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A NEW KIRKBYID OSTRACOD FROM THE
WANAKAH MEMBER OF THE MIDDLE DEVONIAN
LUDLOWVILLE FORMATION IN WESTERN
NEW YORK

BY

ROBERT V. KESLING and MURRAY J. COPELAND



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A NEW KIRKBYID OSTRACOD FROM THE WANAKAH
MEMBER OF THE MIDDLE DEVONIAN LUDLOWVILLE
FORMATION IN WESTERN NEW YORK

By

ROBERT V. KESLING and MURRAY J. COPELAND

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INTRODUCTION

THE new kirkbyid ostracod described in this paper is from the upper part of the Wanakah member of the Middle Devonian Ludlowville formation in western New York. The ostracod belongs to a new genus and species. Its genus is intermediate between *Arcyzona* and *Amphissites* in the development of the kirkbyan pit, node, and ridges. Study of the many immature specimens found furnishes additional evidence on ostracod ontogeny.

The authors are deeply grateful to Mr. Raymond R. Hibbard of Buffalo, New York, for supplying the washed samples of shale from which the specimens were obtained. Dr. C. A. Arnold, Dr. G. M. Ehlers, and Dr. L. B. Kellum offered helpful criticism of the manuscript.

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

REGISTER OF LOCALITY

All specimens described are from the same locality.

LOCALITY

Shale, gray, weathering easily to clay; highly fossiliferous, with microfossils. Roadside exposure 2 miles southeast of East Bethany, Genesee County, New York. Middle Devonian Hamilton group, Ludlowville formation, upper part of the Wanakah member. Collected by Raymond R. Hibbard.

SYSTEMATIC DESCRIPTION

Phylum ARTHROPODA

Class CRUSTACEA

Order OSTRACODA

Superfamily Beyrichiacea

Family Kirkbyidae Ulrich and Bassler 1906

Amphizona, gen. nov.*Genotype*.—*Amphizona asceta*, sp. nov.

Description.—Carapace nearly equivalved; in lateral view subquadrate with rounded ends. Right valve slightly larger and overlapping the left around the free edge. Hinge line long and straight. Dorsal border of each valve straight. Large kirkbyan pit near the middle of each valve. Low node immediately in front of pit. Each valve provided with submarginal ridge, frill, and carina, all of which extend from corner to corner. Dorsal ridge along the dorsal border. Surface distinctly reticulate. Cardinal angles well defined. On the interior of each valve the kirkbyan pit and the node are represented by a prominent protuberance and a shallow depression, respectively. The hinge of the right valve is grooved to accommodate that of the left valve.

Remarks.—*Amphizona* is intermediate between *Arcyzona* (Kesling, 1952, pp. 30–31) and *Amphissites* (Girty, 1910, p. 235; Cooper, 1941, pp. 47–49) in the development of the kirkbyan pit, the node, and the several ridges. It resembles *Arcyzona* in the large size of its kirkbyan pit, but differs from it in having an exterior node, a more prominent carina, and a dorsal ridge. *Amphizona* resembles *Amphissites* in having a kirkbyan pit, node, submarginal ridge, frill, carina, and dorsal ridge, but it can easily be distinguished from that genus by the much larger pit and by the size and position of its node. The node in *Amphizona* is much smaller than that of *Amphissites* and is located in front of the pit instead of above it.

The name of this genus is derived from Greek ἀμφι- (“on both sides”) and ζώνη, f. (“a girdle”) and refers to the reticulation on both valves of a carapace. The name, compounded from stems in the names *Arcyzona* and *Amphissites*, was selected because *Amphizona* is intermediate between those two genera in form. It may also prove to be intermediate between them in the phylogeny of the family.

Amphizona asceta, sp. nov.

(Pl. I, Figs. 1–31; Pl. II, Figs. 1–4, 8–40)

Adult.—Carapace nearly equivalved; subquadrate in lateral view, elongate suboval in dorsal view, and subtrapezoidal in end view, narrower

at the dorsal border. Right valve slightly larger and overlapping the left around the free edge. Hinge line long and straight, with a small flexure toward the left at the end. Dorsal border of each valve straight, slightly above the hinge line; anterior and posterior borders subround; and ventral border nearly straight, slightly convex. A large circular kirkbyan pit near the center of each valve, slightly anterior, its diameter equal to about one-sixth the height. A low subovoid node, vertically elongate, immediately in front of pit.

Five prominent ridges on each valve. Three of these ridges, which have the shape of a distended U and extend from one corner to the other, are interpreted here as submarginal ridge, frill, and carina; the other two ridges, in lateral view straight and subparallel to the hinge line, as dorsal and central ridges. Submarginal ridge sharp, narrow, separated from the free edge by a thin strip of shell material; thin strip delicate, partly broken off on many valves, ornamented by a row of small, shallow punctae elongate at right angles to the free edge (Pl. I, Fig. 9). Frill parallel to submarginal ridge except near the ends, separated from it by a narrow reticulate area; forms free border except near the corners, sharp-edged, wider than submarginal ridge; reticulation extends onto each side, the little crests of the reticulation set perpendicular to the edge and reaching almost to the distal edge. Carina about as wide as the frill, separated from it by a distended sublunate reticulate area on the lateral surface; reticulation extends onto each side of the carina in the same manner as on the frill. Dorsal ridge straight, forming the dorsal border, joined to the ends of the carina and to the ends of the submarginal ridge; reticulations along the two sides of the dorsal border. As seen in dorsal view, the dorsal ridges of the two valves of a carapace outline a narrow subpyriform area narrower at the front end and bisected symmetrically by the hinge line. Central ridge narrower than carina, horizontal and just above the kirkbyan pit; each of its ends separated from the carina by about the diameter of the kirkbyan pit; reticulations extend onto the central ridge, nearly reaching its distal edge. A short, sharp, vertical crest along the axis of the node, dorsally confluent with the central ridge.

Surface of each valve ornamented with deep reticulation except on the distal edges of the five ridges. Meshes of reticulation larger adjacent to the frill, carina, dorsal ridge, and central ridge than on the rest of the lateral surface. Meshes average about one-third the diameter of the kirkbyan pit. Small crests of the reticulation between the dorsal ridge and the hinge line raised, forming a small somewhat irregular ridge about one-third the length of the valve, subparallel to the hinge line, near the middle of the valve length, slightly posterior.

Anterior cardinal angle about 130 degrees; posterior cardinal angle about 120 degrees.

Hinge of left valve consisting of hinge flange continuous with flange of contact margin. Hinge of right valve consisting of a hinge flange continuous with flange of the contact margin, a long straight hinge-flange groove curved sharply downward at each end around the tip of the hinge selvage, and a straight hinge selvage.

On the interior of each valve, the kirkbyan pit is represented by a hemispherical protuberance. The proximal end of this protuberance with granular papillae is interpreted as the scar of the adductor muscle. A shallow, vertically elongate depression in front of the protuberance represents the external node.

Dimensions of adult valves listed in Table I.

Sixth instar.—Valves differ from those of the adult in having the node smaller, the meshes of the reticulation nearly round instead of polygonal, the central ridge about the same size as the carina instead of narrower, and the extension of reticulation onto the frill and carina less prominent. Valves in this instar also differ from those of the adult in lacking the short vertical crest along the axis of the node, the small irregular ridge between the dorsal ridge and the hinge line, and the anterior junction of the carina and the dorsal ridge. Dimensions of valves listed in Table II.

Fifth instar.—Valves only differ from those of the sixth instar in having the dorsal ridge nearer the hinge line and the central ridge lower. Dimensions of valves listed in Table III.

Fourth instar.—Valves very similar to those of the fifth instar, except in the central ridge, which is a narrow crest in some specimens and completely lacking in others. Dimensions of valves listed in Table IV.

Third instar.—Valves lack a central ridge; kirkbyan pit definitely posterior; dorsal ridge joined to the carina posteriorly and to the frill anteriorly. Dimensions of valves listed in Table V.

Second and first instars.—Valves like those of the third instar; dorsal ridge, carina, and frill very fragile. Dimensions of valves in second instar listed in Table VI.

Remarks.—Most of the adult specimens are carapaces, whereas most of the immature specimens are single valves. The smallest specimen was called the first instar of the species, but it may not actually be the youngest because the very young instars may not have been preserved or may have been overlooked in the sample.

The ornamentation of *Amphizona asceta* increases during the ontogeny. Valves in the first three instars have a dorsal ridge, carina, frill, and sub-

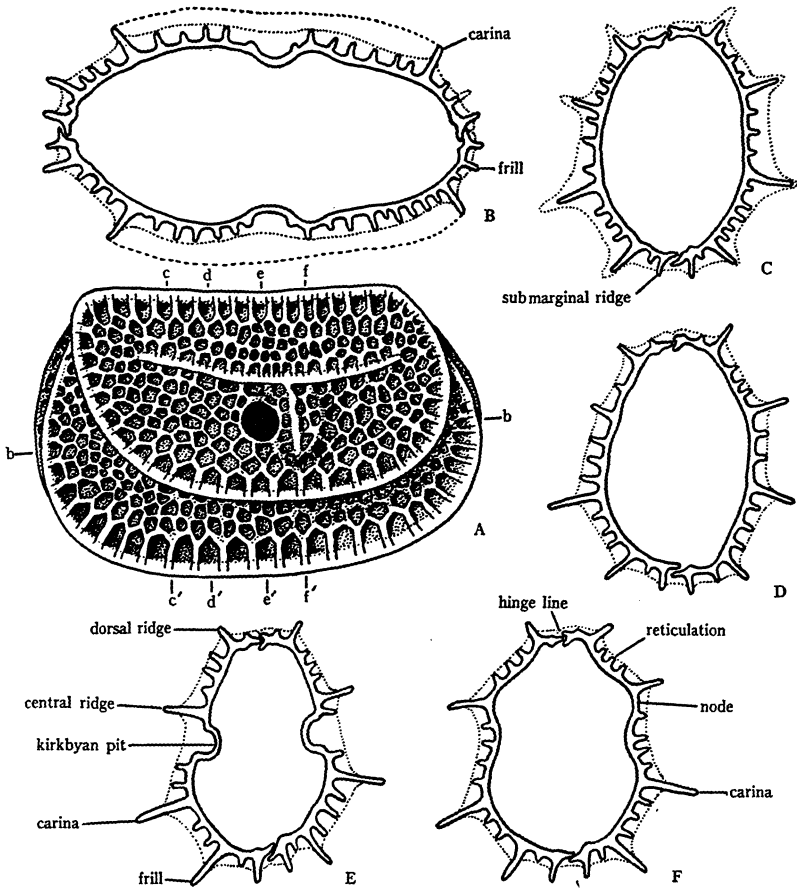


FIG. 1. *Amphiziona asceta*, sp. nov. A.—Sketch of right lateral view of adult carapace. Small letters mark the planes along which the polished surfaces B, C, D, E, and F were located. B.—Polished frontal surface, along b-b' in the sketch at A, as seen from the top. Dotted lines indicate the general level of reticulation, dashed lines indicate the extent of the carina, and solid lines indicate polished surfaces of shell material. C-F.—Successive polished transverse surfaces, along c-c', d-d', e-e', and f-f', as seen from the rear. Dotted lines indicate the general levels of reticulation.

marginal ridge. Valves in instars older than the fourth, as well as some valves in the fourth, have a central ridge in addition to the other four ridges. Adult valves are the only ones which have a short vertical crest on the node. Ornamentation of ostracods generally becomes progressively more distinct and larger from young to adult instars. Le Roy (1945, pp. 81-86) found excellent examples of this ontogenetic increase in ornamentation in species of *Cythereis*.

The kirkbyan pit is the exterior counterpart of the interior adductor muscle scar in all instars of *Amphizona asceta*. During ontogeny the kirkbyan pit shifts from the posterior to the anterior part of the valve. This progressive forward migration of the pit and the muscle scar appears to result from postoral elongation of the valves. As oriented in this paper, the direction of migration of the muscle scar is the same in *Amphizona asceta* as in living species of ostracods.

The volume of the valves in each instar is about double that of the valves in the preceding instar (see Table VII). During ontogeny the length of valves increases a little more than the width and distinctly more than the height.

The thickness of shell material can only be seen on polished surfaces or in thin sections. Frontal and transverse polished surfaces (Fig. 1) were prepared by embedding adult carapaces in oriented positions in Lakeside Thermoplastic Cement No. 70 on glass slides, grinding nearly to the desired plane with Bausch and Lomb Corundum Compound No. 21-80-1000-05, polishing with Buffalo Dental Flour of Pumice, and lightly etching with dilute acid fuchsin. The thickness of shell material between the interior of a valve and the tip of a carina is about equal to one-fourth the height (Fig. 1, C-F). The thickness of shell material between the interior of a valve and the distal surface of the reticulation is about one-third to one-half as great as that between the interior of a valve and the tip of the carina. The thickness of the shell material, apart from reticulation and ridges, is less than one-tenth the width of the valve.

The name of this species is derived from Greek ἀσκητός ("curiously wrought, ornate") and refers to the reticulation and ridges.

Types.—Holotype, an adult carapace, No. 30587. Paratypes: twelve adult carapaces, Nos. 30530-31, 30540, 30588-30591, and 30662-30666; four adult left valves, Nos. 30593-30594 and 30596-30597; eleven left valves in the sixth instar, Nos. 30534, 30598-30599, 30601, 30604, 30606-30609, and 30611-30612; five right valves in the sixth instar, Nos. 30600, 30602-30603, 30605, and 30610; one carapace in the fifth instar, No. 30532; seven left valves in the fifth instar, Nos. 30535-30536, 30617,

30622–30623, and 30625–30626; nine right valves in the fifth instar, Nos. 30613–30616, 30618–30621, and 30624; twelve left valves in the fourth instar, Nos. 30533, 30537, 30628, 30630–30632, 30634, 30636–37, 30641, and 30644–30645; ten right valves in the fourth instar, Nos. 30627, 30629, 30633, 30635, 30638–30640, 30642–30643, and 30646; nine left valves in the third instar, Nos. 30538, 30647–30649, and 30652–30656; two right valves in the third instar, Nos. 30650 and 30651; one carapace in the second instar, No. 30657; two left valves in the second instar, Nos. 30539 and 30660; two right valves in the second instar, Nos. 30658–30659; and one carapace in the first instar, No. 30661. The first two paratypes (Nos. 30530–30531) were ground and polished and are now preserved as the ventral one-third of a carapace and the anterior one-fifth of a carapace.

Amphizona sp. cf. *A. asceta*, sp. nov.

(Pl. II, Figs. 5–7)

Remarks.—Some specimens of *Amphizona* (Table I), which were about the same size as those of *Amphizona asceta*, differ from them in having a more complex kind of reticulation. Some of the crests which make up the reticulation in these specimens are much higher than the others and form crooked, irregularly anastomosing ridges. Immature specimens do not have this type of reticulation as well developed as the adults and can not be separated with certainty from immature specimens of *Amphizona asceta*. Additional specimens need to be studied to determine if these specimens constitute a new species.

Specimens.—Two adult left valves, Nos. 30592 and 30595.

TABLE I

MEASUREMENTS OF ADULT VALVES OF *Amphizona asceta* KESLING AND COPELAND AND
Amphizona sp. cf. *A. asceta* KESLING AND COPELAND

Valve	Catalogue Number	Length (mm.)	Height (mm.)	Width (mm.)	Length x Height x Width (cu. mm.)
left	30592*	1.025	.615	.275	.173
left	30593	1.025	.605	.275	.171
left	30594	.960	.570	.285	.156
left	30595*	.950	.580	.260	.143
left	30596	.935	.600	.320	.179
left	30597	.860	.590	.285	.145

* Specimen classified as *Amphizona* sp. cf. *A. asceta* Kesling and Copeland.

TABLE II
MEASUREMENTS OF VALVES OF *Amphizona asceta* KESLING AND COPELAND
IN SIXTH INSTAR

Valve	Catalogue Number	Length (mm.)	Height (mm.)	Width (mm.)	Length x Height x Width (cu. mm.)
left	30598	.810	.500	.220	.089
left	30599	.800	.480	.205	.079
right	30600	.780	.440	.240	.082
left	30601	.775	.475	.230	.085
right	30602	.770	.470	.220	.080
right	30603	.765	.470	.215	.077
left	30604	.760	.485	.190	.070
right	30605	.740	.460	.220	.075
left	30606	.740	.450	.235	.078
left	30607	.730	.465	.265	.090
left	30608	.725	.465	.195	.066
left	30609	.720	.460	.210	.070
right	30610	.720	.445	.220	.071
left	30611	.700	.455	.205	.065
left	30612	.690	.425	.275	.081

TABLE III
MEASUREMENTS OF VALVES OF *Amphizona asceta* KESLING AND COPELAND
IN FIFTH INSTAR

Valve	Catalogue Number	Length (mm.)	Height (mm.)	Width (mm.)	Length x Height x Width (cu. mm.)
right	30613	.650	.380	.195	.048
right	30614	.645	.390	.180	.045
right	30615	.640	.420	.170	.046
right	30616	.610	.370	.175	.040
left	30617	.610	.365	.180	.040
right	30618	.600	.400	.175	.042
right	30619	.600	.425	.190	.048
right	30620	.600	.385	.165	.038
right	30621	.595	.370	.200	.044
left	30622	.595	.360	.190	.041
left	30623	.585	.375	.215	.047
right	30624	.570	.370	.185	.039
left	30625	.570	.380	.195	.042
left	30626	.550	.370	.205	.042

TABLE IV
MEASUREMENTS OF VALVES OF *Amphizona asceta* KESLING AND COPELAND
IN FOURTH INSTAR

Valve	Catalogue Number	Length (mm.)	Height (mm.)	Width (mm.)	Length x Height x Width (cu. mm.)
right	30627	.500	.325	.160	.026
left	30628	.495	.310	.155	.024
right	30629	.495	.300	.140	.021
left	30630	.490	.310	.165	.025
left	30631	.485	.340	.155	.026
left	30632	.485	.310	.160	.024
right	30633	.490	.325	.160	.025
left	30634	.480	.315	.170	.026
right	30635	.475	.315	.125	.019
left	30636	.475	.305	.165	.024
left	30637	.475	.310	.170	.025
right	30638	.470	.330	.155	.024
right	30639	.470	.315	.150	.022
right	30640	.470	.330	.170	.026
left	30641	.465	.325	.170	.026
right	30642	.465	.270	.150	.019
right	30643	.460	.300	.155	.021
left	30644	.445	.320	.155	.022
left	30645	.435	.300	.200	.026
right	30646	.430	.280	.160	.019

TABLE V
MEASUREMENTS OF VALVES OF *Amphizona asceta* KESLING AND COPELAND
IN THIRD INSTAR

Valve	Catalogue Number	Length (mm.)	Height (mm.)	Width (mm.)	Length x Height x Width (cu. mm.)
left	30647	.395	.255	.115	.0116
left	30648	.380	.270	.140	.0144
left	30649	.380	.240	.130	.0119
right	30650	.380	.245	.110	.0102
right	30651	.380	.260	.110	.0109
left	30652	.380	.250	.100	.0095
left	30653	.370	.250	.140	.0130
left	30654	.365	.255	.135	.0126
left	30655	.360	.255	.115	.0106
left	30656	.360	.250	.140	.0126

TABLE VI
MEASUREMENTS OF VALVES OF *Amphizona asceta* KESLING AND COPELAND
IN SECOND INSTAR

Valve	Catalogue Number	Length (mm.)	Height (mm.)	Width (mm.)	Length x Height x Width (cu. mm.)
right	30658	.305	.220	.100	.0067
right	30659	.300	.225	.115	.0078
left	30660	.290	.215	.080	.0050

TABLE VII
MEAN MEASUREMENTS OF VALVES OF *Amphizona asceta* KESLING AND COPELAND

Instar	Specimens	Length		Height		Width		Length x Height x Width	
		In mm.	Growth Factor	In mm.	Growth Factor	In mm.	Growth Factor	In cu. mm.	Growth Factor
Adult	4	.945		.591		.291		.1628	
			1.263		1.277		1.305		2.11
6	15	.748		.463		.223		.0772	
			1.247		1.209		1.193		1.80
5	14	.601		.383		.187		.0430	
			1.269		1.228		1.169		1.83
4	20	.473		.312		.160		.0235	
			1.260		1.232		1.290		2.02
3	10	.375		.253		.124		.0117	
			1.258		1.150		1.265		1.80
2	3	.298		.220		.098		.0065	
Mean			1.259		1.219		1.244		1.91

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Submitted for publication May 22, 1953.

PLATES

EXPLANATION OF PLATE I

(All figures about $\times 36$)

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PLATE I

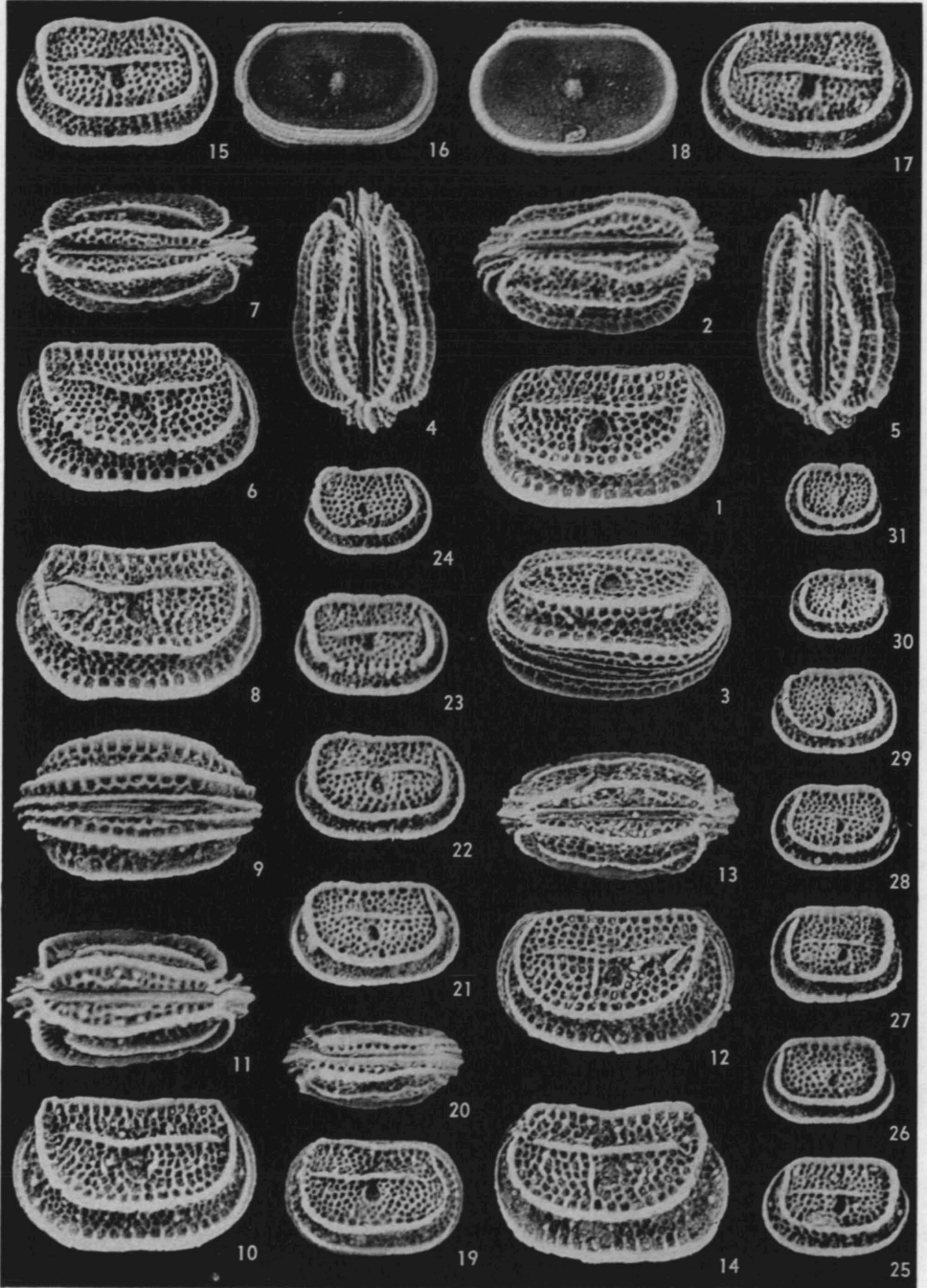
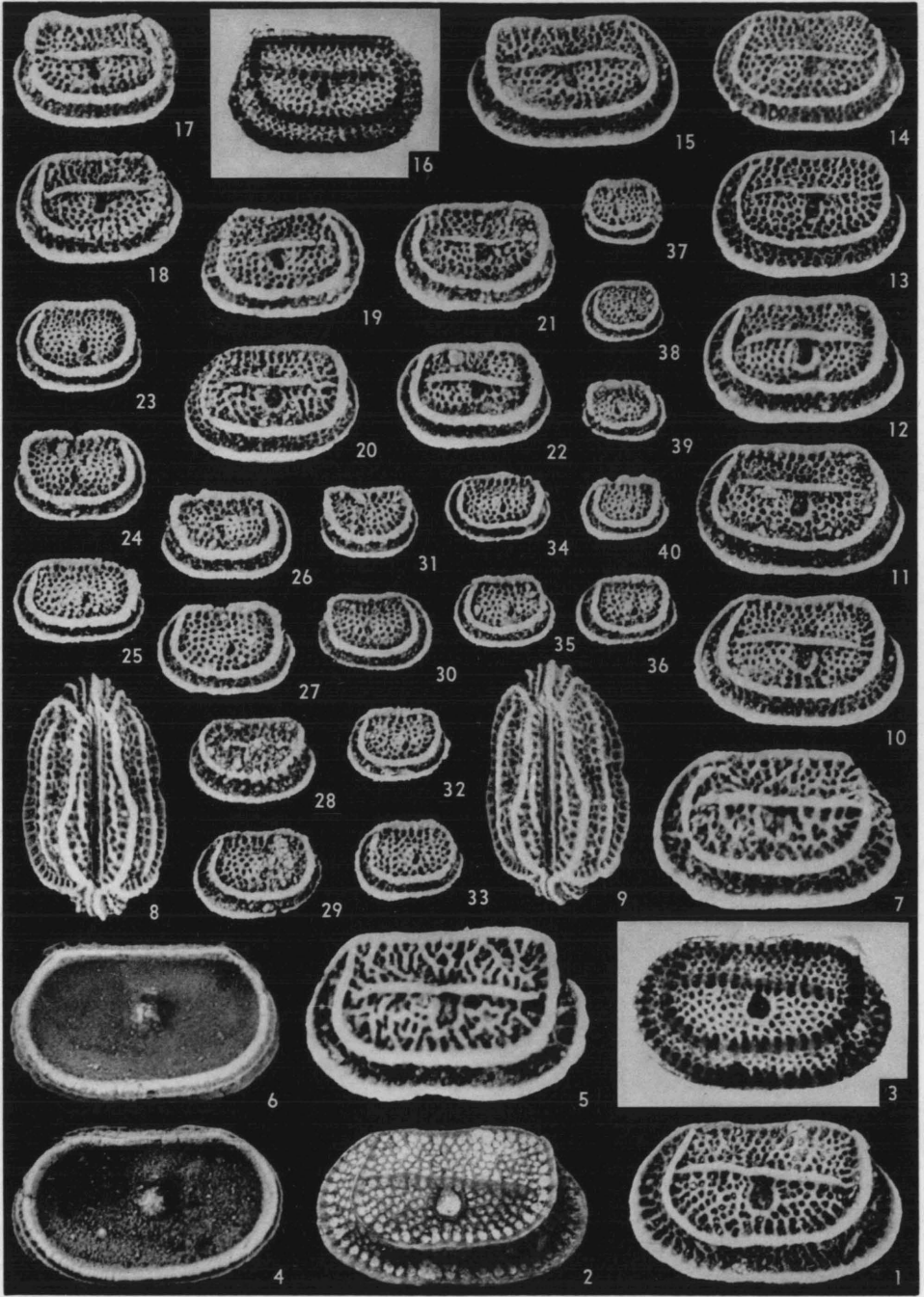


PLATE II



EXPLANATION OF PLATE II

(All figures about $\times 36$)

	PAGE
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FIGS. 1-4. Three lateral and one interior views of adult left valve. Paratype No. 30593. Figure 2 photographed without coating of ammonium chloride; Figure 3, with illumination inclined from below.	
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FIG. 31. Lateral view of a right valve in third instar. Specimen not preserved.	
FIGS. 32-36. Lateral views of five left valves in third instar. Paratypes Nos. 30648, 30538, 30647, 30656, and 30649.	
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VOLUME XI

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