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A NEW OCCURRENCE OF MISSISSIPPIAN OSTRACODA IN MICHIGAN

Thesis for the Degree of M. S.

MICHIGAN STATE COLLEGE

Marilyn Joyce Crane

1955

THESIS

This is to certify that the

thesis entitled

New Occurrence of Mississippian Ostracods in Michigan

presented by

Marilyn Joyce Crane

has been accepted towards fulfillment
of the requirements for

M.S. degree in Geology

Wm. A. Kelly
Major professor

Date March 10, 1955

O-169

A NEW OCCURRENCE OF MISSISSIPPIAN OSTRACODA IN MICHIGAN

By

Marilyn Joyce Crane

A THESIS

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Department of Geology and Geography

1955

THESIS

ACKNOWLEDGMENTS

The author wishes to thank Dr. W. A. Kelly for suggesting the problem and giving valuable assistance and advice while this study was in progress.

She is also indebted to all those who carefully read the manuscript and gave suggestions relating to form and content, as well as to problems of nomenclature. Thanks are also due to Donald E. Campau who made a provisional list of the genera represented and gave helpful suggestions on photography.

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Marilyn Joyce Crane AN ABSTRACT

A discovery of a faunal assemblage of ostracoda and some endothyroid foraminifera throws new light on Mississippian stratigraphy. In this study fourteen species of ostracoda are described from the Bayport limestone in Arenac County, Michigan. These are represented by four genera: Glyptopleura, Perprimitia, Amphissites, and Bairdia. The assemblage shows similarity to both the Chester and Salem faunas.

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INTRODUCTION

A recent discovery of a micro-fauna in Michigan has added to the criteria for distinguishing the Bayport limestone. This limestone is the youngest Mississippian formation outcropping in Michigan. According to Pringle (1937, p. 10), it is composed principally of alternating beds of white, gray, and buff limestone, with subordinate dolomite and local members of calcareous sandstone. The limestone is dense, semi-lithographic, and contains drusy cavities and a few geodes. Zones of gray to black nodular and lenticular chert are common.

The type locality is in the vicinity of Bayport, Huron County, Michigan. Other exposures are found in Arenac, Tuscola, Jackson, Eaton, and Kent counties. On the basis of similar megafossils and lithology the Bayport is thought by Lane (1909), G. M. Ehlers and W. E. Humphrey (1944), and others to be the stratigraphic equivalent of the St. Louis limestone of Illinois and Indiana. Megafossils characteristic of the Bayport limestone, as determined by Dr. W. A. Kelly (personal communication, Nov. 1954), are tabulated below:

Anthozoa:

Lithostrotion proliferum Hall
Syringopora ramulosa Goldfuss
Triplophyllites centralis (Milne-Edwards & Haime)
"Zaphrentis" ls.

Bryozoa:

Dichotrypa sp.
Fenestralia sancti-ludovici (Prout)
Fenestrellina exigua (Ulrich)
Polypora tuberculata Prout
Rhombopora gracilis Ulrich
Sulcoretopora sp.
Taeniodictya ramulosa Ulrich
Taeniodictya subrecta Ulrich

Brachiopoda:

Composita laevis Weller
Echinoconchus alternatus (Norwood & Pratten)
Echinoconchus biseriatus (Hall)
Echinoconchus geneviviensis Weller
Linoproductus tenuicostus (Hall)
Linoproductus ovatus (Hall)
Productus sp.
Rhipidomella sp.
Spirifer sp.
Spiriferina solidirostris White
Spiriferina subtexta White

Pelecypoda:

Allorisma quadrata Strong
Allorisma strongi Ehlers & Humphrey
Aviculopecten lyelli Dawson
Crenipecten sp.
Sanguinolites sp.

Gastropoda:

Naticopsis sp.
Straparolus sp.
Strobeus sp.

Trilobita:

Griffithides sp.

The microfossils herein described were collected by Donald Campau[1] from a quarry in the S.E. corner of section 34, T. 20 N., R. 5 E., just north of the village of Omer in Arenac County, Michigan. Stratigraphically the rocks of this quarry occur near the base of the Bayport formation.

The following, from top to bottom, is a general description of the exposed section (personal communication, D. E. Campau, March 1954).

Bed no.	Description	Thickness
1.	gray limestone	13 inches
2.	gray limestone (Allorisma zone)	6 "
3.	gray limestone	18 "
4.	shaly limestone	6 "
5.	dark gray limestone	6 feet

All the microfossils were collected from the six-inch shaly limestone member, bed 4. Many of the specimens are poorly preserved, being crushed or consisting of inner molds and fragments.

Characteristic of the microfauna is an abundance of foraminifera, provisionally identified as the Genus

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[1] Canadian Stratigraphic Service Ltd., Calgary, Alberta

Millerela, and currently being studied by Donald Campau. Also abundant are smooth formed ostracoda of the superfamily Cypridacea. Other more sparsely represented ostracoda are included in the superfamily Beyrichiacea. Ostracod genera present include: Amphissites, Bairdia, Bythocypris, Glyptopleura, Kirkbya, Perprimitia, and possibly Cavellina, Healdia, and Hollinella. The latter forms are doubtfully identified because of poor preservation.

This paper is concerned only with the Glyptopleura, Perprimitia, Amphissites, and Bairdia. There are a few good specimens both of Bythocypris and Kirkbya, but no two specimens are alike. For this reason these two genera are not included in the descriptions as there is insufficient evidence to determine whether there are several species present or just one or two species exhibiting several different growth stages.

The orientation of specimens is based upon the suggestions of Levinson (1950) and Kesling (1951). The following is a list of the criteria used for determining orientation:

1.	Muscle scars	anterior
2.	Direction major sulcus slants downward	anterior
3.	Greatest height	anterior
4.	Median sulcus	anterior
5.	More obtuse cardinal angle	anterior
6.	Direction of swing	anterior
7.	Widest part of carapace	posterior
8.	Direction of spines and slate extensions.	posterior
9.	Pointed end of carapace	posterior
10.	Highest development of hingement	anterior

SYSTEMATIC DESCRIPTIONS

Order Ostracoda (Latreille, 1802)

Superfamily Beyrichiacea Ulrich and Bassler, 1923

Family Glyptopleuridae Girty, 1910

Genus Glyptopleura Girty, 1910

Glyptopleura omerensis sp. nov.
(left valve)
Plate I, figure 5

Carapace oblong, subpolygonal in lateral view; dorsal border straight; ventral border slightly convex; anterior border well rounded ventrally, straight dorsally; posterior border almost straight, not well preserved. In dorsal view left valve is elongate to subcuneate. Greatest width of carapace slightly anteroventral to the center of the posterior half; greatest height one-fourth of carapace length from anterior border. Anterior cardinal angle more obtuse, 155°; posterior cardinal angle 105°.

A pit lies anterior to and slightly above center. A second pit occurs above and slightly anterior to the first. Twelve ribs cross the carapace obliquely, slanting anteroventrally. A prominent rib, which will be called the primary rib, passes between the two pits, becoming very prominent and spine-like posteriorly. Three ribs occur

above the primary rib, the middle one of these being very short and appearing only on the anterior portion of the carapace. Below the primary rib a short rib occurs anterior to the lower pit and unites with the primary rib just above that pit. Another short rib occurs posterior to the lower pit and unites posteriorly to a longer rib that is located below that pit. Five more ribs occur below and parallel to the latter rib. All ribs coalesce anteriorly except: the short rib anterior to the lower pit, the short rib posterior to the lower pit, and the two longer ribs located just below that pit.

Hinge line long and straight; nature of hinge contact uncertain.

length, 1.179mm.; height, .727 mm.; width, .50 mm.

Remarks. -- This species is closely related to G. perbella (Geis) and G. genevievea (Bayer). G. perbella is much more rhomboidal in shape. G. genevievea has one more rib on the ventral portion of its carapace. Also the lower ribs of G. genevievea are not as straight posteriorly. Neither G. perbella nor G. genevievea has the rib passing between the two pits becoming prominent or spine like posteriorly.

Holotype. -- Michigan State College

Glyptopleura campaui sp. nov.
(3 specimens)
Plate I, figure 2

Carapace subrhomboidal in lateral view; dorsal border straight; ventral border slightly convex; anterior border much more rounded than posterior border. In dorsal view subcuneate; posterior end blunt, anterior sharp. Greatest width of carapace central posterior; greatest height one-fourth of carapace length from anterior border. Right valve larger, overlapping the left ventrally and posteriorly. Anterior cardinal angle 130°.

A pit lies anterior to and slightly above center. A second pit occurs above and slightly anterior to the first. Twelve ribs cross the carapace obliquely, slanting antero-ventrally. A prominent rib, which will be called the primary rib, passes between the two pits, becoming very prominent and spine like posteriorly. Three ribs occur above the primary rib, the middle one of these being very short and appearing only on the anterior portion of the carapace. Below the primary rib a very short rib occurs posterior to the lower pit. Another short rib is anterior to the lower pit and unites with the primary rib just above that pit. Six more ribs occur below the lower pit, hooking upward posteriorly.

Hinge line long and straight.

length, 1.15 mm.; height, .758 mm.; width, .48 mm.

Remarks. -- This species is very similar to G. omerensis sp. nov. It differs in that it is much more rhomboidal in shape, the lower ribs are more curved posteriorly, and the rib below the lower muscle pit is not connected to the short rib posterior to that pit. G. perbella (Geis) is similar to G. campaui sp. nov. in general shape and arrangement of ribs. G. perbella's primary rib does not become prominent or spine like. Also its lower ribs are not as curved posteriorly.

Holotype. -- Michigan State College

Paratype. -- Michigan State College

Glyptopleura cuneata sp. nov.
(1 specimen)
Plate I, figure 1

In lateral view, carapace subrectangular; dorsal border straight; ventral border slightly convex; anterior and posterior borders gently rounded and nearly the same height. In dorsal view, carapace elongate, sides flattened, ends blunt. Greatest width posteroventral. Valves unequal, the right overlapping the left ventrally and anteriorly. Anterior cardinal angle more obtuse, 148°; posterior cardinal angle 125 °.

A pit occurs anterior to and slightly above center. Two short ribs occur one anterior to and one posterior to the pit. The small anterior rib unites just above the pit with a larger rib. This larger rib crosses the carapace obliquely and has a large blunt spine on its posterior end. Above this rib occurs a slightly shorter rib with a small blunt spine or protrusion at the anterior. A short and inconspicuous rib is intercalated between the latter spinose rib and a faint rib closely paralleling the hinge line. Five ribs occur ventral to the pit, diminishing in size toward the ventral margin and bending upward posteriorly. The specific name refers to the large wedge-shaped, flattened, posterior spine.

Hinge line straight and almost as long as carapace.

length, 1.00 mm.; height, .652 mm.; width, .319 mm.

Holotype. -- Michigan State College

Glyptopleura sp. 1
(two specimens)
Plate I, figure 4

Carapace in lateral view elongate, subovate; dorsal border straight; ventral border slightly convex; anterior and posterior borders gently rounded. In dorsal view highly inflated, elongate, sides gently convex. Greatest thickness posterior; greatest height median. Valves

unequal, the right overlapping the left posteriorly and ventrally.

A pit occurs anterior to and slightly above center. A second pit occurs above and anterior to the first. A prominent rib, which is here designated as the primary rib, crosses the carapace obliquely and passes between the two pits. Two small ribs unite with the primary rib just above the lower and most prominent pit, one rib extending anterior to, and one posterior to the pit. Below these short ribs are five long ribs paralleling the primary rib. Three more ribs occur above the primary rib, each one shorter than the one below. All ribs are connected anteriorly.

Hinge line straight, almost as long as carapace.

length, 1.27 mm.; height, .636 mm.; width, .60 mm.

Figured specimen. -- Michigan State College

Family Kirkbyidae Ulrich & Bassler, 1906

Genus Amphissites Girty, 1910

Amphissities sp.
(1 specimen)
Plate I, figure 3

Carapace subrectangular in lateral view; dorsal and posterior borders straight; anterior border broadly rounded; ventral border gently convex. In dorsal view, carapace

strongly convex, ends blunt. Greatest height anterior; greatest width median; overlap not observable. Anterior cardinal angle 90°; posterior cardinal angle 100°.

A round central node occurs slightly ventrad to center. A pit occurs just ventral to the node. Velate ridge smooth, prominent, parallel to and above free edge; Carina not as well developed and parallel to velate ridge. A faint ridge occurs anterodorsal to the central node and joins a ridge that parallels the hinge line. Another faint ridge occurs along the anterior border. Surface reticulations subpolygonal, medium sized, more or less without orderly arrangement.

Hinge line straight and impressed.

length, .95 mm.; height, .62 mm.; width, .50 mm.

Figured specimen. -- Michigan State College

Family Kloedenellidae Ulrich and Bassler, 1923

Genus Perprimitia Croneis and Gale, 1938

Perprimitia rhomboidea sp. nov.
(2 specimens)
Plate I, figure 6

Carapace with anterior swing, small, subrhomboidal in lateral view; dorsal and posterior borders straight; ventral border gently convex; anterior border rounded.

Greatest height anterior; greatest width posterodorsal. Valves unequal, the right overlapping the left ventrally. Anterior cardinal angle 135°; posterior cardinal angle rounded.

A median sulcus is situated slightly anterior to the middle of the carapace. A small node occurs near the dorsal border just anterior to the sulcus. A prominent lobe parallels the ventral border and is separated from the anterior node by a depression. The ventral lobe encroaches on a very prominent posterior lobe or swelling along the posterior border. A narrow furrow separates these two lobes from each other. A well developed spine is situated near the dorsal border between the sulcus and posterior lobe.

The hinge line is straight.

length, .515 mm.; height, .379 mm.; width, .26 mm.

Remarks. -- This species differs from any other Perprimitia in having a straight posterior border. A second specimen, which is crushed, is slightly more elongate and not as rhomboidal.

Holotype. -- Michigan State College

Perprimitia arenacensis sp. nov.
(1 specimen)
Plate I, figure 11

Carapace small, subrhomboidal, and with anterior swing

in lateral view; dorsal border straight; ventral and anterior borders gently rounded; posterior border straight ventrally, rounded dorsally. Greatest height of carapace anterior, greatest width posteroventral. Valves unequal, the right overlapping the left ventrally and anteriorly. Anterior cardinal angle 140°; posterior cardinal angle rounded.

A median sulcus lies slightly anterior to the middle of the carapace. The surface is marked by three lobes; an anterior lobe in the anterocentral portion of the carapace, a ventral lobe situated ventrad to the sulcus and parallel to the ventral border, and a spine-like posterior lobe situated in the posterodorsal portion of the carapace.

Hinge line straight and slightly depressed.

length, .576 mm.; height, .364 mm.; width, .24 mm.

Holotype. -- Michigan State College

Perprimitia sp. 1
(right valve)
Plate I, figure 13

Valve small, subovate in lateral view; dorsal border straight; anterior and posterior borders broadly rounded; ventral border gently convex. Greatest height just posterior to the sulcus; greatest width posterior. Cardinal angles rounded.

A prominent median sulcus is situated slightly anterior to the middle of the carapace. A node occurs at about mid-height just anterior to the sulcus. A prominent lobe parallels the ventral border. This ventral lobe is separated from the anterior node by a depression. A narrow furrow separates the ventral lobe from a prominent posterior lobe or swelling that follows the posterior border. A small spine is situated near the dorsal border between the posterior lobe and median sulcus.

Hinge line straight.

length, .55 mm.; height, .36 mm.; width, .36 mm.

Remarks. -- This species differs from P. funkhouseri (Croneis & Thurman) in the rounded cardinal angles and position of the spine which is located beside the posterior swelling and further down from the dorsal border. P. fraileyi (Coryell and Rozanski) is different also in the position of the spine and in having a concave dorsal border.

Figured specimen. -- Michigan State College

Perprimitia sp. 2
(1 specimen)
Plate I, figure 12

Carapace small, elongate, and inflated; dorsal border straight; ventral border almost straight; posterior and

anterior borders sharply rounded. Greatest height anterior; greatest width posterior. Valves unequal, the right overlapping the left ventrally. Cardinal angles rounded.

A prominent median sulcus is situated slightly anterior to the middle of the carapace. A node occurs near the dorsal border just anterior to the sulcus. Ventrad to the sulcus a ventral lobe parallels the ventral border. This lobe is separated from the anterior node by a depression and from a posterior lobe or swelling by a narrow furrow. A small node (instead of a spine) is situated near the dorsal border between the median sulcus and posterior lobe.

The hinge line is straight.

length, .55 mm.; height, .34 mm.; width, .30 mm.

Figured specimen. -- Michigan State College

Perprimitia sp. 3
(1 specimen)
Plate I, figures 7 & 8

Carapace small, subovate in lateral view; dorsal border straight; ventral border slightly convex; anterior and posterior borders rounded. Greatest height median; greatest width posteroventral. Valves unequal, the right overlapping the left ventrally. Anterior cardinal angle 140°; posterior cardinal angle rounded.

A median sulcus lies slightly anterior to the middle of the carapace. The surface is marked by three lobes; an anterior node in the anterodorsal portion of the carapace, a ventral lobe situated ventrad to the sulcus and parallel to the ventral border, and a spine-like posterior lobe situated in the posterodorsal portion of the carapace.

Hinge line straight and depressed.

length, .52 mm.; height, .34 mm.; width, .24 mm.

Remarks. -- This species differs from P. turrita (Croneis & Gutke) in less overlap, in the rounded posterior cardinal angle, and in having the maximum height median. P. elongata (Cooper) is much more elongate.

Figured specimen. -- Michigan State College

Perprimitia sp. 4
(1 specimen)
Plate I, figures 9 & 10

Carapace small, elongate, subovate in lateral view; dorsal border straight; anterior and posterior borders rounded; ventral border gently convex and subparallel to dorsal border. Greatest height anterior; greatest width posterior. Valves unequal, the right overlapping the left ventrally. Cardinal angles rounded.

A median sulcus lies slightly anterior to the middle of the carapace. The surface is marked by three lobes;

a weak anterior node in the anterodorsal portion of the carapace, a ventral lobe situated ventrad to the sulcus and parallel to the ventral obrder, and a spine-like posterior lobe situated in the posterodorsal portion of the carapace.

Hinge line straight.

length, .55 mm.; height, .32 mm., width, .25 mm.

Remarks. -- Similar to P. elongata (Cooper), but lacks anterior cardinal angle and is not so elongate.

Figured specimen. -- Michigan State College

Superfamily Cypridacea Dana, 1852

Family Bairdiidae Sars, 1887

Genus Bairdia McCoy, 1844

Bairdia compacta Geis
(Specimen a.)
Plate I, figure 15

Carapace short, medium sized in lateral view; dorsal border broadly arched; posterior slope steep, slightly concave; anterior slope shorter, convex; ventral border straight; posterior and produced into short, sharp, subventral beak; anterior end low (differing from Geis's specimen) and sharply rounded. Ends attenuated in dorsal view, posterior sharply and anterior more gently compressed.

Carapace highest one-third of length from anterior, thickest just posterior to center. Left valve larger with very slight dorsal overlap; hinge simple, short, straight, slightly impressed, and inclined posteriorly; surface smooth.

length, .77 mm.; height, .45 mm.; width, .33 mm.

Remarks. -- Geis's specimens are larger, have a higher anterior end, and a more apparent ventral overlap. This specimen may be an immature form.

Figured specimen. -- Michigan State College

Bairdia compacta Geis
(specimen b. left valve only - fragment)
Plate I, figure 14

Carapace short, medium sized in lateral view; dorsal border broadly arched with long steep, slightly concave posterior slope, and shorter convex anterior slope; ventral border straight, posterior produced into short, sharp, subventral beak, anterior portion of specimen broken. Carapace highest one-third of its length from anterior; thickest just posterior to center. Surface smooth.

length, .80 mm.; height, .50 mm.

Figured specimen. -- Michigan State College

Bairdia sp. 1
(1 specimen)
Plate I, figure 16

Carapace medium sized, elongate in lateral view; dorsal border short, moderately convex; anterodorsal slope slightly inclined, gently concave; posterodorsal slope long, moderately inclined, slightly concave; ventral border unevenly convex, ventral slopes upswung, the posteroventral slope longer and not as steep as the anteroventral slope; anterior narrowly rounded, terminated about mid-height; posterior beak long, attenuated, pointed, slightly upturned. In dorsal view carapace subfusiform, side unevenly rounded, ends long and tapering. Greatest length ventral; greatest height one-third of length from anterior; greatest width posterocentral. Left valve larger, overlapping the right dorsally; valve contact in dorsal view straight; dorsal valve contact in lateral view convex. Surface smooth.

length, 1.00 mm.; height, .51 mm.; width, .30 mm.

Remarks. -- This species is similar to B. sp. 9 (Cordell). B. sp. 9 differs in having a straight ventral margin and a ventral overlap.

Figured specimen. -- Michigan State College

Bairdia sp. 2
(1 specimen)

Carapace large, elongate in lateral view; dorsal border convex; anterodorsal slope gently inclined, slightly convex, long; posterodorsal slope straight, somewhat shorter and steeper than anterior slope; ventral border straight; anterior portion of specimen broken; posterior with slight change in curvature, no definite beak. In dorsal view, ends attenuated, the anterior gradually, the posterior more sharply compressed. Greatest length ventral; greatest height posterocentral; greatest width posterocentral.

length, 1.49mm; height, .64 mm.; width, .44 mm.

Figured specimen. -- Michigan State College

SUMMARY

Two species of Glyptopleura in this study, G. campaui sp. nov. and G. omerensis sp. nov., are very closely related to G. perbella (Geis) and G. genevievea (Bayer) of the Salem. This along with the occurrence of Bairdia compacta (Geis) in the Bayport limestone, lends to speculation that in Michigan the Salem may be present as a thin member of the basal Bayport. However, the evidence is very scant and not conclusive due to the habit of some forms to persist through long intervals of time and thus be of little value as guide fossils. Glyptopleura campaui, G. omerensis, and Bairdia compacta (Geis) may represent a recurrence of an environmental condition similar to that which characterized the Salem. Supporting the latter contention is the presence of the formanifera Genus Millerella and the ostracod Genus Perprimitia. These had, before this study was made, been found only in rocks of Chester age. This would suggest that the Bayport is younger than the Salem. If the Bayport is of St. Louis age as has been determined by the study of megafossils, it would mark the oldest occurrence of these two genera.

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EXPLANATION OF PLATE I

Plate I

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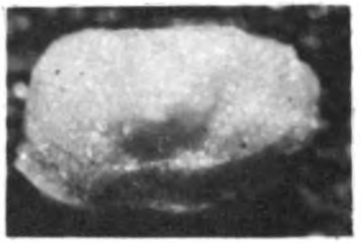
2



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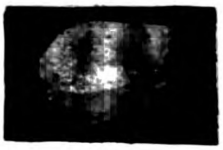

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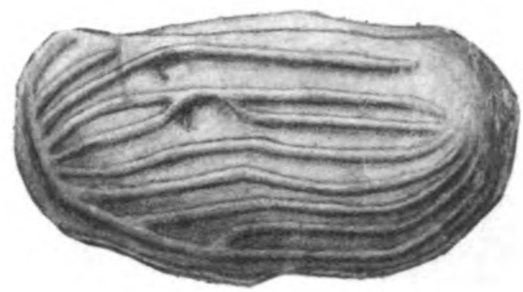

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