper angle of the shell and curved backward on its basal face. Angles of the shell bluntly rounded, obscurely nodulose, the lower ones smooth except where crossed by the growth lines. Apical part of shell terminating abruptly in a convex surface, which suggests that the earliest part of the shell had been broken off at a point marked by a septum or plug.

Remarks.—This species is easily distinguished from *M. alata* by the reduction of the wings which are conspicuous in that species. The internal molds of the two species are so similar in cross section that identification based on these alone is impossible.

The holotype, No. 23926, Museum of Paleontology, University of Michigan, is poorly preserved, but shows the outer surface of the shell. The aperture is lacking. The shell is broken 81 mm. from the apical septum or plug, disclosing the cylindrical inner wall and the triangular outline of the outer wall. Length, 160 mm.; greatest width, 16 mm.; height, 13 mm.

A paratype, No. 23925, Museum of Paleontology, University of Michigan, is a mold of the interior of the shell in which part of the aperture is preserved. The aperture flares strongly at the base, less so at the upper angle, as in *M. alata*. Length, 129 mm.; greatest width of aperture, 25 mm.; height, 13.5 mm. This specimen shows characters of the apical region which are lacking in the holotype.

Occurrence.—Rogers City limestone, along the shore of Lake Huron near the west line of the SW.¼ sec. 31, T. 33 N., R. 9 E., about one-half mile north of the boundary between Alpena and Presque Isle counties, Michigan.

Types.—Museum of Paleontology, University of Michigan, holotype No. 23926; paratype No. 23925.

Mastigospira ingens, sp. nov.

(Pl. I, Figs. 5–6; Pl. III, Figs. 1–4)

Description.—Shell large, at least twice the size of the two preceding species, uncoiled, outer cross section triangular, inner circular, angles acute and pinched out, wings not as wide as in the type

species. Lower and inner sides of the shell concave, the outer convex and bearing two strong carinae, the upper carina 14 mm. from the upper angle of the whorl and the lower carina 7 mm. below the upper one at a point near the aperture. Lip not preserved except on the lower surface of the whorl where it shows a distinct basal notch. Ornamentation of fine, crowded growth lines directed forward from the upper angle of the whorl on the inner surface. On the outer surface the lines are first directed forward as far as the upper carina, then they bend sharply backward toward the outer basal angle of the whorl. On the lower surface the growth lines bend backward sharply, following the outline of the notch in the aperture. Upper angle of whorl distinctly nodose, the nodes unevenly spaced and of unequal size. Outer basal angle bearing smaller nodes, the inner basal angle sharp and not nodose.

Remarks.—The much greater size of this species readily separates it from both the preceding ones. The pinching out of the inner basal angle suggests relationship with *M. alata;* the wingless, nodose upper carina suggests relationship with *M. intermedia.*

The holotype is incomplete; both the apical and apertural parts of the shell are missing. As preserved, the dimensions are as follows: Length, 107 mm.; width, 33 mm.; height, 21 mm. The specimens from the dolomitic limestone at the base of the Rogers City limestone are compressed due to the weight of overlying strata, but their size and the character of their ornamentation clearly show that they belong to this species.

Occurrence.—Rogers City limestone: Beach north of Rockport quarry, along shore of Lake Huron, near west line of the SW.¼ sec. 31, T. 33 N., R. 9 E., about one-half mile north of the boundary between Alpena and Presque Isle counties. Same formation: Dolomitic limestone composing basal eight to nine feet of formation, east shore of False Presque Isle, Presque Isle County, Michigan.

Type.—Museum of Paleontology, University of Michigan, holotype No. 23924.

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EXPLANATION OF PLATE I

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Mastigospira alata (Whiteaves) 116

1. Apical portion of a specimen showing the convex termination at the smaller end indicating the presence of a septum or plug. Hypotype No. 6365, Geological Survey of Canada. Middle Devonian, Dawson Bay, Lake Winnipegosis, Manitoba, Canada. × 2

Mastigospira intermedia, sp. nov. 118

2. Apical portion of another specimen showing the convex termination. Hypotype No. 23925, University of Michigan. Middle Devonian, Rogers City limestone, along the shore of Lake Huron near the west line of the SW.¼ sec. 31, T. 33 N., R. 9 E., about one-half mile north of the boundary between Alpena and Presque Isle counties, Michigan. × 1

Mastigospira alata (Whiteaves) 116

3. Specimen showing basal notch and spines. Hypotype No. 4100, Geological Survey of Canada. Middle Devonian, Station 815, Dawson Bay, Lake Winnipegosis, Manitoba, Canada. × 1

Mastigospira alata (Whiteaves) 116

4. Dorsal view of the best-preserved syntype showing portions of the two basal processes. Syntype No. 4099*a*, Geological Survey of Canada. Middle Devonian, north side of Manitou Island, Lake Winnipegosis, Manitoba, Canada. × 1

Mastigospira ingens, sp. nov. 119

5. Cross section of the holotype just behind the basal notch. Holotype No. 23924, University of Michigan

6. Cross section of the holotype 41 mm. behind the cross section shown in Figure 5

PLATE I

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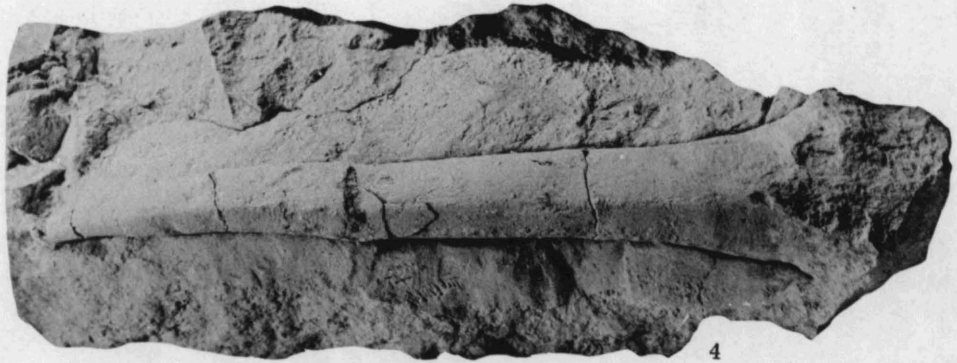

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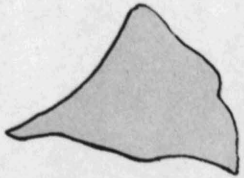

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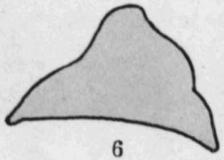

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EXPLANATION OF PLATE II

PAGE

Mastigospira intermedia, sp. nov. 118

1. Ventral view of a mold of the interior showing basal notch and spines. Paratype No. 23925, University of Michigan. Middle Devonian, Rogers City limestone, along the shore of Lake Huron near the west line of the SW.¼ sec. 31, T. 33 N., R. 9 E., about one-half mile north of the boundary between Alpena and Presque Isle counties, Michigan. × 1
2. Cross section of the same specimen as Figure 1
3. Cross section of the same specimen as Figure 4
4. Dorsal view of an almost complete specimen; the smoother areas not showing growth lines are plaster. Holotype No. 23926, University of Michigan. Middle Devonian, Rogers City limestone, same locality as specimen shown in Figure 1. × 1

PLATE II

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2

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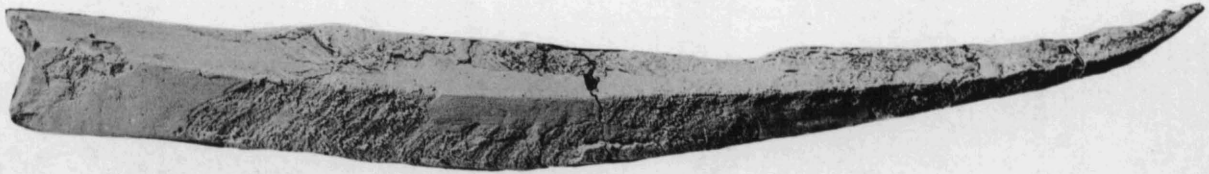

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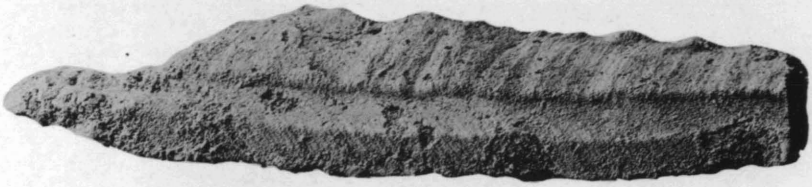
EXPLANATION OF PLATE III

Mastigospira ingens, sp. nov. 119

1. Side view showing features of the inner side of the shell. Holotype No. 23924, University of Michigan. Middle Devonian, Rogers City limestone, along the shore of Lake Huron near the west line of the SW.¼ sec. 31, T. 33 N., R. 9 E., about one-half mile north of the boundary between Alpena and Presque Isle counties, Michigan. × 1
2. Side view of the same specimen showing carinae on the outer wall of the shell. Same formation and locality as Figure 1. × 1
3. Dorsal view of the same specimen showing superior carina and nodes. Same formation and locality as Figure 1. × 1
4. Ventral view of the same specimen, showing basal notch and ornamentation. Note poorly preserved encrusting bryozoan (*Hederella?*) on the surface of the shell. Same formation and locality as Figure 1. × 1

PLATE III

1



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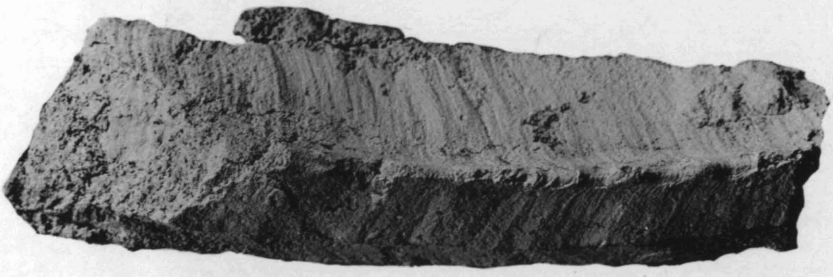

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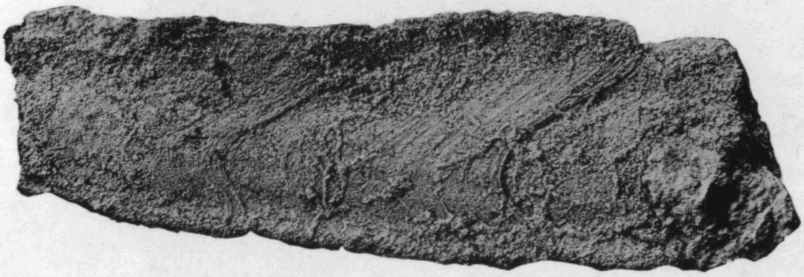

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