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OSTRACODS OF THE FAMILY AECHMINIDAE
FROM THE ARKONA SHALE OF
SOUTHERN ONTARIO

BY

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INTRODUCTION

THE ostracods described in this paper are from the Middle Devonian Arkona shale of Ontario. They belong to the family Aechminidae and include three species which are new and four species which are not identified with certainty.

Aechminid ostracods have straight hinge lines and a well-developed hollow spine in the central dorsal part of each valve; they lack deep sulci and large lobes other than the dorsal spine. The family Aechminidae now includes, however, some ostracods having a pit or small sulci and one or two small lobes anterior to the large spine. The only known ostracod in this family to have a reticulate surface is the new genus and species described in this paper.

Ostracods of this family have been reported from rocks of Ordovician to Pennsylvanian age in North America and from Silurian rocks in Europe. They are not numerous in the Middle Devonian rocks of North America from which ostracod faunas have been described. The species described here are distinctive and may prove useful for correlation of the Arkona shale with other Middle Devonian formations which outcrop in western New York, northwestern Ohio, and northern Michigan and which are encountered in well cores in central Michigan.

The significance of the two large dorsal spines in each carapace is a matter of conjecture. Spinosity often occurs in recent marine invertebrate animals which live in masses of aquatic vegetation. It may be that the large spines of the aechminid ostracods found in the Arkona shale, which appear to be too large for the animal to have balanced and carried in a normal manner, were partly supported by the masses of algae on which

the animal fed. The two spines are hollow and in some species enclose a volume nearly equal to that enclosed by the rest of the carapace. During the lifetime of the animal these hollow spines contained the hypodermis which secreted them and, perhaps, certain organs.

The specimens were obtained from samples collected in 1952 by Mr. and Mrs. Edward Pulteney Wright of Grosse Pointe Farms, Michigan. To them the author expresses great appreciation. He is also grateful to Dr. Lewis B. Kellum, Dr. George M. Ehlers, and Dr. Chester A. Arnold for their helpful criticism of this paper.

All specimens are catalogued and deposited in the Museum of Paleontology of the University of Michigan.

REGISTER OF LOCALITIES

LOCALITY

1. Shale, light gray, highly fossiliferous, weathers easily to soft clay. Fossils calcareous, beautifully preserved. Sample from layer 22 feet below the Encrinal limestone (see Shimer and Grabau, 1902, pp. 152-60, for description of the stratigraphic section including the Encrinal limestone). Brick and tile yard, about one-half mile north of Thedford, Lambton County, Bosanquet Township, Ontario, about one-eighth mile east of north-south road.
2. Shale, light gray, weathers easily to clay. Fossils pyritized, covered by limonite stain. Sample from a layer 14 feet below the Encrinal limestone. This layer about 1 foot above a layer containing numerous brachiopods of the genus *Leptalosia*. Near the junction of Rock Glen and the Ausable River, on the east bank of the river, Middlesex County, West Williams Township, Ontario, about 1 mile northeast of Arkona.
3. Shale, light gray, weathers easily to soft clay. Fossils pyritized, covered by limonite stain. Sample from a layer 16 feet below the Encrinal limestone. This layer about 1 foot below a layer containing numerous brachiopods of the genus *Leptalosia*. Near the junction of Rock Glen and the Ausable River, on the east bank of the river, Middlesex County, West Williams Township, Ontario about 1 mile northeast of Arkona.

SYSTEMATIC DESCRIPTIONS

Phylum ARTHROPODA

Class CRUSTACEA

Order OSTRACODA

Superfamily Beyrichiacea

Family Aechminidae Swartz 1936

Genus *Aechmina* Jones and Holl

Genotype.—By original designation, *Aechmina cuspidata* Jones and Holl, 1869, p. 218, Text Fig. 2, Pl. 14, Fig. 8.

***Aechmina phantastica*, sp. nov.**

(Pl. I, Figs. 1-5)

Description.—Carapace, exclusive of the two large spines, nearly semi-circular in lateral view; sublanceolate in dorsal view; and sublanceolate in end view. Complete carapace subtrifoliate in end view and subtetrafoliate in dorsal view. In the orientation used in this paper, greatest height posterior and greatest width (exclusive of the spines), near the middle of the length, slightly posterior. Left valve overlapping right valve very slightly along the hinge line. Hinge line straight. Dorsal and ventral parts of the anterior border straight, forming a rounded-off obtuse angle; ventral border gently curved; and posterior border subround. Very large spine in the central dorsal part of each valve; the dorsal part of its junction with the rest of the valve slightly below the hinge line. Each spine sloping outward almost perpendicular to the plane of commissure of the two valves, directed slightly upward and slightly backward. Proximal part of each spine cylindrical; distal part of each spine bluntly acuminate, subparaboloid.

Anterior cardinal angle approximately 95 degrees; posterior cardinal angle approximately 110 degrees.

No velate structure. No distinct marginal structure. Depressed area parallel to the posterior and ventral borders, about .05 mm. from the free border. Surface of each spine coarsely granuloreticulate; rest of surface finely granulose.

Dimensions of the holotype, a carapace with the spine broken from the left valve: length, .68 mm.; distance from the hinge line to the ventral border, .43 mm.; width (exclusive of spines), .32 mm.; and width of right valve (including spine), .38 mm.

Remarks.—This species is distinguished from all others in *Aechmina* by the very large size and the distinctive shape of the dorsal spines. According to the orientation used in this paper, the greatest height is posterior. This orientation was selected so that the dorsal spines are directed slightly backward and the greatest width is slightly posterior.

The name of this species is derived from the Greek φανταστικός ("fantastic, freakish"), and refers to the exceptionally large dorsal spines.

Occurrence.—Locality 3.

Type.—Holotype, a carapace with the spine broken from the left valve, No. 29593.

Aechmina sp. cf. *A. choanobasota* Kesling

(Pl. I, Figs. 8-9)

Remarks.—Two specimens were found in the Arkona shale, in which the entire base of each spine slopes gradually onto the lateral surface of

the valve. In *Aechmina choanobasota* Kesling (1952, p. 29, Pl. II, Figs. 15–25; Pl. III, Figs. 1–20) from the Bell shale, only the anterior and anteroventral parts of the base of each spine slope gradually onto the lateral surface of the valve and the posterior junction of the spine and lateral surface is distinct. The specimens from the Arkona shale have several closely spaced, small, marginal papillae on the anterior border and about five similar papillae spaced at equal distances along the ventral and posterior borders. No marginal papillae appear to have been broken off.

Additional specimens need to be studied to determine whether these specimens belong to *Aechmina choanobasota* or form a new species.

Occurrence.—Locality 1.

Specimens.—A right valve, No. 29594, and a left valve, No. 29595.

Aechmina sp.

(Pl. I, Figs. 17–18)

Description.—Right valve, exclusive of the spine, nearly semicircular in outline. Hinge line straight. Long, slightly tapering spine in the central dorsal part of the valve; the dorsal part of the base of the spine tangent to the hinge line.

Remarks.—This ostracod may be an immature instar of *Aechmina* sp. cf. *A. choanobasota* Kesling described above. The ontogeny of the species is unknown. This specimen has a smaller spine than *Aechmina* sp. cf. *A. choanobasota* Kesling.

Occurrence.—Locality 1.

Specimen.—A right valve, No. 29597.

Sigynus, gen. nov.

Genotype.—*Sigynus dictyotus*, sp. nov.

Description.—Carapace, exclusive of the two large dorsal spines, sub-oval in lateral view; sublanceolate in dorsal view; and sublanceolate in end view. Greatest height anterior. Greatest width near the middle of the carapace, slightly posterior. Large spine in the central dorsal part of each valve. Distinct small pit below each spine.

Remarks.—*Sigynus* differs from *Aechmina* in having a distinct pit below each large dorsal spine. It resembles *Paraechmina* in having a pit but differs from that genus in having the pit ventral instead of anteroventral to the spine and in lacking a velate or marginal ridge.

The name of this genus is derived from the Greek σίγυρος, m. (“a spear”) and refers to the shape of the dorsal spine. The name is chosen

because σιγυνοϛ, m. is a synonym of αἶχμη, f., also a Greek word for spear, from which the name *Aechmina* was derived.

***Sigynus dictyotus*, sp. nov.**

(Pl. I, Figs. 10-12)

Description.—Carapace nearly equivalved. Carapace, exclusive of the dorsal spines, subovate in lateral view, broadly sublanceolate in ventral view, and sublanceolate in end view. Hinge line straight. Anterior and ventral borders subround, posteroventral border very gently curved, and posterior border sharply curved and slightly acuminate. Large spine in the central dorsal part of each valve, its proximal part tumid and its distal part tapering evenly to a blunt tip. Distinct small circular pit below the large dorsal spine.

Anterior and posterior cardinal angles about 110 degrees each.

Lateral surface ornamented with a distinct, highly elevated reticulation. Reticulation distinct on the basal half of each spine, indistinct on the distal half. The size of the meshes forming the reticulation decreasing distally on each spine. Meshes on the base of each spine about the same size as those on the lateral surface of the valve.

Dimensions of the holotype, a carapace with the valves askew and slightly crushed: length, .66 mm.; distance from hinge line to ventral border, .47 mm.; height, .68 mm.; width of right valve, exclusive of the dorsal spine, .15 mm.; and total width of right valve, .35 mm.

Remarks.—This species is distinguished by its reticulation. It is the only species in the family Aechminidae known to have reticulation.

The name of this species is derived from Greek δίκτυωτοϛ (“reticulated”), and refers to the unusual surface ornamentation.

Occurrence.—Locality 1.

Type.—Holotype, a carapace with the valves askew and the left valve slightly crushed, No. 29596.

Genus *Aechminaria* Coryell and Williamson

Genotype.—By original designation, *Aechminaria nodosa* Coryell and Williamson, 1936, p. 5, Fig. 8.

***Aechminaria hormathota*, sp. nov.**

(Pl. I, Figs. 21-22, 24-29)

Description of adult.—Carapace, exclusive of the two dorsal spines, subelliptical in lateral view; elongate, hexilateral in ventral view; and sublanceolate in end view. Greatest height anterior. Greatest width near the

anterior end. Large spine in the central dorsal part of each valve; its tip usually broken off. Spine in some valves with tumid basal part and thin elongate tip; spine in some valves broad, subconical; and spine in some valves nearly hemispherical. Short S2 in front of the large spine, deepest in its ventral part, sloping downward and backward from the dorsal border to a point immediately anterior to the ventral part of the spine. L2 represented by a small low node in front of S2, anteroventrally confluent with the lateral surface; dorsal part of node separated from the hinge line by a distance equal to the diameter of the node.

Anterior cardinal angle approximately 125 degrees; posterior cardinal angle approximately 135 degrees. Posterior corner slightly rounded in some specimens.

Lateral surface with a rounded bend parallel to the free border; bend separated from free border by a distance equal to about one-fifth the length. Velate structure consisting of tubercles from the anterior to the posterior corner; these tubercles in some valves contiguous (Pl. I, Fig. 24) and in some valves equally spaced but with each tubercle separated from its neighbor by about its own diameter (Pl. I, Fig. 28).

Dimensions of holotype, a complete carapace: length, 1.10 mm.; height, .72 mm.; and width (exclusive of the dorsal spines), .30 mm.

Remarks.—*Aechminaria hormathota* closely resembles *Aechminaria bigeneris* (Swartz) from the Lower Devonian Shriver chert in Pennsylvania (Swartz, 1936, p. 564, Pl. 86, Figs. 2a, b), but differs from it in having more tubercles in the velate structure, in having an L2 present as a node, and in lacking an anterior ridge. A study of the description and illustrations of *bigeneris* shows that it is more closely related to the genotype of *Aechminaria* than to that of any other aechminid genus and it is here referred to *Aechminaria*. Swartz originally described *bigeneris* as *Aechmina bigeneris* Swartz (1936, p. 564). Warthin (1937, Card 15), however, called it *Cornulina bigeneris* (Swartz) and assigned the species to the genus *Cornulina* described by Coryell and Williamson (1936, p. 2). Since the name *Cornulina* proved to be preoccupied, inasmuch as it had already been used by Conrad (1853, p. 321) for a gastropod, Coryell and Williamson (in Agnew, 1942, p. 760), proposed a new name, *Waldronites*, for their genus and made *Cornulina bispinosa* Coryell and Williamson (1936, pp. 2-3, Fig. 3) the genotype. *Waldronites bispinosa* (Coryell and Williamson) has a ridge for L1, a node for L2, and a spine for L3; the L1 is confluent with a smooth velate ridge which extends below the two sulci and connects the base of L3, the anteroventral part of L2, and the rear part of L1. *Aechminaria bigeneris* (Swartz) lacks a prominent

node or lobe for L2; the short anterodorsal ridge is not connected to the velate structure nor bounded posteriorly by a sulcus; and the velate structure extends to the posterior corner. It is distinctly different from any species of *Waldronites*. *Aechminaria hormathota*, sp. nov., lacks an L1. The author considers, therefore, that the genus *Waldronites* includes only those aechminid ostracods with distinct L1's, L2's, and L3's and that the genus *Aechminaria* includes only those with a pit or sulcus for S2 and a spine for L3. Moreover, *Waldronites* is known only from the Silurian and *Aechminaria* from both the Silurian and Devonian.

The name of this species is derived from Greek ὄρμαθος, m. ("a string of objects"), and refers to the tubercles comprising the velate structure in each valve.

Occurrence.—Locality 2.

Types.—Holotype, a complete carapace, No. 29588. Paratypes, three carapaces, Nos. 29590, 29591, and 29602.

Aechminaria sp. cf. *A. hormathota*, sp. nov.

(Pl. I, Figs. 13–16, 19–20, 23)

Remarks.—Four specimens from the Arkona shale may be immature instars of *Aechminaria hormathota*, sp. nov. Three of these specimens (Nos. 29599–29601) differ from the adults of *A. hormathota* in having less surface ornamentation and in lacking a well-defined velate structure. The other specimen (No. 29589) is very similar to the adults, but differs from them in being smaller and having proportionally larger dorsal spines.

Specimens Nos. 29589 and 29601 are, respectively, .81 mm. and .88 mm. in length, and appear to be ultimate immature instars. Specimen No. 29600 is .62 mm. in length, and appears to be a penultimate immature instar. Specimen No. 29599 is .46 mm. in length, and appears to be four instars younger than the adult.

Occurrence.—Localities 2 and 3.

Specimens.—Four carapaces, Nos. 29589 and 29599–29601.

Aechminaria sp.

(Pl. I, Figs. 6–7)

Description.—Carapace, exclusive of the two dorsal spines, suboval in lateral view; sublozenge-shaped in dorsal view; and sublanceolate in end view. Hinge line straight. Very small blunt spine in the middle of the dorsal part of each valve, dorsally nearly tangent to the hinge line. Shallow S2 curving around the anterodorsal and anterior edges of each spine.

Anterior cardinal angle about 100 degrees; posterior cardinal angle about 105 degrees. Corners somewhat rounded.

Surface smooth, somewhat abraded.

Remarks.—The sulcus on each valve is very shallow and very different from that on valves of *Aechminaria hormathota*, sp. nov. The specimen appears to be a carapace and not an internal mold, but the surface details are obscured by abrasion.

Occurrence.—Locality 1.

Specimen.—Carapace, No. 29592.

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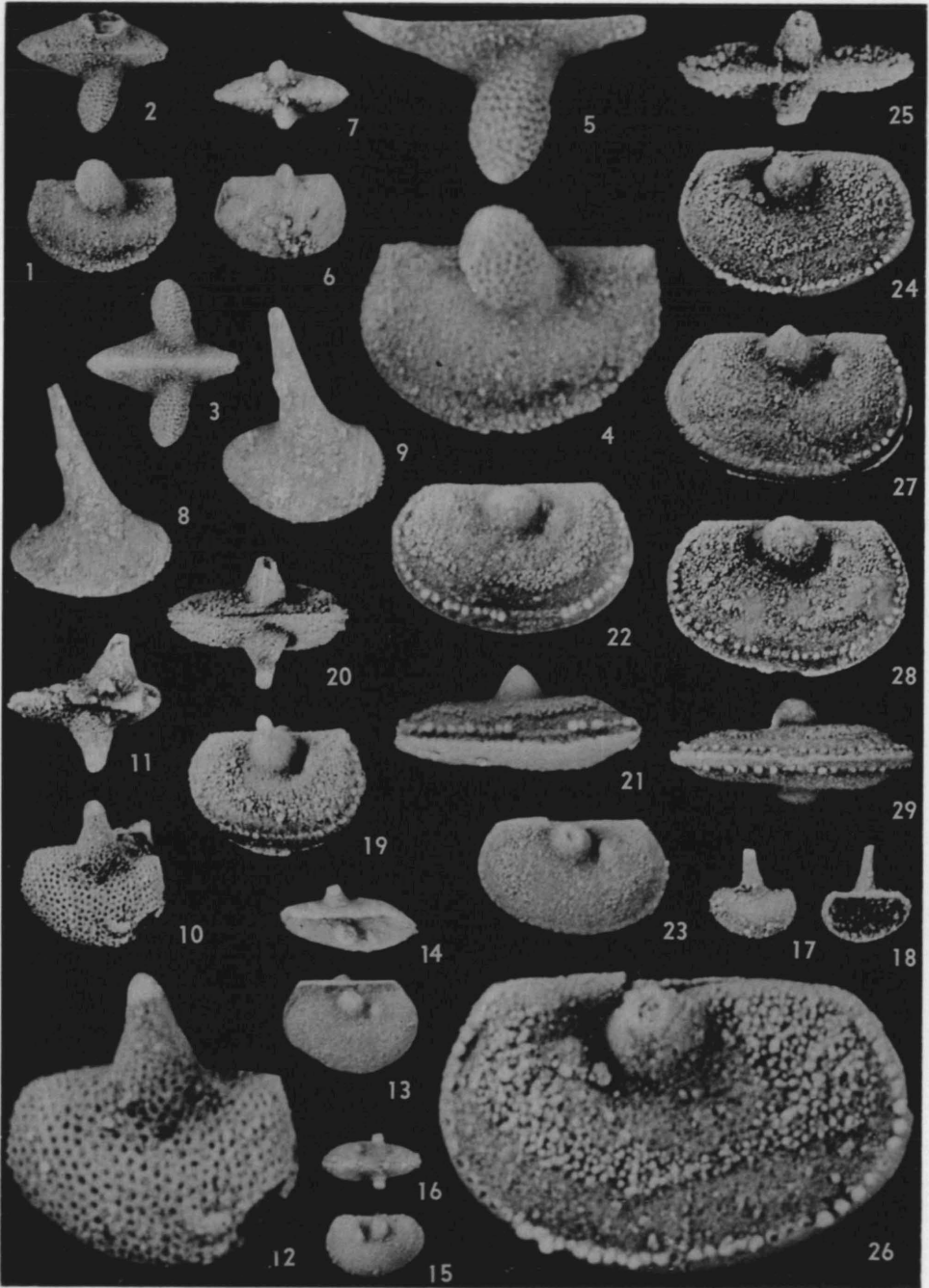
PLATES

EXPLANATION OF PLATE I

(All figures $\times 30$ except as noted)

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PLATE I



VOLUME XI

1. Ostracods of the Family Aechminidae from the Arkona Shale of Southern Ontario, by Robert V. Kesling. Pages 1-10, with 1 plate. Price \$35.

