GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

BULLETIN 200

PART I - Biostratigraphy of some Early Middle Silurian Ostracoda, eastern Canada

PART II - Additional Silurian Arthropoda from Arctic and eastern Canada

M. J. Copeland

Ottawa
Canada
1971

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PREFACE

As more detailed information is obtained on the stratigraphic occurrence and systematic paleontology of Paleozoic Arthropoda, it is increasingly evident that these forms present a useful key for determining the paleontological zonation and age relationships of the enclosing rocks. They are particularly important in strata of lacustrine, brackish, or restricted marine environments in which rapidly evolving leperditiid ostracodes, eurypterids, and phyllocarids may occur to the exclusion of other distinctive faunal elements. These strata represent a considerable portion of geological time and their ages and stratigraphic relationships with marine, potential petroleum-producing sequences, is of considerable economic importance.

Y.O. Fortier,
Director, Geological Survey of Canada.

Ottawa, 8 July, 1970.

Bulletin 200 von M.J. Copeland

I. Teil: Biostratigraphie einiger frühmittelsilurischer Ostrakoden in Ost-Kanada

II. Teil: Weitere silurische Arthropoden aus Ostkanada und der kanadischen Arktis

М.Дж. Копланд. БЮЛЛЕТЕНЬ 200

Часть I- Биостратиграфия некоторых остракод раннего периода среднего силура восточной части Канады.

Часть II- Дополнительные силурийские членистоногие Арктики и восточной части Канады.

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PART I

BIOSTRATIGRAPHY OF SOME EARLY MIDDLE SILURIAN OSTRACODA, EASTERN CANADA

M. J. Copeland

ABSTRACT

Early Middle Silurian leperditiid and beyrichiid ostracode assemblages of central and eastern Canada indicate a biostratigraphic succession of faunizones useful in correlation. This succession is equated with the standard ostracode sequence developed in lower Clinton strata of the Appalachian region and represents both easterly- and westerly-derived faunas.

RÉSUMÉ

Les assemblages d'ostracodes leperditidés et beyrichidés du début du Silurien moyen de l'est et du centre du Canada révèlent une succession biostratigraphique de zones fauniques utiles à la corrélation. Cette succession est comparée avec la séquence ordinaire d'ostracodes décelée dans les couches inférieures de Clinton de la région des Appalaches, et elle représente des faunes de dérivation orientale et occidentale.

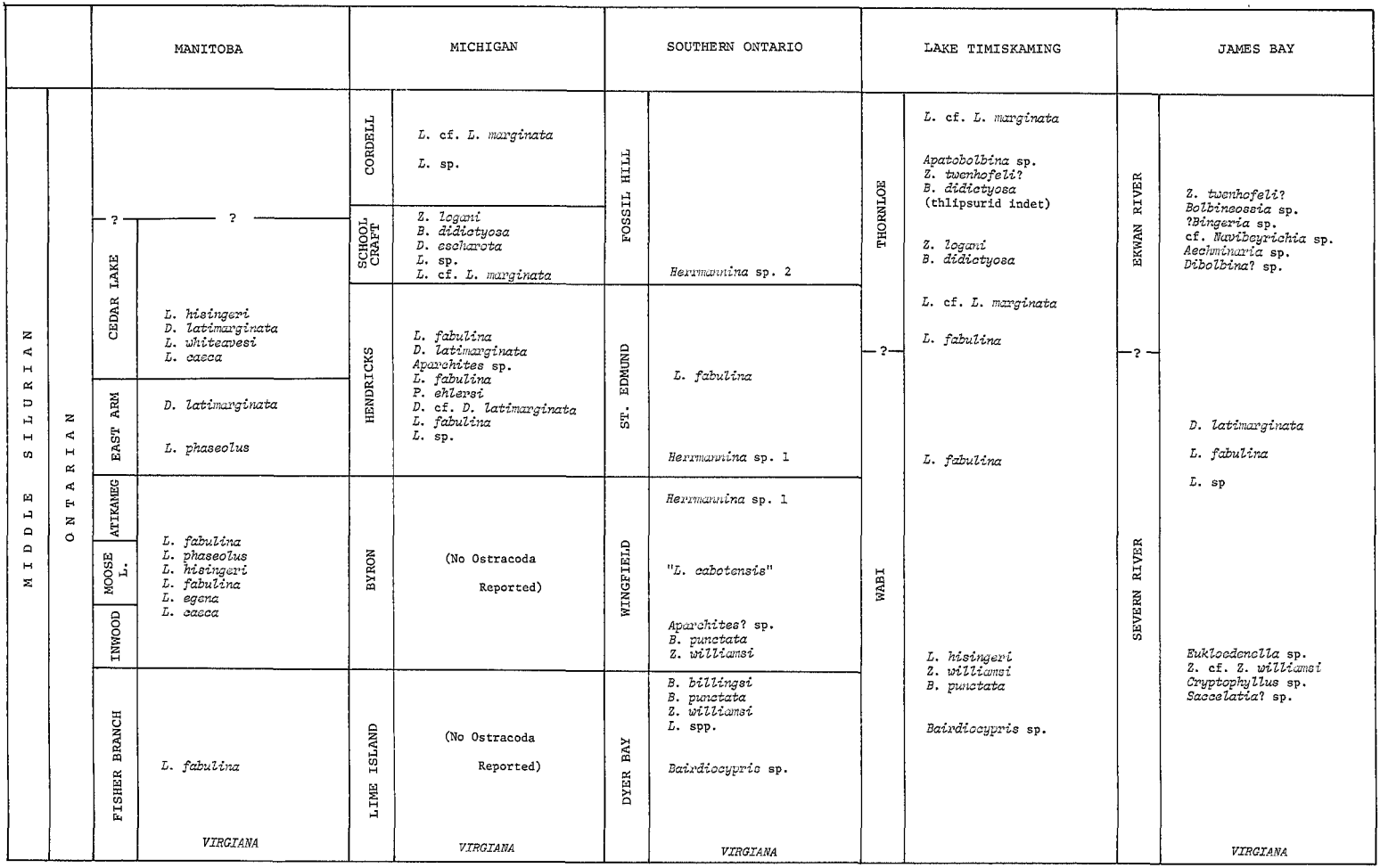

Figure 1. Generalized stratigraphic occurrence of ostracodes, northern mid-continent region.

INTRODUCTION

The most important early Middle Silurian Ostracoda from the northern mid-continent region of North America are leperditiids and beyrichiids. Associated, distinctive ostracodes are rare and, presently, of uncertain stratigraphic ranges. Figure 1 shows the known occurrences of ostracodes eastward from southern Manitoba and northward from southern Ontario to James Bay. Important faunas occur in the intermediate areas of northern Michigan (Ehlers and Kesling, 1957) and Lake Timiskaming in northern Ontario.

Zonation is possible, based on Ostracoda, of these early Middle Silurian strata. The leperditiid assemblage of southern Manitoba is interspersed, in the other areas discussed, with distinctive beyrichiids. This faunal distribution (Fig. 2) suggests two intertonguing, possibly facies controlled, sequences -- a predominantly calcareous, westerly-derived "leperditiid faunizone" and a more argillaceous, easterly "beyrichiid faunizone". The resultant faunal assemblages from oldest to youngest, are characterized by *Zygocosta williamsi, Dihogmochilina latimarginata-"Leperditia" fabulina, Zygobolba* spp., and undetermined leperditiids.

As indicated on morphological grounds (Copeland, 1970a), *Zygocosta williamsi* and its associated brachiopod *Virgiana decussata* appear to be closely allied in time and evolutionary development with *Zygobursa praecursor* and its associated *Virgiana anticostiensis*; it is postulated that this latter fauna from the Becscie Formation of Anticosti Island, Quebec is equivalent to the *Zygocosta williamsi* assemblage. In Anticosti, the overlying Gun River Formation, containing *"Leperditia" selwyni* in abundance and rare specimens of the beyrichiids *Bolbineossia* sp. and *Bolbibollia labrosa,* is considered as within the *Dihogmochilina latimarginata-"Leperditia" fabulina* assemblage. The succeeding Jupiter Formation is replete with zygobolbids (*Zygobolba* spp., *Pletholbina* sp., etc.) and is equated with little difficulty to the *Zygobolba* assemblage of the present paper.

[The Middle Silurian faunal assemblages of Anticosti Island will be considered fully in future publications. The Becscie Formation as used here and by Bolton (1961) includes the lowest unit of the Gun River Formation of all previous authors (Ulrich and Bassler, 1923, p. 369; D5 of Schuchert and Twenhofel, 1910; Gun River unit 1 of Twenhofel, 1928). The two lower units of the Jupiter Formation of Twenhofel (1928) and this paper are Gun River D9 of Schuchert and Twenhofel, 1910 and Ulrich and Bassler, 1923. The intervening Gun River strata of this report (D6-D8 of Schuchert and Twenhofel, 1910; Gun River units 2-4 of Twenhofel, 1928), contain abundant *"Leperditia" selwyni* but are not known to contain zygobolbids.]

Faunal subdivision of the Lower Clinton Group into lower *Zygobolba erecta, Zygobolba anticostiensis,* and upper *Zygobolba decora* faunizones (Ulrich and Bassler, 1923; Fig. 2) is possible in the typical areas of the eastern Appalachian region of the United States and in northern Gaspé. Elsewhere, the *Z. erecta* fauna is missing; its position is occupied by the lower part of

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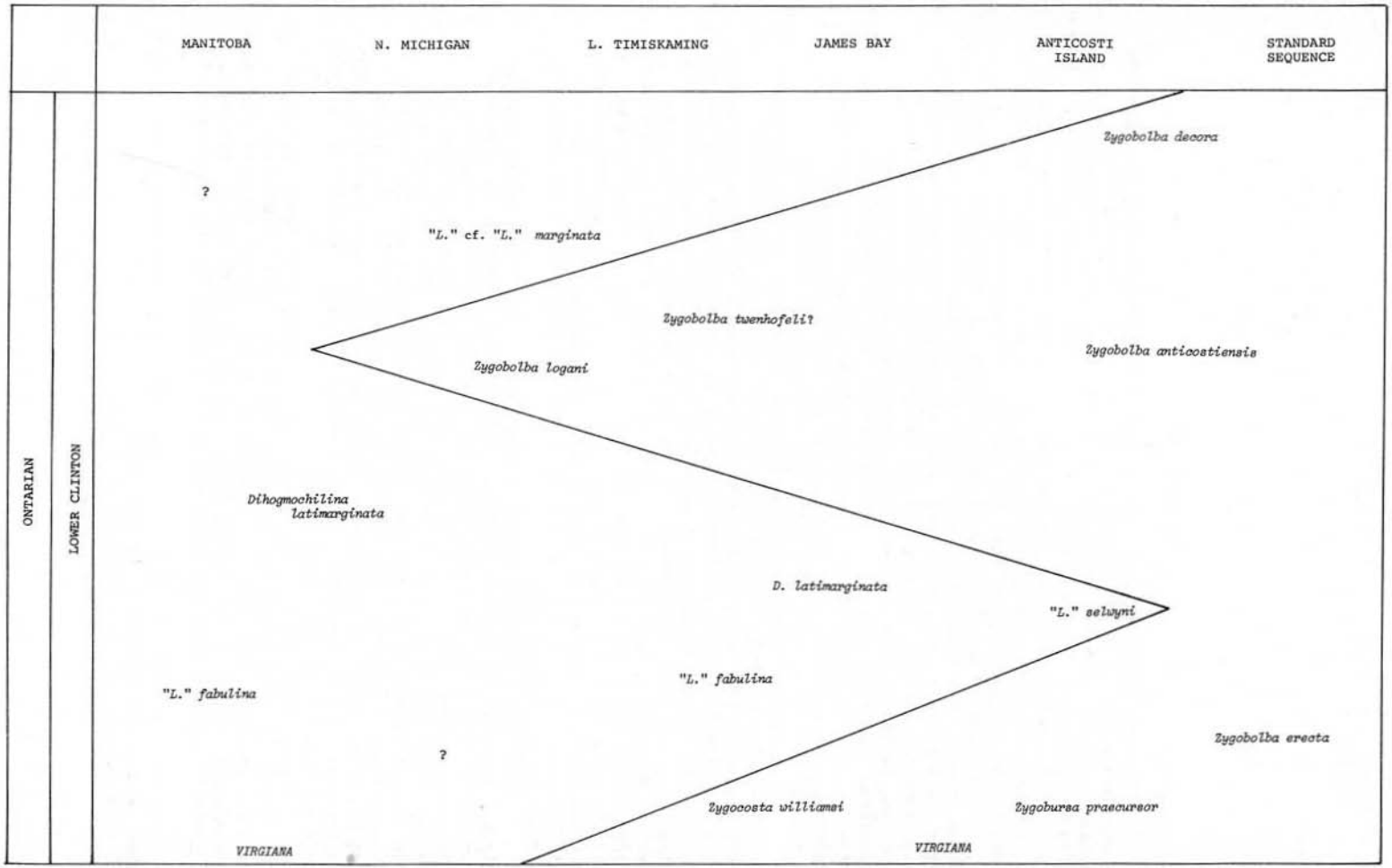

Figure 2. Distribution of leperditiid and zygobolbid ostracode assemblages, northern mid-continent region.

the *Zygobolba excavata* zone of western New York State (fide, Gillette, 1947; Fisher, 1953), the *Zygobursa praecursor* fauna of Anticosti Island, and the *Zygocosta williamsi* assemblage of western and northern Ontario. Only in these latter two areas are *Zygobursa* and *Zygocosta* accompanied by the brachiopod *Virgiana*. The *Zygobolba anticostiensis* fauna is widespread, occurring in western New York State (upper part of the *Z. excavata* zone), Anticosti Island and Gaspé (*Zygobolba anticostiensis zone*), and northern Ontario (*Zygobolba twenhofeli*?). To this fauna may be added *Zygobolba logani* n. sp. which occurs at Lake Timiskaming, Ontario and northern Michigan. The more restricted *Zygbolba decora* zone occurs in the Appalachian region as far west as central New York State and in Anticosti Island and northern Gaspé in Canada.

THE LEPERDITIID ASSEMBLAGE

The leperditiid fauna of this northern mid-continent region is only partly known. Several species from Manitoba were described by Jones (1891) but these are based on imperfect molds with little or no indication of musculature. Shape alone is an unreliable criterion for identification and, indeed, even the generic assignment of most species to *"Leperditia"* is questioned. Comparison with *Herrmannina* should be investigated as a possible alternative. Typical specimens of *"Leperditia" whiteavesi*, *"L." longigibbera*, *"L." phaseolus*, *"L." fabulina*, and *"L." hisingeri* from Manitoba are figured here (Pl. II) for comparison with specimens from other localities. Some of these may be conspecific but their preservation precludes positive comparison.

The most distinctive leperditiid species, *Dihogmochilina latimarginata* (Jones) is widespread (Copeland, 1970b), occurring from Manitoba to James Bay and northward to Southampton Island in the Canadian Arctic. With *"Leperditia" fabulina* Jones, it occupies an interval thought to correspond to at least the upper part of the *Zygobolba erecta* and lower part of the *Zygobolba anticostiensis* faunizones. An overlying, poorly known and largely inferred leperditiid assemblage with *"L."* cf. *"L." marginata* (Keyserling) and younger Middle Silurian species is postulated in the Michigan-Ontario area. This assemblage, occurring predominantly within dolomitic and crystalline limestone lithologies, may include all younger Middle Silurian Ostracoda in the northern mid-continent area.

THE BEYRICHIID ASSEMBLAGE

As previously indicated, zygobolbids are the most widespread and distinctive elements in the beyrichiid fauna under discussion. This rapidly evolving group occurs throughout Middle Silurian (Niagaran Series) strata of the Appalachian region and has been used to successfully distinguish several zones. The three oldest zygobolbid zones, those with species of *Zygobolba*, typify the Ontarian Stage. As shown on Figure 2, these easterly-derived faunal elements die out rapidly in a westerly direction. None are known in Ontario south of Bruce Peninsula, their stratigraphic positions there being occupied by elements of the westerly-derived leperditiid assemblage. The absence of zygobolbid zonal elements, therefore, does not necessarily predicate the presence of a major hiatus in lower Niagaran rocks of that area as suggested by some previous authors.

Some confusion surrounds the genus *Zygobolba* Ulrich and Bassler, 1923. The type species (*Beyrichia decora* Billings, 1866) was designated and first figured by Ulrich and Bassler, 1923. No typical specimens of *B. decora* or *B. venusta* Billings, 1866, described from the same strata, were originally designated but their descriptions indicate that *B. decora* was established on heteromorphic and *B. venusta* on tecnomorphic specimens. Ulrich and Bassler (1923, p. 537) recognized this dimorphism and united these specimens as *Zygobolba decora*. If the original descriptions of these species are

considered, however, another problem may arise. Whereas Billings (1866, pp. 67, 68) did not indicate the surface ornamentation of *B. decora*, he did state of *B. venusta*: "When magnified thirty diameters the surface is seen to be covered with minute rounded pits in some specimens closely crowded together and in others separated, sometimes half their own width." Most subsequent workers (i.e. Martinsson, 1962, pp. 261, 262, Figs. 133, 134) have illustrated *Z. decora* as possessing fine reticulation or punctation but this specific characteristic is not certainly known for *B. decora*. By usage, however, it is desirable to continue to refer to reticulate and punctate specimens from upper Jupiter strata of Anticosti Island as *Z. decora* and consider *Z. venusta* a junior synonym. The possible similarity of *Z. decora*, so constituted, to *Z. intermedia* and/or *Z. robusta*, reported by Ulrich and Bassler from these same strata, is not presently known.

The zygobolbid genera *Zygocosta* and *Zygobursa* (Copeland, 1970a), occur with the brachiopod *Virgiana* and, with the *Zygbolba erecta* fauna of the Awantjish Formation of Gaspé, are considered valid stratigraphic indices to the base of the Clinton Group in eastern Canada. Elsewhere in eastern Canada, the genus *Zygobolba* occurs only in the upper part of the lower Clinton Group and is represented by the *Z. anticostiensis* and, in Anticosti Island and Gaspé, the younger *Z. decora* faunizones. *Zygobolba logani* n. sp. is the only zygobolbid known in northern Michigan; it occurs with *Zygobolba twenhofeli*? Ulrich and Bassler in the Lake Timiskaming area of Ontario. This latter species has been found in the James Bay area of Quebec and occurs in the lower part (*Zygobolba anticostiensis* zone) of the Jupiter Formation of Anticosti Island.

PALEONTOLOGY

Leperditicopida Scott, 1961

Leperditia Rouault, 1851

Discussion. As previously suggested, the specimens herein grouped as *Leperditia* are not known to exhibit typical characteristics of the genus. That is, the posterodorsal swelling of the left valve has not been observed, the musculature cannot be certainly determined on the original specimens, and specimens, especially those from Manitoba, are preserved as impressions. For these reasons, and because reference, at this time, to another more probable generic association (i.e. *Herrmannina*) would be premature, the designation *"Leperditia"* is used.

"Leperditia" fabulina Jones

Plate II, figures 1, 7-9, 13-16, 19, 20, 22

Leperditia Hisingeri Schmidt, Varietas *Fabulina* Jones 1891, p. 82, Pl. 10, figs. 5, 7; Pl. 12, fig. 15; Pl. 13, figs. 2, 3, 5.

Remarks. Jones' all-inclusive descriptions of this and other varieties of *L. hisingeri* (1891, pp. 82-84) are difficult to decipher, but the following comparisons were stated:

1. *L. hisingeri fabulina* has "a rather longer hinge-line" than *L. hisingeri* (p. 83).
2. *L. hisingeri fabulina* differs from *L. louckiana* Jones in "the dorsal angles, and more or less in the antero-ventral slope" and is "too much rounded in front" (p. 83).

3. *L. hisingeri fabulina* "is not readily distinguishable from *L. fabulites* (*L. Josephiana*), but it is fuller in the antero-ventral outline." Specimens are "not only higher (deeper) in the antero-ventral moiety, but have less postero-dorsal slope, are not quite so convex, and show usually some slight marginal rim" (p. 84).

It is obvious, however, that Jones considered the Middle Ordovician *Cytherina fabulites* Conrad as "evidence of an old prototype, or analogous predecessor" of the Middle Silurian *L. hisingeri fabulina* and, probably, derived the varietal name of the latter on this basis. Failure to observe the lack of a chevron scar on *Eoleperditia fabulites* (Conrad) and its presence on *"L." fabulina* Jones cannot be criticized, considering the preservation of the latter specimens. The similarity of *"L." fabulina* and the Middle Ordovician *L. louckiana* Jones is highly questionable. The hinge length relationship between *"L." hisingeri* and *"L." fabulina* may be a valid criterion and is used here. The ratio of hinge length to greatest height of *"L." fabulina* is one or greater whereas that of *"L." hisingeri* is generally less than one.

Specimens of *"L." fabulina* from Lake Timiskaming (Pl. II, figs. 8, 13) exhibit musculature previously unknown for the species. The adductor marginally bears ten to fifteen pairs of elongate (first order or primary, in the sense of Abushik, 1960) tubercules surrounding a variable number of secondary tubercles. The chevron comprises a few (fifteen to twenty) tubercles, generally arranged in a triangular outline but irregular in distribution. This is a characteristic of the Llandovery, early Wenlock genus *Sibiritia* but the present specimens lack the marginal closure pits and tubercles typical of that genus. Anterior and anteroventral of the adductor muscle of specimens of *"L." fabulina* are several discrete, minute scars or puncta. These may be seen on specimens from Manitoba (Pl. II, figs. 16, 22) and Lake Timiskaming (Pl. II, figs. 1, 8, 13).

Figured specimens. Syntypes, GSC Nos. 6052,b, 8753; hypotypes, GSC Nos. 8752a, 26332, 26336, 26337, 26338, 26341.

"Leperditia" longigibbera Swartz

Plate II, figures 10, 11

Leperditia Hisingeri Var. *gibbera* Jones 1891, p. 82, Pl. XIII, fig. 4; not *L. gibbera* Jones 1856, p. 90, Pl. 7, figs. 8-10.

Leperditia longigibbera Swartz, 1949, p. 314.

Remarks. Swartz (1949) redescribed this species based on Jones' original figures (herein, Pl. II, fig. 10). A right valve (Pl. II, fig. 11), number 13 of Jones' specimens (1891, p. 84) and considered by him to closely resemble *"L." fabulina* (Pl. II, fig. 20 herein), is figured here for the first time. The dorsal thickening or elevation on both steinkerns could be the result of lateral crushing of the valves. This is somewhat more apparent on figure 10, and might suggest even more strongly the similarity of specimens of *"L." longigibbera* and *"L." fabulina* if preserved in an uncrushed condition.

Figured specimens. Holotype, GSC No. 8754; hypotype, GSC No. 26343.

"Leperditia" caeca Jones

Plate II, figures 4, 5

Leperditia caeca Jones, 1891, p. 88, Pl. XII, figs. 6, 7, 9.

Remarks. The subquadrate outline of this species is a typical characteristic. Jones (1891, p. 89), describing the ventral margin of the left valve, stated that it "bears minute pimples (casts of little pits) along the marginal angle." The mostly exfoliated right valve figured here from Lake Timiskaming, Ontario likewise bears a few minute mid-ventral pits (fig. 4) and a groove-like posteroventral row of 9(?) pits (fig. 5) situated slightly more dorsally on the valve. This row apparently has no anteroventral counterpart. These pits correspond to tubercles on the interior of the right valve and serve as closure devices for the left valve. This type of closure is typical of specimens of *Sibiritia* Abushik, 1958, which, however, bears in additon an anteroventral row of pits. The distinctive sibiritiid musculature cannot be determined for these Manitoba and Lake Timiskaming specimens, but the resemblance to *Sibiritia* is strongly suggested as an alternative to the non-pit-bearing genus *Leperditia*.

Figured specimen. Hypotype, GSC No. 26343.

"Leperditia" whiteavesi Jones

Plate II, figure 6

Leperditia whiteavesii Jones, 1891, p. 87, Pl. XII, figs. 11-14 woodcut Figure 6.

Remarks. Relatively little is known about this species, the four specimens drawn by Jones are incomplete. The hingeline is short, with obtuse, unpronounced terminal angles. The surfaces of the steinkerns are smooth, with a small, dorsally situated "eye" spot. Musculature is unknown. The specimen figured here bears a slight anterior marginal border, is obviously postplete, and may have a height nearly equal to the hingeline. Without more complete specimens this species remains relatively unknown.

Figured specimen. Syntype, GSC No. 8751a.

"Leperditia" hisingeri Schmidt

Plate II, figures 17, 18, 21, 23, 24

Leperditia Hisingeri Schmidt, Jones 1891, p. 82, Pl. XIII, figs. 1, 9.

Remarks. As stated under *"L." fabulina* above, *"L." hisingeri* possesses a relatively short hingeline, the ratio of hinge length to greatest height being generally less than one. This is the only quasi-distinguishing feature differentiating these species. The identification of the North American specimens with Schmidt's type specimens or topotypic material is not proved and should be investigated.

Figured specimens. Hypotypes, GSC Nos. 8752,b, 26339, 26340, 26342.

"Leperditia" phaseolus (Hisinger)

Plate II, figure 12

Leperditia phaseolus (Hisinger), Jones 1891, p. 85, Pl. XIII, figs. 7, 8.

Remarks. It is difficult to understand how Jones distinguished this species on the basis of the figured Manitoba material. Both of the specimens he figured are incomplete steinkerns, neither showing a complete hingeline. The specimen figured here (Jones' Pl. XIII, fig. 8) bears faint traces of a posterior marginal furrow and, apparently, a somewhat abrupt posterior termination of the hingeline. Neither of these are indicated by Jones. The characteristics used by Jones to distinguish these specimens and *"L." fabulina* are questionable.

Figured specimen. Hypotype, GSC No. 8755a.

"Leperditia" cf. *"L." marginata* (Keyserling)

Plate II, figures 2, 3

For synonymy see, Bassler, R.S. and Kellett, B., 1934, Geol. Soc. Amer., Spec. Paper 1, p. 393.

Remarks. The specimens figured here are only questionably distinguished from *"L." fabulina* and *"L." hisingeri*. They are somewhat more robust than specimens of those species, bear little or no indication of marginal furrows, and have more narrowly curved, prominent, anterior margins. The line of greatest length is more oblique to the hingeline than that of most other leperditiids described here.

Figured specimens. Hypotypes, GSC Nos. 26333, 26334.

Dihogmochilina latimarginata (Jones)

Plate II, figure 20

Isochilina grandis Jones Var. *latimarginata* Jones, 1891, p. 78, Pl. X, figs. 1-4.

Dihogmochilina latimarginata (Jones), Teichert, 1937, p. 153, Pl. 22, figs. 1, 2; Copeland, 1970, p. 11, Pl. II, Pl. III, figs. 8-15.

Remarks. This species has been recently described by Copeland (1970b). Its distinctive shape and restricted stratigraphic occurrence make it the most easily recognized and most valuable Middle Silurian zone ostracode in the northern mid-continent area.

Figured specimen. Hypotype, GSC No. 26341.

Beyrichiacea Matthew, 1886

Zygobolba Ulrich and Bassler, 1923

Zygobolba twenhofeli? Ulrich and Bassler

Plate I, figures 1-9

Zygobolba twenhofeli Ulrich and Bassler, 1923, p. 560, Pl. LXV, figs. 5, 7-9.

Description. Valves subovate, with a broad velar flange. Surface quadrilobate, L1 curved, ventrally approaching L2 and dorsally in contact with velar flange which extends above the hingeline and curves to approach the

dorsal edge of L2. L2 and L3 united ventrally to form the typical zygobolbid U-shaped loop surrounding the deep adductoral sulcus. L2 prominent, slightly inclined anterodorsally, clubshaped, separated from L1 by a short, prominent sulcus. L2 restricted abruptly at point of nearest approach of L1. L3, joined with L2 by thin basal portion of U-shaped ridge, expanded equally along its length and extending nearly vertically to or above the hingeline. L4 inconspicuous, separated from L3 by a low depression.

Heteromorphic valves with prominent anteroventral crumina traversed laterally by velar ridge continuous with velar flange. Crumina nearly obliterating L1 and extending posteroventrally to mid-valve. Ventral surface of crumina striate with indication of dolonoid scar intersecting the margin.

Remarks. These specimens are referred to Z. *twenhofeli*? because of the position and orientation of the U-shaped ridge, shape of L2, and continuous nature of the female velar flange and ridge. They may differ from Z. *twenhofeli* in the prominence and dorsal extension of the marginal flange. One incomplete heteromorphic valve (Hypotype, GSC No. 26311) exhibits an undetermined alar process at the posterior edge of the crumina ventral to the U-shaped L2-L3.

Figured specimens. Hypotypes, GSC Nos. 26303-26311 (26308, Pl. I, fig. 6, missing).

Zygobolba logani n. sp.

Plate I, figures 12, 14-17, 19, 20, 26

Zygobolba sp., Ehlers and Kesling, 1957, p. 20.

Description. Valves large, ovate; hingeline long with prominent terminal angles. Quadrilobate, all lobes ventrally confluent, with three anterior lobes broad and L4 inconspicuous. Velar flange broad, extending along entire free margin and curving at posterior end to lie above L3. Depression between velar flange and lobation interrupted below the adductoral sulcus by a low connection. L1 broad, crescentic, extending from slightly above the hingeline to the base of the prominent node of L2, separated from L2 on some specimens by a shallow depression. S1 sharply defined, crescentic, of equal width for its entire length. L2 prominent, preadductoral node large, constricted ventrally to join with L3 in a U-shaped ridge. Connecting ridge and ridge of L3 of equal width. L3 extending nearly vertically to dorsum. Adductoral sulcus between L2 and L3 deep and narrow, slightly concave anteriorly. L4 inconspicuous, fused to L3, of lower elevation than the ridge extending the length of L3.

One, incomplete heteromorphic valve showing ventral structure of the striate, anteroventrally situated crumina. Crumina obliterating the ventral part of L1. Velar flange continuing onto posterior part of crumina. The dolonoid scar apparently breaking through the margin.

Remarks. This species is differentiated from other zygobolbas by the obesity of L1-L3 and the narrow, slit-like S1. The U-shaped ridge on L2-L3 is pre-eminent and may be distinguished from these lobes only with difficulty.

Figured specimens. Holotype, GSC No. 26318; paratypes, GSC Nos. 26315-26317, 26319-26321, 26324a.

Zygocosta Copeland, 1970

Zygocosta williamsi (Ulrich and Bassler), 1923

Plate I, figures 23, 27-31

Zygobolba williamsi Ulrich and Bassler, 1923, p. 550, Pl. 41, figs. 1-9

Zygocosta williamsi (Ulrich and Bassler), Copeland, 1970, p. 41, Pl. I, figs. 12-22, Figure 2A.

Remarks. This species has been discussed in detail by Copeland (1970a, p. 4). The present specimens are from the uppermost 10 to 12 feet of the shale unit of the Wabi Formation. They occur with *Bairdiocypris* sp., a few feet above rain and ripple-marked shale bearing numerous *"Leperditia" hisingeri* Schmidt.

Figured specimens. Hypotypes, GSC Nos. 26326-26331.

Bolbineossia Kesling, Heany, Kauffman, and Oden, 1958

Bolbineossia didictyosa Kesling, Heany, Kauffman, and Oden, 1958

Plate I, figure 26

Bolbineossia didictyosa Kesling, Heany, Kauffman, and Oden, 1958, p. 149, Pl. 24, figs. 8-16, text figs. 5-7.

Remarks. Only tecnomorphic valves have been observed at Lake Timiskaming. They occur with *Zygobolba logani* n. sp. and *Zygobolba twenhofeli*? Ulrich and Bassler. The wide frill apparently bears two types of ornamentation, distal striae and proximal papillae, the latter aligned approximately with the striae. This is similar to that shown by Kesling, *et al.* for Plate 24, figure 10 but differs from their figure 8 (text-fig. 5) which shows the proximal papillae of random orientation. The central pit (S2) of *B. didictyosa* appears larger than that of other species of the genus.

Occurrence. Lot 5, con. II, Harris tp., Ontario, near the middle of the escarpment near shore of Lake Timiskaming; roadside exposure lot 12, cons. V-VI, Dymond tp., Lake Timiskaming area, Ontario; top of south side of Macnamara quarry, Lake Timiskaming area, Ontario; White Marble Lime Company quarry, Manistique, Michigan, U.S.A.

Figured specimen. Hypotype, GSC No. 26325.

Apatobolbina sp.

Plate I, figures 11, 13

Remarks. Only tecnomorphic valves have been observed in the Lake Timiskaming area. They appear somewhat similar to *Apatobolbina granifera* Ulrich and Bassler from the Jupiter Formation of Anticosti Island, Quebec, but cannot be certainly compared on tecnomorphic valves alone. As on the Anticosti Island specimens, some valves bear pronounced, smooth adductoral scars whereas other specimens lack indication of this scar.

Figured specimens. GSC Nos. 26313, 26314.

Beyrichiid ostracode indet.

Plate I, figure 18

Remarks. One specimen, preserved as a steinkern in a clay matrix, represents a very small heteromorphic valve. The large crumina is situated anteroventrally, and is not encroached upon by the narrow velar margins. There

is no indication of a dolonoid scar. The only lobal features preserved are a faint preadductoral node and very shallow adductoral (S2) sulcus. Whether this lobation would appear on the exterior surface of the valve is unknown. The specimen appears to bear certain resemblance to specimens of *Apatobolbina* (position and shape of the crumina) and *Bolbibollia* (narrow velum and nearly obsolete syllobium), but cannot be referred with any certainty to either.

Figured specimen. GSC No. 26322.

Thlipsuracea Ulrich, 1894

Thlipsurid ostracode indet.

Plate I, figure 10

Remarks. Small, compressed, indeterminate specimens, with thlipsurid hingement, L/R overlap, and convex lateral surfaces are rare in one Lake Timiskaming sample. The lateral surface is centrally depressed and bears three pits or furrows -- anterior, median (adductoral sulcus, S2), and posterior -- aligned horizontally in the shallow median depression. The posterior pit tends to be elongate horizontally, the median pit is circular, and the anterior pit is vertical and crescentic.

Such thlipsurellid-like specimens occur on Anticosti Island in the lower part of the Jupiter Formation (*Zygobolba anticostiensis* zone) and, with at least seven other undescribed species, form an evolutionary sequence occurring in the uppermost Becscie to uppermost Jupiter Formations. These will be named and described in a future publication.

Figured specimen. GSC No. 26312.

Healdiacea Harlton, 1933

Bairdiocypris Kegel, 1932

Bairdiocypris sp.

Plate I, figures 21, 22, 24, 25

Remarks. This is a typical bythocypridid-type ostracode found throughout Middle Silurian strata in eastern Canada. Copeland (1962, p. 10) and others have referred this to the imperfectly known subspecies *Bythocypris punctulata niagarensis* Ulrich, 1891. Modern terminology, however, suggests the discontinuance of use of the generic name *"Bythocypris"* for Paleozoic ostracodes of this type and the substitution of *Bairdiocypris*. In compliance with this, the latter name is used here for small, smooth, ovate, and laterally convex ostracodes having L/R ventral overlap and, generally greater posterior height.

Figured specimens. GSC Nos. 26323, a-c.

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PLATE I

Figures 1-4 *Zygobolba twenhofeli*? Ulrich and Bassler
Right and two left tecnomorphic, and one right heteromorphic valves; locality 82564, Thornloe Formation, top of south side of Macnamara quarry, lot 6, con. VI, Armstrong tp., Ontario; x 10; Hypotypes, GSC Nos. 26303-26306.

Figures 5-8 *Zygobolba twenhofeli*? Ulrich and Bassler
Two left and one right tecnomorphic, and one right heteromorphic valves; locality 82564, Thornloe Formation, five feet below top of Macnamara quarry (see above); x 10; Hypotypes, GSC Nos. 26307-26310 (26308 missing).

Figure 9 *Zygobolba twenhofeli*? Ulrich and Bassler
Incomplete left heteromorphic valve bearing a mid-ventral posterior cruminal alar process of undetermined origin; locality 82564, Thornloe Formation, five feet below top of Macnamara quarry (see above); x 10; Hypotype, GSC No. 26311.

Figure 10 Thlipsurid ostracode indet.
Right lateral view of a carapace; locality 82564, Thornloe Formation, five feet below top of Macnamara quarry (see above); x 25; Fig. spec., GSC No. 26312.

Figures 11, 13 *Apatobolbina* sp.
Two left tecnomorphic valves; locality 82564, Thornloe Formation five feet below top of Macnamara quarry (see above); x 20 and x 15; Fig. spec., GSC Nos. 26313, 26314.

Figures 12, 20 *Zygobolba logani* n. sp.
Two left tecnormorphic valves, locality 82526, Thornloe Formation, lot 5, con. II, Harris tp., Ontario near middle of escarpment above gravel pit at shore; x 15; Paratypes, GSC Nos. 26315, 26316.

Figures 14, 16 *Zygobolba logani* n. sp.
17, 19 Four right tecnomorphic valves, locality 82526 (see above); x 15; Paratype, GSC No. 26317, Holotype, GSC No. 26318, Paratypes, GSC Nos. 26319, 26320.

Figure 15 *Zygobolba logani* n sp.
Ventral view of incomplete left heteromorphic valve; locality 82526 (see above); x 15; Paratype, GSC No. 26321.

Figure 18 Beyrichiid ostracode indet.
Right lateral view of an internal cast, possibly of an *Apatobolbina* sp.; locality 82526 (see above); Fig. spec., GSC No. 26322.

Figures 21, 22 *Bairdiocypris* sp.
24, 25 Right, left, dorsal, and ventral views of four carapaces; locality 82566, Wabi Formation, Evanturel Creek at road bridge, between Heaslip and Kap-Kig-Iwan Provincial Park, south of Englehart, Ontario; x 18; Fig. specs., GSC Nos. 26323, a-c.

Figure 26 *Zygobolba logani* n. sp.
Left and right tecnomorphic valves; locality 82536, Thornloe Formation, roadside exposure, lot 12, cons. V-VI, Dymond tp., Ontario; x 15; Paratypes, GSC Nos. 26324, a.
Bolbineossia didictyosa Kesling, Heany, Kauffman, and Oden
Right tecnomorphic valve; Hypotype, GSC No. 26325.

Figures 23, *Zygocosta williamsi* (Ulrich and Bassler)
27-31 Left tecnomorphic and four left and one right heteromorphic valves; locality 82566, Wabi Formation, Evanturel Creek at bridge on road between Heaslip and Kap-Kig-Iwan Provincial Park, south of Englehart, Ontario; x 15; Hypotypes, GSC Nos. 26326-26331.

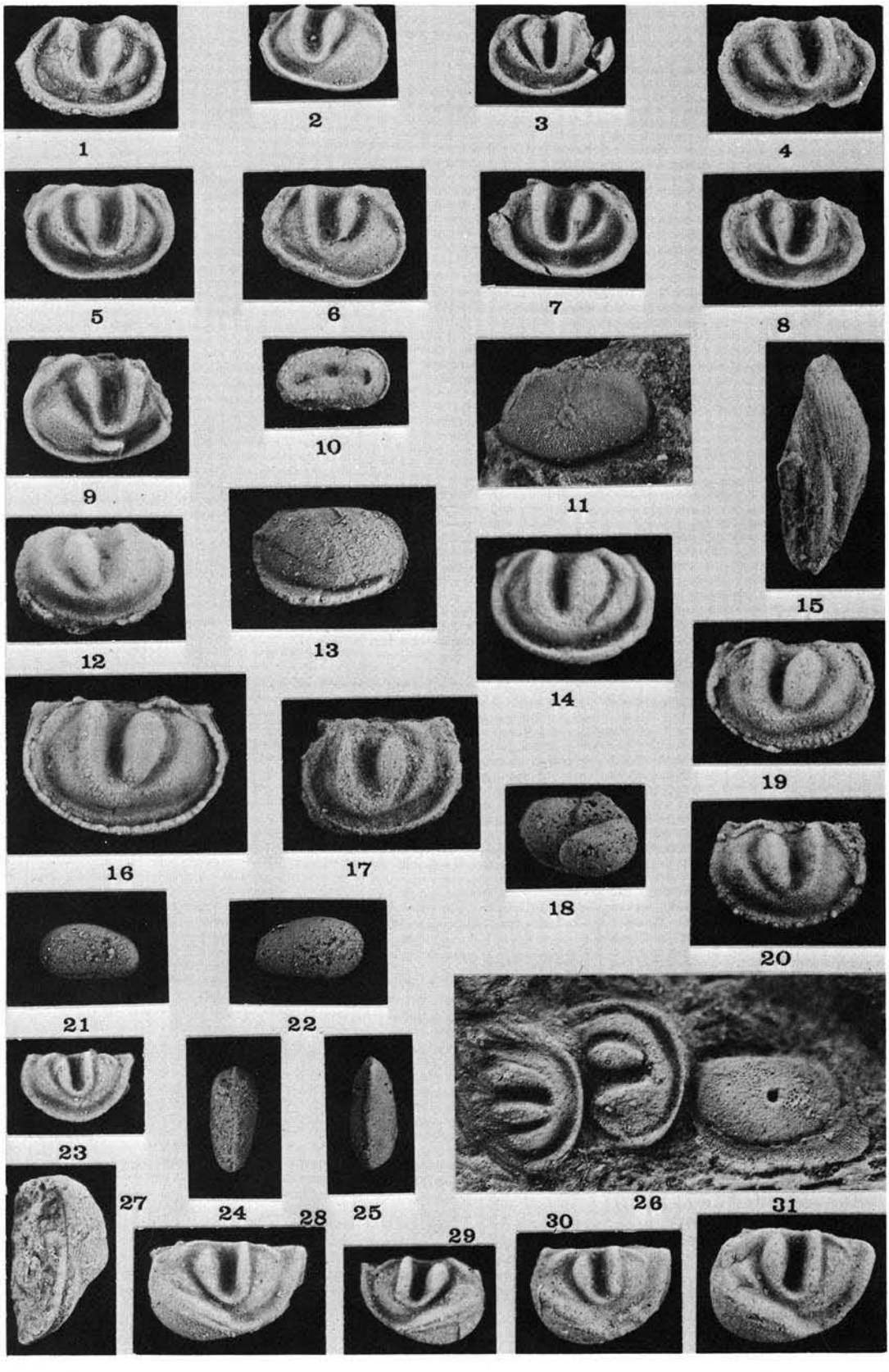
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PLATE II

Figure 1 — *"Leperditia" fabulina* Jones
Left lateral view; locality 82526, Thornloe Formation, lot 5, con. II, Harris tp., Ontario, near middle of escarpment above gravel pit at shore; x 4; Hypotype, GSC No. 26332.

Figure 2 — *"Leperditia"* cf. *"L." marginata* (Keyserling)
Right lateral view; locality 82564, Thornloe Formation, 5 feet below top of Macnamara quarry, lot 6, con. VI, Armstrong tp., Ontario; x 3; Hypotype, GSC No. 26333.

Figure 3 — *"Leperditia"* cf. *"L." marginata* (Keyserling)
Left lateral view; locality 82564, Thornloe Formation, 5 feet below top of Macnamara quarry (see above); x 3; Hypotype, GSC No. 26334.

Figures 4, 5 — *"Leperditia" caeca* Jones
Right lateral views of a valve, No. 5 immersed in liquid; locality 82536, Thornloe Formation, roadside exposure, lot 12, cons. V-VI, Dymond tp., Ontario; x 4; Hypotype, GSC No. 26335.

Figure 6 — *"Leperditia" whiteavesi* Jones
Incomplete right valve; Chemahawin, Saskatchewan River, northwest of Cedar Lake, Manitoba (see Jones, 1891, Pl. XII, fig. 11) ; x 3; Syntype, GSC No. 8751a.

Figures 7, 13 — *"Leperditia" fabulina* Jones
Dorsal and lateral views of right valve; locality 82524, Thornloe Formation, Highway 65, northwest corner lot 3, con. V, Harris tp., northeast of New Liskeard, Ontario; x 3; Hypotype, GSC No. 26336.

Figures 8, 9 — *"Leperditia" fabulina* Jones
Lateral and ventral views of left valve; locality 82524, Thornloe Formation (see above); x 3; Hypotype, GSC No. 26337.

Figures 10, 11 — *"Leperditia" longigibbera* Swartz
Left and right valves; Long Point, Lake Winnipegosis, Manitoba (see Jones, 1891, Pl. XIII, fig. 4); x 3 and x 4; Holotype, GSC No. 8754; Hypotype, GSC No. 26343.

Figure 12 — *"Leperditia" phaseolus* (Hisinger)
Incomplete right valve; Roche Rouge, Saskatchewan River, Manitoba (see Jones, 1891, Pl. XIII, fig. 8); x 2; Hypotype, GSC No. 8755a.

Figure 14 — *"Leperditia" fabulina* Jones
Right valve; Long Point, Lake Winnipegosis, Manitoba; x 4; Hypotype, GSC No. 8752a.

Figure 15 — *"Leperditia" fabulina* Jones
Right valve; Hendricks Formation, small quarry southwest of Blaney, Michigan, U.S.A.; x 3; Hypotype, GSC No. 26338.

Figure 16 — *"Leperditia" fabulina* Jones
Right valve; Long Point, Lake Winnipegosis, Manitoba (see Jones, 1891, Pl. XIII, fig. 3); x 3; Syntype, GSC No. 8753.

Figure 17 — *"Leperditia" hisingeri* Schmidt
Two right valves; locality 82567, Wabi Formation, Evanturel Creek, 1,000 feet above bridge, on road between Heaslip and Kap-Kig-Iwan Provincial Park, south of Englehart, Ontario; x 3; Hypotype, GSC No. 26339.

Figure 18 — *"Leperditia" hisingeri* Schmidt
Right valve; locality 82524, Thornloe Formation, Highway 65, northwest corner lot 3, con. V, Harris tp., northeast of New Liskeard, Ontario; x 2; Hypotype, GSC No. 26340.

Figure 19 — *"Leperditia" fabulina* Jones
Right and left valves; Long Point, Lake Winnipegosis, Manitoba (see Jones, 1891, Pl. X, fig. 7); x 3; Syntype, GSC No. 6052b.

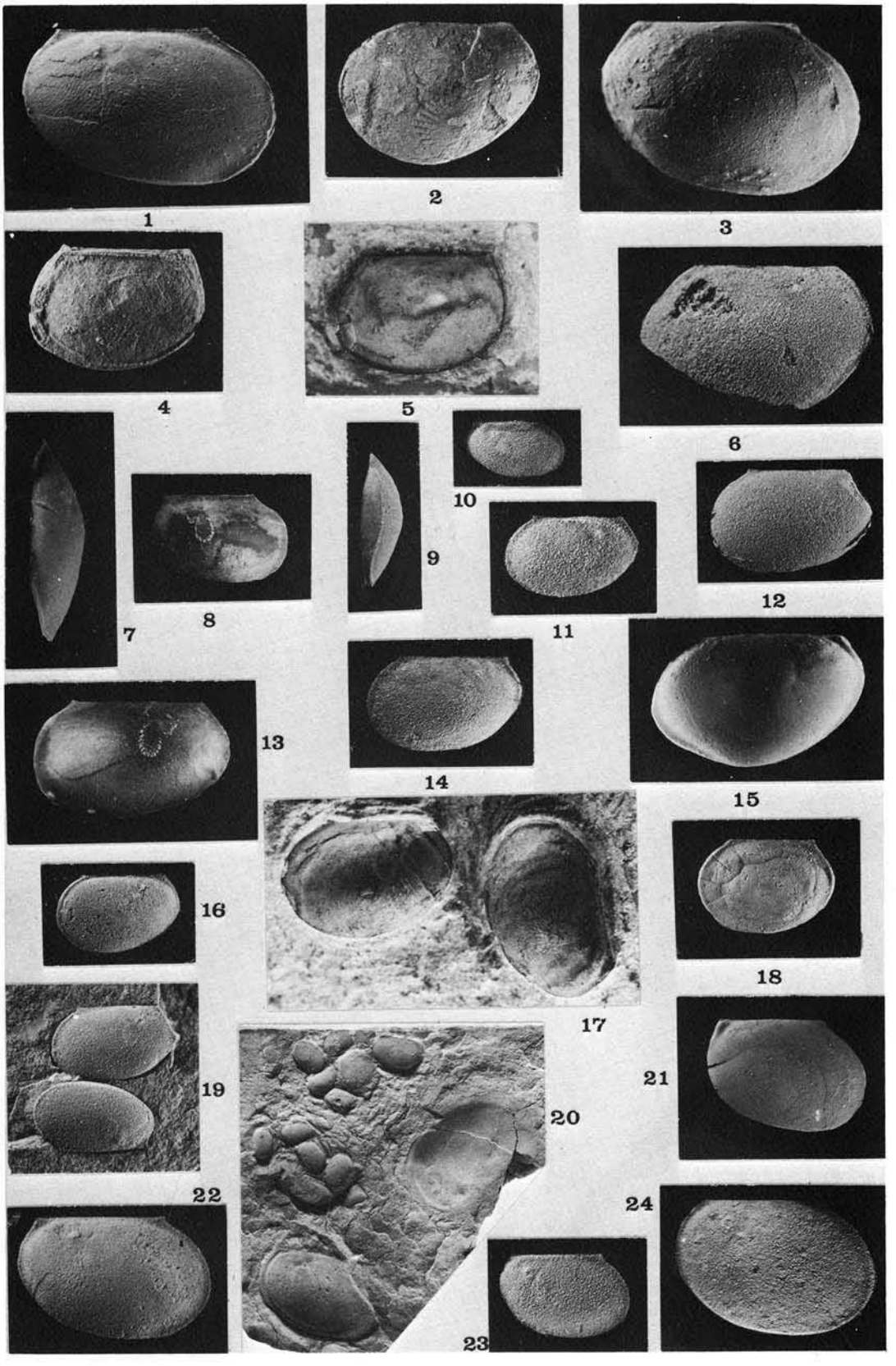
Figure 20 — *Dihogmochilina latimarginata* (Jones)
"Leperditia" fabulina Jones
Southampton Island, District of Franklin, Lat. 64°44'06", Long. 82°28'00"; x 1; Hypotype, GSC No. 26341.

Figure 21 — *"Leperditia" hisingeri* Schmidt
Slightly crushed left valve; locality 82566, Wabi Formation, Evanturel Creek at bridge (see locality, figure 17 above); x 4; Hypotype, GSC No. 26342.

Figure 22 — *"Leperditia" fabulina* Jones
Left valve; Long Point, Lake Winnipegosis, Manitoba (see Jones, 1891, Pl. X, figs. 5a-c); x 3; Syntype, GSC No. 6052.

Figure 23 — *"Leperditia" hisingeri* Schmidt
Left valve; Long Point, Lake Winnipegosis, Manitoba (see Jones, 1891, Pl. XIII, fig. 1); x 4; Hypotype, GSC No. 8752b.

Figure 24 — *"Leperditia" hisingeri* Schmidt
Left valve; Long Point, Lake Winnipegosis, Manitoba (see Jones, 1891, Pl. XIII, fig. 1); x 4; Hypotype, GSC No. 8752.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PART II

ADDITIONAL SILURIAN ARTHROPODA FROM ARCTIC AND EASTERN CANADA

M. J. Copeland

ABSTRACT

Eurypterids, phyllocarids, and ostracodes from strata of Silurian age in the central Canadian Arctic may be divisible into four temporal assemblages based on their associated graptolites. This broad zonation requires additional refinement before its stratigraphic usefulness may be assessed.

RÉSUMÉ

Les euryptéridés, les phyllocaridés et les ostracodes des couches siluriennes du centre de l'Arctique canadien peuvent être répartis en quatre assemblages chronologiques fondés sur leur association aux graptolites. Cette répartition zonale assez élémentaire doit cependant être précisée avant que l'on puisse en déterminer la valeur stratigraphique.

INTRODUCTION

The increase in the last two decades of geological investigations of Canada's Arctic Islands has provided much new paleontological information and specimens for study. Within certain restricted marine facies of the Silurian part of the stratigraphic column there, a succession of graptolite and fish faunas have been successfully developed by Thorsteinsson (1958) and serve as zone indices for many associated fossils. Some of the least common but widespread of these fossils are the Eurypterida, Phyllocarida, and Ostracoda. Certain of these have been described (Copeland and Bolton, 1960; Copeland, 1960, 1962; Martinsson, 1960) and others are contained in the present report. Their stratigraphic positions, based wherever possible on Thorsteinsson's graptolite zonation from the Cape Phillips Formation, Cornwallis Island, appear to indicate the presence in the Canadian Arctic of the following four proposed temporal arthropod assemblages.

1. A lower, diverse assemblage of eurypterids consists of *Carcinosoma* sp. (associated with *Monograptus priodon* Bronn and *Cyrtograptus* sp.), eurypterid remains (with *Cyrtograptus* sp. and *Stomatograptus grandis* Suess) and *Eurypterus* sp. and *Erieopterus phillipsensis* n. sp. (with *Monograptus* sp. and *Cyrtograptus murchisoni* Carruthers). This oldest assemblage from Devon and Cornwallis Islands is of Llandoverian and, possibly, earliest Wenlockian ages.

2. The typical "*Eurypterus fischeri*" assemblage consists of *Eurypterus remipes tetragonophthalmus* Fischer, and *Erieopterus laticeps* (Schmidt) (associated with *Monograptus testis* (Barrande) and *Cyrtograptus trilleri* Eisel). This assemblage from Cornwallis Island is of latest Wenlockian or earliest Ludlovian ages.

3. The *Ceratiocaris cornwallisensis* assemblage consists of *Ceratiocaris cornwallisensis* Copeland, *C.* sp. cf. *C. stygia* Salter, *C.* sp., and undetermined eurypterids from Cornwallis, Bathurst, and Baillie-Hamilton Islands (with *Monograptus* sp. cf. *M. uncinatus* Tullberg, *M. tumescens* Wood, *M. nilssoni* (Barrande), *M. bohemicus* Barrande, *M. ultimus* Perner, and *Monograptus* n. spp. *P.* and *T.* of Thorsteinsson). The age of this assemblage is early to middle Ludlovian.

4. An upper, diverse, widespread assemblage consists of eurypterids and ostracodes of restricted and open marine environments from Devon, Prince of Wales, and Somerset Islands. These lack published graptolite dating and may presently be designated as latest Ludlovian or Downtonian. Their position, relative to the base of the Gedinnian, is uncertain. This heterogeneous arthropod assemblage commonly includes *Eurypterus* sp., *Stylonurus*? sp., *Leperditia gibbera* Jones, and *Beyrichia* (*B.*) *arctigena* Martinsson and is contained within strata of the basal Peel Sound, upper Read Bay, and Sutherland River Formations.

These gross, presently poorly defined assemblage zones require refinement before they can become truely usable stratigraphic tools. Their relationships with established graptolite lineages will remain of prime importance but their dependence on graptolite dating will become less pronounced as more stratigraphically refined arthropod genera and species, particularly Ostracoda, are studied and described.

Other eurypterids are described from Gasport-Goat Island and Bertie Formations, of southern Ontario and St. Leon Formation of Gaspé, Quebec. These provide additional information to that published by Copeland and Bolton (1960) and elsewhere.

SYSTEMATIC PALEONTOLOGY

EURYPTERIDA

Erieopterus phillipsensis n. sp.

Plate I, figure 2

Description. Species known from male specimen showing prosoma (without appendages), preabdomen, and anterior segments of postabdomen. Prosoma nearly twice as wide as long, rectangular, posterolateral angles obtuse, lateral sides with only slight forward convergence. Eyes unknown. Doublure (ventral shield) horseshoe-shaped, pustulose, lobate on inner side, without anterior suture, laterally with three or four pairs of transverse furrows, wrinkle (split?) parallel with anterior margin.

Preabdominal sternites pustulose, indistinct, wide, with epimeral spurs on posterior segments. Male operculum only partly preserved, broad, with parts of basal segment, lateral lobes, and (?) right distal blade.

Postabdominal segments narrower, also pustulose and with epimeral spurs. Telson unknown.

Remarks. The prosomal shape, non-sutured and lobate doublure, pustulose (not scale-like) ornamentation, and postabdominal constriction are typical of this genus. Average prosomal width at base: prosomal length for Silurian and Lower Devonian species of *Erieopterus* from North America range from 1.34 (*E. microphthalmus eriensis*) to 1.98 (*E. latus*). Similar measurements for *E. phillipsensis* n. sp. (assuming the right side of the prosoma is slightly displaced) are ca. 1.93 and more nearly similar to *E. latus* (Ruedemann, 1935) than other measured species. The prosoma of *E. latus* (Ruedemann), however, is semicircular in outline.

Occurrence. Northeast shore of Cornwallis Island, District of Franklin, *ca.* 75°37'30"N Lat., 94°33'W Long. From the type section of the Cape Phillips Formation at 4650 foot level of Thorsteinsson's stratigraphic column (1958, Fig. 4). Thorsteinsson states (personal communication, Nov. 14, 1967) "I now consider the graptolites and fish (with which the eurypterids are associated) to be early Wenlockian in age." Collected by R. Thorsteinsson.

Type. Holotype, GSC No. 24836.

Eurypterus remipes lacustris Harlan

Plate II, figures 3, 4

Remarks. This interesting specimen is uncrushed and undistorted. It is apparently less complete than a similarly preserved specimen in the Walker Museum, University of Chicago (U.C. 28988) reported by Kjellesvig-Waering (1958, p. 1127). The present specimen is curled dorsally (fig. 4),

the tergites contracted and strongly overlapping posteriorly, the sternites fully extended. Measurements, comparable to those of Kjellesvig-Waering (*ibid*: p. 1129) are not available. It appears that the specimen represents parts of three posterior preabdominal segments and the entire postabdomen. The specimen is 14.5 mm in depth anteriorly (segment 5), 8.5 mm deep medially (segment 9), and 9.4 mm deep posteriorly (pretelson). The anterior segments are uniformly convex in cross section, the tergites more highly arched; segment 10 is equally convex dorso-ventrally; and segments 11 and 12 show more ventral convexity, segment 12 being rounded triangular in cross section with a much accentuated venter. The dorsal impression of this specimen was also found (fig. 3).

Occurrence. George C. Campbell Company, Limited quarry at Ridgemount, 2 1/2 miles east of Stevensville, in lot 8, concession VIII, Bertie Township, Welland County, Ontario. In grey-brown massive dolomite of the Bertie Formation in talus from the floor of the quarry, presumably from 25 to 30 feet below the contact with the Devonian Bois Blanc Formation. Collected by T.E. Bolton, 1960.

Type. Hypotype, GSC No. 24837.

Eurypterus sp.

Plate I, figure 1

Remarks. The specimen shows the ventral aspect of the post-prosomal portion of a male individual. It is 37 cm long, the preabdomen, postabdomen, and telson each slightly more than 12 cm in length. The male genital appendage is indistinct but is presumed to be typical of the genus. There is a faint indication of a median suture crossing the abdominal plates. The first, second, and fourth postabdominal sternites and pretelson bear patches of rounded, crescentic scales of various sizes. The pretelson bears prominent, posteriorly directed, lateral spurs. The telson is carinated ventrally and appears to bear small lateral tooth-like projections near mid-length.

The presence of a carinated telson, crescentic scales, and lack of constriction of the metasoma restricts this specimen from inclusion in the other most nearly similar genera of the Eurypteridae, *Erieopterus* Kjellesvig-Waering and *Onychopterella* Størmer.

Occurrence. The same as that of *Erieopterus phillipsensis* n. sp. Collected by R. Thorsteinsson.

Type. Figured specimen, GSC No. 24838.

Carcinosoma sp. 1

Plate III, figure 3

Remarks. The only specimen is the obverse and reverse impressions of the tips of two walking limbs. Each limb bears its terminal end and two strong spines. This specimen is reminiscent of that described by Copeland (1962, p. 53, Pl. XII, fig. 1) from the Allen Bay Formation, Devon Island, District of Franklin.

Occurrence. St. Leon Formation, Upper Silurian, north side of Lac Ste. Anne-Murdochville highway, 10.4 miles east of Lac Ste. Anne bridge. Four feet above base of outcrop at west end of bridge over Lesseps Brook, Lesseps Township, Gaspé Nord County, Quebec. Collected by M.J. Copeland, 1966.

Type. Figured specimen, GSC No. 24833.

Carcinosoma? sp. 2

Plate I, figure 3

Description. Specimen representing only the 8th segment of appendage VI, 46.5 mm long, 19.4 mm in greatest width. Inner and outer margins (except for terminal segment) coarsely serrate.

Remarks. The blunt shape of this strongly developed paddle segment and its coarse marginal serration may indicate its similarity to species of *Carcinosoma* described by Clarke and Ruedemann (1912) from New York and Indiana. Similar specimens of Pterygotidae are distally more acuminate.

Occurrence. Colonel Grant collection, Hamilton, Ontario, "Clinton-Niagara", in grey, massive dolomitic limestone. It is assumed that the specimen was collected from Gasport-Goat Island strata of Niagaran age (Copeland and Bolton, 1969, p. 16) and may occur stratigraphically near *Pterygotus canadensis* Dawson, 1879. Collected by Col. C.C. Grant.

Type. Figured specimen, GSC No. 24834.

Stylonurus? sp.

Plate II, figures 1, 2

Eurypterids (part), Dineley, 1965, p. 97; 1966a, p. 275; 1966b, p. 12.

Remarks. The obverse and reverse impressions of a small stylonurid are preserved as pink "ghosts" in a lighter pink, slightly calcareous and dolomitic mudstone. Little except the somewhat indistinct lateral outline of the specimen is visible. The prosoma appears subquadrate, somewhat flat or "squared-off" anteriorly. The location of the eyes are unknown but may be in the posterior half of the prosoma if a depression in that region (fig. 2) is thus interpreted. The posterior three pairs of legs are preserved in part, the last two greatly elongated, and the last one extending posteriorly to near mid-length of the telson. The opisthosoma may be somewhat trilobate but otherwise appears undifferentiated.

Few of the criteria considered by Kjellesvig-Waering (1966) as distinguishing among the Stylonuracea may be applied here. Those questionably referable to this specimen are: the subquadrate (?) outline of the appearance of the opisthosoma, and the very doubtful posterior position of the eye. Until additional specimens are available this specimen is considered only questionably as belonging to the genus *Stylonurus*.

Occurrence. "Gully at southwest end of beach at Pressure Point, north coast of Somerset Island, District of Franklin. Within basal 70 feet of Peel Sound Formation. Associated vertebrates suggest Downtonian age, lower Old Red Sandstone." Collected by D.L. Dineley, July, 1964.

Type. Figured specimen, GSC No. 24835.

PHYLLOCARIDA

Ceratiocaris cornwallisensis Copeland

Plate I, figure 4; Plate III, figure 4; Plate IV

Remarks. This is the first occurrence of specimens of this species from western Cornwallis Island. Two are preserved with carapaces and abdominal segments; a trace of thoracic segments, without appendages, is possibly present on one. The thoracic and abdominal portions of both are displaced.

One specimen (Pl. IV) shows the thoracic portion sagged from its dorsal position; cusps of the mandibular teeth form small elevations dorsal to the presumed anterior thoracic segment. The style and 5 (?) posterior abdominal segments occur nearly in original position, the seventh abdominal segment appears to be longer than usual. The other specimen (Pl. III, fig. 4) is slightly smaller and shows only the carapace, five posterior abdominal segments, and style. The posterior segments are preserved outside the carapace and are upside down in relation to it. The dorsal margin of the carapace is slightly distorted but the posterior hinge node and anterior process (carapace horn) are distinguishable. The third specimen shows only the carapace, anteriorly broken.

Occurrence. Cape Phillips Formation, Western Cornwallis Island, north side of Abbott River, about 7.5 miles east of Midshipman Bay near axis of Abbot River Syncline. Specimens associated with *Monograptus bohemicus* of early Ludlow age. This species apparently ranges throughout the Lower Ludlow, having been found associated with *M. nilssoni*, *M. bohemicus*, and *M. tumescens*. Collected by R. Thorsteinsson.

Types. Hypotypes, GSC Nos. 24839-24841.

OSTRACODA

Leperditia gibbera Jones

Plate III, figures 1, 2

Remarks. Several specimens of this large leperditiid were obtained from Baring Channel, Prince of Wales Island. They are not as triangular in lateral view as those shown by Jones (1856). This is a true *Leperditia*, the left valve bearing a pronounced, elongate, dorsal ridge; the right valve overlaps along the entire free margin. The surfaces of the valves are finely tuberculate, and bear anterior and posterior marginal borders.

The chevron scar is near to and directly beneath the prominent "eye" tubercle. It consists of several elongate scars delimiting the ventral margin of the field and enclosing a few, nearly circular ones. The adductor scar is large, ovate, and consists of large triangular to polygonal scars.

Occurrence. Northern coast of Prince of Wales Island, on south shore of Baring Channel in strata of the Peel Sound Formation. Collected by D.S. Broad.

Types. Hypotypes, GSC Nos. 24842, 24843.

Beyrichia (Beyrichia) arctigena Martinsson

Plate III, figures 5-13

Remarks. Martinsson's (1960) original description of this species was based on five incompletely preserved, silicified specimens from the Sutherland River Formation, Prince Alfred Bay, Devon Island. Those figured here are also silicified but are more perfectly preserved, permitting their measurement as shown on the accompanying diagram (Fig. 1). The original description is accurate and requires no additional clarification.

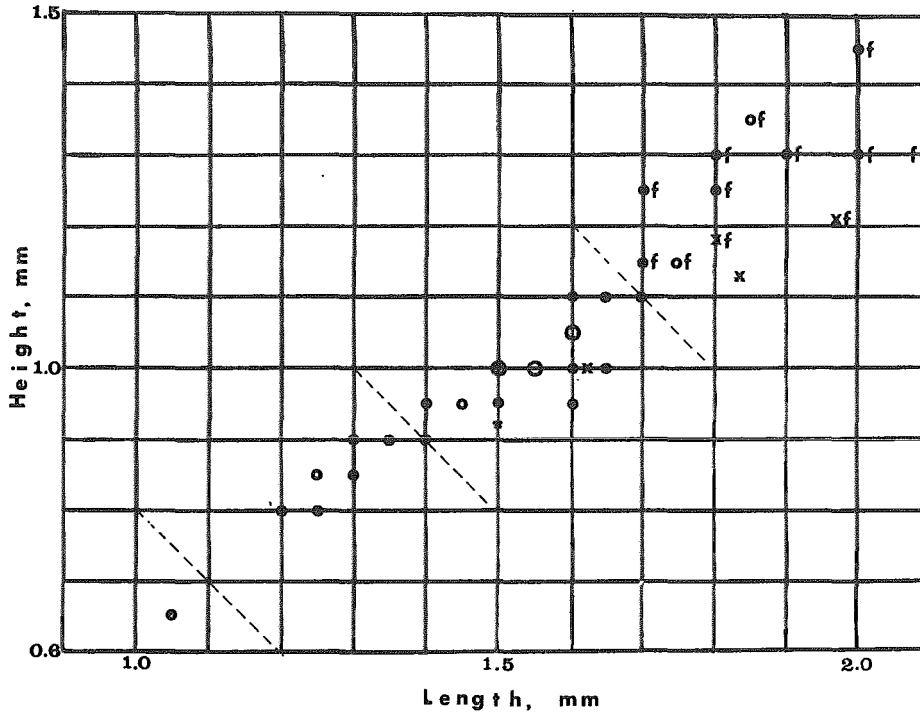

Figure 1: Scatter diagram of maximum height and length of sixty specimens of *Beyrichia (Beyrichia) arctigena* Martinsson from GSC locality 50758.

Occurrence. Figured specimens from undifferentiated Read Bay-Peel Sound Formations, GSC locality 50758, Cape Smith Bay, Prince of Wales Island, 73°16'N; 100°05'W; collected by R.L. Christie, 1962. Other specimens are from the Read Bay Formation of Devon Island, north of the east end of Beechey Island and on the highest hill north of Cape Innes, both collections by H. Griener.

Types. Hypotypes, GSC Nos. 24844, a-e; 24845, a,b; 24846 unfigured (52 specimens).

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Plates I to IV

for Part II

PLATE I

Figure 1 *Eurypterus* sp.
Ventral view of a male specimen; X0.5. Northeast shore of Cornwallis Island, 75°37'30"N, 94°33'W. Fig. spec., GSC No. 24838.

Figure 2 *Erieopterus phillipsensis* n. sp.
Ventral view of a male specimen; X1.7. Northeast shore of Cornwallis Island, 75°37'30"N, 94°33'W. Holotype, GSC No. 24836.

Figure 3 *Carcinosoma*? sp. 2
Paddle of appendage VI; X1. Hamilton, Ontario from Gasport-Goat Island Formations. Fig. spec., GSC No. 24834.

Figure 4 *Ceratiocaris cornwallisensis* Copeland
Carapace; X1. Western Cornwallis Island, north side of Abbot River. Hypotype, GSC No. 24839.

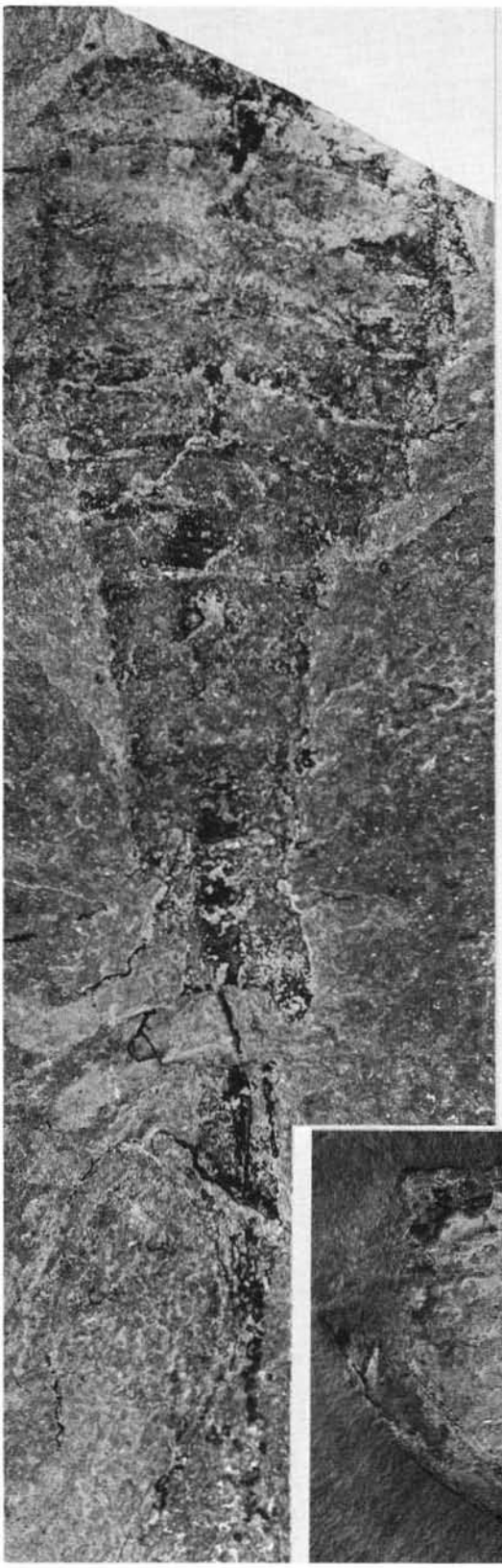

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PLATE II

Figures 1, 2 *Stylonurus*? sp.
Obverse and reverse impressions of a specimen, X0.45 and 0.8; from gully at southwest end of beach at Pressure Point, north coast of Somerset Island. Fig. spec., GSC No. 24835.

Figures 3, 4 *Eurypterus remipes lacustris* Harlan
Uncrushed specimen and dorsal impression, X1; Campbell Quarry, lot 8, con. VIII, Bertie Township, Welland County, Ontario. Hypotype, GSC No. 24837.


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PLATE III

Figures 1, 2 *Leperditia gibbera* Jones
Right and left valves, X2; south shore Baring Channel, Prince of Wales Island. Hypotypes, GSC Nos. 24842, 24843.

Figures 3 *Carcinosoma* sp. 1
Impression of the tips of two walking limbs, X1; bridge over Lesseps Brook, Lesseps Township, Gaspé Nord County, Quebec. Fig. spec., GSC No. 24833.

Figure 4 *Ceratiocaris cornwallisensis* Copeland
Carapace and posterior abdominal segments, X1; same locality as Plate I, fig. 4. Hypotype, GSC No. 24840.

Figures 5-13 *Beyrichia (Beyrichia) arctigena* Martinsson
5-7, 9-11. Five tecnomorphic valves, X15. Hypotypes, GSC Nos. 24844, a-e. 8,12,13. Three heteromorphic valves, X15. Hypotypes, GSC Nos. 24845, a,b. All from Cape Smith Bay, Prince of Wales Island, 73°16'N, 100°05'W.

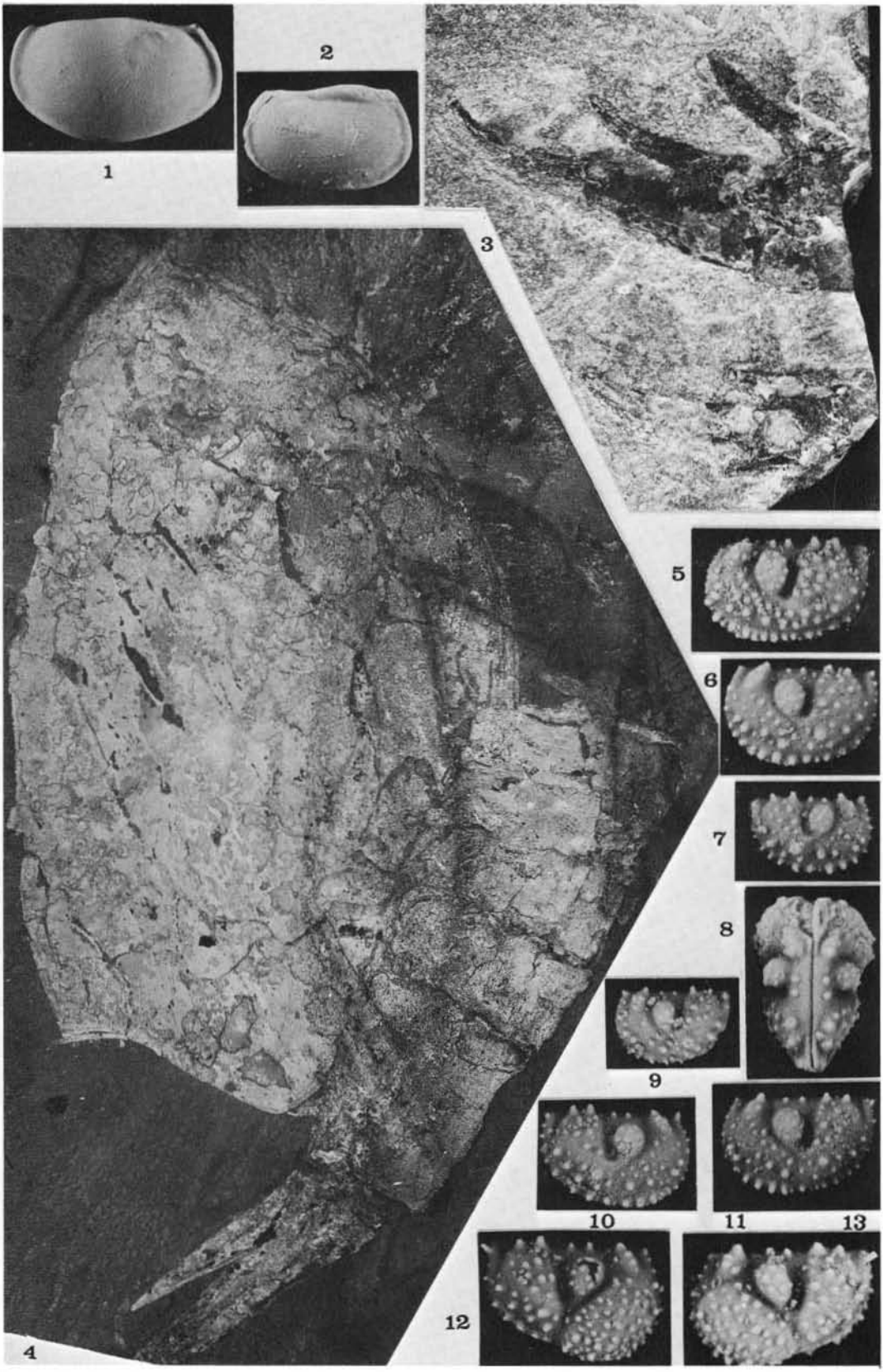
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PLATE IV

Ceratiocaris cornwallisensis Copeland
Nearly complete specimen, X1; same locality as Plate I, figure 4. Hypotype, GSC No. 24841.

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