OKLAHOMA GEOLOGICAL SURVEY

CARL C. BRANSON, DIRECTOR

Circular 39

CHESTER FORAMINIFERA AND OSTRACODA FROM THE RINGWOOD POOL OF OKLAHOMA

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by

R. W. HARRIS

and

THOMAS C. JOBE

Norman

July, 1956

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ILLUSTRATIONS

Chester Foraminifera and Ostracoda from the Ringwood Pool of Oklahoma

R. W. Harris
University of Oklahoma, Norman, Oklahoma
and
Thomas C. Jobe
Humble Oil and Refining Company, Tyler, Texas

Abstract — Three Foraminifera and twenty-seven Ostracoda are described and illustrated from the producing "Manning" horizon of the Ringwood Oil Pool of Oklahoma. Thirteen of the ostracodal species have been reported from Mississippian (Chester) strata of Illinois. Eleven new species and three new varieties of Ostracoda serve to corroborate the assigned age of Upper Mississippian for the "Manning" zone.

INTRODUCTION

In partial fulfillment of the requirements for the M. S. degree at the University of Oklahoma the junior author submitted in 1951 a thesis, "A PRELIMINARY STUDY OF THE RINGWOOD OIL POOL, MAJOR COUNTY, OKLAHOMA." The thesis involved no microfaunal study whatever, though several cores from the producing section in the field were investigated for oil relationship. The microfauna described and illustrated herein was obtained from these "Manning" cores.

The discovery well of the Ringwood Pool of eastern Major County, Superior 41-27 Manning, NE¼ NE¼ NW¼ sec. 27, T. 22 N., R. 10 W., was drilled in 1945 to total depth of 8,274 feet (in Wilcox), with top of the productive "Manning" zone encountered at 6,800 feet. The "Manning" zone is a dolomitic pseudo-oolitic subcoquinoid limestone containing occasional axial fragments of *Archimedes* Owen. The zone varies in thickness from zero, along the line of erosional pinchout north and east of the Ringwood Pool, to a downdip thickness of 145 feet in the southwestern edge of the field . . . . . the zone continues the downdip thickening beyond the field in a southwesterly direction (approximately 165 feet in Superior 63-30 Fuller, sec. 30, T. 21 N., R. 10 W.)

The microfaunal assemblage considered in this report was obtained from "Manning" cores in the interval 6,801-6,820 in the Superior 61-2 Early, NE¼ NW¼ NE¼ sec. 2, T. 21 N., R. 10 W. The three foraminiferal species are primitive, conservative, arenaceous forms, but the twenty-seven Ostracoda are distinctive in shape and ornamentation. Two "Manning" Foraminifera and eleven Ostracoda have been described from the Chester of Illinois, essentially by Dr. Carey Croneis and co-authors. Eleven new species and three new varieties of Ostracoda corroborate the assigned Chester age of the "Manning" horizon.

Appreciation is extended the Superior Oil Company personnel of Oklahoma City and Chickasha for supplying critical cores and subsurface information of the Ringwood Pool. Special acknowledgments are made to the junior author's wife, Mrs. Billye I. Jobe, Micropaleontologist for Humble Oil and Refining Company in Tyler, Texas, for painstaking care and time in picking out and mounting the microfauna. Assistance in financing the typing and preparation of manuscript is extended the Faculty Research Fund of Oklahoma University.

The MC type numbers refer to the University of Oklahoma micropaleontological collection of Mississippian Chester types.

Description of Foraminifera

Order FORAMINIFERA d'Orbigny, 1826

Family AMMODISCIDAE Rhumbler, 1895

Genus GLOMOSPIRA Rzehak, 1888

GLOMOSPIRA sp. cf. G. DISCA Cooper, 1947

Plate 1, figures 1a-b, 2

Glomospira disca Cooper, 1947, Jour. Paleontology, vol. 21, no. 2, p. 87, pl. 20, fig. 18.

Though the adult Manning specimen is considerably larger than Cooper's species described from the Chester of Illinois; nevertheless, the two forms are herein considered conspecific. The Manning form is exceedingly finely arenaceous. A nepionic form illustrated possesses approximately five volutions, while the larger and more ammodiscid-like specimen displays, on moistened surface, approximately nine volutions.

Hypotype specimen No. MC 1A; maximum diameter: 0:42 mm; hypotype specimen No. MC 2A; maximum diameter: 0.22 mm.

Remarks: Several specimens of this glomospirine form were recovered from Manning cores.

Family LITUOLIDAE Reuss, 1861

Genus ENDOTHYRA Phillips, 1846

ENDOTHYRA EXCENTRALIS Cooper, 1947

Plate 1, figures 3a-c

Endothyra excentralis Cooper, 1947, Jour. Paleontology, vol. 21, no. 2, p. 88, pl. 20, figs. 19-23.

The majority of the Manning forms agree in measurements with Cooper's type from the Kinkaid of Illinois, though the specimen figured herein is slightly larger and contains an additional

chamber in the final coil. The sutures are slightly depressed and appear thickened by reason of darker bounding matrix.

Hypotype specimen No. MC 3A; maximum diameter: 0.39 mm; thickness: 0.20 mm.

Remarks: Several specimens of this finely arenaceous tan endothyrid were recovered from Manning cores.

ENDOTHYRA sp.

Plate 1, figures 4a-d

A single robust brownish endothyrid with maximum diameter of 1:75 mm was recovered from Manning cores.

Illustrated specimen No. MC 4A; maximum diameter: 1.75 mm; thickness: 0.60 mm.

Remarks: In size and number of chambers the specimen compares favorably with *E. bowmani* Phillips, from Spergen outcrops of Indiana, but the periphery is more lobulate and the texture not so smoothly finished as the closely coiled white Spergen forms. The specimen is much larger than *E. acuta* Cooper and *E. excentralis* Cooper, Chester forms from Indiana.

DESCRIPTION OF OSTRACODA

Order OSTRACODA Latreille, 1802

Family APARCHITIDAE Ulrich and Bassler, 1923

Genus PARAPARCHITES Ulrich and Bassler, 1906

PARAPARCHITES MANNINGENSIS Harris and Jobe, n. sp.

Plate 1, figures 5a-d

Carapace small, smooth, strongly inflated, semi-ovate in lateral outline, with slight retral swing; short hingement channeled below lowly arched dorsum, cardinal slopes noticeably obtusely rounded, ventral profile strongly convex, slightly truncated anteriorly, anterior nose in median line, posterior end evenly rounded; larger left valve overlaps right about free margins with maximum overlap along venter, flattened venter sloping slightly toward larger left valve.

Holotype specimen No. MC 5A; length: 0.65 mm; height: 0:45 mm; thickness: 0.33 mm.

Remarks: In measurements *P. disjunctus* Morey agrees with this commonly occurring Manning form, but the new species is much more ovate in lateral outline and lacks the flattened sloping dorsum of the Mississippian species from Missouri. The Manning

form is relatively longer and thicker, more evenly biconvex, and lacks the eye spot of *P. inornatus* (McCoy), from the Chester of Illinois. The Manning form is approximately one and one-half times as large as *P. exiguus* Cooper and lacks the reversed dorsal overlap of that smaller Pennsylvanian species. In lateral outline the species superficially resembles *P. fabulus* Cooper, from the Pennsylvanian of Illinois, but the Manning species is twice as large, the anterior nose is in median line, and the antero-dorsal slope is longer and more inclined than that of the Pennsylvanian form.

The trivial name refers to the Manning Zone with the genitive ending of place.

PARAPARCHITES PROJECTUS Harris and Jobe, n. sp.

Plate 1, figures 6, 7a-d

Large carapace subovate in lateral outline with definite retral swing, as much as 3 mm in length; maximum dimensions through center; right valve overlaps left about free margins, with maximum overlap at base, dorsal margin of left valve projecting above hingement of right, with posterior two-thirds of the projection widened and inflated into an umbonal ridge that expands posteriorly; smaller right valve displays within median ventral periphery a raised thickened bulb that increases in length with age, surface otherwise smooth except for eye tubercles well below anterior end of hingement, which disappear in adult molts.

Holotype left valve No. MC 6A; length: 2.40 mm; height: 1.30 mm; paratype specimen No. MC 7A; length: 1.30 mm; height: 0.90 mm; thickness: 0.70 mm.

Remarks: The new species differs from *P. bimammatus* Delo in its more pronounced retral swing, in the possession of eye spots on both valves of all nepionic molts, and in displaying maximum dimensions through the center. *P. robustus* Croneis and Gutke, from the Renault of Illinois, and *P. emaciatus* Scott, from upper Mississippian of Montana, display umbonation of the left valve, but both are smaller and lack the ventral bulb of the right valve. *P. cyclopeus* (Girty) lacks the ventral inflation of the right valve. *P. magnus* Kellett, from the Deer Creek (Pennsylvanian) of Kansas, approximates 2 mm in length, and Geis reports large specimens of *P. carbonarius* (Hall) from the Salem of Indiana that attain

2.5 mm in length, but these species lack dorsal and ventral protuberances on opposite valves.

All growth stages of this large species were recovered from Manning cores, and all molts revealed characteristic bulbous projection along dorsum of left valve and median venter of right valve. Occasional warping and flattening was observed in several large, black, polished specimens.

The trivial name is adapted from the Latin word, projectus, "projecting", referring to projection of left valve beyond dorsal edge of right valve.

Family PRIMITIIDAE Ulrich and Bassler, 1923

Genus CARBOPRIMITIA Croneis and Funkhouser, 1939

CARBOPRIMITIA ROTUNDA Croneis and Funkhouser, 1938

Plate 1, figures 8, 9, 10a-b

Carboprimitia rotunda Croneis and Funkhouser, 1938, Denison Univ. Sci. Lab., Jour., vol. 33, p. 338, pl. 9, figs. 3, 4; Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 63, pl. 14, figs. 16-19; Ellis and Messina, 1954, Cat. Ostrac., Amer. Mus. Nat. History, Spec. Pub., vol. 5.

Carboprimitia rotunda var. *tumida* Croneis and Funkhouser, 1938, Denison Univ. Sci. Lab., Jour., vol. 33, p. 339, pl. 9, figs. 5, 6; Ellis and Messina, 1954, Cat. Ostrac., Amer. Mus. Nat. History, Spec. Pub., vol. 5.

Carboprimitia simulans Croneis and Thurman, 1938, Denison Univ. Sci., Lab., Jour., vol. 33, p. 303, pl. 7, figs. 23, 25.

Though slightly smaller, the species is otherwise identical with types described from the Kinkaid and Clore formations of Illinois. Croneis and co-authors noted the gentle to pronounced posterior obesity of the female carapace, while the male carapace is rather evenly convex. Surface of an occasional Manning specimen is faintly reticulate.

Hypotype specimen No. MC 8A; length: 0.79 mm; height: 0.57 mm; thickness: 0.46 mm; hypotype right valve No. MC 9A; length: 0.92 mm; height: 0.65 mm; hypotype left valve No. MC 10A; length: 0.82 mm; height: 0.52 mm.

Remarks: Single valves of this sansabelloid form with anterior sulcate pit occur fairly commonly in Manning cores.

Family ACRONOTELLIDAE Swartz, 1936

Genus MONOCERATINA Roth, 1928

MONOCERATINA POSTNODOSA Harris and Jobe, n. sp.

Plate 2, figures 1a-b

Small carapace suboblong in lateral outline, with length approximating twice the height; maximum height and thickness through ventral wing, maximum length along median line; hingement straight, elongate, slightly umbonate centrally, dorsal and ventral margins subparallel, cardinal angles obtusely rounded, the posterior the more acute, anterior rounding imperceptibly produced ventrally, posterior nose evenly rounded, ventral profile lowly convex with offset at posterior terminus of wing, in ventral view broad and even convexity broken posteriorly by wing termini and by low node, compact ventral wing conforms to convexity of carapace and is slightly inflated and bluntly rounded posteriorly, surface reticulate with imperceptible obliquely vertical median sinus with low post-ventral node and faint dorsal swelling.

Holotype left valve No. MC 11A; length: 0.58 mm; height: 0.32 mm.

Remarks: This species lacks the anterior and posterior sinus of *M. furcula* Croneis and Gale and also the sinus at anterior end of wing; furthermore, the new species possesses a characteristic post-ventral node. *Mooreina johnsvalleyensis* Harlton, a form similar in lateral outline and in possession of a post-ventral node, displays a prominent antero-dorsal node that projects noticeably above the hinge line.

The trivial name is an adaptation of the Latin word, nodosus, "full of knots", with the Latin prefix, post, "behind"; and refers to the post-ventral node on either valve.

Family GLYPTOPLEURIDAE Girty, 1910

Genus GLYPTOPLEURA Girty, 1910

GLYPTOPLEURA PERBELLA Geis, 1932

Plate 2, figures 2a-b

Kirkbya (? Barychilina) costata Ulrich (not McCoy), 1891, Jour. Cincinnati Soc. Nat. History, vol. 13, no. 4, p. 208, pl. 18, figs. 2a, 2b.

Glyptopleura costata Coryell and Blackmier (not McCoy), 1931, Amer. Midland Nat., vol. 12, no. 12, p. 510, pl. 1, figs. 1a, 1b, 1c.

Glyptopleura perbella Geis, 1932, Jour. Paleontology, vol. 6, no. 2, p. 170, pl. 25, figs. 1a, 1b.

Glyptopleura similis Cooper (not Croneis and Funkhouser), 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 17, pl. 7, figs. 23, 24.

This form appears identical with the type from the Salem of Indiana. The flattened carapace, subquadrate outline, and 10 to 12 slightly sinuous costae (the primary rib bifurcating in front of the median pit) characterize the species. The upper pit of the Manning form is practically obsolete.

Hypotype specimen No. MC 12A; length: 1.25 mm; height: 0.70 mm.

Remarks: This species is larger, relatively thinner, and displays more surficial ribbing in antero-dorsal quarter than does *G. similis* Croneis and Funkhouser. The species closely resembles *G. genevievea* Brayer, from the Salem of Indiana, in measurements and surficial costae, but the lower rib of the pair bifurcating in front of the median pit terminates anteriorly, not forming a continuous loop upon the carapace.

This species occurs sparingly in the Manning horizon.

GLYPTOPLEURA sp. cf. G. RENIFORMIS Croneis and Thurman, 1938

Plate 2, figure 4

Glyptopleura reniformis Croneis and Thurman, 1938, Denison Univ. Sci. Lab., Jour., vol. 33, p. 321, pl. 8, figs. 1, 2; Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 17, pl. 7, figs. 25-27.

This small, subquadrate glyptopleurid is possibly a molt of the type described from the Kinkaid of Illinois (1.0 mm in length). Other than variation in size, the alternating surficial bars of the Manning form are somewhat finer, while the dorsal bar appears slightly stronger than that of the type form.

Hypotype left valve No. MC 13A; length: 0.77 mm; height: 0.47 mm.

Remarks: The species resembles *G. skathiae* Coryell and Johnson and *G. valkyriae* Coryell and Johnson in abrupt termination of surficial ribs, but it is evenly rounded post-ventrally (not truncated) and possesses only one median pit (not two). In posterior truncation of ribs the Manning form is similar to *G. bristoli* Croneis and Gutke, *G. hendricksi* Croneis and Gutke, and *G. varians*

Croneis and Funkhouser, but the two first-mentioned are thicker, and none possesses the long paired ribs above the median depression.

The species occurs sparingly in Manning cores.

GLYPTOPLEURA SIMILIS Croneis and Funkhouser, 1938

Plate 2, figures 3a-d

Glyptopleura *similis* Croneis and Funkhouser (not Cooper), 1938, Denison Univ. Sci. Lab., Jour., vol. 33, p. 352, pl. 10, fig. 4; Ellis and Messina, 1954, Cat. Ostrac., Amer. Mus. Nat. History, Spec. Publ., vol. 5.

In salient features this form agrees with the type from the Clore of Illinois. It is to be noted that minor riblets of the central area may or may not join terminally on opposite valves of the same individual.

Hypotype specimen No. MC 14A; length: 1.0 mm; height: 0.62 mm; thickness: 0.55 mm.

Remarks: The variety occurs quite commonly in the Manning zone.

Genus GLYPTOPLEURINA Coryell, 1928

GLYPTOPLEURINA ? BULBOSA Croneis and Gale, 1938

Plate 2, figures 5a-b

Glyptopleurina ? bulbosa Croneis and Gale, 1938, Denison Univ. Sci. Lab., Jour., vol. 33, p. 282, pl. 6, fig. 3; Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 83, pl. 8, figs. 4-6; Shimer and Shrock, 1948, Index Foss. N. Amer., p. 681, pl. 286, fig. 9; Ellis and Messina, 1954, Cat. Ostrac., Amer. Mus. Nat. History, Spec. Publ., vol. 5.

In the bifurcating surficial ribs, deep sulcus, and prominent nodes this form agrees with the type described from the Chester of Illinois.

Hypotype right valve No. MC 15A; length: 0.82 mm; height: 0.47 mm.

Remarks: A single valve of this exceedingly ornate glyptopleurine form was recovered from Manning cores.

GLYPTOPLEURINA SIMULANS Croneis and Gutke, 1939

Plate 2, figures 6a-b

Glyptopleurina simulans Croneis and Gutke, 1939, Denison Univ. Sci. Lab., Jour., vol. 34, p. 55, pl. 2, figs. 13-14; Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 83, pl. 8, figs. 42-43.

This species is characterized by deep sulcus with anterojacent knob, two subjacent ribs, and strong subjacent posterior inflation; entire surface finely reticulate.

Hypotype right valve No. MC 16A; length: 0.84 mm; height: 0.54 mm.

Remarks: Single valves of this moderately ornate glyptopleurine form occur quite commonly in Manning cores, and in Chester outcrops of Illinois.

Genus SANSABELLA Roundy, 1926

SANSABELLA VINITAENSIS (Harlton) Cooper, 1941

Plate 2, figures 7, 8

Jonesina vinitaensis Harlton, 1929, Amer. Jour. Sci., vol. 218, p. 260, pl. 1, figs. 7a, 7b.

Jonesina holli Croneis and Gutke, 1939, Denison Univ. Sci. Lab., Jour., vol. 34, p. 41, pl. 1, figs. 14, 15.

Jonesina wrighti Croneis and Gutke, 1939, Denison Univ. Sci. Lab., Jour., vol. 34, p. 41, pl. 1, figs. 22, 23.

Sansabella vinitaensis Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 61, pl. 13, figs. 44, 45.

Single valves of this deeply sulcate reticulate specimen with prominent posterior swelling occur quite commonly in Manning cores.

Hypotype right valve No. MC 17A; length: 0.42 mm; height: 0.47 mm; hypotype left valve No. MC 18A; length: 0.73 mm; height: 0.42 mm.

Remarks: The Manning form is intermediate in size between the type Fayetteville form (length 0.80 mm) and the Renault form (length 0.67 mm).

Family KIRKBYIDAE Ulrich and Bassler, 1906

Genus SAVAGELLA Geis, 1932

SAVAGELLA ? ACUMINATA Cooper, 1941

Plate 2, figures 9a-c

Savagella ? acuminata Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 47, pl. 11, figs. 7-9.

Carapace subquadrate-ovate in lateral outline, averaging 1.0 mm in length in both male and female; female strongly inflated posteriorly and post-ventrally, male only slightly elevated in corresponding areas; a shallow groove with faint bordering inner

keel parallels free margins of valves, surface coarsely and irregularly reticulate (12-14 pores in the height), distinct near-median pit.

Hypotype specimen No. MC 19A; length: 1.01 mm; height: 0.60 mm; thickness: 0.58 mm.

Remarks: This form, abundant in the Manning, is larger than *Kirkbyina spinosa* Harlton, from the Wapanucka of Oklahoma, and differs further in possession of reticulate surface, nonspinose ventral border, and reversed overlap of valves. The form is reported from the Renault, the Golconda, and the Vienna of Indiana.

Genus KIRKBYA Jones, 1869

KIRKBYA sp. cf. K. OBLONGA Jones and Kirkby var. TRANSVERSA Girty, 1910

Plate 3, figure 1

Kirkbya oblonga Jones and Kirkby var. *transversa* Girty, 1910, N. Y. Acad. Sci., Annals, vol. 20, p. 234; Ellis and Messina, 1952, Cat. Ostrac., Amer. Mus. Nat. History, Spec. Publ., vol. 1.

A single broken kirkbyan form from Manning core is referred to Girty's variety from the Fayetteville shale of Arkansas. The large smooth form is elongate elliptical in lateral outline, with lowly convex venter. Absence of shoulders, central biconvexity of carapace, neat subcentral polished bead, and low simple inner keel further characterize the species.

Hypotype right valve No. MC 20A; length: (projected) 0.95 mm; height: 0.45 mm.

Remarks: The Manning species possesses identical measurements, lateral outline, and evenly biconvex surface (without the shoulders) as *K.* sp. cf. *K. reflexa* Girty, figured by Cooper from the Fulda (Morrow) limestone of Illinois, but the Oklahoma species does not display the high, strongly fluted keel of the Fulda form. The Manning specimen is slightly larger than *K. symmetrica* Croneis and Thurman, from the Kinkaid of Illinois, and possesses a definite sub-median smooth pit-plug not observed on the Kinkaid type; furthermore, it is thickest through the center (not anteriorly), and lacks the slight anterior shoulder of the established species. The Manning form is larger and lacks the anterior swelling of *K. aequalis* Croneis and Funkhouser. The species lacks the anterior swelling of *K. marginata* Croneis and Funkhouser. *K. firma* Kellett is similar in outline, but possesses a more flatly convex surface with faint anterior shoulder.

Genus AMPHISSITES Girty, 1910

AMPHISSITES RINGWOODENSIS Harris and Jobe, n. sp.

Plate 2, figures 10a-d

Carapace elongate-ovate with slight retral swing; maximum length through center, maximum height at or before midregion, maximum thickness through near-median swelling; long straight hingement deeply channeled below straight to lowly convex dorsum, antero-cardinal angle the more bluntly obtuse, ventral outline straight to concave and sub-paralleling dorsum, antero-ventral margin faintly truncated, anterior nose higher and less produced than the posterior, neither laterally compressed; left valve overlaps right evenly and moderately about free margins, but dorsal margin of smaller right valve is slightly widened and produced above that of left, ventral view reveals on larger left valve a narrow, smooth-to-lineate, thickened marginal border probably rabbeted to receive flanged edge of right, interlocking cardinal processes of smaller right valve embraced terminally by overlapping processes of larger left valve; faint reticulations of strongly and rather evenly convex surface better preserved or delineated near free margins, coarse scattered pores more evident, surface without false keels, but displaying slightly elongate inclined sub-median pit immediately below and before low, inconspicuous, rounded, postmedian swelling.

Holotype specimen No. MC 21A; length: 1.27 mm; height: 0.70 mm; thickness: 0.60 mm.

Remarks: In outline and depressed hingement this species superficially resembles *Roundyella bellatula* Bradfield, from the Dornick Hills of Oklahoma, but the Pennsylvanian form is smaller, displays a more strongly reticulate surface, and lacks terminal interlocking hingement. *Amphissites simplexus* Roth, from the Wapanucka of Oklahoma, exhibits similar outline and dimensions, but its surface is more reticulate, hingement channeled noticeably only anteriorly, and left valve possesses low protuberances below cardinal angles that project beyond right valve. The Manning form differs from *Neokloedenella prima* Croneis and Funkhouser, and *N. secunda* Croneis and Bristol in its larger size, well channeled hingement, sub-median pit with postjacent swelling, and reticuloporate ornamentation.

The trivial name refers to the Ringwood Pool, with the genitive ending of place.

Genus POLYTYLITES Cooper, 1941

POLYTYLITES LOBATUS Harris and Jobe, n. sp.

Plate 3, figure 3

Small carapace subquadrate in lateral outline; maximum length and thickness through median knob, highest through posterior knob; straight line of hingement interrupted by three slightly projecting lateral knobs, ventral border sub-parallel to dorsum, ends sub-equally curved with slight antero-ventral projection; outer and inner low flanges sub-parallel to periphery, the inner flange somewhat "rolled", three prominent elongate vertical knobs of approximately equal length characterize the surface, the anterior the lowest and thinnest, the central less projecting dorsally and slightly expanded ventrally, the posterior slightly expanded dorsally, entire surface reticulate or cancellate, reticulations on knobs appearing as sub-parallel transverse line.

Holotype right valve No. MC 22A; length: 0.72 mm; height: 0.42 mm.

Remarks: This species differs from illustrated types of the genus in its elongate inflated median knob. Other species possess one or two elongate lateral knobs, but in only *P. directus* Cooper is the median knob elongate. In the later form the anterior node is rounded, rather than elongate.

Two specimens of the new form were recovered from Manning cores.

The trivial name is a Latin adjective meaning "lobed", in reference to the lobate character of the carapace.

Family YOUNGIELLIDAE Kellett, 1933

Genus YOUNGIELLA Jones and Kirkby, 1895

YOUNGIELLA ? NODOSA Harris and Jobe, n. sp.

Plate 3, figures 2a-d

Small equivalved carapace subrhomboidal in lateral outline, with definite forward swing; maximum length and thickness through center, highest anteriorly and posteriorly, slightly incised venter sub-paralleling long straight hingeline, post-cardinal angle practically a right angle, antero-cardinal angle approximately 130 degrees, posterior end bluntly rounded and slightly truncated

ventrally, anterior nose evenly rounded; evenly convex surface appears smooth, though possibly minutely pitted, antero-median muscle scar and characteristic low post-ventral node with long flattened base.

Holotype specimen No. MC 23A; length: 0.50 mm; height: 0.26 mm; thickness: 0.20 mm.

Remarks: This single specimen from the Manning zone possesses the outline of *Youngiella* Jones and Kirkby and *Kirkbyella* Coryell and Booth. It does not display the rolled thickened border of the former, nor the deep sulcus and reticulate surface of the latter. The specimen, though distinctive, is tentatively assigned to *Youngiella* Jones and Kirkby, rather than designated as a genotype.

The new species agrees in size with *Y. rhomboidalis* Croneis and Bristol, from the Chester of Illinois, but differs therefrom in the possession of antero-median muscle scar and prominent post-ventral node.

The trivial name is a Latin adjective, meaning "full of knobs", in reference to the antero-ventral node.

Family BAIRDIIDAE Sars, 1887

Genus BAIRDIA McCoy, 1844

BAIRDIA GRANIRETICULATA Harlton var. RINGWOODENSIS Harris and Jobe, n. var.

Plate 3, figures 4a-c

This large bairdian resembles the Fayetteville type in general outline, overlap, and measurements. It differs in that the lateral surface is flattened slightly, and the surficial granulation is finer and appears limited to the central area, rather than dotting the entire surface.

Holotype specimen No. MC 24A; length: 1.48 mm; height: 0.88 mm; thickness: 0.70 mm.

Remarks: The form appears sparingly in the Manning zone.

The varietal name refers to the Ringwood Pool, with the genitive ending of place.

BAIRDIA HUFFMANI Harris and Jobe, n. sp.

Plate 3, figures 5a-c

Carapace elongate-elliptical in lateral outline, with length approximating twice the height, subquadrate in dorsal view be-

cause of slight lateral flattening and full-bodied inflation below post-dorsal angle, ends not compressed; maximum thickness and length through near-median point, maximum height in front of ventral indenture; dorsal margin of larger left valve lowly convex, obtusely rounded anteriorly, steeply truncated and straight post-dorsally, anterior nose subequally rounded, slightly truncated below, posterior nose low and blunt, ventral margin noticeably incised centrally, though fairly straight posteriorly; left valve overlap strongest antero-dorsally, centro-ventrally, and along steep post-dorsal slope, overlap weak antero-ventrally, valves apparently even post-ventrally and at lobate projection in front of ventral incision, post-dorsal margin of larger left valve umbonate above slightly channeled hingement of right, but not overlapping the lower valve; convex carapace finely punctate.

Holotype specimen No. MC 25A; length: 1.30 mm; height: 0.67 mm; thickness: 0.52 mm.

Remarks: This species is characterized by its elongate outline, slightly compressed sides, wide channeled post-dorsal hingement, and posterior thickening. *B. hoxbarensis* Harlton possesses similar elongate outline, but the lateral surface is more evenly convex, not flattened. *B. ampla* Reuss does not possess the steeply inclined post-dorsal slope of the Manning form. In lateral outline and measurements the new species is similar to *B. chasae* Kellett and *B. nevensis* Kellett, but neither end of the new form is compressed or pinched. *B. altifrons* Knight, from the Ft. Scott, displays less posterior truncation and higher convexity of dorsal margin.

The species is named in honor of Dr. George G. Huffman of the University of Oklahoma geology department, in recognition of his research in Mississippian strata of northeastern Oklahoma.

BAIRDIA JOBEAE Harris and Jobe, n. sp.

Plate 3, figures 6a-c

Carapace elongate elliptical in lateral outline, with length twice the height; maximum length and thickness through a point immediately below center; dorsal curvature low and flat with long straight anterior slope and more acute and slightly concave posterior slope, long straight to slightly sinuous ventral margin inclined upwardly posteriorly and gently curving into the wide, compressed, gracefully rounded, slightly upturned posterior nose, anterior end

evenly rounded, slightly compressed; moderate overlap of left valve complete except antero- and post-ventrally; in dorsal view hingement ever so slightly gaping; surface apparently smooth.

Holotype specimen No. MC 26A; length: 1.18 mm; height: 0.57 mm; thickness: 0.42 mm.

Remarks: *B. contracta* Morey is relatively higher, more pointed posteriorly, and possesses longer and more concave post-dorsal slope than the new species. The post-dorsal slope of *B. glennensis* Harlton is longer and the posterior nose, accordingly, much lower than that of the Manning form. *B. nasuta* Morey displays a convex (not concave) post-dorsal slope and a rounded (not acute) posterior nose.

The new species is named in acknowledgment of preparatory assistance by the junior author's wife, micropaleontologist for Humble Oil and Refining Company of Tyler, Texas.

BAIRDIA MOREYI Harris and Jobe, n. sp.

Plate 3, figures 7a-b

Carapace elongate in lateral outline, with length approximating twice the height; maximum length and thickness through mid-region, maximum height slightly post-median; dorsum rather evenly curving into extremities, post-dorsal slope the longer and faintly concave, ventral margin fairly straight and inclined upwardly posteriorly, antero-ventral slope strongly truncated, post-ventral slope gently and lowly rounded; overlap moderate about entire periphery with exception of lower half of anterior nose; valves evenly convex, slightly compressed anteriorly, surface with fine scattered pits.

Holotype specimen No. MC 27A; length: 1.10 mm; height: 0.60 mm; thickness: 0.45 mm.

Remarks: This form differs from *B. nasuta* Morey in its slightly smaller size, punctate surface, non-pinched posterior end, and presence of continuous, rather than limited, ventral overlap. The species differs from *B. insolens* Cooper in its smaller size, punctate surface, and more uniform dorsal overlap. It differs from *B. conilata* Harlton in its surficial pores, its longer and flatter dorsal margin, less acuminate posterior end, and relatively thicker carapace. It differs from *B. attenuata* Girty in that the maximum convexity is median, and not "distinctly posterior".

This species, named in honor of Mr. Phillip S. Morey, Bureau of Economic Geology at Austin, Texas, occurs infrequently in Manning cores.

Genus BAIRDIOLITES Croneis and Gale, 1939

BAIRDIOLITES CENTROPORATUS Harris and Jobe, n. sp.

Plate 3, figures 8a-c, 9a-b

Carapace elongate-ovate subrhomboidal in lateral outline, approximating 1.0 mm in length, dorsal view reveals sides flattened between distinct low outwardly curved vertical ribs approximately in line with cardinal angles; highest behind antero-cardinal angle and thickest through center; both dorsal and ventral margins sloping inwardly posteriorly, dorsal margin of larger left valve rather gently rounding over high point of antero-cardinal angle and sloping flatly posteriorly, post-cardinal angle acutely rounded, steeper and shorter post-cardinal slope the more noticeably excavated, ventral margin of larger left valve often incurved behind prominent antero-ventral angle, otherwise straight and sloping slightly upwardly posteriorly through inconspicuous post-ventral angle, post-ventral curvature shorter and decidedly flatter than antero-ventral slope, anterior nose rather broadly rounded, compressed, and produced in median line, acuminate pinched posterior nose slightly upturned below median line, dorsal and ventral margins of smaller right valve, consequently, straighter and flatter, median venter incised; left valve overlaps right about entire periphery with maximum overlap at post-cardinal angle; flattened medallion-like surface between ribs contains approximately 100 to 120 coarse pores.

Holotype specimen No. MC 28A; length: 0.82 mm; height: 0.44 mm; thickness: 0.32 mm; paratype specimen No. MC 29A; length: 0.83 mm; height: 0.45 mm.

Remarks: This species differs from *B. platypleura* Croneis and Gale in its punctate, rather than pustulose, surface. *B. crescentis* Croneis and Gale and other similar described species of the genus display a smooth surface.

Several complete specimens of the new form were recovered from Manning cores.

The trivial name is adapted from Greek kentron, "center of a circle", and Greek porus, "passage or hole", and refers to the porate median area of the carapace.

Family HEALDIIDAE Harlton, 1933

Genus HEALDIA Roundy, 1926

HEALDIA GONIAPLEURA Croneis and Bristol, 1939

Plate 4, figures 1a-d, 2a-b

Healdia goniapleura Croneis and Bristol, 1939, Denison Univ. Sci. Lab., Jour., vol. 34, p. 94, pl. 3, fig. 22; Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 72, pl. 3, figs. 31-33.

This smooth Chester form, commonly occurring in the Manning zone, is slender-elongate in lateral outline, and occasionally displays a faint seminolitian depression on the anterior end.

Hypotype specimen No. MC 30A; length: 0.65 mm; height: 0.36 mm; thickness: 0.30 mm; hypotype specimen No. MC 31A; length: 0.65 mm; height: 0.35 mm; thickness: 0.29 mm.

Remarks: The species possesses the slender elongate outline and lowly curving dorsum of *Seminolites pushmatahensis* Harlton, but it is smaller and the anterior ridge is undeveloped.

Genus SEMINOLITES Coryell, 1928

SEMINOLITES SYMMETRICUS Cooper, 1941

Plate 4, figures 3a-b, 4

Seminolites symmetricus Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 34, pl. 4, figs. 53-55.

The subtriangular lateral outline, high angled dorsum, distinct terminal bars, and smooth surface characterize this Chester species, commonly occurring in the Manning zone.

Hypotype specimen No. MC 32A; length: 0.67 mm; height: 0.42 mm; thickness: 0.34 mm; hypotype specimen No. MC 33A; length: 0.65 mm; height: 0.42 mm; thickness: 0.33 mm.

Remarks: In outline this form resembles *S. subtriangularis* Harlton, though it is thicker, its posterior bar is more inclined, and the opposing bar is located nearer the anterior end. The surface of *S. sohni* Croneis and Bristol is finely pitted. The dorsal slopes of *Healdia triangularis* Croneis and Gale are steeper, and the carapace is relatively thinner than that of the Manning form.

Genus CRIBROCONCHA Cooper, 1941

CRIBROCONCHA COSTATA Cooper, 1941

Plate 4, figures 5, 6, 7, 8a-b, 9a-c, 10a-b, 11

Cribroconcha costata Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 29, pl. 3, figs. 37-42.

Numerous single- and double-valved cribroconchoid specimens were recovered from Manning cores. Illustrations reveal the surficial pittings varying from few at either end to concentration over the surface. Furthermore, it is observed that rarely do opposite valves of the same individual exhibit identical pitting. Since all perfect Manning specimens displayed angled dorsum and anterior nose, the suite is assigned to the species described by Cooper from the Chester of Illinois.

Hypotype specimen No. MC 34A; length: 0.55 mm; height: 0.33 mm; hypotype right valve No. MC 35A; length: 0.56 mm; height: 0.29 mm; hypotype right valve No. MC 36A; length: 0.59 mm; height: 0.33 mm; hypotype right valve No. MC 37A; length: 0.50 mm; height: 0.31 mm; hypotype specimen No. MC 38A; length: 0.45 mm; height: 0.30 mm; hypotype right valve No. MC 39A; length: 0.55 mm; height: 0.33 mm; hypotype specimen No. MC 40A; length: 0.60 mm; height: 0.38 mm; thickness: 0.24 mm.

Remarks: The species is fairly abundant in the Manning zone.

Genus INCISURELLA Cooper, 1941

INCISURELLA LATA Cooper, 1941

Plate 4, figure 13

Incisurella lata Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 33, pl. 4, figs. 21, 22.

The blunt anterior end and high, wide, rimmed posterior depression serve for ready identification of the species.

Hypotype left valve No. MC 41A; length (projected): 0.70 mm., height: 0.43 mm.

Remarks: A fairly complete single valve from the Manning zone displays characteristics identical with those of the type from the Chester of Illinois.

INCISURELLA PRIMA Cooper, 1941

Plate 4, figure 14a-b

Incisurella prima Cooper, 1941, Ill. Geol. Survey, Rept. Invest. 77, p. 32, pl. 4, figs. 27-29.

The elongate anterior end and terminal pit localized toward lower posterior end characterize this species, originally reported from the Chester of Illinois.

Hypotype right valve No. MC 42A; length: 0.68 mm; height: 0.40 mm; thickness: 0.32 mm (female); hypotype left valve No.

MC 43A; length: 0.64 mm; height: 0.34 mm; thickness: 0.30 mm (male).

Remarks: The male carapace is more slender-elongate than that of the female, both types being recovered from the Manning zone.

Family CYTHERELLIDAE Sars, 1685

Genus CAVELLINA Coryell, 1928

CAVELLINA MOOREI Harris and Jobe, n. sp.

Plate 4, figures 12a-c

Large carapace ovate-elongate in lateral outline, wedge-shaped in dorsal view with posterior end bluntly truncated and anterior end compressed; maximum length and height through center, maximum thickness through posterior quarter; dorsal and ventral margins of larger right valve evenly curved, the dorsal the flatter, anterior end evenly rounded above and obtusely so below, dorsal, ventral, and anterior margins of larger right valve slightly thickened or "rolled", rounded posterior nose with definite ventral truncation; right valve overlaps left about entire periphery with maximum overlap dorsally and ventrally and minimum overlap at post-ventral truncation and anterior end, dorsal overlapping contact a straight line, ventral overlap a low oblique curve; surface smooth with faint muscle scar slightly above median line, moistening reveals interior vertical semi-partition between mid-region and anterior cardinal angle.

Holotype specimen No. MC 44A; length: 1.30 mm; height: 0.78 mm; thickness: 0.55 mm.

Remarks: This species possesses identical measurements of *C. nebraskensis* (Geinitz), but it displays a muscle scar and straighter contact of dorsal overlap. The species is much larger than *Cytherella bransoni* Morey, though resembling it in lateral and dorsal outlines. In lateral outline the new species resembles several established cavelline forms, but the Manning form is much too thick to be conspecific.

In recognition of assistance in subsurface research to the junior author the new species is named in honor of Dr. Carl A. Moore, geology department, University of Oklahoma. The form occurs quite commonly in the Manning horizon.

Genus PARACAVELLINA Cooper, 1941

PARACAVELLINA ELLIPTICA Cooper var. MANNINGENSIS Harris and Jobe, n. var.

Plate 4, figures 16, 17a-c

The new variety is identical in measurements and outline with *P. elliptica* Cooper, genotype from the Chester of Illinois, but it is thickest nearer the posterior end, generally displays a faint muscle scar, and is finely reticulate in depressions adjacent the terminal ridges. Nepionic molts, especially, display deep muscle pit, finely reticulate surface, and even convexity in dorsal view . . . . . the male more evenly convex and slender elongate.

Holotype specimen No. MC 45A; length: 1.06 mm; height: 0.66 mm; thickness: 0.46 mm; paratype young specimen No. MC 46A; length: 0.65 mm; height: 0.40 mm.

Remarks: In lateral outline, presence of muscle scar, and posterior thickened ridge the variety resembles *Cavellina subovata* Coryell, from the Johns Valley of Oklahoma, but the Manning form possesses an antero-vertical ridge, reticulate depressions, and more angled posterior end.

The varietal name refers to the Manning Zone, with the genitive ending of place.

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EXPLANATION of PLATE 1

Figures Page

1a-b—*Glomospira* sp. cf. *G. disca* Cooper (Hypotype MC 1A), a. dorsal; b. ventral, x25 4

2——*Glomospira* sp. cf. *G. disca* Cooper (Hypotype MC 2A), dorsal, x40. 4

3a-c—*Endothyra excentralis* Cooper (Hypotype MC 3A), a. dorsal; b. ventral; c. apertural, x40. 4

4a-d—*Endothyra* sp. (Specimen MC 4A), a. dorsal; b. ventral; c. apertural; d. posterior, x25 5

5a-d—*Paraparchites manningensis* Harris and Jobe, n. sp. (Holotype MC 5A), a. left valve; b. right valve; c. anterior d. dorsal, x40 5

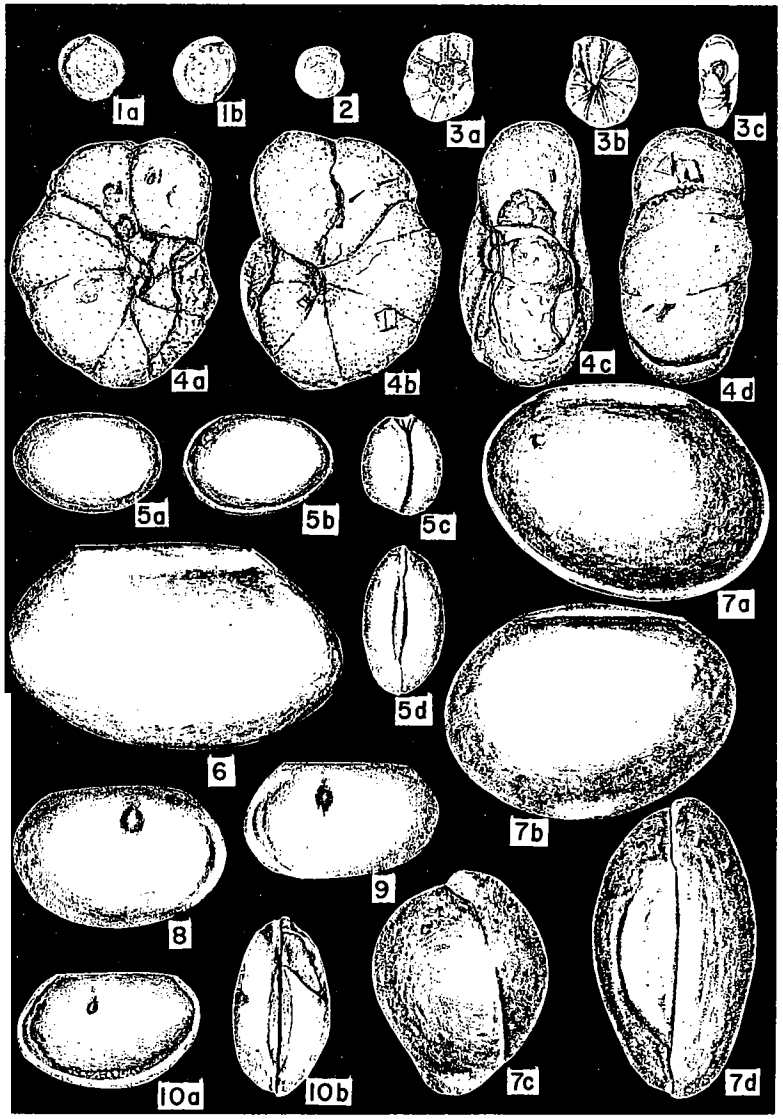
6——*Paraparchites projectus* Harris and Jobe, n. sp. (Holotype MC 6A), left valve, x25. 6

7a-d—*Paraparchites projectus* Harris and Jobe, n. sp. (Paratype MC 7A), a. left valve; b. right valve; c. anterior; d. dorsal, x40 6

8——*Carboprimitia rotunda* Croneis and Funkhouser (Hypotype MC 9A), right valve, x40. 7

9——*Carboprimita rotunda* Croneis and Funkhouser (Hypotype MC 10A), left valve, x40. 7

10a-b—*Carboprimitia rotunda* Croneis and Funkhouser (Hypotype MC 8A), a. left valve; b. dorsal, x40 7



EXPLANATION of PLATE 2

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1a-b—*Monoceratina postnodosa Harris and Jobe*, n. sp. (Holotype MC 11A), a. left valve; b: ventral, x35 8

2a-b—*Glyptopleura perbella* Geis (Hypotype MC 12A), a. left valve; b. right valve, x35. 8

3a-d—*Glyptopleura similis* Croneis and Funkhouser (Hypotype MC 14A), a. left valve; b. right valve; c. dorsal; d. anterior, x40. 10

4——*Glyptopleura* sp. cf. *G. reniformis* Croneis and Thurman (Hypotype MC 13A), left valve, x40. 9

5a-b—*Glyptopleura ? bulbosa* Croneis and Gale (Hypotype MC 15A), a. right valve; b. dorsal, x40. 10

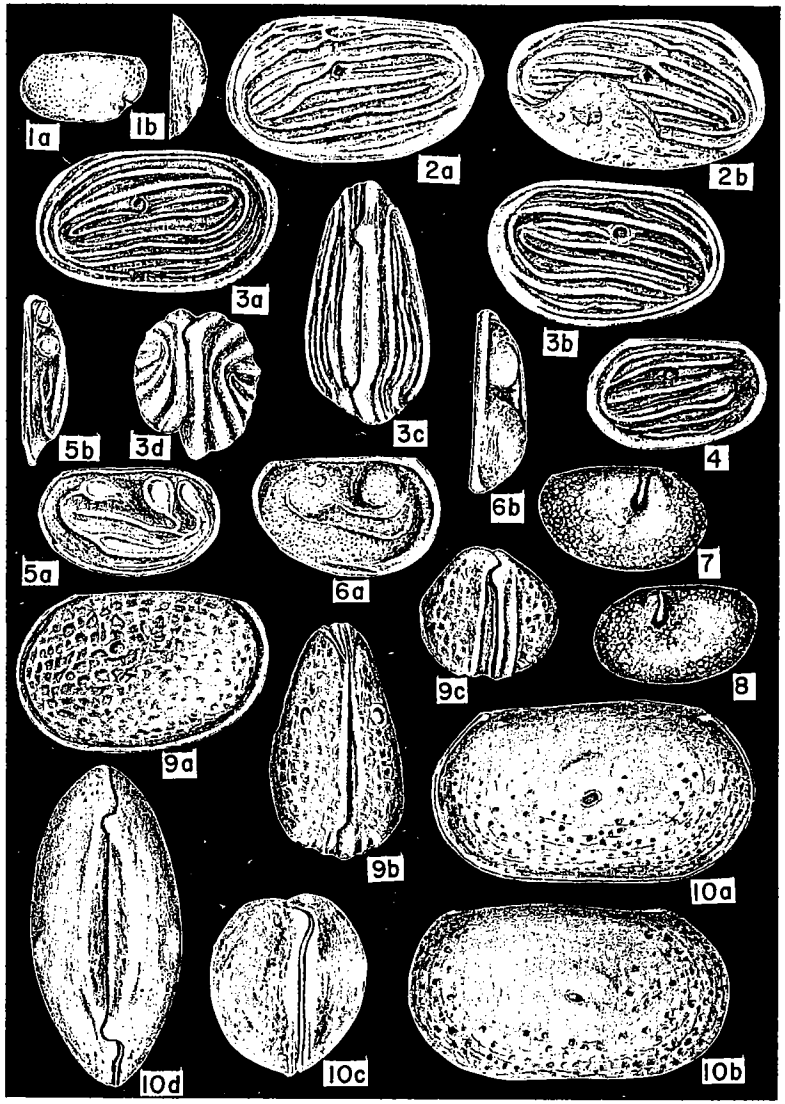
6a-b—*Glyptopleura simulans* Croneis and Gutke (Hypotype MC 16A), a. right valve; b. dorsal, x40. 10

7——*Sansabella vinitaensis* (Harlton) Cooper (Hypotype MC 17A), right valve, x40. 11

8——*Sansabella vinitaensis* (Harlton) Cooper (Hypotype MC 18A), left valve, x40. 11

9a-c—*Savagella ? acuminata* Cooper (Hypotype MC 19A), a. left valve; b. dorsal; c. posterior, x40. 11

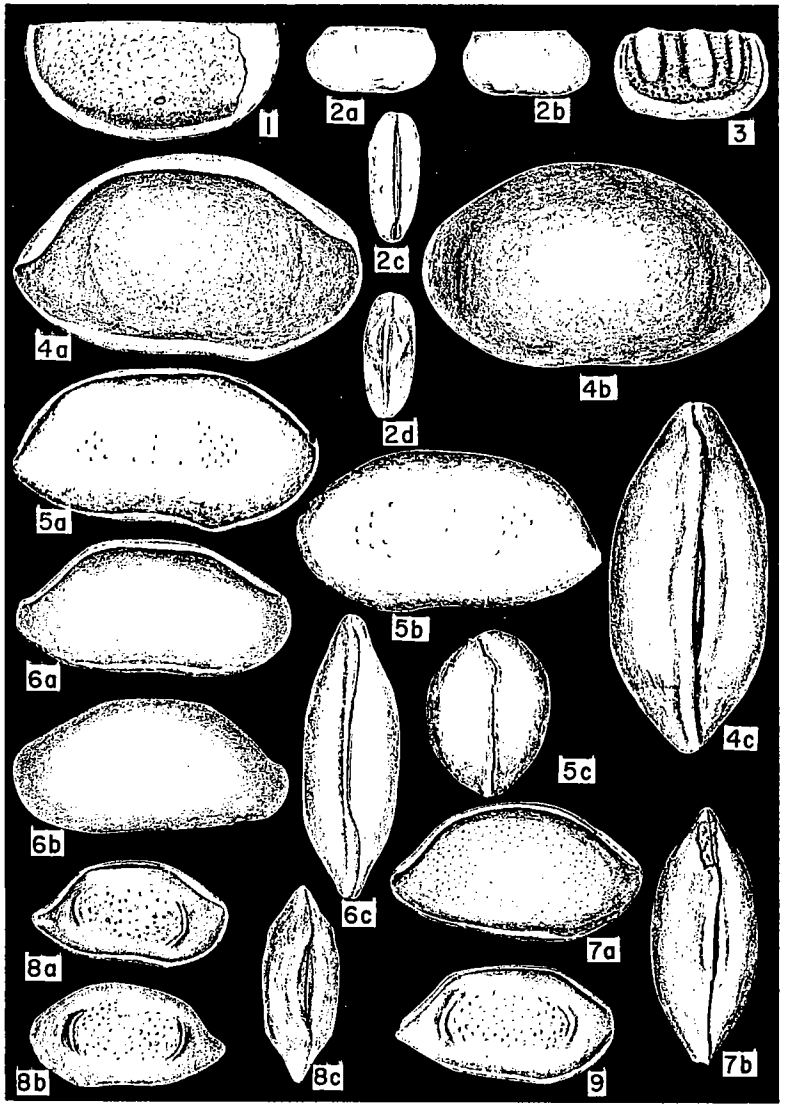
10a-d—*Amphissites ringwoodensis* Harris and Jobe, n. sp. (Holotype MC 21A), a. right valve b. left valve; c. anterior; d. dorsal, x45. 13



EXPLANATION of PLATE 3

Page

Figures



EXPLANATION of PLATE 4

Page

Figures

1a-d—*Healdia goniaplcura* Croneis and Bristol (Hypotype MC 30A), a. right valve; b. left valve; c. posterior; d. dorsal, x40. 19

2a-b—*Healdia goniaplcura* Croneis and Bristol (Hypotype MC 31A), a. right valve; b. dorsal, x40. 19

3a-b—*Seminolites symmetricus* Cooper (Hypotype MC 32A), a. right valve; b. dorsal, x40. 19

4——*Seminolites symmetricus* Cooper (Hypotype MC 33A), right valve, x40. 19

5——*Cribroconcha costata* Cooper (Hypotype MC 35A), right valve, x45 .. 19

6——*Cribroconcha costata* Cooper (Hypotype MC 36A), right valve x40 .. 19

7——*Cribroconcha costata* Cooper (Hypotype MC 37A), right valve, x45. .. 19

8a-b—*Cribroconcha costata* Cooper (Hypotype MC 34A), a. right valve; b. left valve, x45. 19

9a-c—*Cribroconcha costata* Cooper (Hypotype MC 40A), a. right valve; b. left valve; c. dorsal, x40. 19

10a-b—*Cribroconcha costata* Cooper (Hypotype MC 38A), a. right valve; b. left valve, x45. 19

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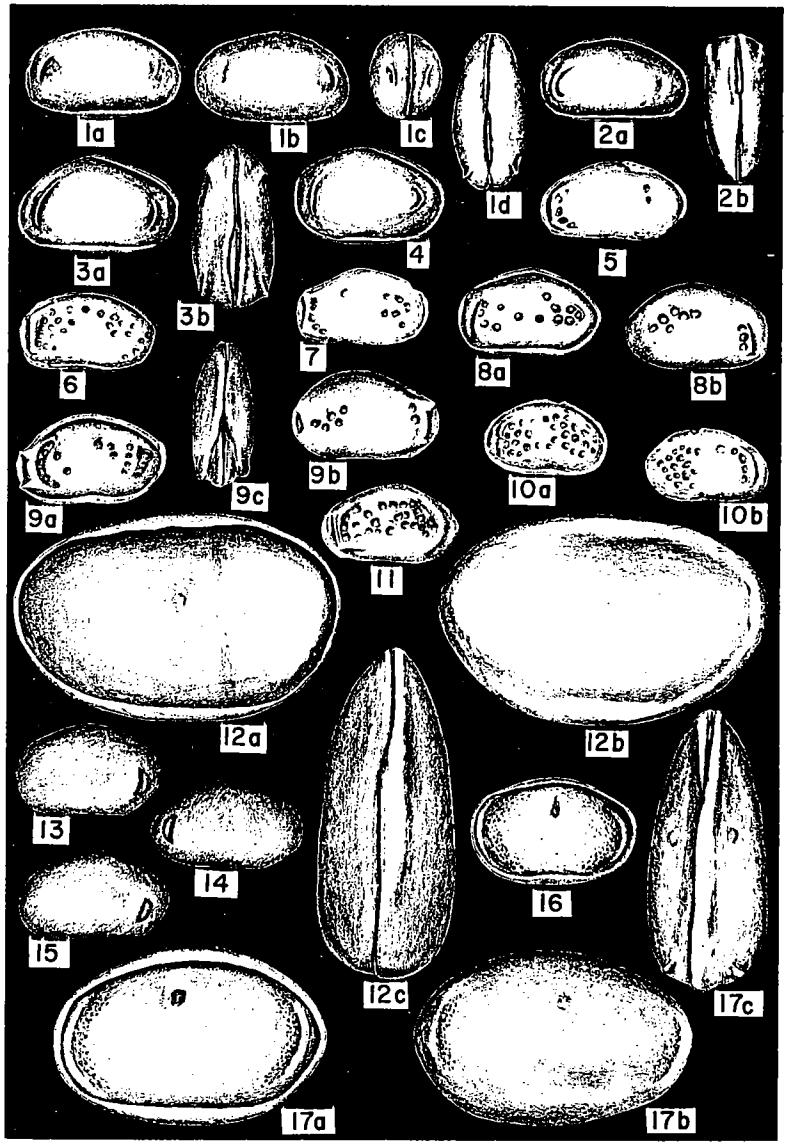

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