



GEOLOGICAL SURVEY OF CANADA  
COMMISSION GÉOLOGIQUE DU CANADA

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**BULLETIN 275**

**EARLY PALEOZOIC OSTRACODA FROM  
SOUTHWESTERN DISTRICT OF MACKENZIE  
AND YUKON TERRITORY**

M. J. Copeland



Energy, Mines and  
Resources Canada

Énergie, Mines et  
Ressources Canada

1977

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Available by mail from

Printing and Publishing  
Supply and Services Canada  
Ottawa, Canada K1A 0S9

and from

Geological Survey of Canada  
601 Booth Street  
Ottawa, Canada K1A 0E8

or through your bookseller

A deposit copy of this publication is also available  
for reference in public libraries across Canada

Cat. No. M42-275 ISBN 0-660-00813-0

Price: Canada: \$4.50

Other countries: \$5.40

Price subject to change without notice

Critical Reader  
A. W. NORRIS

Editor  
MARK KENNEDY

Text printed on Georgian offset, smooth (brilliant white)  
Set in Times Roman with News Gothic captions  
by SOUTHAM MURRAY, TORONTO

Artwork by CARTOGRAPHIC UNIT, GSC

1,300-1977-6645-7



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## PREFACE

The early Paleozoic sedimentary rocks of northwestern Canada comprise two contemporaneous lithological successions, one primarily of clastic and the other of carbonate composition. The clastic Road River belt represents the deeper marine environment of deposition lying seaward of the shallow marine, presumably nearshore carbonate belt. The zone separating the clastic and carbonate facies fluctuated within broad limits from Cambrian to Early Devonian time.

Late Ordovician, Silurian and Early Devonian ostracodes, commonly silicified, occur in rocks of both depositional belts, thereby permitting correlation between markedly dissimilar rock types. They are the oldest known ostracode faunas from northwestern Canada and their identification and description constitute the initial phase in the establishment of these microfaunas as a reliable biostratigraphic tool for determining the early Paleozoic biogeography of the area.

Detailed studies of faunas such as these are valuable in establishing stratigraphic control and in calibrating the geological time scale. They are particularly useful in northwestern Canada where active exploration for stratabound mineral deposits is presently taking place.

*D.J. McLaren*  
Director General  
Geological Survey of Canada

Ottawa, 9 January 1976





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# EARLY PALEOZOIC OSTRACODA FROM SOUTHWESTERN DISTRICT OF MACKENZIE AND YUKON TERRITORY

## Abstract

Early Paleozoic strata of the Cordilleran clastic and carbonate belts are widely distributed throughout northwestern North America. They contain varied, silicified late Ordovician, Late Silurian and Early Devonian ostracode faunas that may serve as a basis for correlation in southwestern District of Mackenzie, central Yukon Territory and eastern Alaska.

Three Middle Ordovician, Whiterockian to Trentonian ostracode assemblages have been previously reported from southwestern District of Mackenzie in strata of the carbonate belt. These are equated to the North American *Orthidiella*-*Goniotelina*, *Mimella* and *Hesperorthis-Oepikina* biostratigraphic assemblages. A fourth assemblage, of Late Ordovician Maysvillian age and equated to the *Cryptolithus-Anataphrus* fauna, is described here from the Road River clastic belt. It contains six taxa of which one is new. These assemblages may be correlated with others from Oklahoma, Virginia and midcontinental North America and demonstrate a late Ordovician North American transgressive faunal sequence.

Ostracode assemblages of Late Silurian and Early Devonian age are present in both clastic and carbonate belts throughout the region. The earlier, cosmopolitan Wenlockian-Pridolian assemblages are of common occurrence locally, especially in the clastic belt, and display a beyrichiacean-bairdiacean fauna of Eurasian aspect. The later, more provincial Siegenian-Emsian assemblage of relict beyrichiaceans and ancestral hollinaceans, may be equated, in general, with the *Monograptus yukonensis* Zone. This assemblage marked a late phase of Early Paleozoic clastic deposition in the Cordilleran area and established a hollinid fauna that, during the Middle Devonian, flourished in midcontinental North America. More than 90 ostracode genera are known from these Siluro-Devonian strata; of these, 116 taxa are recorded here, including 2 new genera and 37 new species.

## Résumé

Les couches du Paléozoïque inférieur qui constituent les zones clastiques et carbonatées de la Cordillère sont largement distribuées dans tout le nord-ouest de l'Amérique du Nord. Elles contiennent des faunes d'ostracodes silicifiés datant de l'Ordovicien supérieur, du Gothlandien supérieur et du Dévonien inférieur; ces faunes peuvent constituer la base d'un système de corrélations dans le sud-ouest du district de Mackenzie, le centre du Yukon et l'est de l'Alaska.

L'existence de trois ensembles d'ostracodes datant de l'Ordovicien moyen, (du Whiterockien au Trentonien) a déjà été indiquée dans le sud-ouest du district de Mackenzie dans les couches de la zone des roches carbonatées. Ils correspondent aux ensembles biostratigraphiques nord-américains de *Orthidiella*-*Goniotelina*, *Mimella* et *Hesperorthis-Oepikina*. L'auteur décrit ici un quatrième ensemble, du Maysvillien (Ordovicien supérieur) provenant de la zone des roches clastiques de Road River et qui correspond à la faune de *Cryptolithus-Anataphrus*. Il comporte six taxons, dont un nouveau. On peut établir la corrélation entre ces ensembles et d'autres ensembles rencontrés en Oklahoma, en Virginie et au centre du continent nord-américain, ce qui montre qu'il y a eu, vers la fin de l'Ordovicien supérieur, en Amérique du Nord, une série de faunes de transgression.

Les ensembles d'ostracodes datant du Silurien supérieur et du Dévonien inférieur sont présents partout dans la région dans les zones de roches carbonatées comme dans les zones de roches clastiques. Les ensembles cosmopolites plus anciens, du Wenlockien-Pridolien sont très communs par endroits, en particulier dans la zone de roches clastiques, et présentent une faune du type beyrichiacéen-bairdiacéen d'aspect eurasiatique. Les ensembles plus récents et plus provinciaux du Siegenien-Emsien, constitués de reliques du type beyrichiacéens et d'hollinacés ancestraux, peuvent être mis en corrélation, en général, avec la zone à *Monograptus yukonensis*. Cet ensemble marque une phase tardive des dépôts clastiques du Paléozoïque inférieur dans la région de la Cordillère et établit une faune d'hollinidés qui, pendant le Dévonien moyen, était florissante au centre du continent nord-américain. Plus de 90 genres d'ostracodes sont connus dans ces couches du Silurien-Dévonien; parmi elles l'auteur relève 116 taxons, dont 2 nouveaux genres et 37 espèces nouvelles.

## Introduction

Stratigraphically important Early Paleozoic ostracode faunas have been described from two regions of western North America: the state of Nevada (Berdan, *in* Gilluly and Masursky, 1965; McClellan, 1973) and the Yukon-Mackenzie rivers area of United States and Canada. In the latter region sufficient ostracode collections are now available on which to base a preliminary and partial zonation embracing strata of Middle Ordovician to Early Devonian ages. Recent discoveries of Ostracoda in eastern Alaska by members of the United States Geological Survey (Churkin

and Brabb, 1968) and Yukon Territory-southwestern District of Mackenzie by A. C. Lenz, R. Ludvigsen and D. G. Perry of University of Western Ontario permit development for the first time of an ostracode succession containing both North American and European faunal elements. Once established, this ostracode zonation could prove of as much value for comprehending the Lower Paleozoic stratigraphy of this vast region of western North America as those of the megafossil groups upon which this preliminary ostracode succession is now dependent. Development of our understanding of the faunal and facies relationships that existed between Ostracoda and other groups of fossils should be of major importance in our search for petroleum, natural gas and metallic mineral resources throughout the region.



Establishment of such a zonation is dependent on the determination and description of ostracode faunas and the documentation of their occurrences and faunal associations. Much of the present work is descriptive because many ostracode genera discussed here are reported from North America for the first time and their taxonomies have been under investigation by ostracode micropaleontologists from this continent for only the last few years. North American or European faunal affinities of numerous taxa, however, permit regional correlation or assessment of intercontinental paleobiogeography. The resulting ostracode distribution patterns appear in general to agree with those of most other fossil groups.

Investigations of Lower Paleozoic ostracode faunas from western North America have been greatly facilitated by the discovery, in the state of Nevada and the Yukon-Mackenzie rivers region, of localities from which numerous silicified ostracode specimens have been obtained. These usually retain much fine valve structure that permits detailed examination and description. Brachiopod and trilobite specimens are similarly preserved at many localities and, together, are most useful in determining the age of the beds in which the previously undescribed ostracodes occur.

In the present paper, six Late Ordovician ostracode species are reported together with 116 species of late Wenlockian to early Emsian ages. They were obtained from 11 stratigraphically collected sections and 13 miscellaneous collections (*see* Locality Register and Ostracode Occurrences) scattered generally in three areas throughout a longitudinal distance of about 500 miles. Although some of the species

are known as yet from only one collection or locality, many are widely distributed and the generic similarity of the ostracodes suggests their approximate ages with a degree of certainty. The species described here may serve as a basis for widespread correlation within northwestern Canada, Alaska and much of the Canadian Arctic Archipelago. Some taxa are similar to described species from northern and eastern Europe and U.S.S.R. and may serve to indicate routes of migration during the Early Paleozoic.

The author is grateful to A. C. Lenz, University of Western Ontario, for specimens from four collections from Royal Creek sections I and II, Yukon Territory. R. Ludvigsen, University of Toronto, kindly provided ostracodes of Upper Ordovician age from Blackwolf Mountain, District of Mackenzie (loc. 12). Special thanks are extended to D. G. Perry (Oregon State University) for initiating this work by submitting the many ostracode collections that were obtained during his doctoral research at the University of Western Ontario and eight collections from Lenz' Royal Creek sections I and II. Without access to those specimens and information on his detailed sections (I to IX) and other collections this work could not have been accomplished.

The systematic part of this paper has been critically reviewed at several stages of preparation by J. M. Berdan, United States Geological Survey. Without her help and knowledge, particularly of European and Asiatic U.S.S.R. literature, the study would have been much more difficult. Our original research in this region (Berdan and Copeland, 1973) provided the background on which much of this study is based.

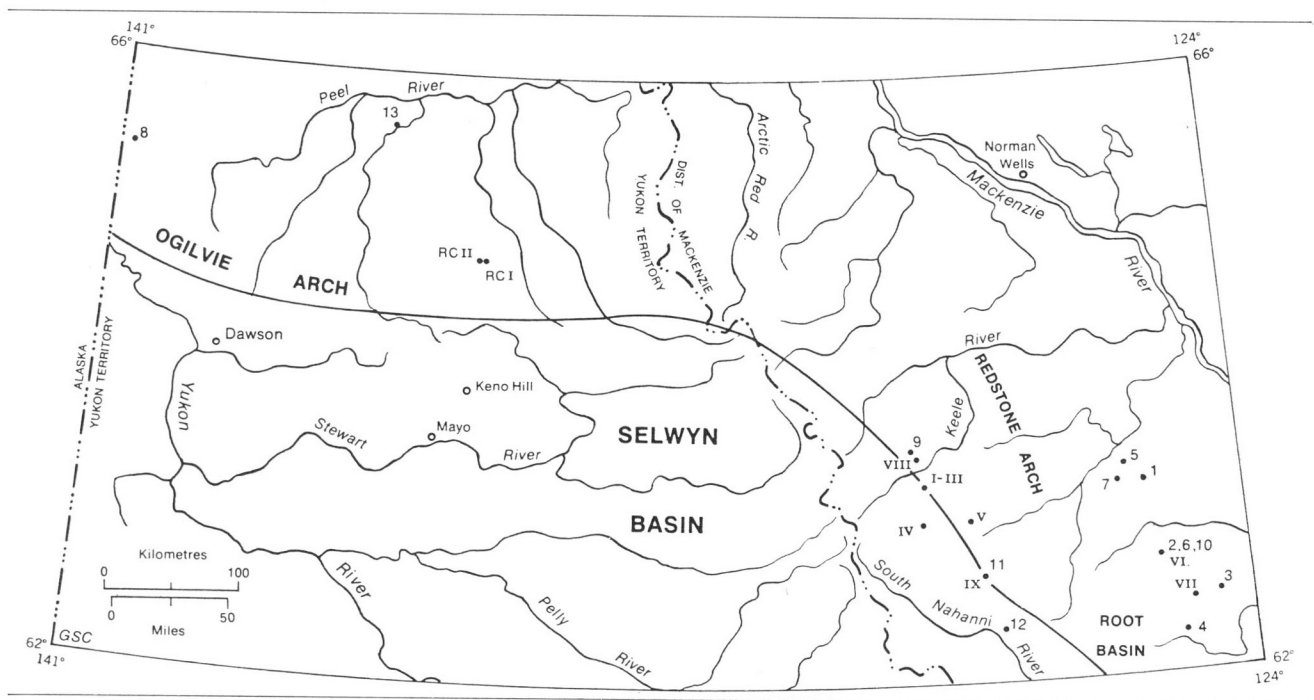


Figure 1. Map of southern Yukon Territory and southwestern District of Mackenzie, showing geographic positions of sections (I-IX, RC-I, RC-II) and localities (1-13) from which ostracodes were obtained, and geological features referred to in

text. Solid line marks the approximate position of equal thicknesses of Ordovician-Early Devonian clastic (south and west) and carbonate (north and east) rocks.

## Geological Setting

Depositional framework of the northern Cordillera has been illustrated by Norford (1964), Gabrielse (1967), Norris (1968) and Lenz (1972). The major areas from which the present ostracode faunas were obtained are there defined as Root Basin and Selwyn Basin along the western flank of Redstone Arch and southern flank of Ogilvie Arch. A thick sequence of carbonate rocks was deposited throughout these areas during Early and Middle Ordovician (Sunblood, Esbataottine [unnamed formation in Copeland, 1974b] and lower Whittaker formations) and continued to be deposited in Root Basin and on Redstone Arch (upper Whittaker and Delorme formations) until well into the Devonian. Along the western flank of Redstone Arch and southern flank of Ogilvie Arch, however, great thicknesses of post-Middle Ordovician, fine-grained clastic rocks (shales of Road River Formation) were deposited. The hypothetical transition zone marking this sometimes abrupt facies change in eastern and northern Selwyn Basin is shown as a solid line in Figure 1. This zone fluctuated over a considerable distance throughout the Upper Ordovician to Middle Devonian (Gabrielse, 1967, Figs. 6-9; Ludvigsen, 1975, Fig. 10).

## Correlation and Ostracode Assemblages

Correlation between Root Basin and Selwyn Basin is presented by Ludvigsen (1975, Fig. 7) for Lower Paleozoic rocks and by Gabrielse (1967, Table I) for the Cambrian to Mississippian sequence. In addition, Gabrielse (1967) related rocks of Richardson Trough (northern Yukon Territory) with those already mentioned. These three areas of deposition contain the ostracode fauna described by Berdan and Copeland (1973), Copeland (1974) and the present paper.

### Ordovician ostracode assemblages

Ludvigsen (1975) recognized nine Ordovician biostratigraphic units in rocks flanking Redstone Arch in eastern Selwyn Basin and Root Basin. These units, of Canadian to Maysvillian ages, are contained within the Broken Skull, Sunblood, Esbataottine, lower Whittaker and Road River formations. Ostracoda have been recovered from all but the Broken Skull (Canadian) Formation and four assemblages of North American aspect have been distinguished (Fig. 2).

Three Middle Ordovician assemblages occur along the southern and eastern flanks of Redstone Arch (Ludvigsen, 1975, Fig. 8, sections G to R; Copeland, 1974) east of the clastic-carbonate transition zone. The oldest is typified by *Bivia bivia* (White) and *Cryptophyllus magnus* (Harris) from the lower Sunblood Formation. This Whiterockian assemblage corresponds with Ludvigsen's *Orthidiella*-*Gonioteatina* fauna. The intermediate assemblage, of Porterfield age, contains *Bolbopisthia ludvigseni* Copeland, a primitive tetradellid, *Tetradella perplexa* Copeland, and the youngest known bradorinid *Ludvigsenites mackenziensis* Copeland, among others. This corresponds with Ludvigsen's *Mimella* fauna, found in the lower part of the Esbataottine Formation. The youngest Middle Ordovician assemblage, from the lower Whittaker Formation, contains such forms as

*Bolbopisthia lenzi* Copeland, *Ceratopsis quadrifida* (Jones) of Wilderness age and *Oepikium* sp. of Barneveld affinities. These latter two species are widespread in northern North America and correspond to the *Doleroides* and lower part of the *Strophomena-Ceraurus* faunas of Ludvigsen.

A Late Ordovician ostracode assemblage was recovered by Ludvigsen in strata of the Road River Formation from Blackwolf Mountain (herein loc. 12; Ludvigsen, 1975, Fig. 1, loc. 7 and p. 691) in Selwyn Basin along the western flank of Redstone Arch. Six species are present, five of which are similar to species from the Maysvillian Maquoketa Formation of Missouri and Iowa; the sixth, *Platylbolbina* (*Reticulobolbina*) *lenzi* n. sp., belongs to a subgenus recorded from Europe. This is the only Ordovician ostracode assemblage that is presently known to occur within the area of clastic sedimentation west of the transition zone and is assigned by Ludvigsen (1975, p. 691) to the *Cryptolithus-Anataphrus* fauna.

Alter Ludvigsen, 1975		After Copeland, 1974 and this paper
Biostratigraphy		Ostracode Biostratigraphy
Edenian-Maysvillian	?	?
	Bighornia-Thaerodonta	Platylbolbina ( <i>Reticulobolbina</i> ) <i>lenzi</i>
	Strophomena-Ceraurus	
	Cryptolithus	
	Anataphrus	
Trentonian	?	Oepikium sp.
	Hesperornis	Ceratopsis <i>quadrifida</i>
	Oeplina	<i>Bolbopisthia lenzi</i>
Blackriveran	Doleroides	
Chazyan	Mimella	<i>Bolbopisthia ludvigseni</i>
	Bathyrus 1	<i>Tetradella perplexa</i>
Whiterockian	Orthidiella-Gonioteatina	<i>Eoleperditia bivia</i>
		<i>Cryptophyllus magnus</i>

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Figure 2. Post-Canadian Ordovician benthonic fauna and ostracode biostratigraphy, South Nahanni River area, southwestern District of Mackenzie.

*Siluro-Devonian ostracode assemblages*

No leperditicoid ostracodes have been recovered from acid residues of rocks studied during the present investigation; however, a few calcareous specimens of Silurian age have been reported from elsewhere in Yukon Territory (Norford, 1964; Copeland, 1966). In Iltyd Range, northern Yukon Territory, *Leperditia* cf. *L. scalaris* Jones is associated in the *Monograptus nilssoni* Zone with the early Ludlovian brachiopod *Conchidium alaskensis* Kirk and Amsden. A similar age is postulated for specimens of *Hogmochilina illtydensis* Copeland in stratigraphically equivalent beds elsewhere in that area. A mixed North American-Asian leperditiid assemblage is present in the upper Vunta Formation of White Mountains, Yukon Territory. There, the North American Niagaran species *Leperditia hisingeri egena?* Jones occurs with the Siberian late Llandoveryan leperditiid *Gibberella* cf. *G. jejuma* Abushik about 120 ft below the upper limit of the formation. Eighty feet higher in the formation an early Ludlovian species *Leperditia* cf. *L. lumaea* Abushik, also recorded from Siberia, occurs with a bizarre leperditiid, *Yukopsis jobi* Copeland.

Silicified palaeocopid and podocopid Ostracoda were obtained from 11 sections and 12 miscellaneous collections of Late Silurian-Early Devonian strata in Yukon Territory and District of Mackenzie. These faunas occur principally in three geographic areas: Royal Creek, Yukon Territory, eastern Selwyn Basin, and Root Basin, District of Mackenzie.

For the purpose of the present report, these areas are well situated because they lie on either side of and astride the lithological transition zone of Selwyn Basin. Their locations permit biostratigraphic evaluation of ostracode faunas from both clastic and carbonate facies and correlation between these facies. Unfortunately, such has not as yet proved possible for Ordovician strata of the same region.

Four ostracode assemblages are separable in the limited number of Late Silurian-Early Devonian collections available. Distribution of some of their species is probably limited by lithological constraints but many stratigraphically useful species occur in two or more areas. The occurrence of these ostracodes within the 11 stratigraphically collected sections is shown in Figures 3-6. Those of Royal Creek sections I and II are assigned as Road River Formation; the beds in which they occur, however, are transitional between Road River and Prongs Creek formations (Klapper, 1969; Lenz and Pedder, 1972; Pedder, 1975) and reflect intertonguing of platform carbonate rocks and graptolitic deeper water shale. A similar paleogeographic setting is demonstrated for ostracode assemblages of eastern Selwyn Basin by the presence of platform carbonate strata of Delorme Formation (sections I-III) in close proximity to the south with graptolitic shale of Road River Formation. In Root Basin (sections VI, VII) ostracode assemblages occur in platform carbonate rocks of the upper Whittaker and lower Delorme formations; these, locally graptolite-bearing

	After Berdan and Copeland, 1973 (in part)		This paper			
	Richardson Trough Yukon Territory	Eagle Quadrangle Eastern Alaska	Royal Creek Yukon Territory	Eastern Selwyn Basin District of Mackenzie	Root Basin District of Mackenzie	
EMSIAN	_____ ? _____	Beyrichiid-Hollinid assemblage	Beyrichiid-Hollinid assemblage	_____ ? _____		
SIEGENIAN	Beyrichiid-Hollinid assemblage					Beyrichiid-Hollinid assemblage
GEDINNIAN	_____ ? _____					
	<i>Berdanopsis royalensis</i>		<i>Berdanopsis royalensis</i>			
PRIDOLIAN				<i>Berdanopsis royalensis</i>		
LUDLOVIAN			<i>Abditoloculina trilocolata</i> <i>Tricornina</i> ( <i>T.</i> ) <i>navicula</i> <i>Beyrichia</i> ( <i>B.</i> ) <i>henningsmoeni</i> <i>Processobairdia delormensis</i>	<i>Abditoloculina trilocolata</i> <i>Tricornina</i> ( <i>T.</i> ) <i>navicula</i> <i>Processobairdia delormensis</i>		<i>Beyrichia</i> ( <i>B.</i> ) <i>henningsmoeni</i> <i>Tricornina</i> ( <i>T.</i> ) <i>navicula</i> <i>Processobairdia delormensis</i>
WENLOCKIAN			<i>Undulirete mackenziensis</i> <i>Cornikloedenina lorangerae</i>	<i>Undulirete mackenziensis</i> <i>Cornikloedenina lorangerae</i>		

GSC

Figure 3. Biostratigraphic zonation of Siluro-Devonian ostracodes, southwestern District of Mackenzie, southern Yukon

Territory and eastern Alaska. (Blank areas indicate strata missing or ostracodes lacking or unavailable.)

formations, may be distinguished by changes in colour on weathered surfaces.

*Royal Creek.* The most extensively documented Siluro-Devonian sections in Yukon Territory are those at Royal Creek (Lenz and Pedder, 1972). Thirty-one species of ostracodes were obtained by A. C. Lenz and D. G. Perry from two Royal Creek sections (RC-I and RC-II) and their ages are well established by the associated megafauna (Lenz and Pedder, 1972; Klapper, 1969). Together, these sections

provide a relatively complete ostracode succession of late Ludlovian to Emsian ages (Fig. 4).

The basal 20 ft of RC-II yields a Ludlovian ostracode assemblage with *Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) henningsmoeni* McGill and *Processobairdia delormensis* n. sp. These species are widespread in strata of Ludlovian age throughout the area under consideration. Two hundred feet higher in RC-II, in beds assigned as Pridolian, *Abditoloculina trilocolata* n. sp. and *Tricornina* (*Tricornina*) *navicula* Bouček are

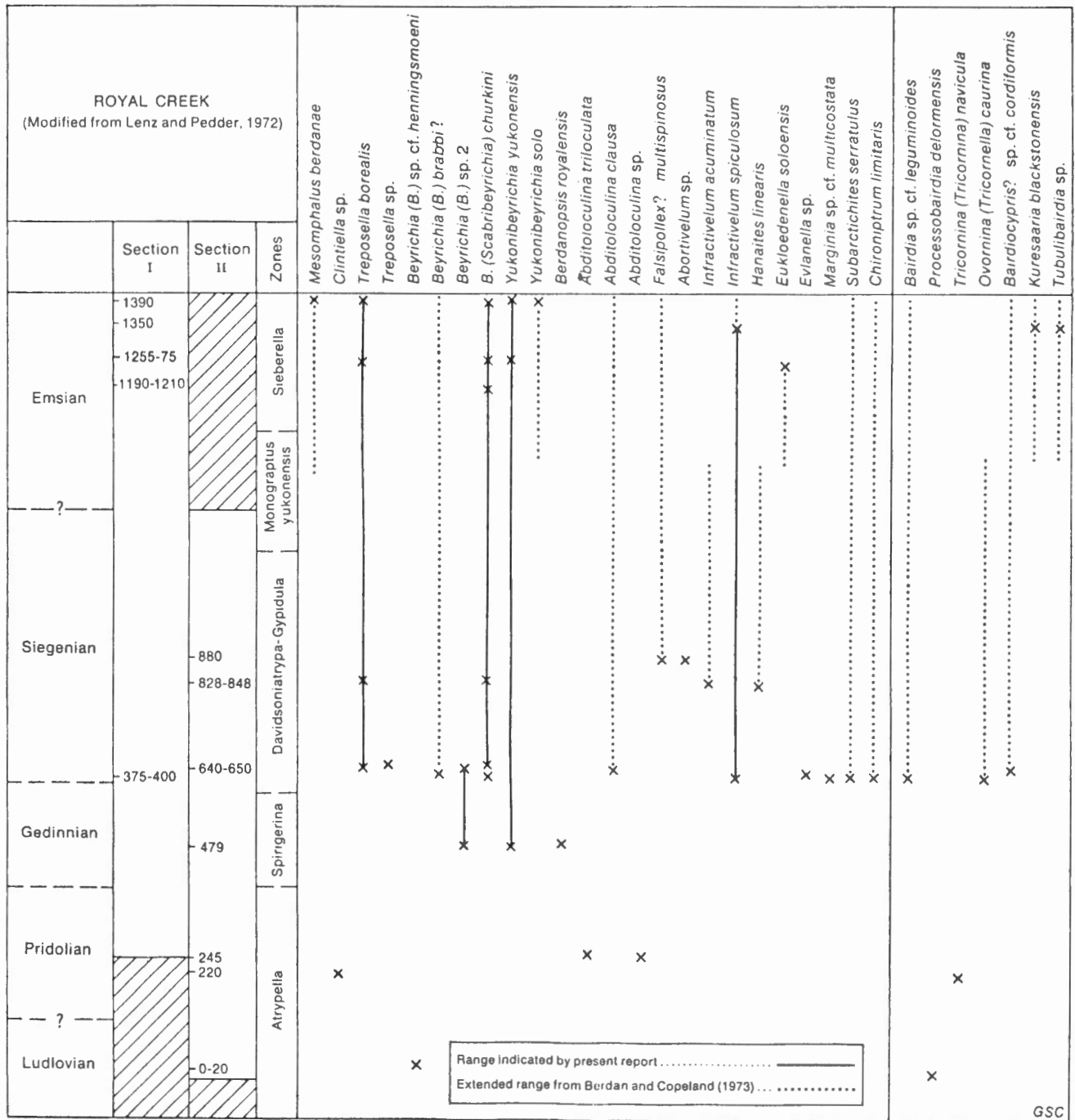


Figure 4. Stratigraphic occurrence of Silurian and Devonian ostracodes, Royal Creek sections I and II, Yukon Territory.





this section. The age of the recurrence of this ostracode assemblage, 800 ft above its first appearance in RC-I, is in accord with the late Emsian age postulated by Berdan and Copeland (1973) for the beyrichiid-hollinid ostracode assemblage of the limestone and shale member of the McCann Hill Chert of eastern Alaska.

*Root Basin.* Calcareous strata of sections VI and VII in Root Basin yielded 28 species of Ostracoda of early Ludlovian (possibly late Wenlockian) to Gedinnian ages (Fig. 5). Two ostracode assemblages are present, the older Late Silurian and the younger Early Devonian. The Late Silurian assemblage is found within the upper 50 ft of the Whittaker Formation and lower 700 ft of the Delorme Formation in section VI and at localities 2, 7 and 10. Diagnostic species of this assemblage are *Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) henningsmoeni* McGill, *Processobairdia delormensis* n. sp., *Tricornina* (*Tricornina*) *navicula* Bouček (three species that occur at Royal Creek), *Cornikloedenina lorangerae* n. sp., *Undulirete mackenziensis* n. sp., *Ovornina* (*Tricornella*) *perryi* n. sp., *Acanthoscapha subnavicula* Abushik and *Acanthoscapha* sp. cf. *A. decurtata* (Bouček). The two latter species have been previously recorded from strata of Ludlovian age in central Asia and Bohemia respectively.

The younger (Gedinnian) ostracode assemblage from Root Basin occurs several hundred feet higher in the Delorme Formation in section VII and at locality 5. It bears *Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) arctigena* Martinsson and *Berdanopsis royalensis* n. sp., species that are widespread throughout northern and northwestern Canada.

*Eastern Selwyn Basin.* Eighty-three ostracode species of Late Wenlockian or possibly Early Ludlovian to Siegenian ages were obtained from seven sections (I to V, VIII, IX) and two localities (9 and 11) along the western flank of Redstone Arch (Fig. 6). There, situated astride the lithological transition zone of eastern Selwyn Basin, fine-grained clastic rocks of Road River Formation may be as young as Siegenian (sections III and IV) and calcareous strata of Delorme Formation as old as Ludlovian (sections V, VIII, IX). Some intermingling of ostracode faunas from both lithological provinces is evident in this area but the true extent to which this occurs is uncertain as ostracodes have been obtained from only four localities in the Road River Formation.

Within the clastic facies of the Road River Formation, prominent late Wenlockian and/or Ludlovian ostracodes are *Processobairdia delormensis* n. sp., *Beyrichia* (*Beyrichia*) sp. 1, *Cornikloedenina lorangerae* n. sp., *Pintopsis* sp. and *Welleriella sekwiensis* n. sp. Of these, only the latter species is presently known from strata of Ludlovian age in Delorme Formation of this area. As in Root Basin and Royal Creek sections, however, also present in Delorme Formation are the Ludlovian species *Berdanopsis ursensis* n. sp., *Undulirete mackenziensis* n. sp., *Tricornina* (*Tricornina*) *navicula* Bouček and *Ovornina* (*Tricornella*) *perryi* n. sp.

The youngest ostracode collection of Road River Formation in eastern Selwyn Basin (B-1350T) occurs in section II. This is considered by Perry (1974) as late Ludlovian or early Pridolian on the basis of brachiopod and fish remains (fish information from R. Thorsteinsson) and some of the ostracode fauna may equally well indicate a late

Ludlovian age. Eight ostracode species present in older strata of the Delorme Formation occur in this collection, together with other Ludlovian elements such as "*Acanthoscapha*" sp. cf. "*A.*" *alata* Abushik, previously reported from central Asia, and *Libumella* sp. cf. *L. ambigua* (Lundin) which occurs in the Henryhouse Formation of Oklahoma. However, numerous ostracode taxa previously unrecorded from North America are also present, making an exact age determination of this collection within the Late Silurian somewhat doubtful.

No definitive Gedinnian ostracode assemblage has been recognized in this area but Siegenian and early Emsian ostracode faunas appear in Delorme Formation of the Natla River sections (I to IV). This is the well-defined beyrichiid-hollinid ostracode assemblage previously described from Yukon Territory and eastern Alaska. Twelve Siegenian-Emsian ostracode species are common to these areas, prominent among which are *Trepostella borealis*, *Beyrichia* (*Scabribeyrichia*) *churkini* and three species of *Hanaites*, all described by Berdan and Copeland (1973). A stratigraphically important eastern North American Early Devonian (Shriver Chert) species *Neocraterellina* sp. cf. *N. oblonga* (Ulrich and Bassler) also occurs in the lower, Siegenian, part of this assemblage.

## Biostratigraphic Considerations

The comparatively few collections of ostracodes available for study at present do not permit biostratigraphic evaluation except on a relatively local basis. Correlations are masked by the presence in northwestern Canada of the boundary between faunal realms in both the Late Silurian and Early Devonian (Boucot, 1974) and the lithological transition zone of Selwyn Basin that separates moderate depth carbonate facies communities (Limestone Suite of Berry and Boucot, 1970, p. 50) from deeper water, possibly locally anaerobic, graptolitic facies faunas (Road River Belt, Berry and Boucot, 1970). The mixing of Eurasian and North American communities in this area is, therefore, complicated by paleotemperature and paleosalinity gradients, reef abundance with resulting restricted water circulation and other factors. It can be shown, however, that the cosmopolitan Bohemian-mixed ostracode facies of Jordan (1970) (equivalent to the Late Silurian Uralian-Cordilleran brachiopod community of Boucot, 1974) gave place in Early Devonian time to an increasingly strong Cordilleran provincial community (Berdan and Copeland, 1973) that apparently reached its culmination in the Emsian (Fig. 7). This feature has been stressed by Boucot (1974) and others for several faunal groups and, while not yet undeniably proved by evidence based on relatively meagre ostracode documentation, appears reliable.

Biostratigraphic studies based on Late Silurian-Early Devonian ostracode assemblages from Eurasia have been reported by Píbyl and Vaněk (1968), Abushik (1968a), Jordan (1964, 1970), Polenova (1968a, 1971), Bandel and Becker (1975) and others. Such studies have demonstrated the diversity and wide geographic extent especially of ostracode communities of the Uralian-Cordilleran region of central Europe (Jordan, 1970). Polenova (1971), in considering biogeographical types of Early Devonian ostracodes,

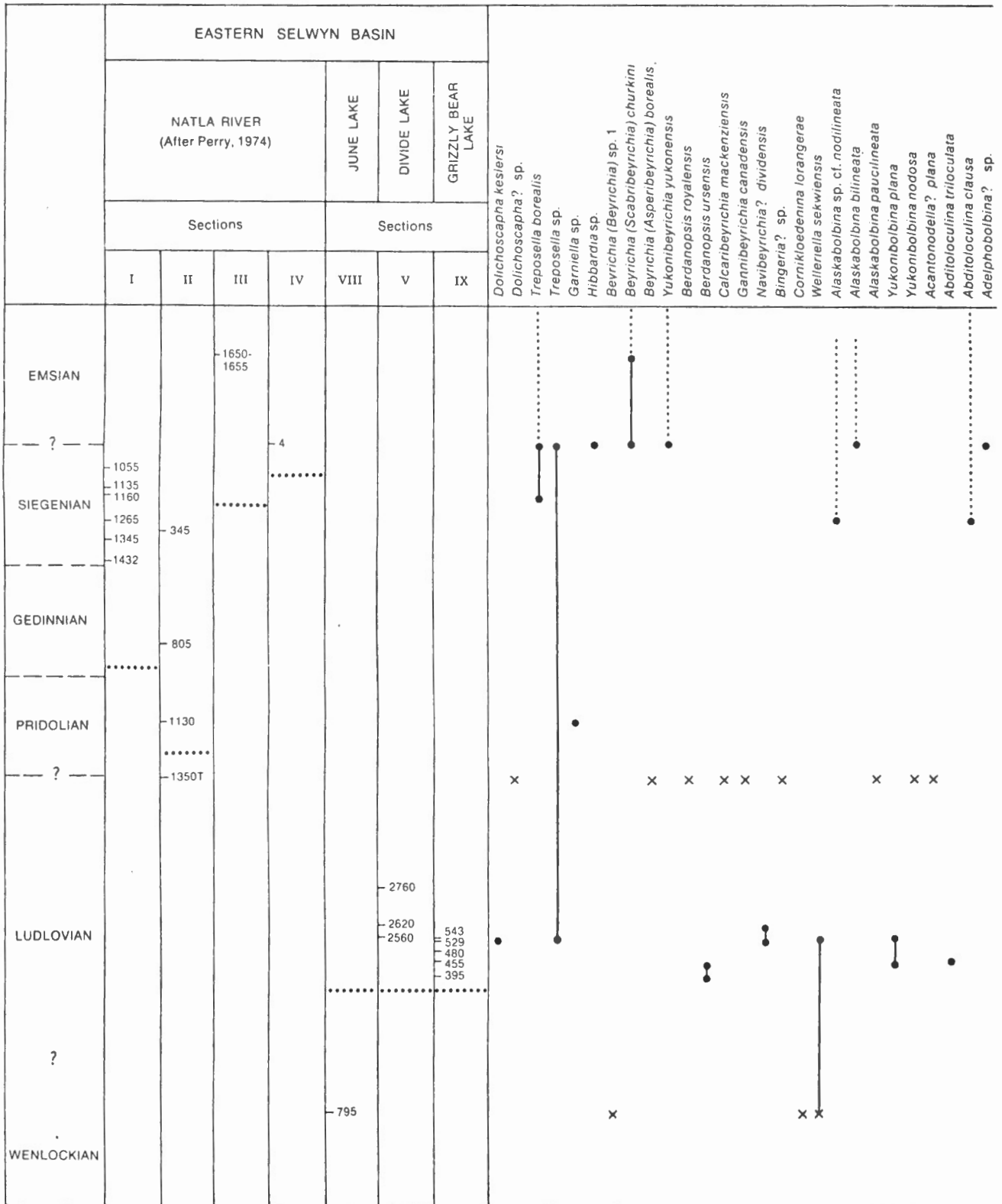
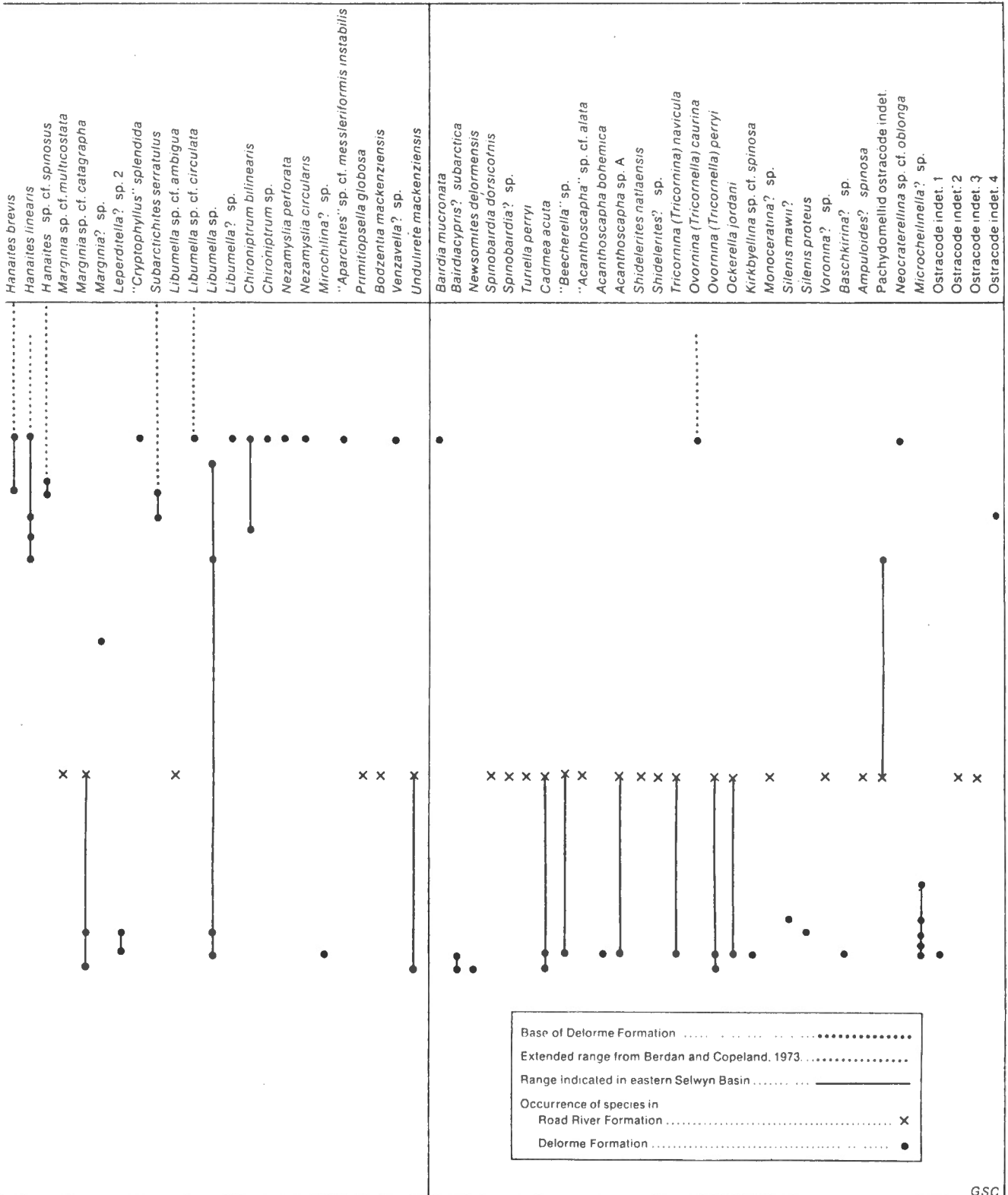


Figure 6. Stratigraphic occurrence of Silurian and Devonian ostracodes, sections I-V, VIII and IX, eastern Selwyn Basin, District of Mackenzie.





EARLY PALEOZOIC OSTRACODA FROM SW DISTRICT OF MACKENZIE AND YUKON

AGE OSTRACODE SPECIES	Late Ordovician	Llandoveryan	Wenlockian	Ludlovian	Pridolian	Lochkovian		ZI.
						Gedinnian	Siegenian	
PALAEOCOPIDA								
Beyrichiacea								
<i>Mesomphalus berdanae</i>								● c
<i>Clintella</i> sp.					●			
<i>Dolichoscapa keslersi</i>				●				
<i>Dolichoscapa?</i> sp.					●			
<i>Treposella borealis</i>							●	● ac
<i>Treposella</i> sp.				●			●	
<i>Treposellina?</i> ostracode indet.				●				
<i>Garniella</i> sp.					●			
<i>Hibbardia</i> sp.							●	
<i>Beyrichia</i> ( <i>Beyrichia</i> ) <i>henningsmoeni</i>				●				
<i>B. (B.)</i> sp. cf. <i>henningsmoeni</i>				●				
<i>B. (B.)</i> <i>arctigena</i>						●		
<i>B. (B.)</i> sp. cf. <i>arctigena</i>						●		
<i>B. (B.)</i> <i>brabbi?</i>							●	abc
<i>B. (B.)</i> sp. 1			●	●				
<i>B. (B.)</i> sp. 2						●	●	
<i>B. (Scabribeyrichia)</i> <i>churkini</i>							●	● abc
<i>B. (Asperibeyrichia)</i> <i>borealis</i>					●			
<i>Yukonibeyrichia yukonensis</i>						●	●	● abc
<i>Y. solo</i>								● c
<i>Berdanopsis royalensis</i>					●	●		
<i>B. ursensis</i>				●				
<i>Calcaribeyrichia mackenziensis</i>					●			
<i>Gannibeyrichia canadensis</i>					●			
<i>Navibeyrichia?</i> <i>dividensis</i>				●				
<i>Bingeria?</i> sp.					●			
<i>Cornikloedenina lorangerae</i>			●	●				
<i>Welteriella sekwiensis</i>			●	●				
<i>Pintopsis</i> sp.				●				
<i>Alaskabolbina</i> sp. cf. <i>nodilineata</i>							●	c
<i>A. bilineata</i>							●	b
<i>A. paucilineata</i>					●			
<i>Yukonibolbina plana</i>				●				
<i>Y. nodosa</i>					●			
Drepanellacea								
<i>Acantonodella?</i> <i>plana</i>					●			
<i>Aechmina wolfensis</i>	●							
<i>Aechmina</i> sp.	●							
<i>Aechminaria</i> sp.				●				
<i>Warthina</i> sp. cf. <i>irregularis</i>	●							
<i>Pseudulrichia</i> sp.	●							
Hollinacea								
<i>Abditoloculina trilocolata</i>				●	●			
<i>A. clausa</i>							●	a
<i>Abditoloculina</i> sp.					●			
<i>Falsipollex?</i> <i>multispinosus</i>							●	a
<i>Abortivelum</i> sp.							●	
<i>Adelphobolbina?</i> sp.							●	
<i>Infractivelum acuminatum</i>							●	c
<i>I. spiculosum</i>							●	● a
<i>Winchellatia?</i> sp.				●				
<i>Platybolbina</i> ( <i>Reticulobolbina</i> ) <i>lenzi</i>	●							
Nodellacea								
<i>Hanaites brevis</i>							●	a
<i>H. linearis</i>							●	c
<i>H. sp. cf. spinosus</i>							●	ac
Kloedenellacea								
<i>Eukloedenella soloensis</i>								● c
<i>Dizygopleura?</i> sp.								●
<i>Evianella</i> sp.							●	
<i>Marginia</i> sp. cf. <i>multicostata</i>					●		●	
<i>M. sp. cf. catagrapha</i>				●	●			
<i>Marginia?</i> sp.						●		
Leperditellacea								
<i>Leperditella?</i> sp. 1	●							
<i>Leperditella?</i> sp. 2				●				
" <i>Cryptophyllus</i> " <i>splendida</i>							●	
Oepikellacea								
<i>Subarctichites serratus</i>							●	ac
<i>Libumella</i> sp. cf. <i>ambigua</i>			●	●	●			
<i>L. sp. cf. circulata</i>							●	ac
<i>Libumella</i> sp.				●			●	
<i>Libumella?</i> sp.							●	
Kirkbyacea								
<i>Chironiptrum limitaris</i>							●	ac

Figure 7. Stratigraphic ranges of Silurian and Devonian ostracodes, southern Yukon Territory and southwestern District of Mackenzie.

AGE OSTRACODE SPECIES	Late Ordovician	Llandoveryan	Wenlockian	Ludlovian	Pridolian	Lochkovian		Pragian		Z.I.
						Gedinnian	Siegenian	Emsian		
<i>C. bilinearis</i> .....								•		
<i>Chironiptrum</i> sp. ....								•		
<i>Nezamyslia perforata</i> .....								•		
<i>N. circularis</i> .....								•		
<i>Mirochilina?</i> sp. ....				•						
Paraparchitacea										
" <i>Aparchites</i> " sp. cf. <i>messleriformis</i>										
<i>instabilis</i> .....			•		•			•		
Primitiopsacea										
<i>Primitiopsella globosa</i> .....					•					
<i>Bodzentia mackenziensis</i> .....					•					
<i>Scipionis delormensis</i> .....				•						
<i>Venzavella?</i> sp. ....								•		
<i>Undulirete mackenziensis</i> .....			•	•	•					
PODOCOPIDA										
Bairdiacea										
<i>Bairdia</i> sp. cf. <i>leguminoides</i> .....								•		ac
<i>B. mucronata</i> .....								•		
<i>Bairdiocypris?</i> <i>subarctica</i> .....				•						
<i>Newsomites delormensis</i> .....				•						
<i>Spinobairdia dorsicornis</i> .....				•	•					
<i>Spinobairdia?</i> sp. ....				•	•					
<i>Turiella perryi</i> .....				•	•					
<i>Processobairdia delormensis</i> .....			•	•						
<i>Cadmea acuta</i> .....			•	•	•					
" <i>Baecherella</i> " sp. ....			•	•	•					
" <i>Acanthoscapha</i> " sp. cf. <i>alata</i> .....			•	•	•					
<i>A. bohémica</i> .....			•	•	•					
<i>A. subnavicula</i> .....			•	•	•					
<i>A. sp. cf. decurtata</i> .....			•	•	•					
<i>A. sp. A</i> .....			•	•	•					
<i>Shidelerites natlaensis</i> .....			•	•	•					
<i>Shidelerites?</i> sp. ....			•	•	•					
Superfamily indet.										
<i>Tricornina (Tricornina) navicula</i> .....			•	•	•					
<i>T. (T.) longula</i> .....			•	•	•					
<i>Ovornina (Tricornella) caurina</i> .....								•		c
<i>O. (T.) perryi</i> .....			•	•	•					
<i>O. (Ovornina?) sp.</i> .....			•	•	•					
<i>Ockerella jordani</i> .....			•	•	•					
<i>Kirkbyellina sp. cf. spinosa</i> .....			•	•	•					
Cypridacea										
<i>Camdenidea?</i> <i>elongata</i> .....				•						
Cytheracea										
<i>Monoceratina?</i> sp. ....					•					
Healdiacea										
<i>Bairdiocypris?</i> sp. cf. <i>cordiformis</i> .....								•		ac
<i>Kuresaaria blackstonensis</i> .....									•	abc
<i>Arcuaria delormensis</i> .....			•	•						
<i>Silenis mawii?</i> .....			•	•						
<i>S. proteus</i> .....			•	•						
<i>Voronina?</i> sp. ....			•	•	•					
<i>Baschkirina?</i> sp. ....			•	•	•		•			
<i>Cooperatia lacrimosa</i> .....			•	•						
<i>Tubulibairdia</i> sp. ....			•	•					•	ac
<i>Ampuloides?</i> <i>spinosa</i> .....					•					
<i>pachydomellid ostracode indet.</i> .....					•			•		
Quasillitacea										
<i>Jenningsina?</i> sp. ....							•			
Thlipsuracea										
<i>Neocraterellina sp. cf. oblonga</i> .....								•		
Indet.										
<i>Microcheilinella?</i> spp. ....				•						
ostracode indet. 1 .....				•						
ostracode indet. 2 .....					•					
ostracode indet. 3 .....					•					
ostracode indet. 4 .....								•		

Species occurring in McCann Hill Chert, eastern Alaska ..... a  
 Species occurring in Michelle Formation, Yukon Territory ..... b  
 Species occurring in Prongs Creek Formation, Yukon Territory ... c

demonstrated the possibility of utilizing the preponderant "types of ostracode fauna" based on their taxonomic rather than quantitative occurrence. The applicability of the distribution of her two main ostracode types, 'beyrichiid' and 'healdiid-aparchitid', may be considered in the area under study with certain modifications.

Lundin (1971) used a somewhat similar method of comparing Silurian and Early Devonian ostracode faunas from midcontinental and northeastern North America. The dominant palaeocope (Beyrichiacea, Kloedenellacea) and podocope superfamilies (Healdiacea, Thlipsuracea) show reverse occurrence patterns, with the percentage of palaeocopid taxa being greater in northeastern North America and that of podocopid taxa more prominent in the midcontinent region (Petersen, 1975, p. 1729). This distribution pattern appears to have varied little throughout mid-Silurian to Early Devonian time so it is possible to postulate a long-ranging predominantly podocopid community occupying at least the southern part of the North American craton with a predominantly palaeocopid community occupying the eastern continental margin.

From Figure 7 of Late Silurian–Early Devonian ostracode occurrences reported here and in Berdan and Copeland (1973) it is apparent that, as with the studies by Polenova and Lundin, consideration can only be given to palaeocope and podocope assemblages. Of these, two palaeocope (Beyrichiacea, Hollinacea) and two podocope superfamilies (Bairdiacea, Healdiacea) are dominant. Species

of other superfamilies reported in this paper either do not vary from a relatively low occurrence or are too sporadically distributed in the present collections to warrant consideration. The taxonomic occurrence curves shown here (Fig. 8) are based on all presently known data from the area. Within the late Wenlockian–Pridolian interval, beyrichiaceans and bairdiaceans are predominant, those of Eurasian aspect occurring with predominantly pelagic faunas from the Road River belt reaching an apex during the Pridolian. Collections bearing ostracodes of Gedinnian age are relatively few; the curves are arbitrarily smoothed out to approximate the inferred faunal trends. Within the Siegenian–Emsian interval, all four superfamilies flourished, those of North American Cordilleran aspect derived from the carbonate facies, particularly the palaeocopid taxa, reaching great prominence during the Emsian. "This ostracode assemblage appears to represent a provincial fauna combining elements that appeared later in widely separated areas" (Berdan and Copeland, 1973, p. 8). It may be postulated that the older dominant, Late Silurian, Eurasian ostracode assemblage became secondary to the younger, Emsian Cordilleran ostracode assemblage as sediments of the Road River Belt became more lithologically interbedded with those of the Limestone Suite. Only in the Middle Devonian did the Cordilleran hollinaceans dominate the beyrichiacean genera and migrate onto the craton proper where they reached their greatest prominence in the North American northern midcontinent region.

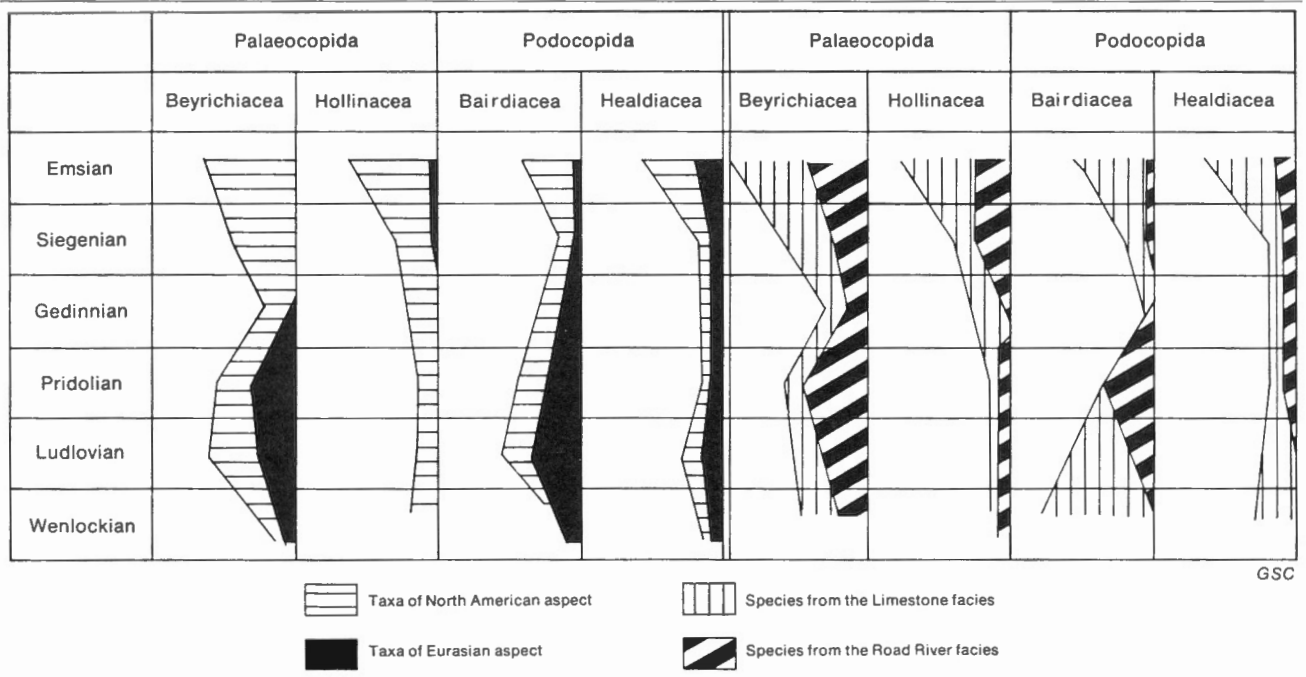


Figure 8. Bio- and lithostratigraphic occurrences of Silurian and Devonian species of dominant ostracode superfamilies.

## Locality Register and Ostracode Occurrences

### SECTION I: Natla River, 63°18'18"N, 128°34'W.

Measured by D. Perry and L. Annand along an east-west trending ridge, north-northwest of Natla River. (Figures indicate footage below top of Delorme Formation.)

#### Locality A-1055 (Siegenian)

*Libumella* sp.

#### Locality A-1135 (Siegenian)

*Hanaites* sp. cf. *H. spinosus* Berdan and Copeland, 1973

#### Locality A-1160 (Siegenian)

*Treposeella borealis* Berdan and Copeland, 1973

*Hanaites brevis* Berdan and Copeland, 1973

*Hanaites* sp. cf. *H. spinosus* Berdan and Copeland, 1973

*Subarctichites serratulus* Berdan and Copeland, 1973

#### Locality A-1265 (Siegenian)

*Alaskabolbina* sp. cf. *A. nodilineata* Berdan and Copeland, 1973

*Abditoloculina clausa* Berdan and Copeland, 1973

*Hanaites linearis* Berdan and Copeland, 1973

*Subarctichites serratulus* Berdan and Copeland, 1973

Ostracode indet. 4

#### Locality A-1345 (Siegenian)

*Hanaites linearis* Berdan and Copeland, 1973

#### Locality A-1432 (Siegenian)

*Hanaites linearis* Berdan and Copeland, 1973

*Libumella* sp.

Pachydomellid ostracode indet.

### SECTION II: Natla River, 63°19'24"N, 128°36'W.

Measured by D. Perry and L. Annand along an east-west trending ridge, north-northwest of Natla River. (Figures indicate footage below top of Delorme Formation.)

#### Locality B-345 (Siegenian)

*Chironiptrum bilinearis* n. sp.

#### Locality B-805 (Gedinnian)

*Marginia*? sp.

#### Locality B-1130 (Pridolian)

*Garniella* sp.

#### Locality B-1350T (late Ludlovian or Pridolian) (top of Road River Formation and base of Delorme Formation at 1260 ft)

*Dolichoscapha*? sp.

*Beyrichia (Asperibeyrichia?) borealis* n. sp.

*Berdanopsis royalensis* n. sp.

*Calcaribeyrichia mackenziensis* n. sp.

*Gannibeyrichia canadensis* n. sp.

*Bingeria*? sp.

*Alaskabolbina paucilineata* n. sp.

*Yukonibolbina nodosa* n. sp.

*Acantonodella? plana* n. sp.

*Marginia* sp. cf. *M. multicostata* Polenova, 1952

*Marginia* sp. cf. *M. catagrapha* Polenova, 1952

*Libumella* sp. cf. *L. ambigua* (Lundin), 1965

*Primitiopsella globosa* n. sp.

*Bodzentia mackenziensis* n. sp.

*Undulirete mackenziensis* n. sp.

*Spinobairdia dorsicornis* n. sp.

*Spinobairdia*? sp.

*Turiella perryi* n. sp.

*Cadmea acuta* n. sp.

"*Beecherella*" sp.

"*Acanthoscapha*" sp. cf. "*A.*" *alata* Abushik, 1968

*Shidelerites natlaensis* n. sp.

*Shidelerites*? sp.

*Tricornina (Tricornina) navicula* Bouček, 1936

*Ovornina (Tricornella) perryi* n. sp.

*Ockerella jordani* n. sp.

*Monoceratina*? sp.

*Voronina*? sp.

*Ampuloides? spinosa* n. sp.

Pachydomellid ostracode indet.

Ostracode indet. 2

Ostracode indet. 3

### SECTION III: Natla River, 63°16'45"N, 128°32'40"W.

Measured westward by D. Perry and A. C. Lenz along an east-west trending ridge northwest of Natla River. (Figures indicate footage below top of Delorme Formation.)

#### Locality S4-1650-1655 (early Emsian)

*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973

### SECTION IV: Natla River, 63°06'16"N, 128°41'W.

Measured by S. L. Blusson along east-west trending ridge west of Natla River, south of platform carbonate margin.

#### Locality 4 (Delorme Formation transitional into Road River Formation) (Siegenian?)

*Treposeella borealis* Berdan and Copeland, 1973

*Treposeella* sp.

*Hibbardia* sp.

*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973

*Yukonibeyrichia yukonensis* Berdan and Copeland, 1973

*Alaskabolbina bilineata* Berdan and Copeland, 1973

*Adelphobolbina*? sp.

*Hanaites brevis* Berdan and Copeland, 1973

*Hanaites linearis* Berdan and Copeland, 1973

"*Cryptophyllus*" *splendida* n. sp.

*Libumella* sp. cf. *L. circulata* Rozhdestvenskaya, 1962

*Libumella*? sp.

*Chironiptrum bilinearis* n. sp.

*Chironiptrum* sp.

*Nezamyslia perforata* n. sp.

*Nezamyslia circularis* n. sp.

"*Aparchites*" sp. cf. "*A.*" *messleriformis instabilis* Polenova, 1974

*Venzavella*? sp.

*Bairdia mucronata* Rozhdestvenskaya, 1960

*Ovornina (Tricornella) caurina* (Berdan and Copeland), 1973

*Neocraterellina* sp. cf. *N. oblonga* (Ulrich and Bassler), 1913

## SECTION V: Divide Lake, 63°10'20"N, 127°59'W.

Measured by D. Perry and R. Ludvigsen.

Locality C-2760 (400 ft above base of Delorme Formation)  
(Ludlovian)*Microcheilinella?* sp.Locality C-2620 (260 ft above base of Delorme Formation)  
(Ludlovian)*Navibeyrichia? dividensis* n. sp.*Silenis mawii?* (Jones), 1887*Microcheilinella?* sp.Locality C-2560 (200 ft above base of Delorme Formation)  
(Ludlovian)*Dolichoscapha keslersi* n. sp.*Treposella* sp.*Navibeyrichia? dividensis* n. sp.*Welleriella sekwiensis* n. sp.*Yukonibolbina plana* n. sp.*Silenis proteus* Pranskevičius, 1972*Microcheilinella?* sp.

## SECTION VI: Delorme Range, 62°46'N, 125°15'W.

Measured eastward by D. Perry and F.

Conrad along an east-west trending ridge in  
Delorme Range.Locality C-47-815T (670 ft above base of Delorme  
Formation) (Ludlovian–Pridolian)*Baschkirina?* sp.Locality C-47-510 (argillaceous carbonate 365 ft above  
base of Delorme Formation) (Ludlovian)*Undulirete mackenziensis* n. sp.*Acanthoscapha subnavicula* Abushik, 1968*Ovornina (Tricornella) perryi* n. sp.*Baschkirina?* sp.*Microcheilinella?* sp.Locality C-47-495 (argillaceous carbonate 350 ft above  
base of Delorme Formation) (Ludlovian)*Acanthoscapha* sp. cf. *A. decurtata* (Bouček), 1936*Microcheilinella?* sp.Locality C-47-455 (argillaceous carbonate 310 ft above  
base of Delorme Formation) (Ludlovian)*Ovornina (Tricornella) perryi* n. sp.*Arcuaria delormensis* n. sp.*Cooperatia lacrimosa* n. sp.*Microcheilinella?* sp.Locality C-47-450 (argillaceous carbonate 305 ft above  
base of Delorme Formation) (Ludlovian)*Beyrichia (B.)* sp. cf. *B. (B.) henningsmoeni* McGill, 1963*Winchellatia?* sp.*Scipionis? delormensis* n. sp.*Undulirete mackenziensis* n. sp.*Cadmea acuta* n. sp.*Acanthoscapha* sp. A (Kesling and Sohn), 1958*Tricornina (Tricornina) navicula* Bouček, 1936*Tricornina (Tricornina) longula* n. sp.*Ovornina (Tricornella) perryi* n. sp.*Arcuaria delormensis* n. sp.*Cooperatia lacrimosa* n. sp.*Microcheilinella?* sp.Locality C-47-150 (argillaceous carbonate 5 ft above the  
base of Delorme Formation) (early Ludlovian)

Treposelline? ostracode indet.

*Beyrichia (Beyrichia)* sp. 1*Aechminaria* sp.*Libumella* sp. cf. *L. ambigua* (Lundin), 1965*Undulirete mackenziensis* n. sp.*Spinobairdia dorsicornis* n. sp.*Processobairdia delormensis* n. sp.*Cadmea acuta* n. sp.*Acanthoscapha subnavicula* Abushik, 1968*Acanthoscapha* sp. cf. *A. decurtata* (Bouček), 1936*Tricornina (Tricornina) navicula* Bouček, 1936*Ovornina (Tricornella) perryi* n. sp.*Ovornina (Ovornina?)* sp.*Camdenidea? elongata* n. sp.*Arcuaria delormensis* n. sp.*Baschkirina?* sp.*Cooperatia lacrimosa* n. sp.*Microcheilinella?* sp.Locality C-47-100 (argillaceous carbonate of Whittaker  
Formation, 45 ft below base of Delorme Formation)  
(late Wenlockian)*Beyrichia (Beyrichia)* sp. 1*Libumella* sp. cf. *L. ambigua* (Lundin), 1965*Undulirete mackenziensis* n. sp.*Processobairdia delormensis* n. sp.*Cadmea acuta* n. sp.*Acanthoscapha subnavicula* Abushik, 1968*Acanthoscapha* sp. cf. *A. decurtata* (Bouček), 1936*Ovornina (Tricornella) perryi* n. sp.*Arcuaria delormensis* n. sp.*Baschkirina?* sp.*Cooperatia lacrimosa* n. sp.

## SECTION VII: Whittaker Anticline, 62°28'50"N, 124°47'W.

Measured eastward by D. Perry, B. D. E.

Chatterton, A. C. Lenz and Gulf, Canada

Limited employees along stream valleys and

ridges on east flank of Whittaker Anticline,

4 mi west of Trench Lake. Composite of two

nearby sections.

Locality CH-27-890-900 (45–55 ft below top of Delorme  
Formation) (early Gedinnian)*Marginia?* sp.Locality CH-27-495 (450 ft below top of Delorme  
Formation) (early Gedinnian)*Beyrichia (Beyrichia)* sp. cf. *B. (B.) arctigena* Martinsson,  
1960*Berdanopsis royalensis* n. sp.*Marginia?* sp.*Jenningsina?* sp.Locality CH-27-490 (455 ft below top of Delorme Forma-  
tion) (Gedinnian)*Beyrichia (Beyrichia)* sp. cf. *B. (B.) arctigena* Martinsson,  
1960

(Section continued; 62°31'N, 124°49'W)

Locality WTA-2-67-2305-2400 (805–900 ft below top of  
Delorme Formation) (Gedinnian?)*Baschkirina?* sp.Locality WTA-2450 (950 ft below top of Delorme  
Formation) (Gedinnian?)

- Baschkirina?* sp.  
 Locality WTA-3050 (1550 ft below top of Delorme Formation) (Gedinnian?)  
*Bairdiocypris?* sp.
- SECTION VIII: June Lake, 63°29'N, 128°37'30"W.  
 Measured eastward by D. Perry and A. C. Lenz along a northeast-trending ridge, 2 mi southeast of June Lake.  
 Locality S-2-795 (Road River Formation, 755 ft below base of Delorme Formation) (late Wenlockian–early Ludlovian)  
*Beyrichia (Beyrichia)* sp. 1  
*Cornikloedenina lorangerae* n. sp.  
*Welleriella sekwiensis* n. sp.
- SECTION IX: Grizzly Bear Lake, 62°41'30"N, 127°52'W.  
 Measured eastward by R. Ludvigsen, 2 mi northwest of Grizzly Bear Lake, on west flank of mountain.  
 Locality L-543 (97 ft below top of Delorme Formation) (Ludlovian)  
*Leperditella?* sp. 2  
*Microcheilinella?* sp.  
 Locality L-529 (111 ft below top of Delorme Formation) (Ludlovian)  
*Marginia* sp. cf. *M. catagrapha* Polenova, 1952  
*Microcheilinella?* sp.  
 Locality L-480 (160 ft below top of Delorme Formation) (Ludlovian)  
*Microcheilinella?* sp.  
 Locality L-455 (185 ft below top of Delorme Formation) (Ludlovian)  
*Berdanopsis ursensis* n. sp.  
*Yukonibolbina plana* n. sp.  
*Abditoloculina trilocolata* n. sp.  
*Leperditella?* sp. 2  
*Libumella* sp.  
*Mirochilina?* sp.  
*Bairdiocypris? subarctica* n. sp.  
*Cadmea acuta* n. sp.  
 "Beecherella" sp.  
*Acanthoscapha bohémica* (Bouček), 1936  
*Acanthoscapha* sp. A (Kesling and Sohn), 1958  
*Tricornina (Tricornina) navicula* Bouček, 1936  
*Ovornina (Tricornella) perryi* n. sp.  
*Ockerella jordani* n. sp.  
*Kirkbyellina* sp. cf. *K. spinosa* Blumenstengel, 1962  
*Baschkirina?* sp.  
*Microcheilinella?* sp.  
 Ostracode indet. 1  
 Locality L-395 (245 ft below top of Delorme Formation) (Ludlovian)  
*Berdanopsis ursensis* n. sp.  
*Marginia* sp. cf. *M. catagrapha* Polenova, 1952  
*Libumella* sp.  
*Undulirete mackenziensis* n. sp.  
*Bairdiocypris? subarctica* n. sp.  
*Newsomites delormensis* n. sp.  
*Cadmea acuta* n. sp.  
*Ovornina (Tricornella) perryi* n. sp.
- ROYAL CREEK SECTION I: Yukon Territory, 64°46'20"N, 135°12'W to 64°46'N, 135°12'W (ages from Lenz and Pedder, 1972, pp. 13–18, in part)  
 Locality 1390 ft (Road River Formation) (Emsian)  
*Mesomphalus berdanae* n. sp.  
*Treposeella borealis* Berdan and Copeland, 1973  
*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973  
*Yukonibeyrichia yukonensis* Berdan and Copeland, 1973  
*Yukonibeyrichia solo* Berdan and Copeland, 1973  
 Locality 1350 ft (Road River Formation) (Emsian)  
*Infractivelum spiculosum* Berdan and Copeland, 1973  
*Kuresaaria blackstonensis* Berdan and Copeland, 1973  
*Tubulibairdia* sp.  
 Locality 1255–1275 ft (Road River Formation) (Emsian)  
*Treposeella borealis* Berdan and Copeland, 1973  
*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973  
*Yukonibeyrichia yukonensis* Berdan and Copeland, 1973  
*Eukloedenella soloensis* Berdan and Copeland, 1973  
 Locality 1190–1210 ft (Road River Formation) (early Emsian)  
*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973  
 Locality 375–400 ft (Road River Formation) (Siegenian)  
*Beyrichia (Beyrichia) brabbi?* Berdan and Copeland, 1973  
*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973  
*Abditoloculina clausa* Berdan and Copeland, 1973  
*Infractivelum spiculosum* Berdan and Copeland, 1973  
*Marginia* sp. cf. *M. multicosata* Polenova, 1952  
*Subarctichites serratulus* Berdan and Copeland, 1973  
*Chironiptrum limitaris* Berdan and Copeland, 1973  
*Bairdia* sp. cf. *B. leguminoides* Ulrich, 1891  
*Ovornina (Tricornella) caurina* (Berdan and Copeland), 1973
- ROYAL CREEK SECTION II: . . . . . Yukon Territory, 64°46'30"N, 135°14'30"W to 64°46'15"N, 135°13'40"W, (ages from Lenz and Pedder, 1972, p. 18–23, in part)  
 Locality 880 ft (Road River Formation) (Siegenian)  
*Falsipollex? multispinosus* Berdan and Copeland, 1973  
*Abortivelum* sp.  
 Locality 828–848 ft (Road River Formation) (Siegenian)  
*Treposeella borealis* Berdan and Copeland, 1973  
*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973  
*Infractivelum acuminatum* Berdan and Copeland, 1973  
*Hanaites linearis* Berdan and Copeland, 1973  
 Locality 640–650 ft (Road River Formation) (Siegenian)  
*Treposeella borealis* Berdan and Copeland, 1973  
*Treposeella* sp.  
*Beyrichia (Beyrichia)* sp. 2  
*Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973

*Evlanella* sp.

*Bairdiocypris*? sp. cf. *B.?* *cordiformis* Rozhdestvenskaya 1959

Locality 479 ft (Road River Formation) (Gedinnian)

*Beyrichia* (*Beyrichia*) sp. 2

*Yukonibeyrichia yukonensis* Berdan and Copeland, 1973  
*Berdanopsis royalensis* n. sp.

Locality 245 ft (Road River Formation) (Pridolian)

*Abditoloculina trilocolata* n. sp.

*Abditoloculina* sp.

Locality 220 ft (Road River Formation) (Pridolian)

*Clintiella* sp.

*Tricornina* (*Tricornina*) *navicula* Bouček, 1936

Locality 0–20 ft (Road River Formation) (Ludlovian)

*Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) henningsmoeni* McGill, 1963

*Processobairdia delormensis* n. sp.

#### Miscellaneous Collections

1. Locality P10-2005: Dusky Range, 63°16'N, 125°23'W.

(collected by D. Perry, in platform carbonate, 225 ft below top of Delorme Formation) (Gedinnian by associated fauna)

Beyrichiid ostracode indet.

*Bairdiocypris* sp.

2. Locality KB-1-67-4400-4430: Delorme Range, 62°47'N, 125°15'W. (collected by Amoco, Canada Limited, in argillaceous carbonate, 0–30 ft above base of Delorme Formation) (age unknown, Wenlockian by associated fauna)

Ostracode indet.

Locality KB-1-67-5100-5105 (600–605 ft above base of Delorme Formation) (Ludlovian)

*Undulirete mackenziensis* n. sp.

3. Locality LP-67-5-2831: Whittaker Anticline, 62°30'N, 124°25'W. (collected by Amoco, Canada Limited, in platform carbonate, 391 ft above base of Delorme Formation) (age unknown)

*Baschkirina* sp.

*Bairdiocypris* sp.

4. Locality TR-DW-1-9540-9575: 62°15'N, 125°00'W. (collected by Texaco, Canada Limited, 1940–1975 ft above base of Delorme Formation) (age unknown, Gedinnian by associated fauna)

*Bairdiocypris* sp.

5. Locality BL-8-N-60-1250-1300: 63°23'N, 125°38'W. (collected by Shell Canada Limited, 750–800 ft below top of Delorme Formation) (age unknown)

Beyrichiid ostracodes indet.

Locality BL-2-N-60-170: (2000 ft below top of Delorme Formation) (Gedinnian)

*Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) arctigena* Martinsson, 1960

6. Locality OT-307-N-60-3290: 62°45'30"N, 125°10'W. (collected by Shell Canada Limited, Road River Formation, 1500 ft below base of Delorme Formation) (age unknown)

*Beyrichia* (*Beyrichia*) sp.

7. Locality RGR-3-55-85: Rouge Range, 63°16'40"N, 125°47'W. (collected by Gulf, Canada Limited, in platform carbonate, 0–35 ft above base of Delorme Formation) (age unknown)

*Bairdiocypris* sp.

Locality RGR-3-475: (420 ft above base of Delorme Formation) (age unknown)

Ostracode indet.

Locality RGR-3-730: (675 ft above base of Delorme Formation) (Ludlovian)

*Cornikloedenina lorangerae* n. sp.

*Bairdiocypris* sp.

8. Locality 12P-845-860: 65°23'N, 140°49'W. (collected by D. Perry; see Perry *et al.*, 1974, p. 1094, section S-15; 245–260 ft above base of Ogilvie Formation) (Emsian)

*Dizygopleura*? sp.

*Kuresaaria blackstonensis* Berdan and Copeland, 1973

*Tubulibairdia* sp.

9. Locality S-1-C: June Lake, 63°32'30"N, 128°39'20"W. (from basal shale, 80 ft below base of Delorme Formation, Road River Formation) (Ludlovian)

*Dolichoscapha keslersi* n. sp.

*Cornikloedenina lorangerae* n. sp.

*Welleriella sekwiensis* n. sp.

*Pintopsis* sp.

10. Locality Delorme Range: 62°48'N, 125°21'W. (no stratigraphic data, see McGill, 1963b) (Ludlovian)

*Beyrichia* (*Beyrichia*) *henningsmoeni* McGill, 1963

11. Locality M-2480-2500 (GSC C-26345): 62°42'N, 127°56'W. (collected by R. Ludvigsen, near carbonate-shale margin, base of Road River Formation) (Wenlockian)

*Cornikloedenina lorangerae* n. sp.

*Welleriella sekwiensis* n. sp.

*Libumella* sp. cf. *L. ambigua* (Lundin), 1965

"*Aparchites*" sp. cf. "*A.*" *messleriformis instabilis*  
Polenova, 1974  
*Processobairdia delormensis* n. sp.  
*Ovornina (Tricornella) perryi* n. sp.

12. Locality Blackwolf Mountain: 62°22'N, 127°31'W. (collected by R. Ludvigsen, Road River Formation) (Upper Ordovician)

*Aechmina wolfensis* n. sp.  
*Aechmina* sp.  
*Warthinia?* sp. cf. *W.?* *irregularis* (Spivey), 1939  
*Pseudulrichia* sp.  
*Platybolbina (Reticulobolbina) lenzi* n. sp.  
*Leperditella?* sp. 1

13. Locality L4-HW-575: Hart River, Yukon Territory, 65°38'N, 136°43'30"W. (collected by R. Ludvigsen, Road River Formation, with *Warburgella rugulosa* subsp. nov.? in *Mono-graptus uniformis* Zone) (early Gedinnian)

*Berdanopsis royaleensis* n. sp.

## Systematic Paleontology

Order *PALAEOCOPIDA* Henningsmoen, 1953

Superfamily *BEYRICHIACEA* Matthew, 1886

Family *BEYRICHIIDAE* Matthew, 1886

Subfamily *CRASPEDOBOLBININAE* Martinsson, 1962

Genus *Mesomphalus* Ulrich and Bassler, 1913

*Mesomphalus berdanae* n. sp.

Plate VII, figures 11–16

*Mesomphalus?* sp., Berdan and Copeland, 1973, p. 9, Pl. 1, figs. 1, 2.

*Description.* Valves subquadrate in lateral view; hinge straight, three-fourths greatest length. Anterior cardinal angle about 105 degrees. Anterior margin smoothly rounded to nearly straight venter; posterior margin subacuminate, posterior cardinal angle slightly obtuse. Greatest height and length near midvalve.

Valve surface uniformly papillose; trilobate, with L1 and L2 weakly developed and separated by very shallow S1. Preadductorial lobe (L2) broad, situated above midvalve and separated from syllobium by narrow, shallow, posteriorly convex adductorial sulcus (S2). Syllobium (L3) broad, with posterodorsal node extending slightly above hingeline. Faint dorsal plica(?). Syllobium dissected by slightly curved longitudinal fissus extending from beneath the preadductorial node posteriorly to beneath greatest elevation of syllobium. Prominent velar ridge separated from domicilium by pronounced groove paralleling free margin; velar ridge separated from marginal ridge by narrow subvelar groove. Marginal ridge apparently denticulate on some specimens.

Heteromorphic specimens with short, sausage-shaped crumina about one-half valve length, situated along and only slightly overhanging ventral margin of valve. Greater part of crumina slightly anterior of midlength. Dolonoid scar long, along distal edge of velar ridge. Velum only slightly contracted beneath crumina. Syllobial fissus present along dorsal edge of posterior half of crumina and extending onto syllobium for same distance as on tecnomorphic specimens.

Length of holotype, GSC 42084, 4.00 mm, height 2.50 mm; length of paratype, GSC 42086, 3.50 mm, height 2.20 mm.

Number of specimens studied, more than 25.

*Types.* Holotype, GSC 42084; paratypes, GSC 42083, 42085, 42086.

*Occurrence.* Road River Formation, Royal Creek section I, 1390 ft, Yukon Territory, Emsian.

*Remarks.* Only two incomplete tecnomorphic valves of this species were available for study by Berdan and Copeland (1973). Those valves have more finely preserved surface ornamentation than the present ones, but their exact taxonomic position could not be determined because heteromorphic individuals were lacking. It is now possible to assign all specimens to *Mesomphalus* rather than *Clintiella*, and to equate *M. berdanae* with other mesomphalid species.

Martinsson (1962, p. 189) assigned all Silurian *Mesomphalus* species from North America to *Clintiella*, based on cruminal-velar relationships. Among Devonian species of *Mesomphalus*, *M. magnificus* Copeland of Early Devonian age from New Brunswick is most nearly similar to *M. berdanae* n. sp. Both of these species have a broad velar flange only slightly constricted beneath the short crumina, but *M. magnificus* is punctate and has a dorsal plica whereas *M. berdanae* is larger, papillose and has a relatively prominent dorsal node on the syllobium. Both differ from *M. hartleyi* Ulrich and Bassler, the type species, in size of crumina, and strength of velar ridge, especially ventral of the crumina. It may be that these and other species from Appalachian North America should be included in still another genus.

Genus *Clintiella* Martinsson, 1962

*Clintiella* sp.

Plate IX, figure 3

*Remarks.* The species is known from one broken tecnomorphic specimen. Typical of the genus, this specimen exhibits a strong velar ridge, a narrow and deep adductorial sulcus, an almost obsolete preadductorial node and a relatively prominent syllobial groove. The surface is granular as are most species of the genus. (Martinsson, 1962, p. 191).

*Type.* Figured specimen, GSC 42105.

*Occurrence.* Road River Formation, Royal Creek section II, 220 ft, Yukon Territory, Pridolian.



Genus *Dolichoscapha* Kesling and Ehlers, 1958*Dolichoscapha keslersi* n. sp.

## Plate IX, figures 4–7

*Description.* Dorsal border straight to gently arched, extending slightly above hinge line, cardinal angles flattened. Valves amplete, smooth on steinkerns (Pl. IX, figs. 4, 6, 7) slightly granular on specimen with shell partly preserved (Pl. IX, fig. 5). Adductorial scar large, near midvalve, a circular pit on steinkerns, an indistinct spot on specimen with shell preserved. Steinkerns bearing up to five small auxiliary muscle pits which encircle the adductorial scar on its dorsal side at some distance from the scar. Adductorial scar nearly hidden in lateral view behind depressed dorsal edge of the crumina. Crumina long, sausage-shaped, extending along ventral margin of valve, slightly anterior in position. Ventral surface of crumina with long, slightly curved dolonoid scar. Velar ridge narrow, complete.

Length of holotype, GSC 42106, 1.10 mm, height 0.60 mm.  
Number of specimens studied, 4.

*Types.* Holotype, GSC 42106; paratypes, GSC 42107–42109.

*Occurrences.* Road River Formation, loc. S-1-C, 1 mi north of June Lake, 80 ft below base of Delorme Formation, District of Mackenzie, Ludlovian; Delorme Formation, section V, loc. C-2560, District of Mackenzie, mid-Ludlovian.

*Remarks.* The position of *Dolichoscapha* within the Beyrichiidae is not known. It would appear to be with genera having long crumina, such as *Clintiella* and *Bolbiprimitia* (see Swartz and Whitmore, 1956; Martinsson, 1962, p. 190). Many species of these genera are reticulate or granulose, more so than the one specimen (GSC 42107) in the present collection that has some replaced shell material preserved; but all are sulcate with the exception of *Bolbiprimitia tere-saccula* Swartz and Whitmore. Until the ventral morphologies of *Dolichoscapha escharota* and *Bolbiprimitia* are known it is not possible to equate those species within the same genus.

Comparison of *Dolichoscapha escharota* Kesling and Ehlers and *D. keslersi* n. sp. is difficult because of the preservation of most specimens of the latter species. It appears, however, that *D. keslersi* is not reticulate and bears the adductorial pit much lower on the lateral surface of the valve, so low that it is obscured in lateral view by the dorsal part of the crumina.

*Dolichoscapha?* sp.

## Plate VIII, figure 7

*Description.* Preplete, ovate, truncated dorsally by long, straight hinge line. Cardinal angles abrupt, obtuse; anterior margin smoothly rounded to venter, posteroventral slope longer than anteroventral slope, posterior margin more narrowly rounded in dorsal half. Lateral surface uneven, finely reticulate with a near median pit (blocked by a grain of silica on the figured specimen) only slightly larger than reticulae. Complete velar ridge along lateral margin, subvelar furrow and marginal ridge.

Length of figured specimen, 1.20 mm, height 0.70 mm.  
Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42088.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species is most similar to *D. escharota* Kesling and Ehlers, in ornamentation and nature of central pit. The presumed adult heteromorph of *D. escharota* is much smaller than the figured tecomorphic specimen of *Dolichoscapha?* sp.

## Subfamily TREPOSELLINAE Henningsmoen, 1954

Genus *Treposella* Ulrich and Bassler, 1908*Treposella borealis* Berdan and Copeland, 1973

## Plate I, figures 13–17; Plate VI, figures 5–10

*Treposella borealis* Berdan and Copeland, 1973, p. 9, Pl. 1, figs. 5–10.

*Remarks.* Variable silicification is evident between collections from Natla River, District of Mackenzie (Pl. I) and Royal Creek, Yukon Territory (Pl. VI). The former section provided only small, finely preserved immature and tecomorphic specimens but large specimens of both dimorphic forms are present, coarsely silicified and with most reticulation obscured, at the latter section. Cruminae on specimens from Royal Creek appear slightly smaller than that of the holotype from Alaska.

Length of hypotype, GSC 41977, 2.10 mm, height 1.0 mm; length of hypotype, GSC 42064, 3.0 mm, height 2.0 mm.  
Number of specimens studied, more than 50.

*Types.* Hypotypes, GSC 41973–41977, 42062–42067.

*Occurrences.* Road River Formation, Royal Creek section I, 1255–1275, 1390 ft and Royal Creek section II, 640–650, 828–848 ft, Yukon Territory, Siegenian-Emsian; Delorme Formation, section I, loc. A-1160, District of Mackenzie, and section IV, loc. 4, District of Mackenzie, Siegenian.

*Treposella* sp.

## Plate VIII, figures 11–13; Plate IX, figure 2

*Remarks.* Several small and broken specimens with the lobation of *Treposella lyoni* (Ulrich) and coarse reticulation have been found at several localities. Most of these specimens are cuspidate with a vertically divided syllobium, and one (GSC 42093) has a longitudinally ribbed crumina. Unlike other *Treposella* species, however, these specimens have a very reduced velar ridge.

*Types.* Figured specimens, GSC 42092–42094, 42104.

*Occurrences.* Delorme Formation, section V, loc. C-2560, District of Mackenzie, Ludlovian; Road River Formation, Royal Creek section II, 640–650 ft, Yukon Territory, Siegenian; Delorme Formation, section IV, loc. 4, Siegenian.

Treposeiline? ostracode indet.

Plate I, figure 10

*Remarks.* A deeply etched, presumably heteromorphic specimen of a beyrichiid ostracode, possibly exhibiting treposeiline characteristics was found in one collection. L2, L3 and the crumina are partly destroyed giving the specimen an unusual appearance. L2 and L3 are prominent, extending slightly above the hinge line, separated by deep S2 and joined ventrally. Crumina apparently prominent, anteroventral of L2, not extending to velum. Velum complete, undisturbed by crumina. Subvelar field concave, possibly with subvelar ridge (torus?).

*Type.* Figured specimen, GSC 41970.

*Occurrence.* Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, Ludlovian.

Genus *Garniella* Martinsson, 1962

*Garniella* sp.

Plate IX, figures 8, 9

*Description.* Valves somewhat preplete. S2 deep, slitlike extending from dorsal margin and curving anteriorly to midvalve. S2 dorsally separating undifferentiated L1-L2 and syllobium, anterior and posterior lobes of equal width extending above dorsal margin with low dorsal crista, broadly connected beneath S2. Surface reticulate, reticulae randomly oriented in dorsal half of valve, arranged somewhat linearly in ventral half. Complete velar and marginal ridges with broad supravelar and marginal furrows.

Length of figured specimen, GSC 42111, 1.15 mm, height 0.75 mm.

Number of specimens studied, 4.

*Types.* Figured specimens, GSC 42110, 42111.

*Occurrence.* Delorme Formation, section II, loc. B-1130, District of Mackenzie, Pridolian.

*Remarks.* Because of the linear arrangement of reticulae on the ventral part of the domicilium, this species is considered as belonging to the genus *Garniella*. The concept of *Garniella* (Martinsson, 1962) is very broad; the type species, *G. lineolata* Martinsson appears to be separable from most other species assigned to the genus. *G. strepuloides* Martinsson, is most similar to the present species but bears larger, less linearly oriented reticulae and has a broad adductorial sulcus. *Garniella concentrica* Berdan (1972, p. 22), from the Silurian Cobleskill Limestone of New York State, has a much wider velum and the linearly arranged reticulae extend onto the anterior part of the valve indicating the position of the preadductorial lobe.

Genus *Hibbardia* Kesling, 1953

*Hibbardia* sp.

Plate VIII, figure 6

*Description.* Valve preplete, dorsal border long, slightly

arched, extending above hinge line in posterior half. Surface of valve coarsely reticulate with angular reticulae, velar ridge continuous, smooth, with subvelar channel and smooth marginal ridge. S2 indistinct, marked at midvalve by ovate pit surrounded by smooth ridge.

Length of figured specimen, GSC 42087, 1.10 mm, height 0.70 mm.

Number of specimens studied, 2.

*Type.* Figured specimen, GSC 42087.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* This species is very similar to *Hibbardia lacrimosa* (Swartz and Oriol) of Middle Devonian age from central North America. The tecomorphic specimens observed are not as posteriorly elevated as those shown by Kesling (1953) and the anterodorsal corner of the domicilium is not smooth as in *H. lacrimosa*, although the velar ridge is of greater width in that region.

Subfamily BEYRICHIINAE Matthew, 1886

Genus *Beyrichia* M'Coy, 1846

Subgenus *Beyrichia (Beyrichia)* M'Coy, 1846

*Beyrichia (Beyrichia) henningsmoeni* McGill, 1963

Plate VIII, figures 1-5

*Beyrichia henningsmoeni* McGill, 1963, p. 1284, Pl. 181, figs. 7-13.

*Remarks.* McGill (1963b, p. 1284-1286) gave a full description of *B. henningsmoeni*, the type specimens of which are figured here. In particular, the species is remarkable in that it is not cuspidate, and bears a row of prominent tubercles across the ventral part of the domicilium. *B. (B.) arctigena* Martinsson, the North American species most nearly allied to *B. (B.) henningsmoeni*, is cuspidate (L3 bicuspidate) and has a more pustulose domicilium.

*Types.* Holotype, GSC 20254; paratypes, GSC 20255-20257.

*Occurrence.* Delorme Range, 62°48'N, 125°21'W, west of Mackenzie River, District of Mackenzie. The age of these specimens is uncertain but assumed by McGill (1963b, p. 1286) to be "Middle to Upper Silurian". Present collections indicate its Late Silurian, possibly mid-Ludlovian age.

*Beyrichia (Beyrichia) sp. cf. B. (B.) henningsmoeni*  
McGill, 1963

Plate I, figure 1

*Remarks.* Immature specimens of *Beyrichia (Beyrichia)* occur in strata of Road River and Delorme formations. These specimens are not cuspidate, bear a row of tubercles across the ventral part of the domicilium and are relatively non-pustulose. No heteromorphic specimens have been obtained but their resemblance to *B. (B.) henningsmoeni* McGill is distinct.

*Type.* Hypotype, GSC 41961.

*Occurrences.* Road River Formation, Royal Creek section II, 0–20 ft, Yukon Territory, Ludlovian; Delorme Formation, section VI, loc. C-47-450, District of Mackenzie, Ludlovian.

*Beyrichia (Beyrichia) arctigena* Martinsson, 1960

Plate XVI, figures 1–4

*Beyrichia (Beyrichia) arctigena* Martinsson, (in Boucot *et al.*), 1960, p. 16, Pl. IV, nos. 1–6; Copeland, 1971, p. 24, Pl. III, figs. 5–13.

*Remarks.* Numerous silicified specimens of this species have been found throughout Arctic Canada. They appear to be very consistent in their occurrence.

*Types.* Hypotypes, GSC 42850–42853.

*Occurrence.* GSC C-26829, western Prince of Wales Island, Smith Bay area, District of Franklin, section IV, 31.5 ft above base of section, collected by R.E. Smith, 1973, Lochkovian.

*Beyrichia (Beyrichia) sp. cf. B. (B.) arctigena*  
Martinsson, 1960

Plate I, figures 2–4

?*Beyrichia (Beyrichia) arctigena* Martinsson, 1960 (in Boucot *et al.*, 1960), p. 24, Pl. IV, nos. 1–6; Copeland, 1971, p. 24, Pl. III, figs. 5–13.

*Remarks.* Only incomplete or tecnomorphic valves have been found during the present study. These specimens agree in all respects with those previously figured. This species is of wide geographic extent, having been reported from several localities in the Canadian Arctic Archipelago, Yukon Territory and District of Mackenzie. It was originally described as Upper Silurian from Sutherland River Formation, Devon Island (Boucot *et al.*, 1960) but recent investigations have shown these strata as possibly Lower Devonian and the fauna of early Gedinnian age (Copeland, 1971, p. 20).

*Types.* Hypotypes, GSC 41962–41964.

*Occurrences.* Delorme Formation, loc. BL-2-N-60-170 ft, District of Mackenzie, and section VII, locs. CH-27-490, CH-27-495, District of Mackenzie, early Gedinnian.

*Beyrichia (Beyrichia) brabbi?* Berdan and Copeland, 1973

?*Beyrichia (Beyrichia) brabbi* Berdan and Copeland, 1973, p. 10, Pl. 2, figs. 1–8.

*Remarks.* Several broken or poorly preserved specimens occur in one collection from Royal Creek section I. All may be presumed as tecnomorphs, although several are broken anteriorly and this is not certain. The ornamentation and sulcation appear to conform with that of *B. (B.) brabbi* and as they occur in strata of approximately the same age as that of the type specimens, they are questionably assigned to that species.

Number of specimens studied, 8.

*Occurrence.* Road River Formation, Royal Creek section I, 375–400 ft, Yukon Territory, Siegenian.

*Beyrichia (Beyrichia) sp. 1*

Plate I, figures 5, 6

*Description.* Small subamplete *Beyrichia (Beyrichia)* species with undifferentiated tuberculation on the lobes, more numerous tubercles in ventral part of valve separated from less tuberculate dorsal part of valve by nontuberculate syllobial groove. Anterior lobe and syllobium broadly connected without lobular differentiation. Preadductorial lobe broad, low, feebly differentiated from anterior lobe. Adductorial sulcus short, in dorsal half of valve. Velum a low tuberculate ridge. Heteromorphic characteristics unknown.

Length of figured specimen, GSC 41965, 2.1 mm, height 1.1 mm.

Number of specimens studied, 12.

*Types.* Figured specimens, GSC 41965, 41966.

*Occurrences.* Whittaker Formation, section VI, loc. C-47-100, and Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, late Wenlockian or early Ludlovian; Road River Formation, section VIII, loc. S-2-795, District of Mackenzie, late Wenlockian or early Ludlovian.

*Remarks.* Only tecnomorphic (immature?) specimens have been found, precluding more detailed description. Lack of lobular differentiation and absence of dorsal cusps are features typical of immature specimens of *Beyrichia (Beyrichia) brabbi* Berdan and Copeland but specimens of that species are shorter and have overall tuberculation.

*Beyrichia (Beyrichia) sp. 2*

Plate IX, figures 10–12

*Description.* Lateral outline preplete, anterior lobe indistinct, preadductorial lobe low, barely separated from anterior lobe. Adductorial sulcus deep, slitlike, extending more than half the height of the valve. Syllobium broad, undivided. Spines developed at antero- and posterodorsal corners of valve (Pl. IX, fig. 11), along dorsal margin of syllobium and above preadductorial lobe. Velar ridge distinct, finely spinose. Surface covered with spines except for adductorial sulcus.

Length of figured specimen, GSC 42113, 1.30 mm, height 0.68 mm.

Number of specimens studied, more than 15.

*Types.* Figured specimens, GSC 42112–42114.

*Occurrences.* Road River Formation, Royal Creek section II, 479 and 640–650 ft, Yukon Territory, Gedinnian–Siegenian.

*Remarks.* This species is distinguished from *Beyrichia (Beyrichia) sp. 1* by its overall tuberculation, lack of distinct anterior sulcus and presence of dorsal spines. The specimens may be immature and thus conform more nearly to small specimens of *B. (B.) brabbi* figured by Berdan and Copeland (1973, Pl. 2, figs. 1, 2). *Beyrichia (Beyrichia) brabbi* Berdan and Copeland, however, is shorter, has a distinct anterior sulcus and is less tuberculate anterodorsally.

Subgenus *Beyrichia* (*Scabribeyrichia*) Martinsson, 1962*Beyrichia* (*Scabribeyrichia*) *churkini*

Berdan and Copeland, 1973

Plate VII, figures 1–6; Plate IX, figures 20–22

*Beyrichia* (*Scabribeyrichia*) *churkini* Berdan and Copeland, 1973, p. 10, Pl. 3, figs. 1–9.

*Remarks.* This species is readily distinguished by its pustulose carapace and narrow, distinct fissus. The very large specimens figured here have more lowly elevated pustules than those figured by Berdan and Copeland (1973); this may be the result of preservation but smaller specimens in all collections appear to have more highly elevated pustules.

Length of hypotype, GSC 42078, 3.50 mm, height 2.10 mm.

Number of specimens studied, more than 40.

*Types.* Hypotypes, GSC 42073–42078, 42122–42124.

*Occurrences.* Road River Formation, Royal Creek section I, 375–400, 1190–1210, 1255–1275, 1390 ft, Royal Creek section II, 640–650, 828–848 ft, Yukon Territory, Siegenian-Emsian; Delorme Formation, section IV, loc. 4, District of Mackenzie, section III, loc. S4-1650–1655 ft, District of Mackenzie, Siegenian-Emsian.

Subgenus *Beyrichia* (*Asperibeyrichia*) Martinsson, 1962*Beyrichia* (*Asperibeyrichia*?) *borealis* n. sp.

Plate IX, figures 13, 15, 16; Plate X, figure 10

*Description.* Valve preplete, subovate, truncated by long, straight hinge line; free margin evenly convex; cardinal angles about 100 degrees. Trilobate, L1 low, extending above hinge line, with a low ventral lobule; L2 broad, prominent, well below hinge line and linked with L3 by a zygial arch; L3 broad, extending above hinge line. All lobate areas spinose. S1 a semiculus, posteriorly concave, extending to ventral side of L2; S2 deep, broad, joined dorsally with S1. Two small spines on dorsum above S2. Syllobium spinose ventral of syllobial groove, with a row of tubercles, some more prominent than others, with lesser tubercles in advelar position. Velar ridge spinose, with more prominent spines along anterior margin. Crumina tuberculate, overhanging anteroventral margin, delimited from valve surface:

Length of holotype, GSC 42118, 1.50 mm, height 1.10 mm.

Number of specimens studied, more than 15.

*Types.* Holotype, GSC 42118; paratypes, GSC 42115, 42117, 42138.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species bears a low zygial arch and anterior ventral lobule on L1 typical of the type species. The crumina is more distinctly limited from the lobal parts of the valve than other asperibeyrichiids and, unlike most species, L2 is distinctly pustulose or spinose. A rudimentary calcarine spine may occur, similar to that present on species of *Simplicibeyrichia* and *Calcaribeyrichia*.

Genus *Yukonibeyrichia* Berdan and Copeland, 1973*Yukonibeyrichia yukonensis* Berdan and Copeland, 1973

Plate VI, figures 11–15; Plate XIV, figure 21

*Yukonibeyrichia yukonensis* Berdan and Copeland, 1973, p. 12, Pl. 4, figs. 5–11.

*Remarks.* The presence of an anterodorsal cusp, uncler tubercle, indistinct S1 and faint syllobial fissus distinguishes this species from *Y. solo* Berdan and Copeland. These structures are consistent in all collections examined from Prongs Creek Formation and Michelle Formation of Yukon Territory and McCann Hill Chert of Alaska.

Length of hypotype, GSC 42068, 2.80 mm, height 1.80 mm.

Number of specimens studied, more than 15.

*Types.* Hypotypes, GSC 42068–42072, 42835.

*Occurrences.* Road River Formation, Royal Creek section I, 1255–1275, 1390 ft, Yukon Territory, Early Emsian; Royal Creek section II, 479 ft, Yukon Territory, Gedinnian; Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Yukonibeyrichia solo* Berdan and Copeland, 1973

Plate VI, figures 1–4

*Yukonibeyrichia solo* Berdan and Copeland, 1973, p. 13, Pl. 4, figs 1–4.

*Remarks.* The present specimens agree in all respects with those from the Prongs Creek Formation of Solo Creek, Yukon Territory. They are not as pustulose as the previously figured specimens but this is probably due to the type of preservation as all specimens from this collection are somewhat more coarsely silicified. As stated in the original description, specimens of this species consistently lack an anterodorsal cusp.

Length of hypotype, GSC 42058, 3.0 mm, height 1.75 mm.

Number of specimens studied, more than 20.

*Types.* Hypotypes, GSC 42058–42061.

*Occurrence.* Road River Formation, Royal Creek section I, 1390 ft, Yukon Territory, Emsian.

Genus *Berdanopsis* n. gen.Type species. *Berdanopsis royalensis* n. sp.Included species. *Berdanopsis ursensis* n. sp.*Beyrichia plagosa* Jones, 1858*Pseudobeyrichia ventrilirata* Hoskins, 1961? *Ulrichia obesita* McClellan, 1973? *Beyrichia clathrata* Jones, 1858

*Diagnosis.* Beyrichiinae with crumina and anterior and posterior lobes cristate. Crumina almost incorporated with the carapace, the velar edge passing across it without interruption.

*Remarks.* It is difficult to estimate the relationships of this genus. The presence of lateral cristae is typical of certain Treposellinae but cruminal development of *Berdanopsis* is distinctly beyrichiine. In that respect, the genus is somewhat similar to *Navibeyrichia* but lacks the lobal dissection of that genus, and the cristae of *Berdanopsis* are superimposed on the lobation and syllobium rather than representing a lateroventral lobule. Martinsson (1962, p. 343) noted similarity between *Navibeyrichia* and *Beyrichia* (*Asperibeyrichia*). The presence in the latter genus of a rudimentary zygial arch and lineation of tubercles, in particular those tubercles on the syllobium and ventral of the syllobial groove (Martinsson, 1962, p. 305, Fig. 167), may approach the zygial connection and cristae of *Berdanopsis*. The presence in *Berdanopsis* of a syllobial groove is unknown as this feature, if developed, is incorporated with the cristae and is indistinguishable.

Of the species included in this genus, *B. royalensis* n. sp., *B. ursensis* n. sp. and *Pseudobeyrichia ventrilirata* Hoskins are known from both tecnomorphic and heteromorphic specimens. There is little doubt that *Beyrichia plagosa* Jones belongs in this genus by virtue of the concentric cristae, even though velar and dimorphic characteristics are unpublished. *?Beyrichia clathrata* Jones is considered by the author most likely to be an eroded or exfoliated specimen of *B. plagosa*; but this remains to be proved. *?Ulrichia obesita* McClellan, from the Lower Devonian McMonnigal Limestone of Nevada, shows cristae only on the holotypic specimen, and the three type specimens, which are tecnomorphs, show highly elevated, yoked, preadductorial and syllobial lobes more typical of kozlowskiellid species. Without heteromorphic specimens, however, it is not possible to determine the treposelline or beyrichiine nature of that species.

*Berdanopsis royalensis* n. sp.

Plate X, figures 18, 21; Plate XV, figures 2, 10–13;  
Plate XVI, figures 5–10

*Description.* Valve semicircular, truncated dorsally by long, straight hinge line. Cardinal angles obtuse, about 100 degrees. Trilobate, L1 and L3 joined ventrally and projecting slightly above dorsum, L2 a large ovate node in anterodorsal quarter, well below dorsum and joined (in most specimens) to L3 by a weakly developed zygial arch. Preadductorial sulcus (S1) deep, narrow, posteriorly concave and extending to beneath L2. S2 broad, joining with S1 dorsally of L2. Velar ridge complete, subvelar field slightly concave. Marginal ridge with a few denticles.

Surface of valve cristate. Cristae concentric about S2, subparallel with free margin. The proximal, major crista passing from preadductorial cusp to syllobial cusp, ventral of S2 and incorporating the zygial arch. A subvertical crista, sometimes divided, delimiting the anterior edge of L3 and extending from the zygial arch to the syllobial cusp. Three or four lesser crista cross the domicilium distally of the major crista, the most dorsal one joining the major crista beneath S2. All cristae curve to intersect at the cusps of L1 and L3, the distal crista continuing between the cusps dorsally of S1,

L2 and S2 and completely encircling the surface of the valve. Cristae separated from velum by wide velar groove.

Crumina broad, occupying most of anteroventral part of valve, not delimited dorsally from valve surface but slightly displacing major crista on L1. Cristae cross crumina without interruption. Velum, slightly reduced on heteromorphic specimens, crossing ventral side of crumina without interruption.

Length of holotype, GSC 42142, 1.70 mm, height 1.10 mm.

Number of specimens studied, more than 30.

*Types.* Holotype, GSC 42142; paratypes, GSC 42145, 42837, 42845–42848, 42854–42858.

*Occurrences.* Road River Formation, Royal Creek section II, 479 ft, Yukon Territory, Gedinnian, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section VII, loc. CH-27-495, District of Mackenzie, Gedinnian; GSC loc. 33024, headwaters of Tundra Creek, a tributary of Ram River, District of Mackenzie, unstated age.

*Remarks.* This species is readily distinguished from *Berdanopsis ursensis* n. sp. by the presence of a dorsal carina connecting the cusps of L1 and L3. *B. ventrilirata* (Hoskins) bears two lateral carinae that die out posteriorly in the ventral part of the syllobium.

*Berdanopsis ursensis* n. sp.

Plate X, figures 19, 20, 22–25; Plate XV, figures 3, 14

*Description.* Valve semicircular, truncated dorsally by long, straight hinge line. Cardinal angles obtuse, about 100 degrees. Trilobate, L1 and L3 joined ventrally and projecting slightly above dorsum, L2 a large, ovate node in anterodorsal quarter, almost reaching dorsum and joined to L3 by a weakly developed zygial arch. Preadductorial sulcus (S1) deep, narrow, posteriorly concave and extending to beneath L2. S2 broad, joining with S1 dorsally of L2. Velar ridge complete, subvelar field slightly concave. Marginal ridge with a few denticles.

Surface of valves cristate. Two major cristae concentric about S2, subparallel with free margin. The proximal major crista passing from preadductorial cusp to syllobial cusp, ventral of S2 and incorporating the zygial arch. Crista dividing posteriorly into three parts that pass dorsally up L3. The distal major crista delimits the domiciliar area and curves to form the cristate dorsal margins of L1 and L3, the anterodorsal crista extends posteriorly to the dorsal margin of L2. No crista dorsal of S2 but one or two denticles may be present in this area. Cristae separated from velum by wide velar groove.

Crumina broad, occupying most of anteroventral part of valve, not delimited dorsally from valve surface but slightly displacing major crista on L1. Both major cristae cross crumina without interruption. Velum, of equal strength to major cristae, crosses ventral side of crumina without interruption.

Length of holotype, GSC 42144, 1.00 mm, height 0.70 mm.

Number of specimens studied, more than 35.

*Types.* Holotype, GSC 42144; paratypes, GSC 42143, 42146–42149, 42838, 42849.

*Occurrences.* Delorme Formation, section IX, locs. L-395, L-455, District of Mackenzie, Ludlovian.

*Remarks.* This species is distinguished from *B. royalensis* by the lack of dorsal carina between L1 and L3, the lesser number of carinae on the surface of the valve and the strength of the major carina and velar ridge that cross the crumina.

### Genus *Calcaribeyrichia* Martinsson, 1962

*Calcaribeyrichia mackenziensis* n. sp.

Plate IX, figures 14, 17–19; Plate X, figure 8

*Description.* Preplete, valves subovate with long, straight hinge line. Cardinal angles slightly obtuse; free margin evenly rounded, anterior more narrowly rounded than posterior. Trilobate, cusps of L1 and L3 extending above dorsum; L2 tuberculate, lower on valve. L1 dissected into smaller pustulose cuspidal lobule and anteroventral lobule, both marked by a row of prominent tubercles which may become fused in cuspidal lobule. L3 with numerous smaller tubercles on cuspidal lobule separated by syllobial groove from calcarine lobule. Calcarine lobule nearly continuous with anteroventral lobule, with prominent or very prominent calcarine spine and less prominent unclar and acroidal spines separated by lesser tubercles. S1 short, extending to ventral part of anterior cuspidal lobule. S2 narrow, relatively deep, sometimes obscured by tubercles of posterior cuspidal lobule. Two small tubercles dorsal of S2. Velum more prominent on anteroventral portion, tuberculate, posterior part of velum low, more lowly tuberculate. Heteromorph unknown.

Length of holotype, GSC 42137, 1.20 mm, height 0.80 mm.

Number of specimens studied, 12.

*Types.* Holotype, GSC 42137; paratypes, GSC 42116, 42119–42121.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species is less cuspidate than those figured by Martinsson (1962), and the tecnomorphic velum is more prominent in the anteroventral part of the valve rather than being more posteroventrally prominent as are the Baltic species. *C. mackenziensis* n. sp. belongs with the group of calcaribeyrichiids that exhibit inconsiderable dissection of the syllobium and anterior lobe but have conspicuous development of calcarine, unclar and acroidal spines.

### Genus *Gannibeyrichia* Martinsson, 1962

*Gannibeyrichia canadensis* n. sp.

Plate X, figures 4, 9, 14–17; Plate XIV, figures 9, 10

*Description.* Valve ovate in lateral view, truncated dorsally by

long straight hinge line. Preplete, anterior margin regularly curved to slightly sloping ventral margin; posterior margin gently convex. Cardinal angles abrupt, each with small alate projection. Trilobate, L1 linear, slightly projecting above hinge line; L2 a large, round isolated node situated slightly anterior of mid valve; L3 divided with linear callic lobule and stout syllobial cusp. Linear lateroventral lobe from lower part of L1 to the end of the calcarine lobule. One or two small tubercles on dorsal margin above L2. Complete velar ridge. Heteromorph unknown.

Length of holotype, GSC 42130, 1.10 mm, height 0.70 mm.

Number of specimens studied (all tecnomorphs), 23.

*Types.* Holotype, GSC 42130; paratypes GSC 42128, 42129, 42131–42133, 42823, 42824.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species is very similar to *G. biplicata* Martinsson, 1962 but does not bear tubercles on the lateral surface and the syllobial cusp is linear rather than an ovate node. The presence on *G. canadensis* of one or two small tubercles dorsal of L2 is unknown on other species of the genus. Unfortunately no heteromorphic specimens have been observed so it is not known if the velar edge is restricted behind the crumina.

### Genus *Navibeyrichia* Martinsson, 1962

*Navibeyrichia? dividensis* n. sp.

Plate X, figures 11–13

*Description.* Valves small, subovate, preplete. Hinge line straight, cardinal angles obtuse. Free margin smoothly curved, anterior margin more narrowly curved than posterior margin. Trilobate, L1 very low, reaching to dorsum, with a sharp thin crest curving posteroventrally to nearly join zygial ridge slightly ventral of L2. L2 an ovate node well removed from dorsum, joined to L3 by thin zygial ridge. L3 nearly vertical, elongate, club-shaped with elevated surface, extending above hinge line. S1 narrow, deep, concave posteriorly, extending from dorsum to ventral of L2. S2 broad, deep, joined to S1 above L2, limited ventrally by zygial ridge. Lateroventral lobe lowly crested, passing from anteroventral edge of L1 to posteroventral edge of L3, parallel with velar ridge. Tecnomorphic velum complete, broad and flaring nearly at right angle to line of closure. Subvelar field slightly concave to denticulate marginal ridge. Heteromorph with large crumina incorporating L1 and extending ventral of obscure zygial ridge to well beneath L3. Lateroventral lobe low posterior of the crumina, extending onto posterior half of crumina as a thin fine crest. Velum narrow, crossing ventral edge of crumina and passing anterodorsally to anterior cardinal angle. Surface of valve finely papillose except on crested areas.

Length of holotype, GSC 42139, 0.60 mm, height 0.40 mm.

Number of specimens studied, 6.



*Types.* Holotype, GSC 42139; paratypes, GSC 42140, 42141.

*Occurrences.* Delorme Formation, section V, locs. C-2560, C-2620, District of Mackenzie, Ludlovian.

*Remarks.* This species is questionably assigned to the genus *Navibeyrichia* because of the presence of a lateroventral lobe and the continuation of that lobe and the velum across the crumina. In these respects *N. dividensis* is more similar to *N. balticivaga* Martinsson (especially those specimens figured by Sarv (1968), Pl. XX, figs. 4, 5) than to *N. hanseatica* Martinsson, the type species. *N. dividensis*, however, has a wider tecomorphic velar frill than either of those Baltic species, the zygial ridge is more pronounced, L1 is a sharply crested lobe more associated with the dorsal lobation than with the lateroventral lobe and it lacks a toric ridge.

### Genus *Bingeria* Martinsson, 1962

*Bingeria?* sp.

Plate XIV, figure 17

*Description.* Tecnomorphic valve subovate, truncated dorsally by long, straight hinge line. Trilobate, L1 low, with dorsal plica; L2 ovate, with low zygial connection, nearly fused anteriorly to L1; L3 broad, extending to hinge line, with low cuspidal plica. S1 nearly obsolete; S2 deepest ventrally. Velar flange narrow. Surface irregular, granular. Heteromorph unknown.

Length of figured specimen, GSC 42831, 1.40 mm, height 0.80 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42831.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

### Genus *Cornikloedenina* Abushik, 1971

*Cornikloedenina lorangerae* n. sp.

Plate VIII, figures 16–21; Plate IX, figure 1

*Description.* Valves amplete to preplete, dorsal margin long, straight, hinge line hidden by cuspidal ridges. L1 broad, separated from preadductorial node by shallow S1. Pre-adductorial node large, connected with broad syllobium by narrow zygial ridge. S2 deep, straight. Crumina reaching to beneath S2. Small tubercle present on some specimens ventral of posterior side of S2.

Length of holotype, GSC 42102, 1.60 mm, height 1.05 mm.

Number of specimens studied, 15.

*Types.* Holotype, GSC 42102; paratypes, GSC 42097–42101, 42103.

*Occurrences.* Road River Formation, section VIII, loc. S-2-795, District of Mackenzie, late Wenlockian–early Ludlovian, loc. S-1-C, 1 mi north of June Lake, 80 ft below base of Delorme Formation, District of Mackenzie,

Ludlovian; loc. M-2480–2500 (GSC loc. C-26345) District of Mackenzie, Wenlockian; Delorme Formation, Rouge Range, loc. RGR-3-730, District of Mackenzie, Ludlovian?

*Remarks.* All specimens are steinkerns lacking surface ornamentation and ventral cruminal structures. *C. lorangerae* n. sp. is most similar to *C. inornata* (Alth) but the crumina of *C. lorangerae* is more prominent and L2 is less elevated. Both species demonstrate the weak S1 typical of the genus. Because the present specimens are steinkerns, the anterior margin of the crumina is more distinctly outlined than in most other species of the genus. The presence on several tecnomorphic specimens of a small tubercle ventral of S2 indicates the position of this species in *Cornikloedenina*. Heteromorph specimens also bear a similar tubercle on the domicilium.

### Genus *Welleriella* Abushik, 1971

*Welleriella sekwiensis* n. sp.

Plate VIII, figures 8–10

*Description.* Amplete, valves ovate in lateral view, truncated dorsally by long, straight hinge line. Cardinal angles about 100 degrees, with small projections; free margins evenly rounded with complete marginal ridge. Trilobate, L1 and L3 with low dorsal crests, L2 a low round node one-quarter greatest height from dorsum and one-third greatest length from anterior. S1 shallow, short, S2 about one-third greatest height, deepest ventrally. Heteromorph crumina large, not differentiated dorsally from domicilium, greatly overhanging free margin along two-thirds of ventral edge. Surface smooth.

Length of holotype, GSC 42091, 0.95 mm, height 0.80 mm.

Number of specimens studied, more than 15.

*Types.* Holotype, GSC 42091; paratypes, GSC 42089, 42090.

*Occurrences.* Delorme Formation, section V, loc. C-2560, District of Mackenzie, Ludlovian; Road River Formation, section VIII, loc. S-2-795, late Wenlockian–early Ludlovian, loc. S-1-C, 1 mi north of June Lake, 80 ft below base of Delorme Formation, Ludlovian, loc. M-2480–2500 (GSC loc. C-26345), District of Mackenzie, Wenlockian.

*Remarks.* This species is smaller, but similar to *W. prostrata* Abushik, 1971 (p. 82, Pl. XIX, figs. 5–9). Heteromorph valves show extreme ventral overreach of the crumina and lack of crumina-domicilium differentiation. Species of the most closely allied genera, *Kloedeniopsis*, *Welleria* and *Welleriopsis* have less ventral cruminal overhang and more pronounced L2.

### Genus *Pintopsis* Copeland, 1964

*Pintopsis* sp.

Plate VIII, figures 14, 15

*Description.* Valves smooth, trilobate, L1 and L3 extending above dorsal margin, L2 ovate, nearly isolated from valve

surface by ventral part of S1, S2 deep, extending to mid-height, ending abruptly at base of L2. L4 not distinct from L3, but forming a low posterior 'shoulder' on L3. Velar bend complete.

Length of figured specimen, GSC 42096, 0.80 mm, height 0.50 mm.

Number of specimens studied, 2.

*Types.* Figured specimens, GSC 42095, 42096.

*Occurrence.* Road River Formation, loc. S-1-C, 1 mi north of June Lake, 80 ft below base of Delorme Formation, District of Mackenzie, late Ludlovian.

*Remarks.* These specimens are similar in many respects to specimens of *P. tricornis* (Ulrich and Bassler) figured by Copeland (1964, Pl. I). The present specimens are steinkerns of tecnomorphs, but certain features distinguish them from *P. tricornis*. The lobation and sulcation of *P. tricornis* is confined within the dorsal third of the valve whereas in *Pintopsis* sp. these features occupy the entire dorsal half of the valve. L1 and L3 of *P. sp.* are more prominent and L3 is only indistinctly separable into two lobes. Also, L2 of the present species is lower on the valve, not extending to the dorsal margin as in *P. tricornis*. The two major sulci of *P. tricornis* are of near equal size whereas S2 of *Pintopsis* sp. is much more prominent than S1.

#### Subfamily Indeterminate

Genus *Alaskabolbina* Berdan and Copeland, 1973

Type species. *Alaskabolbina unilineata*

Berdan and Copeland, 1973

Species included. *Alaskabolbina bilineata*  
Berdan and Copeland, 1973

*Alaskabolbina nodilineata* Berdan and Copeland, 1973

*Alaskabolbina paucilineata* n. sp.

*Alaskabolbina* sp. Berdan and Copeland, 1973

*Alaskabolbina?* sp. Berdan and Copeland, 1973 (part)

*Hollinella* sp. McClellan, 1973

*Remarks.* The diagnosis of this genus is essentially correct, but species of *Alaskabolbina?* sp. and *Hollinella* sp. McClellan do not bear "anterodorsal and posterodorsal cusps or spines" (Berdan and Copeland, 1973, p. 14) and the subvelar field apparently lacks ridge(s) parallel with the free margin. The specimen of *Hollinella* sp. figured by McClellan appears to bear a slight ventral thickening along the base of the velar ridge. This may be interpreted as subvelar but is probably not a torus in the true sense. The description of this species, herein designated as *Alaskabolbina* sp. 2 (McClellan), should be amended to indicate that the broad striate frill extends from the anterodorsal corner to the posteroventral slope where it ends in a prominent, short, hollow spine. The frill is directed laterally more than ventrally and is broadest mid-ventrally. The surface of the valve is relatively smooth but extraneous material posterior of the central bulb gives the false impression of a median sulcus.

At present it is not desirable to separate *Alaskabolbina* species into subgenera on the presence or absence of dorsal nodes and subvelar ridges. The group without dorsal nodes or subvelar toric ridge(s) (*Alaskabolbina* sp. 2 (McClellan) and *Alaskabolbina?* sp. Berdan and Copeland, 1973, Pl. 5, figs. 9, 10 only) is represented by relatively few specimens, all of which are small by comparison with the type and other nominal species. This grouping, therefore, may represent only juvenile specimens of which none are presently known for the species represented by presumably adult specimens. The beyrichiid or eurychilid affinities of alaskabolbinid species are still unknown. The velar frill of some specimens is conspicuously broad and gently flaring, that of others is narrow and abruptly bent. This character may subsequently prove to be dimorphic but this can only be demonstrated when more specimens are available.

#### *Alaskabolbina* sp. cf. *A. nodilineata*

Berdan and Copeland, 1973

Plate XII, figures 1, 2

?*Alaskabolbina nodilineata* Berdan and Copeland, 1973, p. 14, Pl. 5, figs. 1-6.

*Remarks.* These specimens may be immature individuals. The pustulose nature of the valves, lack of dorsal nodes and presence of larger tubercles in their positions, and more dorsal position of the median node seem to indicate their inclusion in *A. nodilineata*. There is no evidence of subvelar tubercles.

Number of specimens studied, 6.

*Types.* Hypotypes, GSC 42175, 42176.

*Occurrence.* Delorme Formation, section I, loc. A-1265, District of Mackenzie, Siegenian.

#### *Alaskabolbina bilineata* Berdan and Copeland, 1973

Plate XV, figure 5

*Alaskabolbina bilineata* Berdan and Copeland, 1973, p. 14, Pl. 5, figs. 16-21.

*Remarks.* Typical specimens of this species were obtained from one locality. The spinose dorsal cusps, coarse tuberculation, large subcentral node and double toric ridges easily distinguish this species from other alaskabolbinids. The figured specimen demonstrates the wide velum of the species.

Number of specimens studied, 6.

*Type.* Hypotype, GSC 42840.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

#### *Alaskabolbina paucilineata* n. sp.

Plate XIII, figures 23-26; Plate XIV, figure 14

*Description.* Lateral outline amplete. Large subcircular median node above midheight of valve. Massive, blunt anterodorsal and posterodorsal cusps protrude above hinge



line. Surface finely reticulate. Striated velum extending from anterodorsal angle to posterior part of free margin, ending in upward recurved spur. Velum curved away from contact margin in ventral view; smooth subvelar field widest near midlength. Heteromorph not known.

Length of holotype, GSC 42808, 1.60 mm, height 1.10 mm.

Number of specimens studied, more than 15.

*Types.* Holotype, GSC 42808; paratypes, GSC 42807, 42809, 42810, 42828.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species differs from other *Alaskabolbina* species in having a reticulate surface and lacking a toric ridge. The hollow velum (Pl. XIV, fig. 14) is very broad and flares laterally more so than other species of the genus.

#### Genus *Yukonibolbina* n. gen.

Type species. *Yukonibolbina plana* n. sp.

Included species. *Yukonibolbina nodosa* n. sp.

*Alaskabolbina?* sp. Berdan and Copeland, 1973 (part)

*Diagnosis.* Nonsulcate palaeocope ostracodes with no lateral ornamentation or a very low median fold. Velum tubulous, incomplete, extending from anterior cardinal angle to posteroventral slope, ending in hollow spine. Domicilium smooth to finely granular. Inconspicuous ridge (torus) on subvelar field parallel with free margin. Heteromorph not known.

*Discussion.* This genus is allied with *Alaskabolbina* Berdan and Copeland, 1973 and, possibly, *Praepaegnium* Polenova, 1974. These genera have a node or rudimentary subcentral fold, may bear one or more toric ridges, and have a striated velar frill. The velar frills of *Alaskabolbina* and *Yukonibolbina* terminate in a spinous process on the posteroventral slope, whereas that of *Praepaegnium* extends along the entire free margin and is constricted in apatobolbinid or leptobolbinid fashion on the posteroventral margin of the valve. The systematic position of these genera is in doubt until proved heteromorphic specimens are available. The demonstrable variation in width of velar frill of many species may prove a valid dimorphic criterion as no specimens showing cruminal or dolonal characteristics have been observed. The possible position of *Praepaegnium* within the family Arcyzonidae (Polenova, 1974, p. 31) is not considered valid.

#### *Yukonibolbina plana* n. sp.

Plate XIII, figure 12; Plate XIV, figure 8;  
Plate XVI, figures 15, 16

*Description.* Valves nonsulcate, unornamented, with a tubulous velum extending from anterior cardinal angle to posteroventral slope and ending in a hollow spine. Domicilium smooth to granular. Low torus on subvelar field near

midvalve, parallel with free margin and in contact with velum at each end.

Length of holotype, GSC 42863, 1.20 mm, height 0.55 mm.

Number of specimens studied, 12.

*Types.* Holotype, GSC 42863, paratypes, GSC 42215, 42822.

*Occurrences.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, section V, loc. C-2560, District of Mackenzie, Ludlovian.

*Remarks.* *Y. plana* n. sp. is very similar to *Y. nodosa* n. sp. but lacks the faint median fold of that species.

#### *Yukonibolbina nodosa* n. sp.

Plate XIII, figures 20–22

*Description.* Valves nonsulcate with a slight median fold (sulcus?) posterior of a low node. Tubulous velum extending from anterior cardinal angle to posteroventral slope and ending in a hollow spine. Domicilium smooth to finely granular. Low toric swelling on subvelar field near midvalve, parallel with free margin and in contact with velum at each end.

Length of holotype, GSC 42805, 1.40 mm, height 0.80 mm.

Number of specimens studied, 8.

*Types.* Holotype, GSC 42805; paratypes, GSC 42804, 42806.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* The presence of a slight, near median fold and low node distinguishes this species from *Y. plana* n. sp.

#### Superfamily DREPANELLACEA Ulrich and Bassler, 1923

Family DREPANELLIDAE Ulrich and Bassler, 1923

Genus *Acantonodella* Zaspelova, 1952

*Acantonodella? plana* n. sp.

Plate XII, figures 3–6

*Description.* Valves small, semicircular, truncated dorsally. Dorsal margin straight, free margins evenly convex. Valves amplete to slightly preplete. Cardinal angles nearly 90 degrees, assumed to be connected by tubulous(?) velar ridge parallel with contact margin. Ridge terminating anteriorly and posteriorly in short, somewhat posteriorly inclined spines extending above dorsum. Surface smooth, slightly undulating with poorly defined L2, S2 and L3. L2 and L3 closer to anterior end of valves with spines extending above dorsum, these lobes dying out ventrally near midvalve.

Length of holotype, GSC 42180, 0.9 mm, height 0.8 mm.

Number of specimens studied, 4.

*Types.* Holotype, GSC 42180; paratypes, GSC 42177–42179.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* The position of this species within the Drepanel-  
lacea is uncertain. In certain aspects, it resembles *Neodre-*  
*panella* but appears to have a complete near marginal ridge  
similar to that of *Limbatula*. Neither genus however has  
been reported to have four dorsal spines as does *A.? plana*,  
but both have three spines and L2 as a low lobe high on the  
lateral surface of the valve. *A.? plana* has greater height than  
species of either genus, and paratype GSC No. 42179 has  
posteroventral obesity not seen on the other specimens.  
Similarly with species of *Acantonodella* is likewise remote,  
but *A.? plana* does bear four spines and has greater valve  
height, more characteristic of species of that genus.

Family AECHMINIDAE Bouček, 1936

Genus *Aechmina* Jones and Holl, 1869

*Aechmina wolfensis* n. sp.

Plate V, figures 1–3

*Aechmina* spp. Copeland in Ludvigsen, 1975, p. 691 (part).

*Description.* Valves small, amplete, anterior cardinal angle  
greater than 90 degrees, posterior cardinal angle about  
90 degrees. Anteroventral margin with four or five low,  
rounded tubercles. Long, slender, near dorsal spine slightly  
anterior of mid valve, posterolaterally directed, with only  
slight elevation above hinge at distal end. Surface of valves  
finely papillose.

Length of holotype, GSC 42038, a valve, 0.6 mm, height  
(without spine) 0.3 mm.

Number of specimens studied, 50.

*Types.* Holotype, GSC 42038; paratypes, GSC 42039, 42040.

*Occurrence.* Road River Formation, Blackwolf Mountain,  
District of Mackenzie, Upper Ordovician.

*Remarks.* The somewhat recumbent attitude of the dorsal  
spine and presence of four or five large anteroventral  
marginal tubercles serve to distinguish this species.

*Aechmina* sp.

Plate V, figures 6, 7

*Aechmina* spp. Copeland in Ludvigsen, 1975, p. 691 (part).

*Description.* Valves small, preplete, anterior cardinal angle  
greater than 90 degrees, posterior cardinal angle 90 degrees  
or less. Anterior and anteroventral margin of most specimens  
with numerous small denticles. Long, dorsolaterally directed  
spine arising near dorsal margin at midlength of valve.  
Surface of valves finely papillose.

Length of figured specimen, GSC 42044, 0.65 mm,  
height (without spine) 0.3 mm.

Number of specimens studied, more than 25.

*Types.* Figured specimens, GSC 42043, 42044.

*Occurrence.* Road River Formation, Blackwolf Mountain,  
District of Mackenzie, Upper Ordovician.

*Remarks.* Great variation in this species is evident from the  
Blackwolf Mountain collection. The posterior cardinal angle

may be rounded or abrupt and the anterior denticles may be  
visible in lateral view or nearly obsolete in end view.

Genus *Aechminaria* Coryell and Williamson, 1936

*Aechminaria* sp.

*Remarks.* One specimen of a large aechminariid was found  
during the present study; it was lost while being photo-  
graphed. The dorsal spine of this specimen was stout and  
directed dorsally more than laterally. The pit anterior of the  
spine base was prominent.

*Occurrence.* Delorme Formation, section VI, loc. C-47-150,  
District of Mackenzie, Ludlovian.

Family BOLLIIDAE Bouček, 1936

Genus *Warthinia* Spivey, 1939

*Warthinia?* sp. cf. *W.? irregularis* (Spivey), 1939

Plate V, figures 8, 9

?*Beyrichia irregularis* Spivey, 1939, p. 172, Pl. 21, figs. 1, 2.

?*Eohollina irregularis* Spivey. Harris, 1957, p. 207.

*Warthinia* cf. *irregularis* (Spivey). Copeland in Ludvigsen, 1975, p. 691.

*Remarks.* This species has been described from several  
localities in Upper Ordovician strata of North America.  
The present specimens are not as pronouncedly lobate as the  
type specimen but this may be due to the type of preser-  
vation. Also, the large ventral lobe of L3 continues beneath  
L2 and meets smoothly with the anterior valve surface, not  
abruptly elevated as indicated by Spivey. The valve surface  
anterior of S2 is more inflated on the present specimens than  
that of the type specimen, causing L2 to be less delimited  
anteriorly from L1.

Length of hypotype, GSC 42045, 0.7 mm, height  
0.4 mm.

Number of specimens studied, more than 25.

*Types.* Hypotypes, GSC 42045, 42046.

*Occurrence.* Road River Formation, Blackwolf Mountain  
District of Mackenzie, Upper Ordovician.

Family RICHINIDAE Scott, 1961

Genus *Pseudulrichia* Schmidt, 1941

*Pseudulrichia* sp.

Plate V, figures 4, 5

?*Pseudulrichia* sp. Copeland in Ludvigsen, 1975, p. 691.

*Description.* Valves small, amplete or slightly preplete;  
hinge straight, about three-fourths greatest length of valve.  
Cardinal angles obtuse. Lateral surface finely papillose,  
rising abruptly from marginal surface with faint marginal  
band and curving evenly to dorsum.

Two lobes in dorsal quarter, separated at midvalve by  
short, distinct S2. L2 low, rounded node, L3 smooth,  
pointed, directed slightly posterodorsally.

Length of figured specimen, GSC 42042, 0.4 mm, height 0.3 mm.

Number of specimens studied, more than 50.

*Types.* Figured specimens, GSC 42041, 42042.

*Occurrence.* Road River Formation, Blackwolf Mountain, District of Mackenzie, Upper Ordovician.

*Remarks.* All specimens observed are very small, whether immature or dwarfed cannot be ascertained. Some similarity is apparent between this species and *Warthinia binoda* (Keenan) but the nodes appear more prominent on *W. binoda* and the surface texture of that species is reticulate.

### Superfamily HOLLINACEA Swartz, 1936

Family CTENOLOCULINIDAE  
Jaanusson and Martinsson, 1956

Genus *Abditoloculina* Kesling, 1952

*Abditoloculina trilocolata* n. sp.

Plate XII, figures 10, 11; Plate XIV, figures 19, 20

*Description.* Lateral outline preplete; L1 projecting as cusp above hinge line; L2 rounded node below hinge line; L3 triangular, spinose, projecting well above hinge line. S1 weak; S2 deep, narrow, confined to dorsal third of valve. Three prominent ventral nodes, the anterior one about the same size as L2 and anteroventral of L2, a smaller median node ventral of L2 and joined posteriorly with a larger, spinose posterior node ventral of L3. Tecnomorphic velum smooth, flaring anteroventrally, extending from anterior cardinal angle to beneath posteroventral node. Heteromorph with three large loculi situated anteroventrally and ventrally. Loculi apparently closed in ventral view. Surface finely granulose.

Length of holotype, GSC 42184, 0.75 mm, height 0.60 mm.

Number of specimens studied, 4.

*Types.* Holotype, GSC 42184; paratypes, GSC 42185, 42833, 42834.

*Occurrences.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian; Road River Formation, Royal Creek section II, 245 ft, Yukon Territory, Pridolian.

*Remarks.* *Abditoloculina trilocolata* n. sp. is the oldest yet described species of the genus. Kesling and Peterson (1958, p. 130) proposed that species of this genus may be discriminated by the number of heteromorphic loculi. Berdan and Copeland (1973, p. 16) concluded that such may prove of stratigraphic value because all Middle Devonian abditoloculinids bear seven or more loculi, with the lowest number of loculi (6) being reported for *A. clausa* Berdan and Copeland of Emsian age from Alaska. *A. trilocolata*, of Ludlow age, bears only three loculi of large size and unlike other species of the genus bears no velar tubercles on either dimorph. If this trend is valid, number of loculi and development of velar tubercles may prove of great taxonomic and stratigraphic importance.

### *Abditoloculina clausa* Berdan and Copeland, 1973

*Abditoloculina clausa* Berdan and Copeland, 1973, p. 16, Pl. 6, figs. 2-8.

*Remarks.* Both dimorphs of this species were observed in collections from Yukon Territory and District of Mackenzie. They agree with specimens previously described.

*Occurrences.* Road River Formation, Royal Creek section I, 375-400 ft, Yukon Territory, Siegenian; Delorme Formation, section I, loc. A-1265, District of Mackenzie, Siegenian.

### *Abditoloculina* sp.

*Remarks.* Several immature or tecnomorphic specimens of an abditoloculinid species have been recovered from one locality in Yukon Territory. These specimens are preplete, L1 projects above the hinge line, L2 and L3 are round nodes set lower on the valve surface, S2 is deep and the presence of a node or spur ventral of S2 is inferred. The velar ridge is either lacking or not preserved, but some near-marginal tubercles appear to be present posteriorly.

*Occurrence.* Road River Formation, Royal Creek section II, 245 ft, Yukon Territory, Pridolian.

### Family HOLLINIDAE Swartz, 1936

Subfamily FALSIPOLLINAE Bless and Jordan, 1971

Genus *Falsipollex* Bless and Jordan, 1971

*Falsipollex? multispinosus* Berdan and Copeland, 1973

*Falsipollex? multispinosus* Berdan and Copeland, 1973, p. 17, Pl. 7, figs. 14-16.

*Remarks.* Poorly preserved and broken specimens of this species were present in one collection. Only tecnomorphic specimens were identified but the lobation and spinose nature of the valves indicate their similarity to this previously described species.

*Occurrence.* Road River Formation, Royal Creek section II, 880 ft, Yukon Territory, Siegenian.

### Family HOLLINELLIDAE Bless and Jordan, 1971

Genus *Abortivelum* Berdan and Copeland, 1973

*Abortivelum* sp.

Plate XIV, figure 18

*Description.* Lateral outline preplete. Hinge line straight, free margins evenly rounded. L1 low, only slightly projecting above hinge line in lateral view. L2 small, oblong, separated from L1 by short indistinct S1. L3 large, bulbous, extending to hinge line, slightly constricted at midheight, separated from posterior slope of valve by shallow posterodorsal depression. S2 deep, broad, extending from dorsum to near midvalve. Tecnomorph unknown. Heteromorph with flaring velar frill extending from anterior cardinal angle, abruptly constricted below L3 and continuing posteriorly as a velar bend. Velar frill merging with lateral surface of valve, not

distinctly separated from it. Surface granulose becoming pustulose near velar structure.

Length of figured specimen, GSC 42832, 1.70 mm, height 1.20 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42832.

*Occurrence.* Road River Formation, Royal Creek section II, 880 ft, Yukon Territory, Siegenian.

*Remarks.* This species differs from *A. truncatum* Berdan and Copeland in size, width of S2, surface ornamentation and length of velar frill. Unlike *A. truncatum*, the frill of the present species is abruptly constricted posteriorly.

#### Genus *Adelphobolbina* Stover, 1956

##### *Adelphobolbina?* sp.

*Remarks.* Two smooth steinkerns of specimens somewhat resembling *Adelphobolbina prongsensis* Berdan and Copeland occur at one locality. The lobate areas on these specimens are irregularly etched but the ventral portions of the valves and parts of the narrow velum are preserved. The manner in which the anterior lobate area is etched would appear to indicate the fused nature of L1 and L2, possibly similar to that of *A. prongsensis*.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

#### Genus *Infractivelum* Berdan and Copeland, 1973

##### *Infractivelum acuminatum* Berdan and Copeland, 1973

##### Plate XII, figure 21

*Infractivelum acuminatum* Berdan and Copeland, 1973, p. 21, Pl. 8, figs. 19–23.

*Remarks.* Only one heteromorphic specimen of this species has been found during the present study. It is incomplete posteriorly but its identification is undoubted.

*Type.* Hypotype, GSC 42195.

*Occurrence.* Road River Formation, Royal Creek section II, 828–848 ft, Yukon Territory, Siegenian.

##### *Infractivelum spiculosum* Berdan and Copeland, 1973

##### Plate VII, figure 10

*Infractivelum spiculosum* Berdan and Copeland, 1973, p. 22, Pl. 8, figs. 24–27.

*Remarks.* The papillose nature of this species helps differentiate it from *I. acuminatum* Berdan and Copeland. Only four tecnomorphic specimens have been found in the present collections.

Length of hypotype, GSC 42082, 1.90 mm, height 0.90 mm.

*Type.* Hypotype, GSC 42082.

*Occurrences.* Road River Formation, Royal Creek section I, 375–400 and 1350 ft, Yukon Territory, Siegenian-Emsian.

#### Family SIGMOOPSIDAE Henningsmoen, 1953

##### Genus *Winchellatia* Kay, 1940

##### *Winchellatia?* sp.

##### Plate XIV, figure 16

*Description.* Valve preplete, dorsal margin straight, long, cardinal angles obtuse, free margin evenly rounded, anterior margin more narrowly rounded than posterior margin. Unisulcate, S2 narrow, concave anteriorly, near midvalve, extending from dorsum to below midheight of valve. L1-L2 and L3 joined ventral of S2, ventral edge of lobate area elevated from anterior third of valve to near posterodorsal angle. Elevation bendlike, highest in posterior third of valve. Valve surface ventral of bend at right angle to lateral surface. Marginal surface recurved to plane of valve closure. Surface smooth.

Length of figured specimen, GSC 42830, 1.20 mm, height 0.70 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42830.

*Occurrence.* Delorme Formation, section VI, loc. C-47-450, District of Mackenzie, Ludlovian.

*Remarks.* The tecnomorphic specimen described above is very questionably assigned to *Winchellatia*. It is possible that all Silurian species assigned to this genus should be re-examined and assigned to other genera.

#### Family EURYCHILINIDAE Ulrich and Bassler, 1923

##### Genus *Platybolbina* Henningsmoen, 1953

##### Subgenus *Platybolbina (Reticulobolbina)*

##### Schallreuter, 1969

*Diagnosis.* Muscle scar smooth, velum gradually narrowing posteriorly, lateral surface reticulate (with pores or pustules).

*Remarks.* Characteristics of species previously referred to this subgenus are a large, ovate muscle scar, little or no sulcal depression, narrow tecnomorphic velum and elongate, ill-defined (in lateral view) heteromorphic dolon. Dorsal projection of the cardinal corners may also prove a distinguishing feature but this cannot be proved for all included species.

##### *Platybolbina (Reticulobolbina) lenzi* n. sp.

##### Plate V, figures 12–20

*Platybolbina (Reticulobolbina)* sp. Copeland in Ludvigsen, 1975, p. 691.

*Description.* Carapace slightly preplete in lateral view, postplete in internal view; hinge line straight, nearly as long as greatest length of valve. Anterior cardinal angle obtuse, slightly projecting; posterior cardinal angle 90 degrees, with more pronounced posterodorsally directed projection. Surface of domicilium reticulate, with small, slightly sunken muscle scar and faint vertical depression extending through

the scar and dividing domicilium into more highly elevated posterior half and lower anterior half. Reticulae lacking on anterodorsal part of domicilium and much reduced or lacking near contact of domicilium and velum.

Tecnomorph with complete velum, widest anteroventrally and becoming a velar ridge before being incorporated in projecting cardinal angles. Velum faintly striate, concave laterally especially along anteroventral and posterior margins.

Heteromorph with velum similar to that of tecnomorph but with broad, convex, anteroventral dolon. Dolon encroaching slightly onto domicilium, dorsal margin of dolon straight and oblique. Margin of dolon curling smoothly to distal margin of velum both anteriorly and posteriorly, but dolonal margins not in contact when valves closed. Dolon and velum with broad, horizontally striate partitions.

Immature valves similar to tecnomorphic valves, but muscle scar proportionately larger, velum reduced in width, cardinal angles produced into prominent projections, surface more finely reticulate and posterior half of valve proportionately less elevated than adult valves.

Length of holotype, GSC 42056, 1.50 mm, height 1.05 mm; length of paratype, GSC 42049, 1.60 mm, height 1.00 mm; length of paratype, GSC 42050 (including posterior spine), 0.60 mm, height 0.50 mm.

Number of specimens studied, more than 100.

*Types.* Holotype, GSC 42056; paratypes, GSC 42049–42055, 42057.

*Occurrence.* Road River Formation, Blackwolf Mountain, District of Mackenzie, Upper Ordovician.

*Remarks.* Velar morphology of this species agrees with that described by Schallreuter (1969, 1975) for the subgenus *Platybolbina* (*Reticulobolbina*) and Jaanusson (1957) for *Platybolbina* species described from Sweden. *P. (R.) lenzi* differs from other species of the subgenus in having a smaller muscle scar, a more discrete dolon and greater elevation of the posterior half of the domicilium. *P. (R.) lenzi* also has more prominent cardinal projections than has been reported previously for other species of the subgenus.

#### Superfamily NODELLACEA Becker, 1968

##### Family NODELLIDAE Zaspelova, 1952

##### Genus *Hanaites* Pokorný, 1950

##### *Hanaites brevis* Berdan and Copeland, 1973

Plate I, figures 7–9; Plate II, figures 1–8

*Hanaites brevis* Berdan and Copeland, 1973, p. 25, Pl. 9, figs. 4–9.

*Remarks.* *H. brevis* has been fully discussed by Berdan and Copeland. The present specimens are similar to those from the McCann Hill Chert of Alaska. Specimens from section I, loc. A-1160 (Pl. I) are not well preserved but their identification as *H. brevis* is not in doubt.

Number of specimens studied, more than 50.

*Types.* Hypotypes, GSC 41967–41969, 41978–41985.

*Occurrences.* Delorme Formation, section I, loc. A-1160,

District of Mackenzie, section IV, loc. 4, District of Mackenzie, Siegenian.

##### *Hanaites linearis* Berdan and Copeland, 1973

Plate II, figure 9; Plate XIV, figure 15

*Hanaites linearis* Berdan and Copeland, 1973, p. 24, Pl. 9, figs. 2, 3.

*Remarks.* Few specimens of this species have been found during the present study. They agree with the type specimens from Prongs Creek Formation of Solo Creek, Yukon Territory and are readily distinguished from *H. brevis* Berdan and Copeland by their relative length, acuminate posterior and number of rows of reticulae beneath S2.

Number of specimens studied, more than 10.

*Type.* Hypotypes, GSC 41986, 42829.

*Occurrences.* Road River Formation, Royal Creek section II, 828–848 ft, Yukon Territory, Siegenian; Delorme Formation, section I, locs. A-1265, A-1345, A-1432, District of Mackenzie, Siegenian, section IV, loc. 4, District of Mackenzie, Siegenian.

##### *Hanaites* sp. cf. *H. spinosus* Berdan and Copeland, 1973

Plate II, figure 12

?*Hanaites spinosus* Berdan and Copeland, 1973, p. 25, Pl. 9, figs. 10–15

*Remarks.* Lack of linear dorsal crest and presence of a posterodorsal node distinguish this species from *H. linearis* and *H. brevis*. The figured specimen has lost the distal part of the posterodorsal node so its exact similarity to *H. spinosus* may be questioned. All specimens are equally poorly preserved.

Number of specimens studied, more than 15.

*Type.* Hypotype, GSC 41989.

*Occurrences.* Delorme Formation, section I, locs. A-1135, A-1160, District of Mackenzie, Siegenian; (also from Eids Formation, GSC loc. 57730, Eids Fiord, Ellesmere Island, District of Franklin).

#### Superfamily KLOEDENELLACEA Ulrich and Bassler, 1908

##### Family KLOEDENELLIDAE Ulrich and Bassler, 1908

##### Genus *Eukloedenella* Ulrich and Bassler, 1923

##### *Eukloedenella soloensis* Berdan and Copeland, 1973

Plate VII, figure 7

*Eukloedenella soloensis* Berdan and Copeland, 1973, p. 29, Pl. 11, fig. 28.

*Remarks.* This species is distinguished by its strong posterior swing, and small, dorsally situated S2. No surface ornamentation is visible on the only specimen obtained.

*Type.* Hypotype, GSC 42079.

*Occurrence.* Road River Formation, Royal Creek section I, 1255–1275 ft, Yukon Territory, Early Emsian.

Genus *Dizygopleura* Ulrich and Bassler, 1923*Dizygopleura?* sp.

## Plate IV, figures 9–15

*Description.* Species known from elongate-ovate steinkerns, dorsal and ventral margins subparallel, anterior margin broadly curved, posterior margin slightly truncated ventrally. Trisulcate, S1 and S3 dividing valve into three equal parts. S1 narrow, slightly oblique, extending across valve; S2 a large median pit with a low dorsal extension; S3 deep, extending from venter two-thirds the distance to the dorsal margin. Quadrilobate, L1 occupying anterior third of valve and separated from posterior lobes by S1; L2 a narrow vertical lobe joined ventrally of S2 to broad L3; L4 vertical, joined dorsally with L3. Heteromorphic specimens with L4 subdivided at midheight by a low horizontal furrow. Left valve apparently overlapping right dorsally and ventrally. Dimorphism expressed by variation in posterior width. Heteromorphic specimens with broad, subdivided L4, tecnomorphs considerably more narrow posteriorly and L4 a complete, slightly curved lobe.

Length of figured specimen, GSC 42022, a heteromorphic steinkern, 0.70 mm, height 0.30 mm.

Number of specimens studied, more than 30.

*Types.* Figured specimens, GSC 42022–42028.

*Occurrence.* Ogilvie Formation, loc. 12P-845-860, Yukon Territory, early Emsian.

*Remarks.* All specimens observed are steinkerns precluding identification of a stragulum and the possible junction of S1 and S3, the latter a characteristic of *Poloniella*. The pitlike nature of S2 is typical of *Dizygopleura* and the specimens are questionably included in that genus.

Genus *Evlanella* Egorov, 1950*Evlanella* sp.

## Plate XIV, figure 13

*Description.* Valve subretangular. Dorsal margin long, straight, parallel with ventral margin, end broadly rounded, posterior end higher than anterior end. S2 deep, pitlike, in dorsal third of valve slightly anterior of midlength. L2 prominent, knoblike anterior of S2. L3 broad. Planispiral ridge subparallel with free margin extending from posterior end, along dorsum into ventral part of S2 and from anterior end to dorsal part of L2. Surface of valve within planispiral ridge finely pustulose sometimes forming indistinct lineaments, exterior of planispiral ridge surface finely granular.

Length of figured specimen, GSC 42827, 1.00 mm, height 0.50 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42827.

*Occurrence.* Road River Formation, Royal Creek section II, 640–650 ft, Yukon Territory, Siegenian.

*Remarks.* This species is more closely related to lobate evlanellids with planispiral ridges (Polenova, 1974; Becker, 1964) than to those less ornamented species described by

Adamczak (1968). Only one specimen has been found, precluding more detailed description of the species.

## Family BEYRICHIOPSIDAE Henningsmoen, 1953

Genus *Marginia* Polenova, 1952*Marginia* sp. cf. *M. multicosata* Polenova, 1952

## Plate XIII, figures 13–16

?*Marginia sculpta multicosata* Polenova, 1952, p. 99, Pl. V, figs. 7a, b; Becker, 1964, p. 83, Pl. 14, figs. 1, 2; Groos, 1969, p. 48, fig. 26.

*Description.* Valve subovate, hinge moderately long, straight, cardinal angles rounded, free margins evenly rounded with indistinct marginal ridge. Lateral surface of valve rising evenly from all margins. S2 lacrimose in dorsal half of valve, deepest ventrally, very shallow in dorsal part. L2 a low, indistinct, elongate node anterior of S2. L3 broadly connected to L1–L2 beneath S2. Surface of valves with 6 to 12 posterodorsally anteroventrally inclined ribs fading out posterodorsally. Dorsal ribs not present in S2 but continuous anteriorly and posteriorly of S2. Ventral ribs tending to be more prominent.

Length of hypotype, GSC 42798, 1.40 mm, height 0.85 mm; length of hypotype, GSC 42800, 1.00 mm, height 0.70 mm.

Number of specimens studied, more than 20.

*Types.* Hypotypes, GSC 42797–42800.

*Occurrences.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian, and Royal Creek section I, 375–400 ft, Yukon Territory, Siegenian.

*Remarks.* In lateral view, this species may be confused with *Clavofabella multicosata* Neckaja, *Venzavella costata* Neckaja and *V. subcostata* Gailite of Ludlow age from Estonia. *M.* cf. *M. multicosata* Polenova, however, has no primitiopsid velar structure and S2 is a furrow not a pit. Evidence of dimorphism has not been seen in the present specimens. The longitudinal ribs of *M. multicosata* are variable in number. Specimens such as hypotypes, GSC 42798 and 42800 show the extremes of those present in the collections—a specimen with 6 linear ribs as opposed to one with 12 somewhat anastomosing ribs. Because these specimens occur in the same collection, they are considered as representative of the range of variation present within the species.

The specimens described by Polenova (1952) are late Givetian whereas those from the present collections are Pridolian and Siegenian indicating a long range for the species.

*Marginia* sp. cf. *M. catagrapha* Polenova, 1952

## Plate XIII, figures 17, 18

?*Marginia catagrapha* Polenova, 1952, p. 102, Pl. V, figs. 6a, b.

*Description.* Valves subovate, hinge long, straight, cardinal angles rounded with indistinct marginal ridge. Lateral surface of valve rising evenly from all margins. S2 shallow, pitlike ventrally. L2 a low poorly defined node. L3 broadly

connected to anterior lobe below S2. Surface of valve with numerous, fine, longitudinal anastomosing nodose ridges. Less elevated, short transverse ridges connect the nodes to form a reticulate surface over parts of the valve.

Length of hypotype, GSC 42801, 1.10 mm, height 0.70 mm.

Number of specimens studied, 6.

*Types.* Hypotypes, GSC 42801, 42802.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section IX, locs. L-395 and L-529, District of Mackenzie, Ludlovian.

*Remarks.* Surface ornamentation of the Middle Devonian specimens figured by Polenova is very similar to that in the present specimens. Hypotype GSC 42801 is more posteriorly inflated than hypotype GSC 42802 and is considered to be heteromorphic. The posterodorsal extension figured by Polenova for heteromorphic specimens is also present on GSC 42801.

*Marginia?* sp.

Plate II, figure 10

*Remarks.* Several specimens of a weakly bisulcate ostracode species were obtained from three collections. These specimens have a long, straight, slightly sunken hinge line, the surface has fine, parallel to anastomosing longitudinal riblets and a thin, narrow velar ridge parallels the free margin. The left valve of the figured specimen, a carapace, overlaps the right valve. That specimen is 1.85 mm long, 1.10 mm high and 0.90 mm wide.

*Type.* Figured specimen, GSC 41987.

*Occurrences.* Delorme Formation, section II, loc. B-805, District of Mackenzie, Gedinnian; section VII, locs. CH-27-495 and CH-27-890-900, District of Mackenzie, early Gedinnian.

Superfamily LEPERDITELLACEA

Ulrich and Bassler, 1906

Family LEPERDITELLIDAE Ulrich and Bassler, 1906

Genus *Leperditella* Ulrich, 1894

*Leperditella?* sp. 1

Plate V, figures 10, 11

*Leperditella* cf. *rex* Coryell and Schenck. Copeland in Ludvigsen, 1975, p. 691.

*Remarks.* Several nondescript, smooth and faintly sulcate specimens of questionable affinities occur in the Blackwolf Mountain collection. There is little to distinguish them and as they lack evidence of marginal structures they are questionably assigned to the genus *Leperditella*.

Length of figured specimen, GSC 42048, 1.1 mm, height 0.8 mm.

Number of specimens studied, more than 25.

*Types.* Figured specimens, GSC 42047, 42048.

*Occurrence.* Road River Formation, Blackwolf Mountain, District of Mackenzie, Upper Ordovician.

*Leperditella?* sp. 2

Plate XIV, figures 3, 4

*Description.* Valves preplete, hinge line about two-thirds greatest length, cardinal angles obtuse, anterior margin broadly rounded meeting ventral margin in a smooth curve, posterior margin more narrowly rounded. Surface granular.

Length of figured specimens, 1.30–1.40 mm, height 0.90 mm.

Number of specimens studied, more than 25.

*Types.* Figured specimens, GSC 42817, 42818.

*Occurrences.* Delorme Formation, section IX, locs. L-455 and L-543, District of Mackenzie, Ludlovian.

*Remarks.* The specimens are corroded, possibly accounting for the granular surface ornamentation. Because of this, it is not possible to determine the presence or absence of rare granules on the ventral valve surface such as are reported for species of the Ludlovian genus *Ortygia* Pranskevičius, 1972 (p. 60, Pl. III, figs. 4, 5).

Genus *Cryptophyllus* Levinson, 1951

*"Cryptophyllus"* *splendida* n. sp.

Plate X, figures 6, 7

*Description.* Valves subovate, preplete. Hinge long, five-sixths greatest length. Cardinal angles obtuse. Marginal edge smoothly convex, more narrowly rounded anteriorly. Bilobate, preadductorial node low, circular, well removed from dorsum, L3 broad, extending to or above dorsum. S2 deep, straight, extending half valve height. Margins of moults each with a prominent elevated ridge, shallowly concave marginal field and denticulate contact margin. Surface granular, with row of large denticles dorsal of and parallel to marginal ridge, not obscured by marginal ridge of previous moult.

Length of holotype, GSC 42135, 1.20 mm, height 0.85 mm; length of paratype, GSC 42136, 1.30 mm, height 0.70 mm.

Number of specimens studied, 2.

*Types.* Holotype, GSC 42135; paratype, GSC 42136.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* This species bears relatively little resemblance to other species of the genus. Fortunately, the two specimens are valves, permitting correct orientation resulting in the determination of their preplete nature and larger size of L3. The presence of a complete prominently elevated marginal ridge on each moult is a very distinctive characteristic of this species. The near marginal row of tubercles has its counterpart in *Eridoconcha granulifera* Adamczak of Givetian age from Poland.

Adamczak (1961, p. 71) erected the family Cryptophyllidae to include "middle-sized Eridostraca with carapace



composed of several (6) or of one lamella, having a straight hinge margin and a well formed median sulcus. Genera referable to this new family are distinguished by their ability to moult (*Cryptophyllus*, *Milleratia*, *Schmidtella* and *Paraschmidtella*)."'

The present specimens retain only one to three moult stages. The ability to discard moults (i.e. Pl. X, Fig. 7) makes the taxonomic usefulness of moult retention a questionable concept. Possibly such moult retention may be of more common occurrence for certain relatively smooth Paleozoic ostracodes than previously considered, the moults becoming loosened at certain stages in the development of the animal (i.e. because of excessive valve weight) or at death. Also, environmental conditions might induce retention or shedding of moults.

Superfamily OEPIKELLACEA Jaanusson, 1957

Family APARCHITIDAE Jones, 1901

Genus *Subarctichites* Berdan and Copeland, 1973

*Subarctichites serratulus* Berdan and Copeland, 1973

*Subarctichites serratulus* Berdan and Copeland, 1973, p. 27, Pl. 9, figs. 16-24.

*Remarks.* Specimens typical of those described by Berdan and Copeland (1973, p. 27) were obtained from collections at three localities. The single marginal row of spines is less prominent but the silicification of the present specimens is coarse.

Number of specimens studied, 20.

*Occurrences.* Road River Formation, Royal Creek section I, 375-400 ft, Yukon Territory, Siegenian; Delorme Formation, section I, locs. A-1160, A-1265, District of Mackenzie, Siegenian.

Genus *Libumella* Rozhdestvenskaya, 1959

*Libumella* sp. cf. *L. ambigua* (Lundin), 1965

Plate I, figures 11, 12; Plate XII, figure 18

?*Ehlersia ambigua* Lundin, 1965, p. 42, Pl. 9, figs. 2a-t; Lundin and Newton, 1970, p. 28, Pl. 1, fig. 2a.

*Remarks.* The small posteroventral frill of this species distinguishes it from other libumellids. *L. huntonensis* (Roth) is reported by Lundin (1965, p. 44) as having coarser surface ornamentation and a posteroventral serrate ridge. The present specimens have small posteroventral serrations that, because of preservation due to silicification, may be remnants of a frill. Also, the surface reticulae are not as large as those of figured specimens of *L. huntonensis*. For those reasons the present specimens are considered more comparable to *L. ambigua*.

Number of specimens studied, more than 40.

*Types.* Hypotypes, GSC 41971, 41972, 42192.

*Occurrences.* Road River Formation, loc. M-2480-2500 (GSC C-26345), District of Mackenzie, Wenlockian; Road River Formation, section II, loc. B-1350T, District of

Mackenzie, Pridolian; Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, late Wenlockian-early Ludlovian; Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, late Wenlockian-early Ludlovian.

*Libumella* sp. cf. *L. circulata* Rozhdestvenskaya, 1962

?*Libumella circulata* Rozhdestvenskaya, 1962, p. 179, Pl. 3, figs. 3a-g. *Libumella* sp. cf. *L. circulata* Rozhdestvenskaya. Berdan and Copeland, 1973, p. 28, Pl. 10, figs. 6-8.

*Remarks.* The skewed, subcircular outline of this species helps to distinguish it from the form species *Libumella* sp. discussed elsewhere in this report. Whether such distinction is, in fact, valid may be questioned, but specimens herein referred to *L. sp. cf. L. circulata* are known only from strata of Pragian-early Emsian age whereas *Libumella* sp. is of Ludlow-early Pragian age.

Number of specimens studied, 6.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Libumella* sp.

Plate XII, figure 12

*Remarks.* Poorly preserved specimens of subcircular outline with barely perceptible marginal thickening occur at several localities. Only dissociated valves are present, having short hinge lines and no surface ornamentation. In this respect they agree with *L. circulata* Rozhdestvenskaya but that species is not as circular in outline.

Length of figured specimen, GSC 42186, 1.40 mm, height 1.20 mm.

Number of specimens studied, more than 30.

*Type.* Figured specimen, GSC 42186.

*Occurrences.* Delorme Formation, section IX, locs. L-395, L-455, District of Mackenzie, Ludlovian; Delorme Formation, section I, locs. A-1055, A-1432, District of Mackenzie, Siegenian.

*Libumella?* sp.

Plate II, figure 11

*Description.* Species known from one left valve. Specimen amplete, dorsum slightly arched, hinge line depressed. Surface reticulate, except for small, central adductorial spot. S2 low, extending from adductorial spot to dorsum. Postero-dorsal part of valve inflated. Complete adventral ridge with ventral plication on left valve; ventral structures obscured in lateral view.

Left valve with long, simple hinge line, slightly withdrawn from free margin. Dorsal margin with slight anterior and posterior indentations.

Length of figured specimen, GSC 41988, 1.10 mm, height 0.80 mm.

*Type.* Figured specimen, GSC 41988.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.



*Remarks.* This species agrees only questionably with Middle Devonian libumellid species described by Rozhdestvenskaya (1959). The presence of a relatively distinct, shallow S2 and posterior inflation are not typical of the genus. Specimens of *Ochescapha* Becker (1965) described by Adamczak (1968, p. 73, *et seq.*) are somewhat similar in lateral view but they possess a posteroventral beyrichiine crumina; specimens of *Namaia* Green (1963) have a low preadductorial node and a narrow slitlike S2. Whether the present species exhibits characteristics intermediate between *Libumella* and *Namaia* cannot be determined on the basis of the incomplete material available.

Superfamily KIRKBYACEA Ulrich and Bassler, 1906

Family ARCYZONIDAE Kesling, 1961

Genus *Chironiptrum* Kesling, 1952

*Chironiptrum limitaris* Berdan and Copeland, 1973

*Chironiptrum limitaris* Berdan and Copeland, 1973, p. 22, Pl. 8, figs. 2–8.

*Remarks.* This species is represented by several broken specimens. They are readily distinguished from *C. reticularis* Berdan and Copeland by the finer reticulation and presence of papillae on the lateral surface. *Chironiptrum* sp. (McClellan) (= *Limbinaria* sp. McClellan) is also more coarsely reticulate than *C. limitaris* and may be conspecific with *C. reticularis*. This cannot be ascertained until better specimens are obtained from the Roberts Mountains Formation of Nevada.

*Occurrence.* Road River Formation, Royal Creek section I, 375–400 ft, Yukon Territory, Siegenian.

*Chironiptrum bilinearis* n. sp.

Plate XII, figures 26–30

*Description.* Valves subelliptical, slightly postplete; hinge line straight; anterior and posterior margins evenly curved; ventral margin gently curved to nearly straight. Deep, drop-shaped pit slightly anterior of centre of valve. Lateral surface surrounded by wide, flaring, double frill confluent with dorsal ridge, which is only faintly visible along dorsal margin in lateral view. Lateral surface finely reticulate. Frill and channel smooth. Marginal ridge around free margin.

Length of holotype, GSC 42204, 1.30 mm, height 0.90 mm.

Number of specimens studied, more than 10.

*Types.* Holotype, GSC 42204; paratypes, GSC 42200–42203.

*Occurrences.* Delorme Formation, section II, loc. B-345, District of Mackenzie, Siegenian; section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* The fine reticulation of this species and restriction of the dorsal ridge is similar to *C. limitaris* Berdan and Copeland; however, the double lateral frill on each valve differentiates *C. bilinearis* from other *Chironiptrum* species. The size and position of this frill differs markedly on each

valve, that of the right valve surrounding the entire lateral surface whereas the frill of the left valve is broad and well removed from the lateral margin of the valve.

*Chironiptrum* sp.

Plate XII, figure 7

*Description.* Valve subelliptical, amplete, hinge straight, anterior and posterior margins evenly rounded; ventral margin slightly convex. Large pit near midvalve. Lateral surface surrounded by low, wide frill with long, posteriorly directed spurs extending over the hinge line at each cardinal angle. Dorsal ridge very low, possibly lacking medially. Lateral surface reticulate. Frill and channel smooth. Marginal ridge around free margin.

Length of figured specimen, GSC 42181, 0.63 mm, height 0.50 mm.

Number of specimens studied, 3.

*Type.* Figured specimen, GSC 42181.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* This species agrees most closely with *C. oiostathmicum* Kesling (1952) in possessing a posteriorly directed dorsal spur at each cardinal angle. Unlike that species, however, *Chironiptrum* sp. has a low to imperceptible dorsal ridge.

Genus *Nezamyssia* Přibyl, 1955

*Nezamyssia perforata* n. sp.

Plate III, figure 8; Plate XII, figures 19, 20

*Description.* Valves small, amplete to slightly postplete. Hinge line about three-fourths greatest length; cardinal angles distinct, obtuse; free margin broadly rounded. Velar structure complete, widest in posteroventral part of valve; distinct dorsal plica joining smoothly with velar structure but slightly withdrawn from cardinal angles. Domicilium coarsely reticulate with adductorial pit same size or larger than reticulae situated a little anterior of midvalve. Anterodorsal part of valve surface with one or two larger elongate reticulae causing twisting of the dorsal plica.

Length of holotype, GSC 42000, 0.90 mm, height 0.70 mm.

Number of specimens studied, 5.

*Types.* Holotype, GSC 42000; paratypes, GSC 42193, 42194.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* This species bears certain resemblance to *N. bohémica* (Přibyl and Snajdr) the type species, but the domicilium of the present species is more coarsely reticulate and the two larger anterodorsal reticulae are more prominent. The anterodorsal angle of *N. perforata* is less pronounced than that of the type species. *N. gemmula* (Weyant)

is very similar to *N. perforata* but is larger, bears more prominent dorsal angles and has the adductor pit situated more anteriorly than that of *N. perforata*.

*Nezamyslia circularis* n. sp.

Plate XII, figure 22

*Description.* Valve amplete, dorsal margin long and straight, lateral outline subcircular. Adventral structure narrow, continuous with dorsal ridge and paralleling entire margin, slightly withdrawn from cardinal angles. Dorsal ridge deflected toward hinge above muscle spot. Valve surface with angular reticulæ, slightly depressed and irregular above muscle impression. Adductor spot circular, at level of lateral surface of valve and slightly dorsal and anterior of midvalve, delimited by a ring of fused reticulæ. Marginal structure a thin ridge along the free margin.

Length of holotype, GSC 42196, 1.10 mm, height 0.80 mm.

Number of specimens studied, 3.

*Type.* Holotype, GSC 42196.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* *N. circularis* n. sp. is similar to *N. eifeliensis* (Adamczak), in lateral outline, presence of a continuous adventral structure and dorsal ridge, circular adductor spot and reticulate ornamentation. These features, however, are variable in that on *N. circularis* the adventral structure and dorsal ridge are narrower and much more near marginal in position, the adductor spot is delimited by a ring of fused reticulæ and the surface reticulæ are larger.

Family PRIBYLITIDAE Pokorný, 1958

Genus *Mirochilina* Bouček, 1936

*Mirochilina?* sp.

Plate XIV, figure 6

*Description.* Valve subrectangular in lateral view. Dorsal margin straight, long, equal to greatest length. Cardinal angles abrupt, 90 degrees. Ventral margin evenly convex. Free margin with complete velar frill. Lateral surface finely granular with shallow, triangular sulcus near midlength extending nearly half valve height. Greatest width in ventral half of valve.

Length of figured specimen, 0.80 mm, height 0.60 mm.

Number of specimens studied, 2.

*Type.* Figured specimen, GSC 42820.

*Occurrence.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian.

*Remarks.* This species is somewhat similar to *Mirochilina acuta* Bouček (1936, p. 52, Pl. III, figs. 8–11) but lacks the abrupt ventral bend typical of the genus and has a more prominent sulcus situated near midlength of the valve.

Superfamily PARAPARCHITACEA Scott, 1959

Family PARAPARCHITIDAE Scott, 1959

Genus "*Aparchites*" Jones, 1889

"*Aparchites*" sp. cf. "*A.*" *messleriformis instabilis* Polenova, 1974

Plate XII, figures 23, 24

?*Aparchites messleriformis instabilis* Polenova, 1974, p. 7, Pl. I, figs. 1–5; Pl. II, figs. 1–3; Pl. III, fig. 8.

*Remarks.* The variation in form exhibited by specimens of this subspecies has been described by Polenova (1974). The present specimens are somewhat more ovate (i.e. less subcircular) than those figured by Polenova and may or may not bear distinct cardinal angles. Lack of near marginal structures precludes this species from *Aparchites* s.s. but for the present they are considered as falling within the too-broad range of "*Aparchites*" s. 1.

Length of hypotype, GSC 42197, 1.0 mm, height 0.8 mm.

Number of specimens studied, more than 30.

*Types.* Hypotypes, GSC 42197, 42198.

*Occurrences.* Road River Formation, loc. M-2480-2500 (GSC loc. C-26345), District of Mackenzie, Wenlockian; Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

Superfamily PRIMITIOPSACEA Swartz, 1936

Family PRIMITIOPSIDAE Swartz, 1936

Genus *Primitiopsella* Polenova, 1960

*Leperditellina* Polenova, 1955 (non Neckaja, 1955)

*Viazoviella* Martinsson, 1960

*Primitiopsella globosa* n. sp.

Plate XI, figures 9, 10

*Description.* Valve small, subovate in lateral view, dorsal margin slightly convex, cardinal angles rounded, anterior end more broadly rounded than posterior end. Hinge line straight, slightly sunken beneath convex dorsum. Valve smooth to finely granular, nonsulcate. Large, globular swelling in posteroventral part of valve, broadly open on interior of valve. Low, rounded adventral ridge extending from posterior swelling along the free margin to near anterodorsal corner. Only heteromorphs known.

Length of holotype, GSC 42158, 0.80 mm, height 0.60 mm; posteroventral swelling 0.30 mm in diameter, extending 0.25 mm from surface of valve.

Number of specimens studied, 2.

*Types.* Holotype, GSC 42158; paratype, GSC 42159.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This bizarre species bears only limited similarity to *P. miranda* (Polenova). The latter species has a broad sausage-shaped heteromorphic swelling along the posterior

and posteroventral margin with a low angular adventral ridge paralleling the ventral margin. *P. globosa* has a globular posteroventral swelling and a low rounded adventral ridge extending to near the dorsal cardinal angle.

Genus *Bodzentia* Adamczak, 1968

*Bodzentia mackenziensis* n. sp.

Plate XII, figure 14

*Description.* Carapace ovate in lateral view, subrhomboidal in end view, flat-iron-shaped in ventral view. Bisulcate, indistinct S1 and prominent S2 in dorsal third of valve delimiting knoblike L2. Broad L3 occupying posterior half of valve. Adventral structure paralleling free margin and extending from midanterior margin to posterocardinal angle. Marginal tubercles along free margin, perimarginal ridge a thickening incorporated with posteroventral marginal tubercles.

Length of holotype, a carapace, GSC 42188, 0.60 mm, height 0.42 mm, width 0.40 mm.

Number of specimens studied, 1.

*Type.* Holotype, GSC 42188.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species is distinguished from other species of the genus by the presence of a distinct presulcal knob and the integration of the short perimarginal ridge with the posteroventral marginal tubercles. On nonsilicified specimens, these posteroventral structures may prove distinct from each other.

Genus *Scipionis* Gailite, 1966

*Scipionis? delormensis* n. sp.

Plate XIV, figures 5, 12; Plate XVI, figure 11

*Description.* Valves postplete to amplete, semicircular in lateral view with long straight hinge line. Surface smooth with nodelike L2 and shallow but distinct S2. Heteromorphic velum extending from posterodorsal to anteroventral corners of valve, broadest posteroventrally.

Length of holotype, GSC 42818, 0.95 mm, height 0.70 mm.

Number of specimens studied, 6.

*Types.* Holotype, GSC 42818, paratypes, GSC 42826, 42859.

*Occurrence.* Delorme Formation, section VI, loc. C-47-450, District of Mackenzie, Ludlovian.

*Remarks.* This species is somewhat similar to *S. vagus* Gailite, 1966 but has greater height and the velar ridge of heteromorphic specimens extends to the anteroventral corner of the valve. Presumed tecnomorphic specimens of *S. delormensis* bear no velar ridge but this may be due to preservation.

Genus *Venzavella* Gailite, 1967

*Venzavella? sp.*

Plate III, figure 9

*Description.* Valves ovate in lateral view, with complete velar ridge continuous with dorsal plica. Hinge straight, sunken. Marginal and velar ridges separated by faint subvelar furrow. Adductorial pit large, slightly anterodorsal of mid-valve, with dorsal extension to dorsal plica. Preadductorial lobe low, knoblike; posterior lobe indistinct. Valve surface traversed by three major and one minor horizontal ridges. Major ridges dividing valve into equal quarters, minor ridge extending across preadductorial lobe between dorsal and median major ridges. Dorsal ridge deflected by, but continuous across adductorial sulcus, minor ridge terminating posteriorly at sulcus.

Length of figured specimen, GSC 42001, 1.10 mm, height 0.80 mm.

Number of specimens studied, 3.

*Type.* Figured specimen, GSC 42001.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* Specimens of only one dimorph have been observed. These are presumably tecnomorphic as no dolonate specimens are present so the inclusion of this species within the Primitiopsinae may be questioned. Certain similarity exists between this species and *V. costata* (Neckaja) as illustrated by Gailite (1967, Pl. II, figs. 6a, b) but the lateral ridges of the present species are more continuous and there is no intermediate marginal ridge. This latter ridge may be more prominent on heteromorphic valves.

Genus *Undulirete* Martinsson, 1964

*Undulirete mackenziensis* n. sp.

Plate X, figure 5; Plate XIV, figures 1, 2, 11

*Description.* Valves ovate, truncated dorsally by straight hinge, amplete to slightly postplete. S2 short, deep, posterior of small L2 lobe, in anterodorsal quarter of valve. Surface reticulate. Posteriorly spinose velar ridge along free margin. Dorsal plica and vague longitudinal fold below S2 on presumed adult (heteromorphic?) specimens, not present on presumed immature (tecnomorphic?) specimens. A fine toric ridge may be present in the subvelar field on some specimens. Marginal structure denticulate.

Length of holotype, GSC 42816, 0.75 mm, height 0.50 mm.

Number of specimens studied, more than 10.

*Types.* Holotype, GSC 42816; paratypes, GSC 42134, 42815, 42825.

*Occurrences.* Delorme Formation, section IX, loc. L-395, District of Mackenzie, Ludlovian; Whittaker and Delorme formations, section VI, locs. C-47-100 and C-47-150, Wenlockian-early Ludlovian; Delorme Formation, section VI, locs. C-47-450 and C-47-510, District of Mackenzie, Ludlovian; Road River Formation, section II, loc. B-1350T,

District of Mackenzie, Pridolian; Delorme Formation, locality KB-1-67, 5100–5105 ft, Delorme Range, Ludlovian.

*Remarks.* This species is similar in many respects to *U. balticum* Martinsson but has a small, discrete L2 lobe and a spinose velum. As noted by Martinsson (1964, p. 146) and Gailite (1967, p. 101) young individuals of *U. balticum* bear a much reduced dorsal plica and subsulcal fold on the lateral surface. This is also true for immature (tecnomorphic?) specimens of the present species.

Order *PODOCOPIDA* Müller, 1894

Superfamily BAIRDIACEA Sars, 1888

Family BAIRDIIDAE Sars, 1888

Genus *Bairdia* M'Coy, 1844.

*Bairdia* sp. cf. *B. leguminoides* Ulrich, 1891

?*Bairdia leguminoides* Ulrich, 1891, p. 197, Pl. 17, figs. 5a–c; Sohn, 1960 (1961), p. 29, Pl. 1, figs. 19–21.  
*Bairdia* sp. cf. *B. leguminoides* Ulrich. Berdan and Copeland, 1973, p. 30, Pl. 11, figs. 10, 11.

*Description.* Elongate carapace with short straight hinge line, and dorsally inclined acuminate extremities drawn out into spines. L/R overlap. Dorsum and venter convex, surface smooth.

Number of specimens studied, 4.

*Occurrence.* Road River Formation, Royal Creek section I, 375–400 ft, Yukon Territory, Siegenian.

*Remarks.* Only poorly preserved specimens were obtained. They are comparable to those described by Berdan and Copeland (1973, p. 30) and apparently lack the vertical shoulders of *Bairdiolites? sonni* Berdan and Copeland, an otherwise very similar species.

*Bairdia mucronata* Rozhdestvenskaya, 1960

Plate XI, figure 22

*Bairdia mucronata* Rozhdestvenskaya, (in, Abushik *et al.*) 1960, p. 355, Pl. 68, figs. 9a, b, 10a, b; Berdan and Copeland, 1973, p. 30.

*Description.* Carapace elongate, spindle-shaped, with short curved hinge line and dorsally inclined acuminate ends prolonged as spines on larger left valve and acute angulations on smaller right valve. Posterior end more acute. Left valve overlaps right all around. Dorsal and ventral borders convex, ventral border with median concave area. Both valves inflated, maximum thickness near midvalve. Surface smooth.

Length of hypotype, GSC 42171, 1.80 mm, height 0.90 mm.

Number of specimens studied, 2.

*Type.* Hypotype, GSC 42171.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* The present specimens bear a more convex dorsal margin than *B. leguminoides* Ulrich, 1891 and are less elongate than *B. emaciata* Kesling and Kilgore, 1952. Also, *B. emaciata* bears the terminal spines much lower on the

carapace. The presence of marked ventral overlap, especially that of the midventral concave area, is typical of *B. mucronata*, and much more pronounced than that of *B. emaciata*.

Genus *Bairdiacypris* Bradfield, 1935

*Bairdiacypris? subarctica* n. sp.

Plate XIII, figure 8

*Description.* Valves bairdiid in outline with relatively flat lateral sides in dorsal view. Left valve larger than right all around, greatest overreach along dorsum. Greatest height posterior of midlength, greatest length in ventral half of valves. Ventral margin slightly concave on left valve, relatively straight on right valve. Anterior margin elongated, narrowly rounded. Posterior margin acuminate, more so on right valve. Dorsal margin of left valve highly arched in rishonid manner with abrupt uncrested contact of lateral surface and dorsal commissure.

Length of holotype, GSC 42212, 2.50 mm, height 1.30 mm.

*Type.* Holotype, GSC 42212.

*Occurrence.* Delorme Formation, section IX, locs. L-395 and L-455, District of Mackenzie, Ludlovian.

*Remarks.* This species is questionably referred to *Bairdiacypris* because of its unusual bairdiid outline. Lack of reversal of overlap precludes it from inclusion in the Rishonidae and Longisculidae. *Bairdiacypris venustus* Abushik (in Pranskevičius, 1972, p. 137, Pl. XXVII, figs. 1, 2), of Lower Ludlow age in the south Baltic area, is most similar to *B. subarctica* but lacks the pronounced left valve dorsal overreach and the right valve is less posteriorly acuminate.

Genus *Newsomites* Morris and Hill, 1952

*Newsomites delormensis* n. sp.

Plate XI, figures 5, 6

*Description.* Carapace amplete, tumid, subovate in lateral view. Dorsal and ventral margins of both valves strongly convex. Anterior and posterior margins of left valve more sharply rounded than that of right valve. Carapace asymmetrical, left valve strongly overreaching the right dorsally and overlapping it along the free margin, particularly at the anterior and posterior ends. Hinge short, straight and noticeably depressed between dorsal humps of valves. Surface smooth. Shell appears porous in tubulibairdiid fashion.

Length of holotype, GSC 42155, a carapace, 0.90 mm, height 0.60 mm, width 0.70 mm.

Number of specimens studied, 5.

*Types.* Holotype, GSC 42155; paratype, GSC 42154.

*Occurrence.* Delorme Formation, section IX, loc. L-395, District of Mackenzie, Ludlovian.

*Remarks.* This species is more anteriorly acuminate than the older Silurian species *N. pertumidus* Morris and Hill and

*N. profusus* Lundin and Newton and the younger, Devonian, species *Newsomites?* sp. Berdan and Copeland and *N. notabilis* Polenova. Also, it exhibits less L/R overlap than other species of the genus. Lundin and Newton (1970, p. 33) recorded the presence of fine normal pore canals in shells of *N. profusus*. Such canals appear to be present in *N. delormensis* and are thought to be indicated by spinose projections on the broken anterior end of the left valve of the holotype. This may, however, be a result of silicification and not a valid assumption.

Genus *Spinobairdia* Morris and Hill, 1952

*Spinobairdia dorsicornis* n. sp.

Plate IV, figures 20, 21

*Description.* Valves bairdiid in lateral view with greatest height slightly anterior of midlength. Dorsal margin broadly arched, slightly concave posteriorly; ventral margin long, gently convex, curving gently to acuminate posterior end and more broadly rounded anterior end. Surface smooth, rising gently from all margins, anterior part of valve with indistinct flattened area paralleling anterior margin. Large, abruptly tapering, near dorsal spine situated in anterodorsal quarter of valve.

Length of holotype, GSC 42033, 1.90 mm, height 0.80 mm.

Number of specimens studied, 6.

*Types.* Holotype, GSC 42033; paratype, GSC 42034.

*Occurrences.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, late Wenlockian–early Ludlovian.

*Remarks.* *S. dorsicornis* is distinguished from *S. kellestae* Morris and Hill, *S. shideleri* Morris and Hill and *Spinobairdia* sp. Lundin (1965) by the position and shape of the anterodorsal, broadly based, abruptly tapering spine. Valves of the other species mentioned have small spine bases situated at various distances from the dorsal margin on the lateral surface slightly posterior to midlength. As in *S. kellestae*, however, the present species has an indistinct flattening of the anterior edge of the valve. *Spinobairdia* sp. A Lundin and Newton (1970) has a broadly based, short, blunt spine somewhat similar to that of *S. dorsicornis*; the Alabama specimens, however, bear the spine well down on the lateral surface in the posterodorsal quarter of the valve.

*Spinobairdia?* sp.

Plate XII, figure 9

*Description.* Species known from one incomplete right valve probably of bairdiid outline. Dorsum highly arched, posterior hinge and anterodorsal slope meeting at abrupt angle. Long, posterodorsally inclined spine at greatest height of dorsal margin.

*Type.* Figured specimen, GSC 42183.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* The dorsal spine of this specimen is longer and more dorsally inclined than other species of *Spinobairdia* and is on the opposite valve to that of *Janusella* species. Also, the steeply inclined hinge of *Spinobairdia?* sp. is very distinctive.

Genus *Turiella* Zenkova, 1969

*Turiella perryi* n. sp.

Plate XIII, figures 3–5

*Description.* Valves subtriangular in lateral view, highly arched, greatest height in posterior half. Ventral margin straight to slightly concave. Anterior end higher than posterior, both extremities somewhat flattened marginally. Free margin overlap unknown but left valve presumed to overlap right, the latter fitting into midventral ‘lip’ of left valve. Dorsal margins of both valves cariniform, highly elevated above hinge line, carina of left valve higher and more posterior in position than that of right valve. Lateral surface of left valve meeting dorsal commissure at more abrupt angle (carina) than on right valve. Contact edge coinciding with lateral margin of valves only ventral of line of greatest length. Hinge straight, about one-third greatest length of valve, subparallel to venter or slightly inclined posteriorly, of ridge and groove type.

Length of holotype, GSC 42208, 1.20 mm, height 0.80 mm.

Number of specimens studied, 6.

*Types.* Holotype, GSC 42208; paratypes, GSC 42207, 42209.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species differs from *T. composita* Zenkova, the type species and from other presently described *Turiella* species in having a pronounced high, sharp dorsal crest on each valve. The dorsal crest of the right valve of *T. perryi* is more rounded than that of the left valve, but is still more sharply defined than that of other species of *Turiella*. Those species of *Turiella* described by Zenkova (1969, p. 114–118) from the eastern Urals are recorded as of Late Silurian, post-Ludlovian–pre-Gedinnian age.

Genus *Processobairdia* Blumenstengel, 1965

*Processobairdia delormensis* n. sp.

Plate II, figure 15; Plate III, figures 1–7

*Description.* Valves of modified ‘bairdian’ aspect. Dorsum lowly arched; anterior broadly rounded; venter straight, slightly concave medially; posterior bluntly acuminate at or above midheight of valve. Surface smooth, with strong, near marginal anterior spine directed anterolaterally and strong, near marginal posterodorsal spine directed laterally or posterolaterally. Anterior spine slightly smaller and situated lower on valve surface than posterior spine.

Hinge inclined, about three-fifths greatest length with

ridge and groove hingement. Hinge of left valve with anterior and posterior flanges fitting into corresponding depressions in the selvage of the right valve. Duplicature narrow terminally, dying out along midventer. Adductorial scar large, ovate, pattern indistinct; situated slightly anterior of midlength of valve. Valve interior with two pits, one at base of each hollow lateral spine.

Length of holotype, GSC 41993, 2.10 mm, height 1.00 mm; length of paratype, GSC 41996, 2.20 mm, height 1.00 mm.

Number of specimens studied, more than 35 valves.

*Types.* Holotype, GSC 41933; paratypes, GSC 41992, 41994–41999.

*Occurrences.* Road River Formation, Royal Creek section II, 0–20 ft, Yukon Territory, Ludlovian; Road River Formation, loc. M-2480–2500 (GSC loc. C-26345), District of Mackenzie, Wenlockian; Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, late Wenlockian–early Ludlovian; Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, late Wenlockian–early Ludlovian.

*Remarks.* Specimens of *P. delormensis* have less height than that of most species of *Processobairdia* figured by Blumenstengel (1965b). An exception to this is shown on Pl. III, fig. 2; other unfigured specimens showing this excessive height are present in the collections. These specimens agree in all other respects with typical *P. delormensis* and are not considered to constitute a different taxon. In size and shape of valve and strength of lateral spines, typical *P. delormensis* is most similar to *P. nodocerata* Blumenstengel; however, the latter species has a more prominent posterior marginal angulation and the hinge is parallel to the venter, not inclined as is that of *P. delormensis*.

*Processobairdia* species having a single lateral spine are somewhat similar to *Spinobairdia* Morris and Hill. The latter genus, of Silurian age, has species with a much shorter hinge line than *Processobairdia* and the dorsal process of *Spinobairdia* is in a near median position on the dorsal part of the valve.

#### Family RISHONIDAE Sohn, 1960

#### Genus *Cadmea* Pranskevičius, 1970

#### *Cadmea acuta* n. sp.

Plate IV, figure 6; Plate XIII, figures 6, 7, 9;  
Plate XV, figure 7

*Description.* Valves bairdiid in outline, ovate in end view. Hinge short, at greatest height of valve. Left valve thought to overlap right valve at least along antero- and postero-dorsal margins. Greatest height posterior of midlength, greatest length in ventral half of valve. Ventral margin straight to lowly convex, posterior end low, narrowly acuminate, anterior end higher, more broadly acuminate, dorsoterminal margins concave. Surface smooth.

Length of holotype, GSC 42019, 1.40 mm, height 0.70 mm.

Number of specimens studied, more than 25.

*Types.* Holotype, GSC 42019; paratypes, GSC 42210, 42211, 42213, 42842.

*Occurrences.* Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, late Wenlockian; Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section VI, locs. C-47-150, C-47-450, District of Mackenzie, Ludlovian, section IX, locs. L-395, L-455, District of Mackenzie, Ludlovian.

*Remarks.* *Cadmea acuta* is more distinctly bairdiid in outline than *C. inexplorata* Pranskevičius of Wenlock age from Lithuania. The overlap relationships of *C. acuta* are not fully understood as only single valves have been observed.

#### Family BEECHERELLIDAE Ulrich, 1894

#### Genus *Beecherella* Ulrich, 1891

#### "*Beecherella*" sp.

Plate XII, figure 8

*Description.* Valves ovate in lateral view with arcuate dorsum, gently rounded anterior and more angular posterior extremities and flat venter. Hinge three-fifths greatest length, subparallel with venter, mostly in posterior half of valve. Valve triangular in dorsal and end view, greatest width through flattened venter at midlength of valve. Distinct carina present where smooth lateral surface joins ventral surface at an acute angle. Carina somewhat alate and slightly posteriorly directed at midvalve.

Length of figured specimen, GSC 42182, 1.02 mm, height 0.50 mm.

Number of specimens studied, 6.

*Type.* Figured specimen, GSC 42182.

*Occurrences.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian.

*Remarks.* This species somewhat resembles "*Beecherella*" *angularis* Ulrich (see Berdan 1960, p. 474, pl. 66, figs. 11–15) but does not have a posteroventral spine and, in ventral view a carapace would present a subrhomboidal rather than spindle-shaped outline. "*Beecherella*" *nitida* Abushik (= *Microcheilinella nitida* Abushik, 1968) of Ludlow age from the Turkestan Range, Soviet Central Asia is very similar but has a shorter ventral carina and is trapeziform in lateral view.

#### Genus *Acanthoscapha* Ulrich and Bassler, 1923

#### "*Acanthoscapha*" sp. cf. "*A.*" *alata* Abushik, 1968

Plate XI, figure 4

?*Acanthoscapha alata* Abushik, 1968b, p. 75, Pl. VIII, figs. 10a, b.

*Description.* Valve subovate, spindle-shaped, arched dorsum only slightly less elevated than free margin. Anterior and posterior extremities constricted, produced into slightly dorsally directed, nearly horizontal spines. Valve more



strongly inflated ventrally, line of greatest inflation near ventral margin and marked by a wide, slightly ventrally directed carina extending parallel with free margin from beneath anterior spine to beneath ventral spine. Surface smooth.

Length of hypotype, GSC 42153, 1.05 mm, height 0.50 mm.

Number of specimens studied, 3.

*Type.* Hypotype, GSC 42153.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* These specimens bear an anterior spine that is reportedly lacking on the type specimen which has an abrupt anterodorsal angulation. It is possible that the spine has been broken on the Asian specimen, but this is unknown. *A. alata* is less dorsally arched than the present specimens and the fine lateral carina of the type specimen is laterally rather than lateroventrally directed, giving *A. alata* the appearance of having the carina more dorsally situated on the lateral surface of the valve. The degree of variation that may exist within species of the Beecherellidae is unknown making it necessary to consider specimens from the District of Mackenzie as "*A.*" sp. cf. "*A.*" *alata*.

It is convenient to assign beecherellid species having dorsal spinose projections to *Acanthoscapha*, and those with ventral spinose projections to *Beecherella*. This presents no problem, especially as most species of *Beecherella* are ventrally carinate. "*A.*" *alata*, however, combines acanthoscaphid cardinal projections and beecherellid carina making the generic designation questionable.

### *Acanthoscapha bohémica* (Bouček), 1936

Plate XI, figures 23–25

*Alanella bohémica* Bouček, 1936, p. 71, Pl. 5, figs. 2a, b, 3a, b; Kesling and Sohn, 1958, p. 522.  
*Acanthoscapha bohémica* (Bouček). Berdan, 1960, p. 471, 473.

*Description.* Valves long, spindle-shaped; dorsum lowly arched, anterior margin more narrowly rounded than long, broadly curved posterior margin, venter gently curved, with prominent but short concavity (notch) slightly anterior of midvalve. Left valve larger than right valve, overlapping right for a short distance ventral of the cardinal angles and in ventral notch, overreaching right dorsally and at cardinal angles. Posterior cardinal angle of left valve produced into a long, nearly horizontal spine wrapping around short, sharp angulation of right valve; anterior cardinal angle of left valve curved, directed anterodorsally, wrapping around short cardinal extension of right valve. Lateral surface of valves smooth to slightly granular. Valve surface compressed antero- and posteroventrally; compressed areas separated along venter by ventral marginal notch.

Length of figured specimen, GSC 42173, 2.60 mm (including cardinal projections of left valve), height 0.80 mm (at midvalve, slightly posterior of ventral notch).

Number of specimens studied, more than 20.

*Types.* Hypotypes, GSC 42172–42174.

*Occurrence.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian.

*Remarks.* The specimens of Ludlow age figured by Bouček (1936) from Czechoslovakia lack the cardinal extensions of the left valve. These extensions are very prominent and distinctive on two of the specimens figured here. Another distinguishing feature of this species is the slightly pre-median notch on the ventral margin. This notch is much more pronounced on *A. bohémica* than that of *A. decurtata* and completely separates the antero- and posteroventral compressed areas of the valve.

### *Acanthoscapha subnavicula* Abushik, 1968

Plate IV, figures 16–19

*Acanthoscapha subnavicula* Abushik, 1968b, p. 75, Pl. VIII, figs. 6–9.

*Description.* Valve preplete, dorsum lowly arched, venter convex with greatest height in anterior third. Cardinal angles prolonged into short angular projections; posterior angulation at even junction of ventral and dorsal margins, anterior projection a spine constricted at valve surface. Valve inflated medially, inflation forming an elevated area near middorsum. Interior with slightly inclined ridge delimiting anterior edge of median inflation. Surface of valve depressed anterior and posterior of median inflation. Surface smooth to finely granular.

Length of hypotype, GSC 42030, 1.70 mm, height 0.6 mm.

Number of specimens studied, more than 25.

*Types.* Hypotypes, GSC 42029–42032.

*Occurrences.* Whittaker Formation, section VI, loc. C-47-100, Wenlockian; Delorme Formation, section VI, locs. C-47-150, C-47-510 and section IX, locs. L-395, L-455, District of Mackenzie, Ludlovian.

*Remarks.* The convexity of the median part of the valves of *A. subnavicula* differentiates it from other species of the genus. The nonspinose, acuminate posterior termination of the valves is also distinctive. This is the only acanthoscaphid species in the present collections that bears an internal ridge; it is in the position of the anterior edge of the median inflation but is not otherwise indicated on the surface of the valve as an external furrow or sulcus.

### *Acanthoscapha* sp. cf. *A. decurtata* (Bouček), 1936

Plate III, figures 10–12; Plate XV, figure 6

?*Alanella bohémica* var. *decurtata* Bouček, 1936, p. 72, Pl. V, figs. 1a, b; Pl. VI, fig. 2 (not, *A. decurtata* Bouček. Bouček and Přibyl, 1955, Pl. 68, figs. 9a, b, 10a, b).

?*Alanella decurtata* Bouček. Kesling and Sohn, 1958, p. 522, Pl. 78, figs. 18, 19.

?*Acanthoscapha decurtata* (Bouček). Berdan, 1960, p. 471, 473.

*Description.* Valve subovate, spindle-shaped, dorsum long, very lowly arched, venter straight to slightly concave, anterior margin more narrowly curved than posterior. Anterior and posterior margins compressed ventrally, constricted, drawn out into horizontally, sometimes slightly

dorsally directed, spines. Left valve larger than right, terminal spines of left valve extending well past those of right valve; both valves with a flattened flange extending along the entire free margin without overlap. Only slight dorsoterminal marginal concavity. Lateral surface smooth.

Length of hypotype, GSC 42841, 1.70 mm, height 0.60 mm.

Number of specimens studied, more than 30.

*Types.* Hypotypes, GSC 42002–42004, 42841.

*Occurrences.* Whittaker Formation, section VI, loc. C-47-100, Wenlockian; Delorme Formation, section VI, locs. C-47-150, and C-47-495, District of Mackenzie, Ludlovian.

*Remarks.* This species is very similar to *Acanthoscapha navicula* (Ulrich), 1891 from which it differs in having a slightly convex rather than straight dorsal margin over most of its length and in having a slightly less L/H ratio. There does not appear to be any L/R ventral overlap on the carapaces in these collections; this is a criterion used by Berdan (1960, p. 473) to distinguish between *A. navicula* and *A. decurtata*. These distinctions may possibly be insufficient to warrant specific differentiation.

#### *Acanthoscapha* sp. A (Kesling and Sohn), 1958

Plate XI, figures 20, 21

*Alanella decurtata* Bouček. Bouček and Přibyl, 1955, p. 588, 615, 640, Pl. 2, figs. 18, 19; Pl. 3, fig. 11.

*Alanella* sp. A Kesling and Sohn, 1958, p. 522.

*Description.* Valve subovate, spindle-shaped, dorsum arched, venter evenly rounded, anterior margin more narrowly curved than posterior. Anterior and posterior margins compressed ventrally, constricted, drawn out into somewhat dorsally directed spines. Dorsoterminal margins concave. Lateral surface smooth.

Length of figured specimen, GSC 42169, 1.40 mm, height 0.70 mm.

Number of specimens studied, 15.

*Types.* Figured specimens, GSC 42169, 42170.

*Occurrences.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section IX, loc. L-455, and section VI, loc. C-47-450, District of Mackenzie, Ludlovian.

*Remarks.* The convex dorsum and somewhat dorsally directed terminal spines distinguish this species from *A. decurtata* (Bouček).

#### Genus *Shidelerites* Morris and Hill, 1951

*Shidelerites natlaensis* n. sp.

Plate XI, figures 11, 12

*Description.* Carapace elongate in lateral view, acuminate at each end; fusiform in dorsal view; oval in end view. Left valve larger than right, overreaching it dorsally and overlapping it midventrally and posterovertrally. Greatest height in anterior third, greatest length dorsal. Hinge line straight,

long. Free margin lowly rounded, with midventral concavity. Anteroventral margin curved to meet vertical anterior margin. Anterior cardinal angle of left valve wrapped around slight projection of right valve and produced into strong vertically directed spine or horn. Posterior cardinal angle of each valve acuminate. Depressed areas along antero- and posterovertrally margins of each valve, that of the right valve deflected laterally by overlapping left valve into a marginal ridge. Surface smooth.

Length of holotype, GSC 42160, 1.40 mm, height 0.50 mm.

Number of specimens studied, 2.

*Types.* Holotype, GSC 42160; paratype, GSC 42161.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species is somewhat similar to *S. yukonensis* Berdan and Copeland but is more elongate, has more pronounced depressed areas along the venter, and the right valve bears a ridge along the free margin. The presence of a marginal ridge on becherellid species has been demonstrated for *Scaphina* Polenova (1968b).

#### *Shidelerites?* sp.

Plate XI, figure 13

*Description.* Carapace elongate in lateral view, acuminate anteriorly(?), broadly rounded posteriorly(?); fusiform in dorsal view, ovate in end view. Left(?) valve larger than right(?), overreaching it dorsally and overlapping it midventrally. Greatest height in posterior(?) third, greatest length dorsal. Hinge line straight, long. Free margin lowly rounded with midventral concavity. Anteroventral(?) margin lowly curved and extended dorsally to form anterior(?) cardinal angle. Cardinal process of left(?) valve extending well above right angled cardinal corner of right(?) valve. Posterovertrally(?) margin broadly rounded, recurving dorsally to join smoothly with dorsum. A small node on each valve at obtuse posterior(?) cardinal angle. Narrow depressed areas along antero- and posterovertrally margins of each valve separated by midventral marginal concavity.

Length of figured specimen, GSC 42162, 1.30 mm, height 0.60 mm (near midvalve).

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42162.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This becherellid species is unique in that its greatest height is reversed from that of typical *Shidelerites*; the dorsal process is present on the attenuated end rather than on the more broadly rounded end. The description above is predicated on the assumption that the left valve of this species is larger than the right valve as in other becherellids. If the figure of *Beecherella? inepta* Polenova, 1960 is reoriented so that the cardinal process is dorsal, a species with similar overlap characteristics to *Shidelerites?* sp. may be recognized. *B.? inepta*, however, bears the dorsal process on the other end of the valve than that of *Shidelerites?* sp.



## Superfamily Indeterminate

Family TRICORNINIDAE Blumenstengel, 1965

Genus *Tricornina* Bouček, 1936Subgenus *Tricornina (Tricornina)* Bouček, 1936*Tricornina (Tricornina) navicula* Bouček, 1936Plate III, figure 15; Plate XI, figures 18, 19;  
Plate XV, figure 1*Tricornina navicula* Bouček, 1936, p. 50, Pl. III, figs. 3a, b, c, 4.  
*Tricornina (Tricornina) navicula* Bouček. Gründel, 1966, p. 98.

*Description.* Valve subtriangular in lateral view, greatest length dorsal, greatest height anterior. Dorsal margin straight; anterior margin narrowly rounded, vertical at anterior cardinal angle; venter convex; posteroventral slope long, gently convex. Cardinal angles acute, spinose, anterior spine short, anterodorsally directed, posterior spine long, posterodorsally directed. Large, long, hollow lateral spine ventral of midvalve, slightly posteroventrally directed. Surface smooth.

Length of hypotype, GSC 42168, 1.40 mm, height 0.60 mm, length of lateral spine 0.50 mm.

Number of specimens studied, more than 30.

*Types.* Hypotypes, GSC 42010, 42167, 42168, 42836.

*Occurrences.* Delorme Formation, section IX, loc. L-455, section VI, locs. C-47-150, C-47-450, Ludlovian; Road River Formation, section II, loc. B-1350T, District of Mackenzie, Royal Creek section II, 220 ft, Yukon Territory, Pridolian.

*Tricornina (Tricornina) longula* n. sp.

Plate XV, figure 4

*Description.* Valve subtriangular in lateral view, triangular in end view, greatest length dorsal, greatest height in anterior half, greatest width at ventral bend of valve. Dorsal margin straight, anterior margin rounded, compressed, with narrow marginal flange and extending slightly anterior of anterior cardinal angle; venter straight, with flat ventral surface beneath broad lateral spine; posteroventral slope convex. Cardinal angles with spinose projections, anterior projection short, anterodorsally directed, posterior spine long, horizontally directed, aligned with dorsal margin. Large, long, hollow lateral spine near midvalve, on lateral surface above bend between lateral and ventral surfaces, spine base extending along lateral bend, one-third or more of greatest length of domicilium. Surface smooth.

Length of holotype, GSC 42839, 1.70 mm, height 0.60 mm.

Number of specimens studied, 2.

*Type.* Holotype, GSC 42839.

*Occurrence.* Delorme Formation, section VI, loc. C-47-450, District of Mackenzie, Ludlovian.

*Remarks.* The extreme L/H ratio and abrupt lateral bend of the valve that forms a flat ventral surface distinguishes this species from other described tricorinids.

Genus *Ovornina* Gründel, 1966Subgenus *Ovornina (Tricornella)* Gründel, 1966*Ovornina (Tricornella) caurina* (Berdan and Copeland), 1973

Plate XI, figure 17

"Tricornina" *caurina* Berdan and Copeland, 1973, p. 33, Pl. 12, figs. 1-3.

*Remarks.* Well preserved specimens from two localities have been obtained during the present study. The anterior cardinal angle of these specimens, which is not preserved on the type specimen, does not bear a spine. The species is, therefore, removed from "Tricornina".

Length of hypotype, GSC 42166, 0.90 mm, height 0.50 mm.

Number of specimens studied, 16.

*Type.* Hypotype, GSC 42166.

*Occurrences.* Road River Formation, Royal Creek section I, 375-400 ft, Yukon Territory, Siegenian; Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Ovornina (Tricornella) perryi* n. sp.

Plate III, figures 13, 14, 16-18;

Plate XI, figures 15, 16

*Description.* Carapace boat-shaped; greatest length along dorsal margin; posterior cardinal angle acuminate; posteroventral margin sloping to relatively straight ventral margin; anterior cardinal angle more than 90 degrees, anterior margin broadly rounded. Entire free margin with narrow marginal flange. Surface smooth, evenly curved from lateral margins to very long hollow spine at midvalve. Spine base stout, diameter about one-half height of valve; spine extending horizontally from valve, tapering distally with distinct posterior swing.

Length of holotype, GSC 42006, 1.30 mm, height 0.50 mm.

Number of specimens studied, more than 50.

*Types.* Holotype, GSC 42006; paratypes, GSC 42005, 42007-42009, 42164, 42165.

*Occurrences.* Delorme Formation, section IX, locs. L-395, L-455, section VI, locs. C-47-150, C-47-450, C-47-455, C-47-510, District of Mackenzie, Ludlovian; Road River Formation, section II, loc. B-1350T, Pridolian, loc. M-2480-2500 (GSC C-26345), District of Mackenzie, Wenlockian; Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, Wenlockian.

*Remarks.* This species is very similar to *Ovornina (Tricornella) caurina* (Berdan and Copeland), but is more posteriorly acuminate and the lateral spine is much thinner and tapers very gradually.

Subgenus *Ovornina (Ovornina)* Gründel, 1966*Ovornina (Ovornina?)* sp.

Plate III, figure 19

*Description.* Valve ovate, slightly preplete, dorsum lowly

convex, free margin and cardinal angles evenly rounded. Stout, blunt spine in ventral half, near midvalve. Spine directed lateroventrally. Surface smooth.

Length of figured specimen, GSC 42011, 0.85 mm, height 0.60 mm.

Number of specimens studied, 4.

*Type.* Figured specimen, GSC 42011.

*Occurrence.* Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, Ludlovian.

*Remarks.* This species differs from other species of *Ovornina* (*Ovornina*) in having a much stouter lateral spine and in being less elongate.

### Genus *Ockerella* Jordan, 1964

*Ursina* Jordan, 1964

*Ockerella jordani* n. sp.

Plate XI, figures 1–3; Plate XV, figure 9

*Description.* Valve nearly semicircular, slightly preplete. Dorsum lowly convex, free margin evenly rounded. Cardinal angles produced into dorsally directed spines, anterodorsal spine vertical, distally with a gentle posterior curvature, posterodorsal spine straight, slightly posteriorly inclined. Large, long, hollow spine at midheight of valve slightly posterior of midlength. Surface smooth.

Length of holotype, GSC 42844, 0.60 mm, height of valve 0.40 mm, with dorsal spines, 0.50 mm.

Number of specimens studied, 12.

*Types.* Holotype, GSC 42844; paratypes, GSC 42150–42152.

*Occurrences.* Road River Formation, section II, loc. B-1350T, Pridolian; Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian.

*Remarks.* *Ockerella jordani* differs from *O. tricornuta* Jordan, the type species, in having more slender dorsal spines and a stronger lateral spine situated slightly posterior of midvalve. The lateral spine of *O. tricornuta* is located near the anterior margin. *O. latispina* (Jordan) is more similar to *O. jordani* n. sp. but has greater valve height. The lateral spine on an 'acronotellid ostracode' specimen figured by Jordan (1964, Pl. XX, fig. 134) is similar in size and position to that of *O. jordani* but it is uncertain if Jordan definitely referred that specimen to *O. latispina* as indicated in the type description (Jordan, 1964, p. 70).

### Family BEROUNELLIDAE Sohn and Berdan, 1960

Genus *Kirkbyellina* Kummerow, 1939

*Kirkbyellina* sp. cf. *K. spinosa* Blumenstengel, 1962

Plate XI, figure 14; Plate XIV, figure 7

?*Kirkbyellina spinosa* Blumenstengel, 1962, p. 18, Pl. III, figs. 51–54, 58, 59, Pl. V, figs. 93–97.

*Description.* Lateral outline subtrapezoidal; dorsal margin straight to slightly convex; ventral margin straight, anterior margin slightly sinuous, extended anterodorsally as a curved spine; posterior margin concave, curving posteriorly parallel

to dorsal margin. Posterior end of valve drawn out into long hemitube characteristic of the genus. Valves unisulcate, anterior lobe prominent, rounded, posterior lobe prominent, pointed, situated near midvalve, sulcus shallow, only slightly depressed into valve surface but forming a prominent ridge on the interior. Small spine near posteroventral margin and small spines ventral of anterodorsal spine. Surface of valve posterior of lobate area with several small spines.

Number of specimens studied, 2.

*Types.* Hypotypes, GSC 42163, 42821.

*Occurrence.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian.

*Remarks.* The bilobed nature of this species indicates its relationship to *Kirkbyellina* rather than to the trilobate *Berounella*. Similarity to *K. spinosa* is indicated by the arrangement of marginal spines and prominence of the posterior lobe. Unlike *K. spinosa*, however, the anterior lobe of the present specimens is much more prominent.

### Superfamily CYPRIDACEA Baird, 1845

Family uncertain

Genus *Camdenidea* Swain, 1953

*Camdenidea? elongata* n. sp.

Plate II, figures 13, 14

*Description.* Lateral outline subreniform; dorsal margin highly arched, curving smoothly to narrowly rounded anterior margin; ventral margin long, straight, slightly concave medially at closure, equal to greatest length of valve; posterior margin acuminate. Hinge short, in upper third of posterodorsal slope. Overlap unknown. Surface smooth, rising lowly from valve margins. Duplicature narrow.

Length of holotype, GSC 41990, 2.00 mm, height 1.00 mm.

Number of specimens studied, more than 10 valves.

*Types.* Holotype, GSC 41990; paratype, GSC 41991.

*Occurrence.* Delorme Formation, section VI, loc. C-47-150, District of Mackenzie, early Ludlovian.

*Remarks.* This species is more posteroventrally acuminate than other species of the genus, and may possibly belong with an amorphous group of Paleozoic ostracode species collectively assigned as 'pontocyprids' for want of a better designation. The position within the Cypridacea of *Camdenidea* and related Paleozoic forms is unknown. *Camdenidea* sp. Berdan and Copeland, 1973, from the McCann Hill Chert of Alaska is less acuminate posteriorly and has compressed areas at the extremities of the left valve.

### Superfamily CYTHERACEA Baird, 1850

Family BYTHOCYTHERIDAE Sars, 1926

Genus *Monoceratina* Roth, 1928

*Monoceratina? sp.*

Plate XI, figure 8

*Description.* Valve ovate in lateral view, preplete. No

marginal structures. Surface smooth to finely pustulose in posterior part. Strong, small alate projection near mid-ventral margin, curved posteriorly at distal end and extending at 90 degrees from the lateral surface of the valve.

Length of figured specimen, 0.90 mm, height 0.60 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42157.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This specimen is questionably assigned to *Monoceratina* because of the alate lateral projection from the valve surface. It is atypical of the genus because of the arched dorsum and lack of cardinal angles and median sulcal depression.

### Superfamily HEALDIACEA Harlton, 1933

#### Family BAIRDIOPYRIDIDAE Shaver, 1961

##### Genus *Bairdiocypris* Kegel, 1932

##### *Bairdiocypris?* sp. cf. *B.?* *cordiformis* Rozhdestvenskaya, 1959

?*Bairdiocypris?* *cordiformis* Rozhdestvenskaya, 1959, p. 167, Pl. 25, figs. 1a, b; 2a, b.

*Bairdiocypris?* sp. cf. *B.?* *cordiformis* Rozhdestvenskaya. Berdan and Copeland, 1973, p. 35, Pl. 12, figs. 10, 11.

*Remarks.* The heart-shaped lateral outline, L/R dorsal overlap and indistinct antero- and posteroventral flanges of the right valve distinguish this species from other bairdiocyprids in the collection. The greatest height of the present specimens is near or slightly anterior of median whereas the Baschkirian specimens have their greatest height in a slightly posterior position.

Number of specimens studied, 6.

*Occurrence.* Road River Formation, Royal Creek section II, 640–650 ft, Yukon Territory, Siegenian.

##### Genus *Kuresaaria* Adamczak, 1967

##### *Kuresaaria blackstonensis* Berdan and Copeland, 1973

##### Plate IV, figures 1–5; Plate VII, figure 8

*Kuresaaria blackstonensis* Berdan and Copeland, 1973, p. 35, Pl. 12, figs. 13–25.

*Remarks.* Numerous steinkerns of this species were obtained from loc. 12P-845-860. Preliminary examination suggested their relationship to the genus *Cytherellina* but size and shape of muscle scar and complete valve overlap dictated against such an assignment. Also, the tripartite nature of steinkerns of *Cytherellina* is not present on *Kuresaaria blackstonensis*, instead it is only suggested by the relative elevation of the muscle scar impression.

Length of hypotype, GSC 42080, 2.0 mm, height 1.5 mm.

Number of specimens studied, more than 50.

*Types.* Hypotypes, GSC 42014–42018, 42080.

*Occurrences.* Ogilvie Formation, loc. 12P-845-860, Yukon

Territory; Road River Formation, Royal Creek section I, 1350 ft, Yukon Territory, Emsian.

### Genus *Arcuaria* Neckaja, 1958

#### *Arcuaria delormensis* n. sp.

##### Plate IV, figure 8

*Description.* Valves somewhat bairdiid in lateral view. Dorsum highly arched, greatest height slightly posterior of midlength. Posterodorsal slope straight to somewhat concave, meeting convex posteroventral slope at slight angulation. Ventral margin straight. Anterior margin narrowly rounded. Right valve overreaches left valve dorsally, left valve overlaps right valve ventrally and along anterior and posterior margins.

Length of holotype, GSC 42021, 1.50 mm, height 0.80 mm.

Number of specimens studied, more than 25.

*Type.* Holotype, GSC 42021.

*Occurrences.* Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, late Wenlockian; Delorme Formation, section VI, locs. C-47-150, C-47-450, C-47-455, Ludlovian.

*Remarks.* The slightly bairdiid lateral outline of this species distinguishes it from other arcuariids. The R/L dorsal overreach, L/R ventral overlap and subtriangular outline are, however, distinctive characteristics (Copeland, 1973a, p. 53) and clearly indicate the relationship of this species to *Arcuaria*.

### Genus *Silenis* Neckaja, 1958

#### *Silenis mawii?* (Jones), 1887

##### Plate XVI, figures 12, 17

?*Pontocypris mawii* Jones, 1887, p. 182, Pl. 4, figs. 4a–d, 7.

?*Rishona?* *mawii* (Jones). Sohn, 1960, p. 80.

?*Silenis mawii* (Jones). Pranskevičius, 1972, p. 151, Pl. XXXV, figs. 1–3.

*Remarks.* Specimens in the present collections are glauconitic(?) steinkerns showing the contact relationships poorly. The left valve overlaps the right valve around the free margin and the valves are even dorsally. The antero-dorsal margin is long and slightly convex; the posterodorsal margin is shorter and more highly convex.

Length of specimens figured, 1.50–1.55 mm, height 0.90 mm.

Number of specimens studied, more than 25.

*Types.* Hypotypes, GSC 42860, 42864.

*Occurrence.* Delorme Formation, section V, loc. C-2620, District of Mackenzie, Ludlovian.

#### *Silenis proteus* Pranskevičius, 1972

##### Plate XV, figure 8; Plate XVI, figures 13, 14

*Silenis proteus* Pranskevičius, 1972, p. 153, Pl. XXXII, figs. 1–3.

*Description.* Valves subtriangular in lateral view, greatest

height in posterior half of valve. Dorsal margin highly arched, posterodorsal slope broadly convex, ventral margin straight to slightly convex, anterior margin narrowly rounded, long anterodorsal slope straight. Left valve overlapping right around free margins, valves meeting evenly above short hinge at greatest height. Right valve with slightly concave anterodorsal slope and ventral margin. Surface smooth to granular.

Length of figured specimens, 1.40–1.60 mm, height 0.80–1.00 mm.

Number of specimens studied, more than 25.

*Types.* Hypotypes, GSC 42843, 42861, 42862.

*Occurrence.* Delorme Formation, section V, loc. C-2560, District of Mackenzie, Ludlovian.

*Remarks.* Specimens figured by Pranskevičius have somewhat more angular posterior margins than those figured here. Whether this is diagnostic is questionable. In this respect they are somewhat similar to *Silenis insolitus* Pranskevičius but that species is smaller and more triangular in outline.

#### Family CAVELLINIDAE Egorov, 1950

##### Genus *Voronina* Polenova, 1952

###### *Voronina?* sp.

###### Plate XII, figure 13

*Description.* Lateral outline ovate, margins smoothly curved, ends more abruptly curved. Markedly asymmetrical, right valve overlapping left all around. Greatest overlap along ventral margin. Junction between lateral surface and marginal overlapping right valve bluntly subangular with a low keel developed at junction dorsally. Left valve evenly ovate, anterior end slightly more rounded than posterior. Interior unknown.

Length of figured specimen, GSC 42187, 1.30 mm, height 0.90 mm.

Number of specimens studied, 2.

*Type.* Figured specimen, GSC 42187.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* This species is similar to *V.* sp. cf. *V. inventa* Rozhdestvenskaya as figured by Berdan and Copeland (1973, Pl. 13, figs. 12–17) but the greatest overlap by the right valve is ventral rather than dorsal. The present species is oriented as shown because, as with *V.* sp. cf. *V. inventa* Rozhdestvenskaya, the dorsal edge of the right valve is developed as a keel. A slight dorsal angulation is also present on the left valve.

#### Family KRAUSELLIDAE Berdan, 1961

##### Genus *Baschkirina* Rozhdestvenskaya, 1959

###### *Baschkirina?* sp.

###### Plate III, figures 20, 21; Plate XI, figure 7

*Description.* Valves ovate, smooth, right valve with short

posteroventral spinose process directly posteriorly or slightly posteroventrally. Hinge along greatest height of valve. Left valve posteriorly acute but without spine. Right valve may overlap left midventrally.

Length of figured specimen, GSC 42013, 1.30 mm, height 0.60 mm.

Number of specimens studied, more than 25.

*Types.* Figured specimens, GSC 42012, 42013, 42156.

*Occurrences.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, section VI, locs. C-47-815T, C-47-510, C-47-150, District of Mackenzie, Ludlovian; Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, late Wenlockian.

*Remarks.* Distinction is difficult between *Baschkirina* species and Siluro-Devonian species from central Europe referred to *Krausella*. The present specimens are somewhat similar to *Krausella blumenstengeli* Zagora but the posterior process of that species is near midheight of the valve. The type species of *Baschkirina* and *Krausella* have a posterior attenuation of the right valve rather than a posterior spine. It is possible that species bearing a spinose posterior process should be removed to another genus.

##### Genus *Cooperatia* Tolmachoff, 1937

###### *Cooperatia lacrimosa* n. sp.

###### Plate IV, figures 22–24

*Description.* Valves ovate, tear-shaped in lateral view. Dorsal and ventral margins of left valve broadly convex, drawn-out posteriorly to narrowly rounded posterior acumination, anterior margin evenly rounded. Right valve ovate, somewhat more narrowly rounded posteriorly but not acuminate. Left valve overlapping right valve all around, greatest overlap along dorsal and ventral margins and at extreme posterior end. Hinge sunken, straight, about half greatest length of valve. Surface smooth to finely granular, rising abruptly but evenly from all margins.

Length of holotype, GSC 42035, 1.44 mm, height 1.00 mm.

Number of specimens studied, more than 25.

*Types.* Holotype, GSC 42035; paratypes, GSC 42036, 42037.

*Occurrences.* Whittaker Formation, section VI, loc. C-47-100, District of Mackenzie, late Wenlockian; Delorme Formation, section VI, locs. C-47-150, C-47-450, C-47-455, District of Mackenzie, early to middle Ludlovian.

*Remarks.* *Cooperia granum* Tolmachoff, type species of the genus *Cooperatia*, is only poorly known. The specimens figured by Tolmachoff (1926) and their description appear to be at variance. *C. lacrimosa* n. sp. is not anteriorly acuminate as indicated for the type species and is much more rotund in dorsal view. Also, the hinge of *C. lacrimosa* is sunken between the dorsal humps of both valves; such does not appear to be the case with *C. granum*.

## Family PACHYDOMELLIDAE Berdan and Sohn, 1961

Genus *Tubulibairdia* Swartz, 1936*Tubulibairdia* sp.

## Plate VII, figure 9

*Tubulibairdia* sp. Berdan and Copeland, 1973, p. 38, Pl. 14, figs. 27-29.

*Remarks.* Some indication of tubules is present in the shell walls of several of these poorly preserved specimens. All specimens exhibit complete left valve overlap, the greatest overlap being along the ventral margin.

Length of figured specimen, GSC 42081, 1.90 mm, height 1.20 mm.

Number of specimens studied, more than 15.

*Type.* Figured specimen, GSC 42081.

*Occurrences.* Ogilvie Formation, loc. 12P-845-860, Yukon Territory; Road River Formation, Royal Creek section I, 1350 ft, Yukon Territory, Emsian.

Genus *Ampuloides* Polenova, 1952*Ampuloides?* *spinosa* n. sp.

## Plate XIII, figures 1, 2

*Description.* Valves preplete, very inflated. Hinge straight, long, equal to greatest length, sunken beneath arched dorsum. Anterior and ventral margins broadly curved, posterior margin depressed, sloping gently to acute posterocardinal angle. Surface randomly spinose, dorsal and posterolateral spines prominent, largest spine near posterocardinal angle. Three or four tubercles on anterior margin.

Length of holotype, GSC 42205, a left valve, 0.80 mm, height 0.50 mm, width 0.40 mm.

Number of specimens studied, 14.

*Types.* Holotype, GSC 42205; paratype, GSC 42206.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* Highly inflated, spinose species of variable shape have been placed in this genus. The type species *A. verrucosa* Polenova has a straight dorsal margin and a curved furrow (possibly due to moult retention?) encircling the area of greatest inflation. There is little question that more than one genus are presently contained within *Ampuloides*; the included taxa should be carefully re-examined.

The present species is similar in lateral outline to *Ampuloides avus* Zagora, 1967 but is more spinose and has much greater width.

## Pachydomellid ostracode indet.

## Plate XIII, figures 10, 11

*Description.* Lateral outline subovate, dorsal outline hastate. Valves asymmetrical, left larger than right, overreaching it dorsally and overlapping it around free margin. Carapace tumid, width greater than height, greatest width in posterior

half of valve. Valves compressed posteriorly and in anterior third. Shell smooth.

Length of figured specimen, GSC 42214, 0.80 mm, height 0.43 mm.

Number of specimens studied, 3.

*Type.* Figured specimen, GSC 42214.

*Occurrences.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian; Delorme Formation, section I, loc. A-1432, District of Mackenzie, Siegenian.

*Remarks.* This species is somewhat similar to pachydomellid indet. 1 of Berdan and Copeland, 1973 (p. 38, Pl. 14, figs. 24-26) but the present species is more compressed anteriorly and the dorsal overreach of the left valve is more prominent.

Superfamily QUASILLITACEA  
Coryell and Malkin, 1936

## Family QUASILLITIDAE Coryell and Malkin, 1936

Genus *Jenningsina* Coryell and Malkin, 1936*Jenningsina?* sp.

## Plate XIII, figure 19

*Description.* Valve ovate, margins evenly rounded, lateral surface evenly elevated, more abruptly elevated to posterior ridge. S2, a comma-shaped pit, in anterodorsal quarter of valve. Surface of valve ornamented with numerous vertical striae joining ventrally of S2.

Length of figured specimen, GSC 42803, 0.7 mm, height 0.4 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42803.

*Occurrence.* Delorme Formation, section VII, loc. CH-27-495, District of Mackenzie, early Gedinnian.

*Remarks.* It is questionable if those vertically striate and posteriorly ridged ostracodes of this age described from several localities in Europe should be referred to *Jenningsina*. Most specimens do not appear to bear typical *Jenningsina*-like marginal structures.

## Superfamily THLIPSURACEA Ulrich, 1894

## Family THLIPSURIDAE Ulrich, 1894

Genus *Neocraterellina* Krandijevsky, 1968

*Neocraterellina* sp. cf. *N. oblonga* (Ulrich and Bassler), 1913

## Plate XII, figures 16, 17

?*Craterellina oblonga* Ulrich and Bassler, 1913, p. 540, Pl. 98, fig. 20.

?*Thlipsurella oblonga* (Ulrich and Bassler). Swartz, 1932, p. 49, Pl. 11, figs. 1a-c.

?*Eucraterellina oblonga* (Ulrich and Bassler). Wilson, 1935, p. 641; Copeland, 1962, p. 27, Pl. V, figs. 13, 14.

?*Neocraterellina oblonga* (Ulrich and Bassler). Krandijevsky, 1968, p. 72, Pl. XI, fig. 17, Textfig. 5.

*Description.* Valves ovate in lateral view, dorsum convex, highest posteriorly, sloping to narrowly rounded anterior

margin. Venter slightly convex, nearly straight. Posterior margin broadly convex. Left valve larger than right, overreaching it dorsally and overlapping it around free margins. Valve smooth, posteriorly with recumbent 'U'-shaped groove at or slightly above midheight. Groove subparallel to posterior margin and comprised of a series of united pits. Valve elevated abruptly from margin behind groove.

Length of hypotype, GSC 42190, a carapace, 1.00 mm, height 0.70 mm, width 0.50 mm.

Number of specimens studied, 2.

*Types.* Hypotypes, GSC 42190, 42191.

*Occurrence.* Delorme Formation, section IV, loc. 4, District of Mackenzie, Siegenian.

*Remarks.* Specimens from the Delorme Formation are relatively typical of *N. oblonga* but the posterior groove of that species is 'C'-shaped (Copeland, 1962), the dorsal and ventral limbs of the groove approaching each other anteriorly without touching. The present specimens possess the same general configuration but the groove is recumbent 'U'-shaped, the limbs extending anteriorly parallel with each other. Also, the ventral limb of the groove may be slightly longer than that of the dorsal limb. Whether the shape of the posterior groove is of taxonomic importance is questionable. A third member of this series may be *N. ? crescentifera* Berdan and Copeland from the McCann Hill Chert of Alaska in which the limbs of the posterior groove are widely divergent, the dorsal limb being longer.

#### Ostracoda incertae sedis

Genus *Microcheilinella* Geis, 1933

*Microcheilinella?* spp.

Plate IV, figure 7; Plate XII, figure 25

*Remarks.* Numerous smooth, elongate ostracodes occur in the collections. Some valves show considerable width but are otherwise undistinguished. Carapaces are invariably steinkerns and exhibit no overlap characteristics. No attempt has been made to subdivide these specimens.

*Types.* Figured specimens, GSC 42020, 42199.

*Occurrences.* Delorme Formation, section V, locs. C-2560, C-2620, C-2760; section VI, locs. C-47-150, C-47-450, C-47-455, C-47-495, C-47-510; section IX, L-455, L-480, L-529, L-543, District of Mackenzie, Ludlovian.

Ostracode indet. 1

Plate X, figure 1

*Description.* Nonsulcate, slightly preplete ostracode with long hinge line and smoothly curved free margin. Lateral surface finely pustulose. Complete, widely flaring, tubulous velar frill, apparently increasing in width anteriorly. A row of prominent denticles ventral of and at the base of the velar frill. Shallow subvelar channel and marginal ridge.

Length of figured specimen, 0.95 mm, height 0.60 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42125.

*Occurrence.* Delorme Formation, section IX, loc. L-455, District of Mackenzie, Ludlovian.

*Remarks.* This may be an immature specimen of an otherwise distinguishable genus. It is not thought to bear a sulcus, but it is somewhat broken anterodorsally and the dorsal margin has become slightly depressed.

Ostracode indet. 2

Plate X, figure 2

*Description.* Valves preplete, subovate, median part of valve depressed, possibly indicating a median sulcus. Surface finely pustulose. Complete (?), tubulous velar frill, wide, flaring. Subvelar channel wide, with some denticles indicating marginal structure.

Length of figured specimen, 0.9 mm, height 0.6 mm.

Number of specimens studied, 2.

*Type.* Figured specimen, GSC 42126.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* Most of the velar frill has been removed, but the bases of the velar tubules are aligned to near the posterior cardinal angle. The central depression (sulcus?) is broad, triangular, opening dorsally and extending from near the velar frill.

Ostracode indet. 3

Plate X, figure 3

*Description.* Preplete, hinge line long, anterior margin evenly rounded to convex venter and long, curved posteroventral slope. S2 deep, with prominent club-shaped L2 joined to equally club-shaped L3 by zygial ridge beneath S2. Complete velar ridge, subvelar channel and marginal ridge. Surface smooth with faint ventral rugulosity.

Length of figured specimen, 0.95 mm, height 0.70 mm.

Number of specimens studied, 6.

*Type.* Figured specimen, GSC 42127.

*Occurrence.* Road River Formation, section II, loc. B-1350T, District of Mackenzie, Pridolian.

*Remarks.* These specimens are poorly preserved and may be immature specimens or steinkerns of *Navibeyrichia* species or other closely allied genera.

Ostracode indet. 4

Plate XII, figure 15

*Description.* Nonsulcate, preplete, equivalved, subovate in lateral view, truncated dorsally by long, slightly convex dorsal margin. Lateral surface of valves coarsely granulose and pitted, only slightly convex, surrounded by abrupt, tuberculate marginal bend or ridge continuous with dorsal

ridge. Bend at right angle to lateral surface. Hinge straight, sunken between dorsal ridges.

Length of figured specimen, GSC 42189, 1.40 mm, height 0.90 mm.

Number of specimens studied, 1.

*Type.* Figured specimen, GSC 42189.

*Occurrence.* Delorme Formation, section I, loc. A-1265, District of Mackenzie, Siegenian.

*Remarks.* The specimen may be coarsely silicified accounting in part for its granular appearance. It has some resemblance to *Sphenicibysis hypoderota* Kesling, but that species is wider, the marginal (velar?) ridge is farther removed from the contact edge of the valve and the hinge is not sunken between dorsal ridges.

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Plates I–XVI

Plate I

(Specimens from Delorme Formation except Fig. 6,  
Whittaker Formation)

Figure 1. *Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) henningsmoeni* McGill, 1963; left lateral view of a tecnomorphic valve,  $\times 40$ , sec. VI, loc. C-47-450, hypotype, GSC 41961.

Figures 2–4. *Beyrichia* (*Beyrichia*) sp. cf. *B. (B.) arctigena* Martinson, 1960; figure 2, right lateral view of a tecnomorphic valve,  $\times 20$ , loc. BL-2-N-60, 170 ft, hypotype, GSC 41962; figure 3, right lateral view of an incomplete heteromorphic? valve,  $\times 40$ , sec. VII, loc. CH-27-495, hypotype, GSC 41963; figure 4, left lateral view of an incomplete tecnomorphic valve,  $\times 40$ , sec. VII, loc. CH-27-495, hypotype, GSC 41964.

Figures 5, 6. *Beyrichia* (*Beyrichia*) sp. 1; right and left lateral views of two tecnomorphic valves,  $\times 20$ , sec. VI, locs. C-47-150 and C-47-100, figured specimens, GSC 41965, 41966.

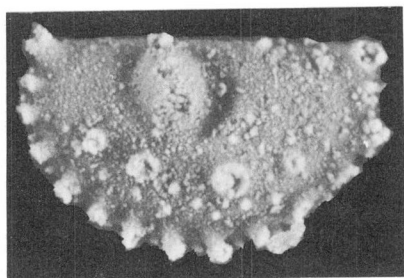
Figures 7–9. *Hanaites brevis* Berdan and Copeland, 1973; two left

and one right lateral views of three tecnomorphic valves,  $\times 40$ , sec. I, loc. A-1160, hypotypes, GSC 41967–41969.

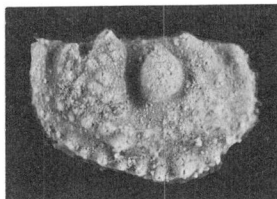
Figure 10. Treposelline? ostracode indet; left lateral view of a poorly preserved valve,  $\times 55$ , sec. VI, loc. C-47-150, figured specimen, GSC 41970.

Figures 11, 12. *Libumella* sp. cf. *L. ambigua* (Lundin), 1965; left and right lateral views of two valves,  $\times 35$ , sec. VI, loc. C-47-150, hypotypes, GSC 41971, 41972.

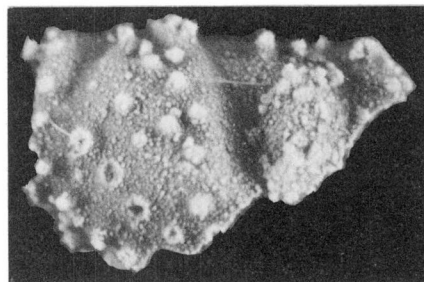
Figures 13–17. *Treposeella borealis* Berdan and Copeland, 1973; figure 13, right lateral view of a tecnomorphic valve,  $\times 35$ , sec. IV, loc. 4, hypotype, GSC 41973; figure 14, right lateral view of a tecnomorphic valve,  $\times 40$ , sec. I, loc. A-1160, hypotype, GSC 41974; figure 15, oblique ventral view of a tecnomorphic carapace,  $\times 40$ , sec. I, loc. A-1160, hypotype, GSC 41975; figure 16, left lateral view of a tecnomorphic valve,  $\times 35$ , sec. I, loc. A-1160, hypotype, GSC 41976; figure 17, right lateral view of a tecnomorphic valve,  $\times 40$ , sec. I, loc. A-1160, hypotype, GSC 41977.



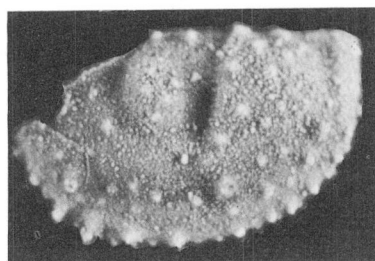
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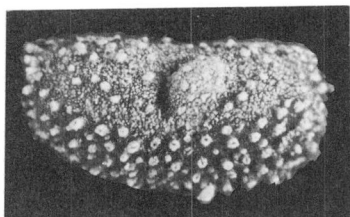
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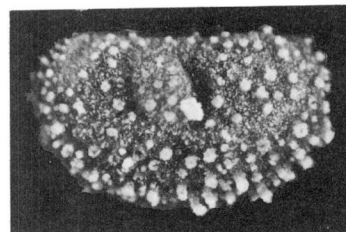
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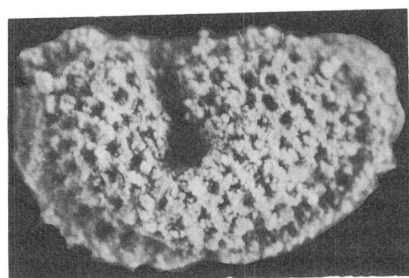
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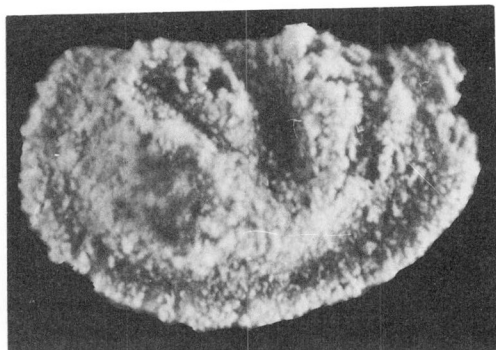
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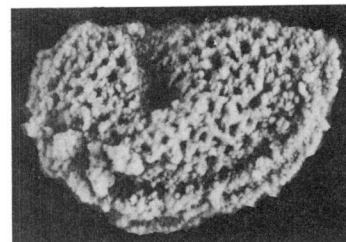
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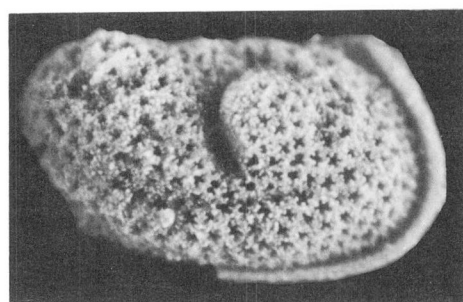
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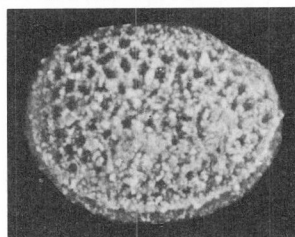
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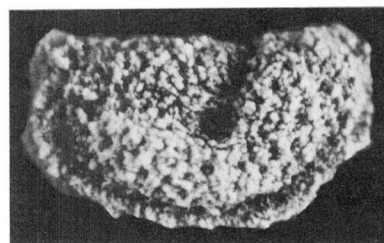
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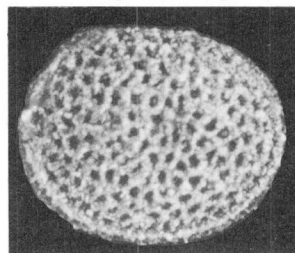
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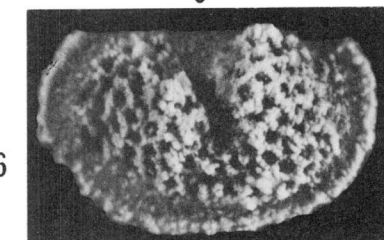
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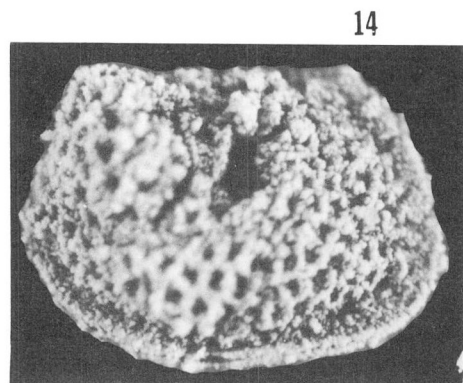
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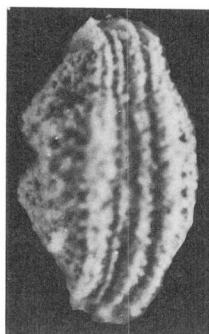
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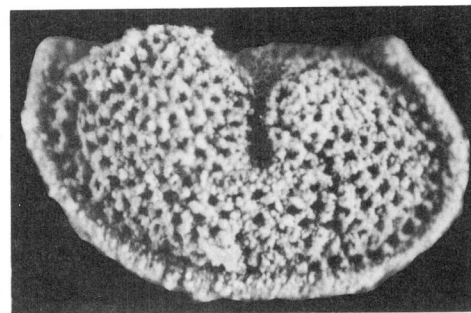
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Plate II

(All specimens from Delorme Formation)

Figures 1–8. *Hanaites brevis* Berdan and Copeland, 1973; figure 1, left lateral view of a heteromorphic valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41978; figure 2, left lateral view of a tecnomorphic valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41979; figure 3, dorsal view of a tecnomorphic carapace,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41980; figure 4, left lateral view of a heteromorphic valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41981; figure 5, right lateral view of an incomplete valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41982; figure 6, left lateral view of a tecnomorphic valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41983; figure 7, ventral view of a heteromorphic carapace,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41984; figure 8, right lateral view of an incomplete heteromorphic? valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41985.

Figure 9. *Hanaites linearis* Berdan and Copeland, 1973; right

lateral view of a heteromorphic valve,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 41986.

Figure 10. *Marginia?* sp.; right lateral view a coarsely silicified tecnomorphic carapace,  $\times 20$ , sec. II, loc. B-805, figured specimen, GSC 41987.

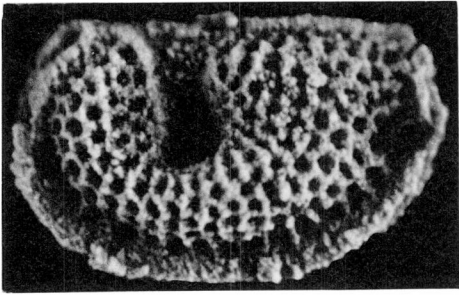
Figure 11. *Libumella?* sp.; left lateral view of an immature valve,  $\times 40$ , sec. IV, loc. 4, figured specimen, GSC 41988.

Figure 12. *Hanaites* sp. cf. *H. spinosus* Berdan and Copeland, 1973; left lateral view of a heteromorphic valve,  $\times 60$ , sec. I, loc. A-1160, hypotype, GSC 41989.

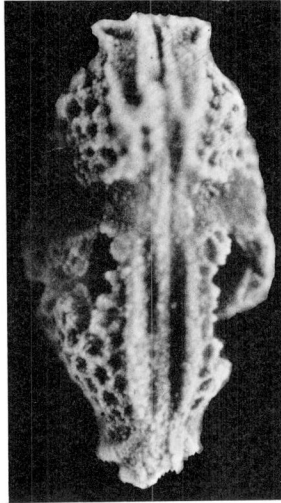
Figures 13, 14. *Camdenidea? elongata* n. sp.; right and left lateral views of two valves,  $\times 40$ , sec. VI, loc. C-47-150, holotype, GSC 41990, paratype, GSC 41991.

Figure 15. *Processobairdia delormensis* n. sp.; dorsal view of left valve,  $\times 20$ , sec. VI, loc. C-47-150, paratype, GSC 41992.

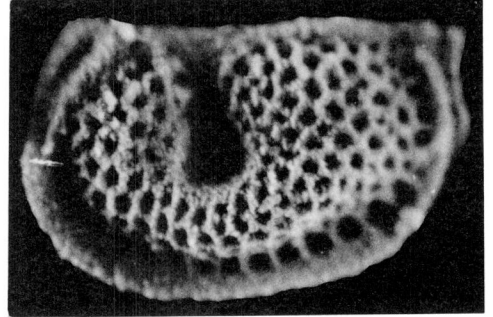




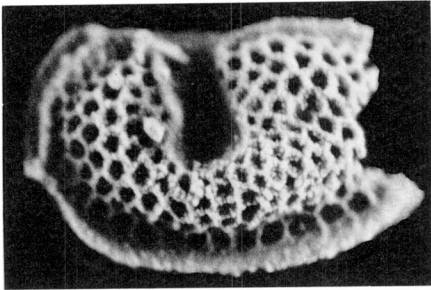
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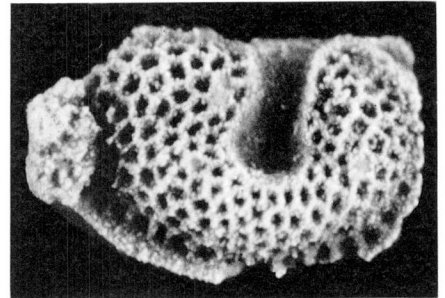
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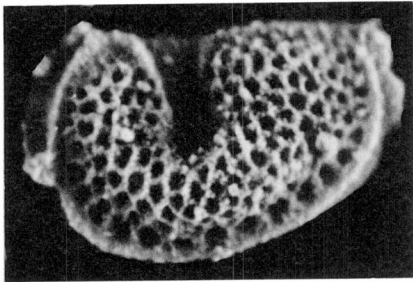
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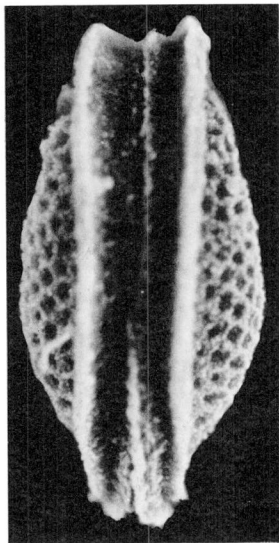
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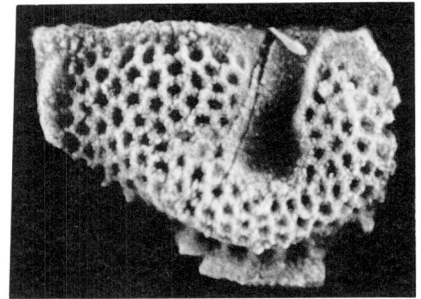
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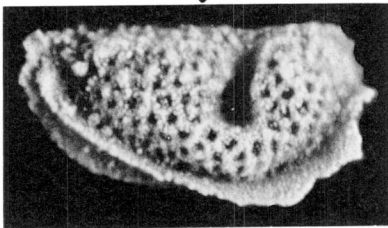
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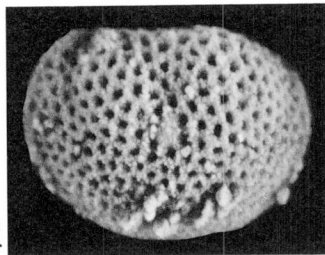
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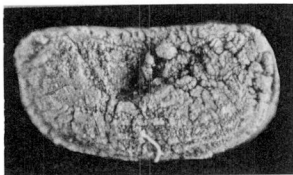
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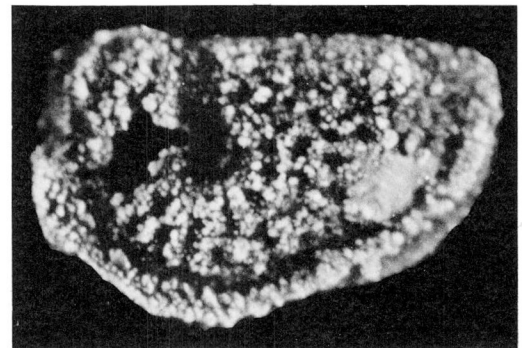
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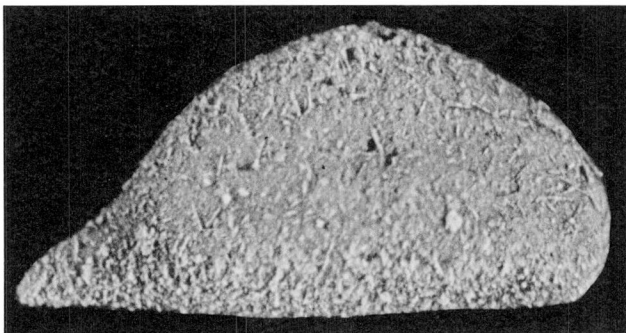
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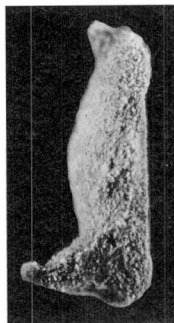
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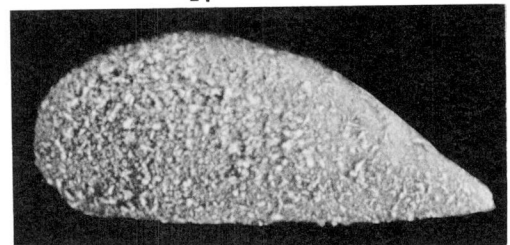
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## Plate III

(All specimens from Delorme Formation)

Figures 1–7. *Processobairdia delormensis* n. sp.; figure 1, right lateral view of a valve,  $\times 20$ , sec. VI, loc. C-47-150, holotype, GSC 41993; figures 2, 3, left interior views of two valves,  $\times 20$ , sec. VI, loc. C-47-150, paratypes, GSC 41994, 41995; figures 4, 5, right interior views of two valves,  $\times 20$ , sec. VI, loc. C-47-150, paratypes, GSC 41996, 41997; figure 6, right lateral view of a valve,  $\times 20$ , sec. VI, loc. C-47-150, paratype, GSC 41998; figure 7, left lateral view of a valve,  $\times 20$ , sec. VI, loc. C-47-150, paratype, GSC 41999.

Figure 8. *Nezamyslia perforata* n. sp.; left lateral view of a valve,  $\times 40$ , sec. IV, loc. 4, holotype, GSC 42000.

Figure 9. *Venzavella?* sp.; right lateral view of a valve,  $\times 40$ , sec. IV, loc. 4, figured specimen, GSC 42001.

Figures 10–12. *Acanthoscapha* sp. cf. *A. decurtata* (Bouček), 1936; figure 10, left lateral view of a valve,  $\times 45$ , sec. VI, loc. C-47-150, hypotype, GSC 42002; figure 11, right interior view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, hypotype, GSC 42003; figure 12, right

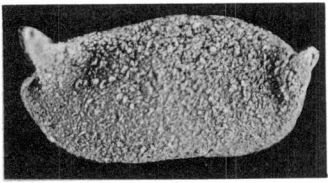
lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, hypotype, GSC 42004.

Figures 13, 14, 16–18. *Ovornina (Tricornella) perryi* n. sp.; figure 13, dorsal view of left valve,  $\times 40$ , sec. VI, loc. C-47-150, paratype, GSC 42005 (broken); figure 14, right lateral view of a valve,  $\times 35$ , sec. VI, loc. C-47-150, holotype, GSC 42006; figure 16, right lateral view of a valve,  $\times 35$ , sec. VI, loc. C-47-150, paratype, GSC 42007; figure 17, ventral view of a left valve,  $\times 40$ , sec. VI, loc. C-47-150, paratype, GSC 42008; figure 18, right lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, paratype, GSC 42009.

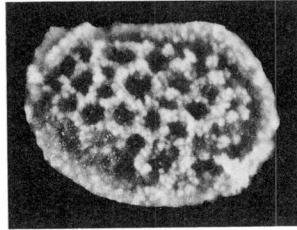
Figure 15. *Tricornina (Tricornina) navicula* Bouček, 1936; left lateral view of an immature valve,  $\times 35$ , sec. VI, loc. C-47-150, hypotype, GSC 42010.

Figure 19. *Ovornina (Ovornina?)* sp.; right lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, figured specimen, GSC 42011.

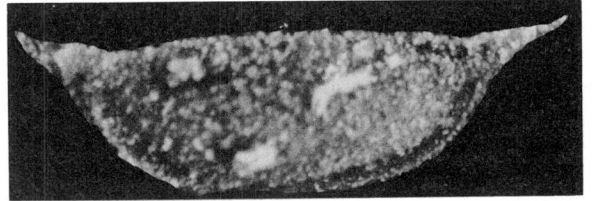
Figures 20, 21. *Baschkirina?* sp.; right interior and lateral views of two valves,  $\times 40$ , sec. VI, loc. C-47-150, figured specimens, GSC 42012, 42013.



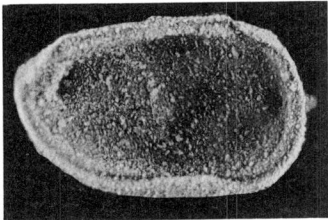
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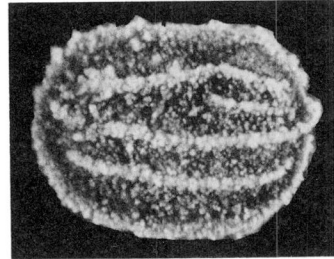
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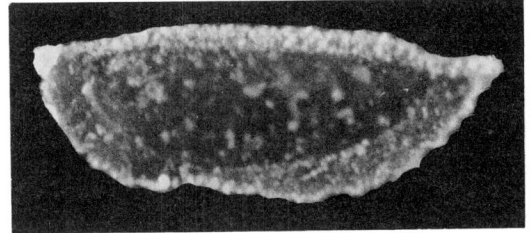
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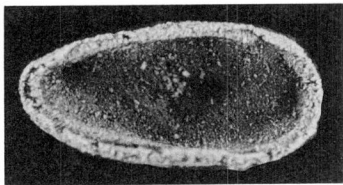
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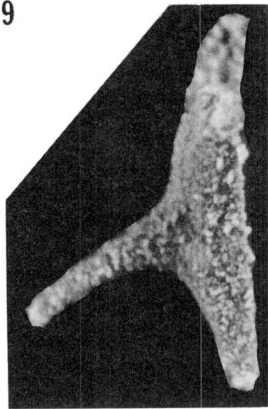
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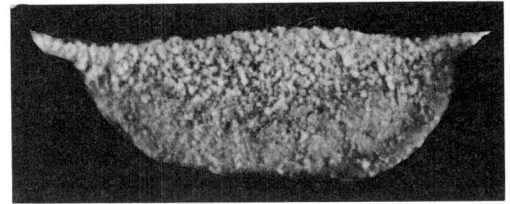
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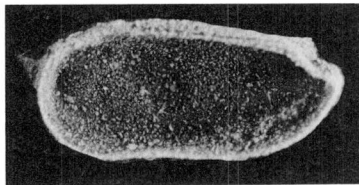
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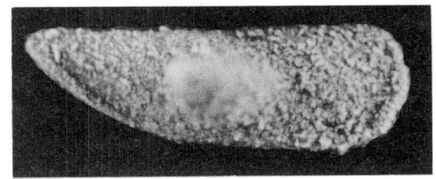
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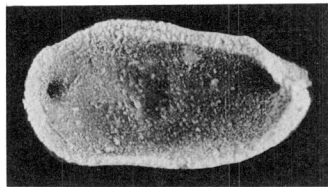
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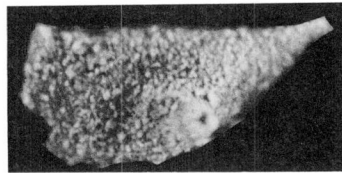
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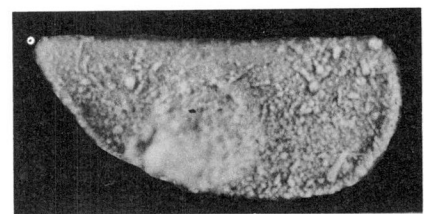
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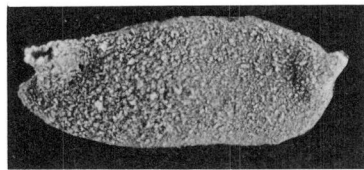
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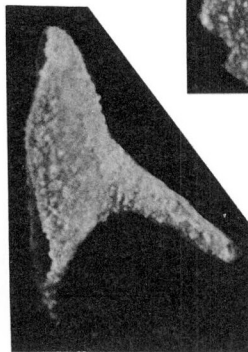
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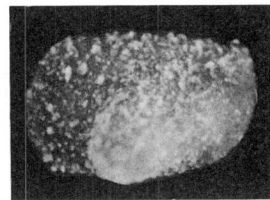
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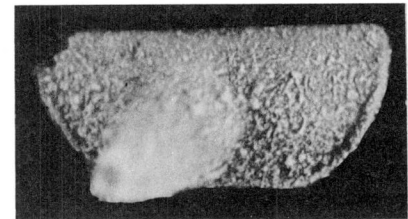
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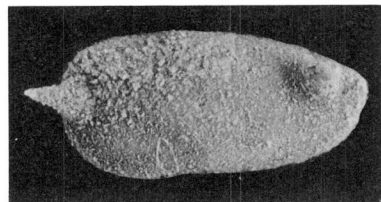
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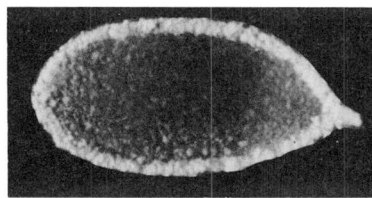
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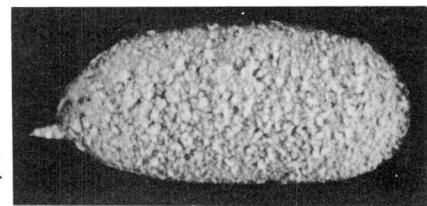
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Plate IV  
(Specimens from Delorme Formation  
unless otherwise indicated)

Figures 1–5. *Kuresaaria blackstonensis* Berdan and Copeland, 1973; steinkerns of five carapaces showing adductor impressions,  $\times 40$ , Ogilvie Formation, loc. 12P-845-860, hypotypes, GSC 42014–42018.

Figure 6. *Cadmea acuta* n. sp.; left lateral view of a valve,  $\times 35$  Whittaker Formation, sec. VI, loc. C-47-100, holotype, GSC 42019.

Figure 7. *Microcheilinella?* sp.; left interior view of a valve,  $\times 20$ , sec. VI, loc. C-47-450, figured specimen, GSC 42020.

Figure 8. *Arcuaria delormensis* n. sp.; right lateral view of a carapace,  $\times 35$ , Whittaker Formation, sec. VI, loc. C-47-100, holotype, GSC 42021.

Figures 9–15. *Dizygopleura?* sp.; figures 9, 10, right and left lateral views of steinkerns of two heteromorphic carapaces,  $\times 40$  and  $\times 35$ , Ogilvie Formation, loc. 12P-845-860, figured specimens, GSC 42022, 42023; figure 11, right lateral view of steinkern of a tecnomorphic carapace,  $\times 35$ , Ogilvie Formation, loc. 12P-845-860, figured specimen, GSC 42024; figures 12, 13, right lateral views of

steinkerns of two heteromorphic carapaces,  $\times 35$ , Ogilvie Formation, loc. 12P-845-860, figured specimens, GSC 42025, 42026; figures 14, 15, dorsal views of steinkerns of heteromorphic and tecnomorphic carapaces,  $\times 35$ , Ogilvie Formation, loc. 12P-845-860, figured specimens, GSC 42027, 42028.

Figures 16–19. *Acanthoscapha subnavicula* Abushik, 1968; figure 16, left lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, hypotype, GSC 42029; figure 17, left lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, hypotype, GSC 42030; figure 18, right interior view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, hypotype, GSC 42031; figure 19, left interior view of a valve,  $\times 50$ , sec. VI, loc. C-47-150, hypotype, GSC 42032.

Figures 20, 21. *Spinobairdia dorsicornis* n. sp.; left lateral views of two valves,  $\times 20$ , sec. VI, loc. C-47-150, holotype, GSC 42033, paratype, GSC 42034.

Figures 22–24. *Cooperatia lacrimosa* n. sp.; figure 22, right lateral view of a carapace,  $\times 35$ , sec. VI, loc. C-47-150, holotype, GSC 42035; figure 23, left lateral view of a carapace,  $\times 40$ , sec. VI, loc. C-47-150, paratype, GSC 42036; figure 24, left interior view of a valve,  $\times 35$ , sec. VI, loc. C-47-150, paratype, GSC 42037.

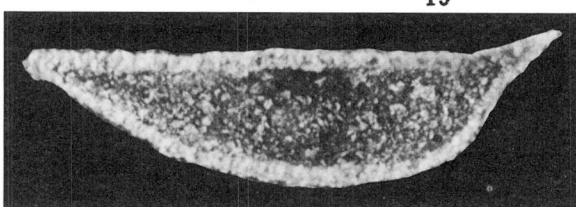
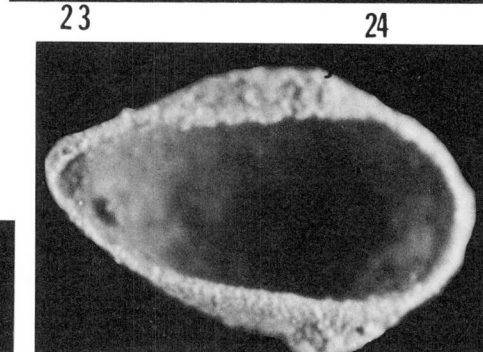
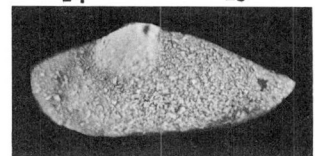
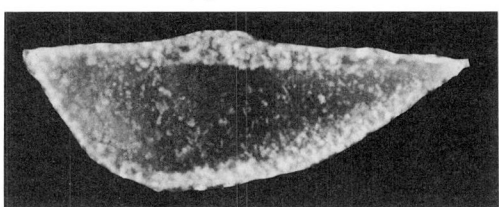
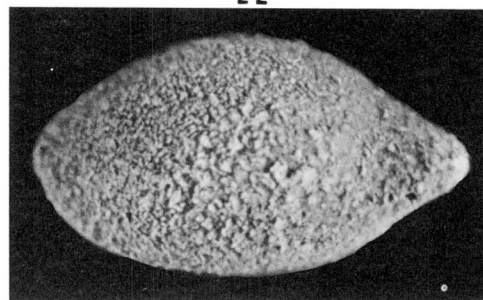
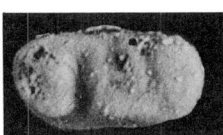
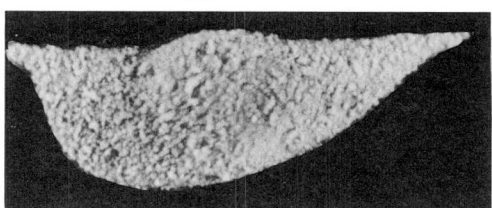
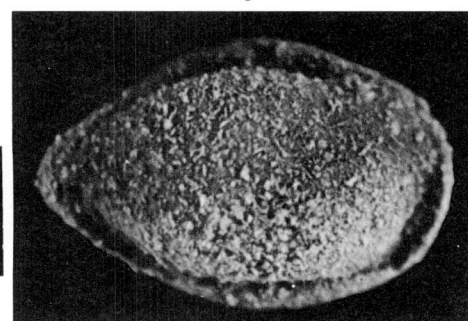
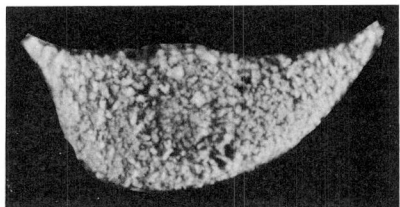
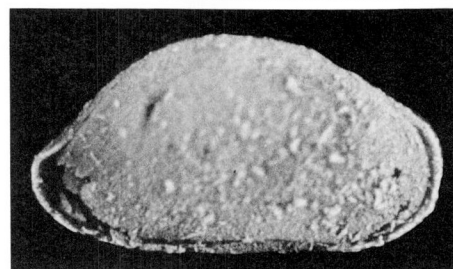
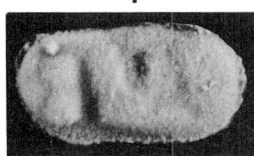
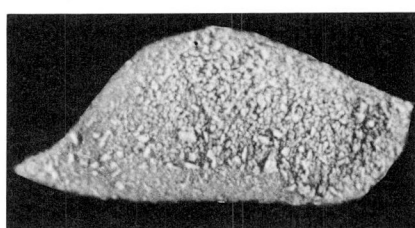
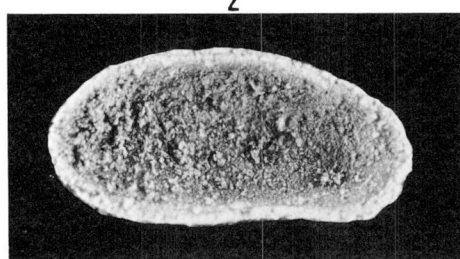
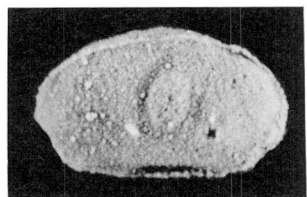
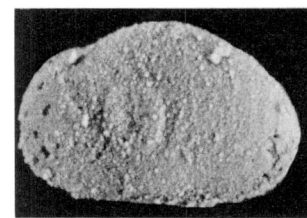


Plate V

(All specimens from Road River Formation,  
Blackwolf Mountain)

Figures 1–3. *Aechmina wolfensis* n. sp.; figure 1, right lateral view of a valve,  $\times 40$ , holotype, GSC 42038; figure 2, left lateral view of a valve,  $\times 40$ , paratype, GSC 42039; figure 3, right lateral view of a valve,  $\times 40$ , paratype, GSC 42040.

Figures 4, 5. *Pseudulrichia* sp.; left and right lateral views of two valves,  $\times 40$ , figured specimens, GSC 42041, 42042.

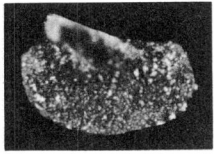
Figures 6, 7. *Aechmina* sp.; left and right lateral views of two valves,  $\times 40$ , figured specimens, GSC 42043, 42044.

Figures 8, 9. *Warthinia*? sp. cf. *W.?* *irregularis* (Spivey), 1939; right and left lateral views of two valves,  $\times 40$ , hypotypes, GSC 42045, 42046.

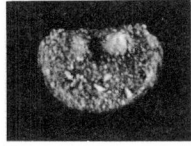
Figures 10, 11. *Leperditella*? sp. 1; right and left lateral views of two specimens,  $\times 40$ , figured specimens, GSC 42047, 42048.

Figures 12–20. *Platybolbina* (*Reticulobolbina*) *lenzi* n. sp.; figure 12, right lateral view of a tecnomorphic valve,  $\times 40$ , paratype, GSC 42049; figure 13, left lateral view of an immature valve,  $\times 50$ , paratype, GSC 42050; figure 14, left lateral view of a tecnomorphic valve,  $\times 40$ , paratype GSC 42051; figure 15, left interior view of a heteromorphic valve,  $\times 40$ , paratype, GSC 42052; figure 16, left lateral view of a tecnomorphic valve,  $\times 40$ , paratype, GSC 42053; figure 17, left lateral view of a heteromorphic valve,  $\times 40$ , paratype, GSC 42054; figure 18, left interior view of a tecnomorphic valve,  $\times 40$ , paratype, GSC 42055; figure 19, right lateral view of a heteromorphic valve,  $\times 40$ , holotype, GSC 42056; figure 20, left lateral view of part of a heteromorphic valve,  $\times 40$ , paratype, GSC 42057.

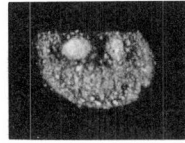




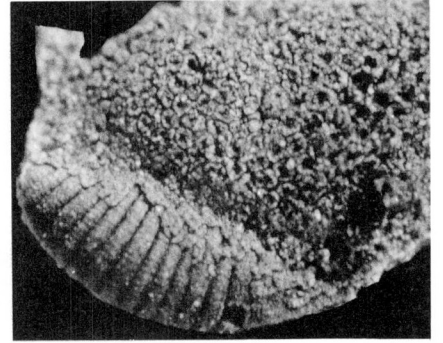
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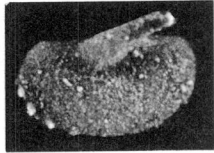
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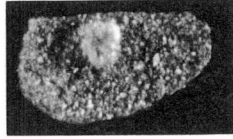
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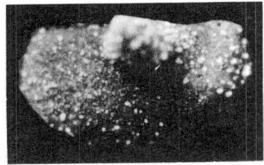
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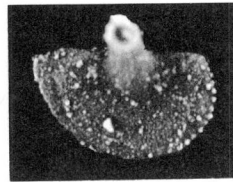
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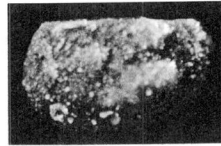
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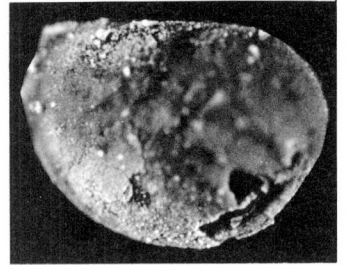
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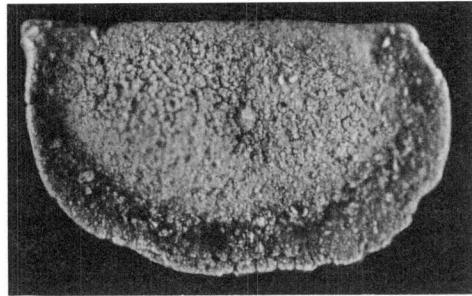
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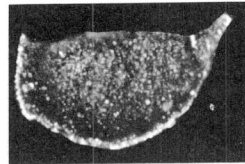
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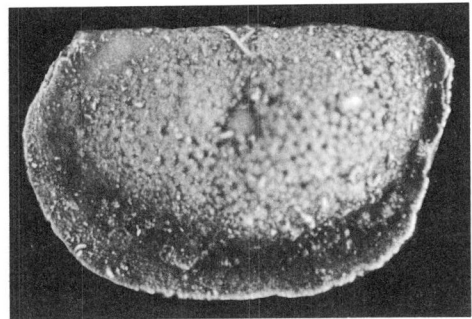
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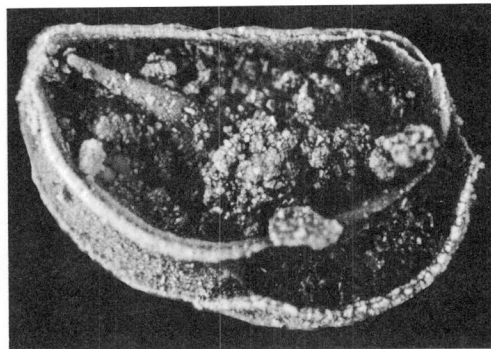
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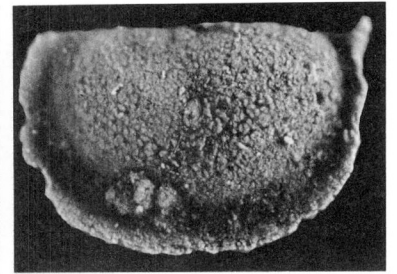
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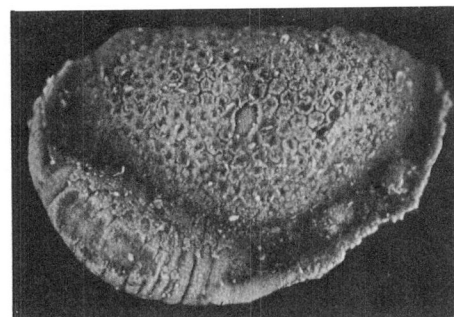
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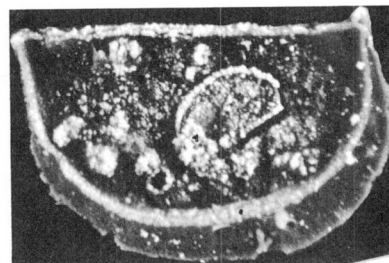
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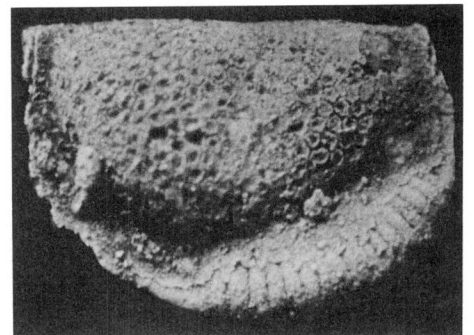
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Plate VI

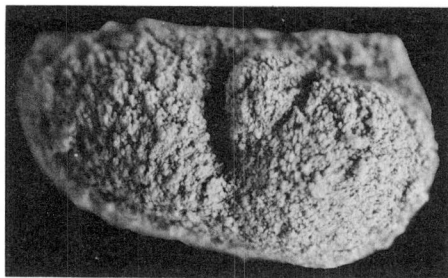
(All specimens from Road River Formation)

Figures 1–4. *Yukonibeyrichia solo* Berdan and Copeland, 1973; figures 1, 3, right lateral view of a heteromorphic valve and dorsal view of a heteromorphic carapace,  $\times 19$ , Royal Creek section I, 1390 ft, hypotypes, GSC 42058, 42060; figures 2, 4, left and right lateral views of two tecnomorphic valves,  $\times 19$ , Royal Creek section I, 1390 ft, hypotypes, GSC 42059, 42061.

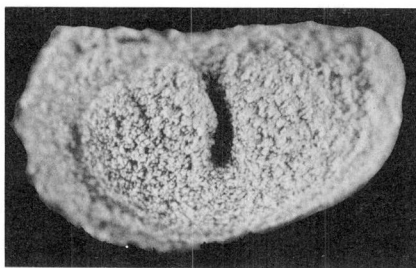
Figures 5–10. *Treposella borealis* Berdan and Copeland, 1973; figures 5, 6, 9, 10, three right and one left lateral views of four heteromorphic valves,  $\times 19$ , Royal Creek section I, figure 5 from

1255–1275 ft, figures 6, 9 and 10 from 1390 ft, hypotypes, GSC 42062, 42063, 42066, 42067; figures 7, 8, right and left lateral views of two tecnomorphic valves,  $\times 19$ , Royal Creek section I, 1390 ft, hypotypes, GSC 42064, 42065.

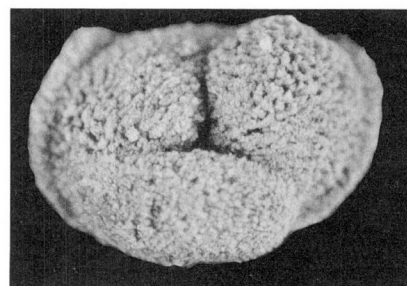
Figures 11–15. *Yukonibeyrichia yukonensis* Berdan and Copeland, 1973; figures 11–13, one right and two left lateral views of three heteromorphic valves,  $\times 19$ , Royal Creek section I, figures 11 and 12 from 1255–1275 ft and figure 13 from 1390 ft, hypotypes, GSC 42068–42070; figures 14, 15, right and left lateral views of two valves,  $\times 19$ , Royal Creek section I, 1390 ft, hypotypes, GSC 42071, 42072.



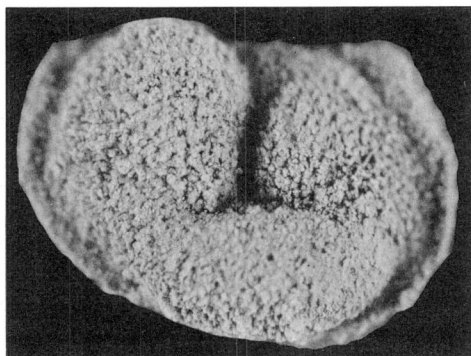
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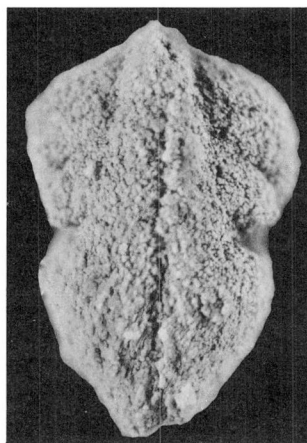
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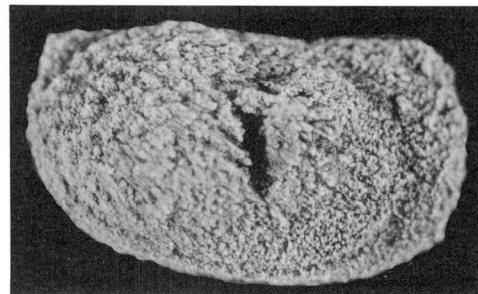
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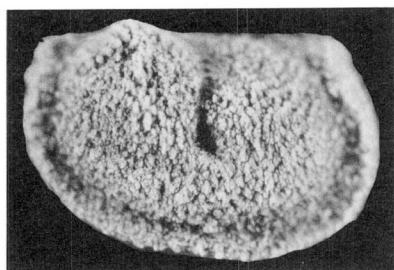
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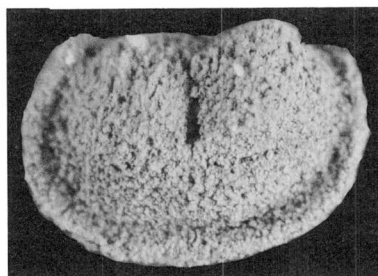
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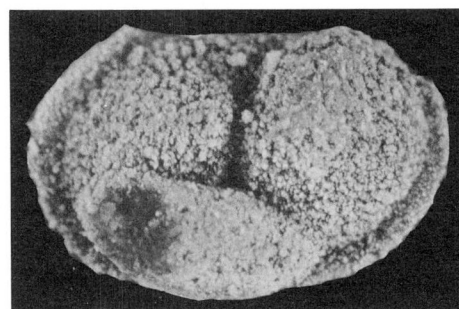
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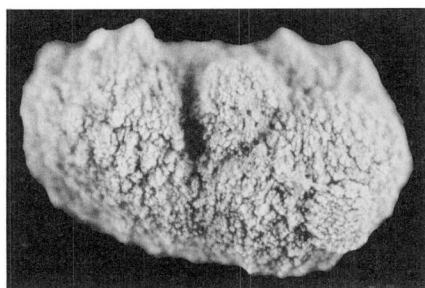
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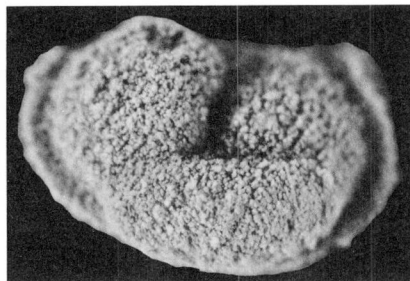
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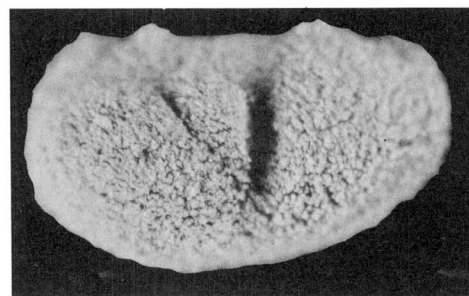
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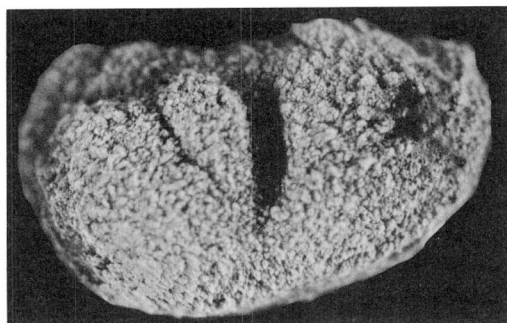
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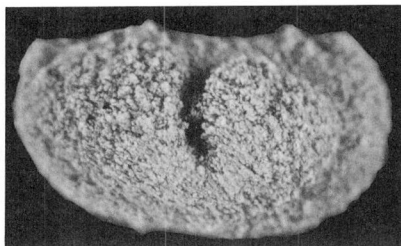
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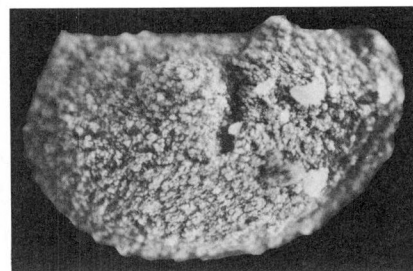
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Plate VII

(All specimens from Road River Formation)

Figures 1–6. *Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973; figures 1, 2, right and left lateral views of two tecnomorphic valves,  $\times 19$ , Royal Creek section I, 1390 ft, hypotypes, GSC 42073, 42074; figure 3, right lateral view of a heteromorphic valve,  $\times 19$ , Royal Creek section I, 1390 ft, hypotype, GSC 42075; figures 4, 5, right and left lateral views of two immature valves,  $\times 19$ , Royal Creek section I, 1190–1310 ft and 1255–1275 ft, hypotypes, GSC 42076, 42077; figure 6, left lateral view of a heteromorphic valve,  $\times 19$ , Royal Creek section I, 1390 ft, hypotype, GSC 42078.

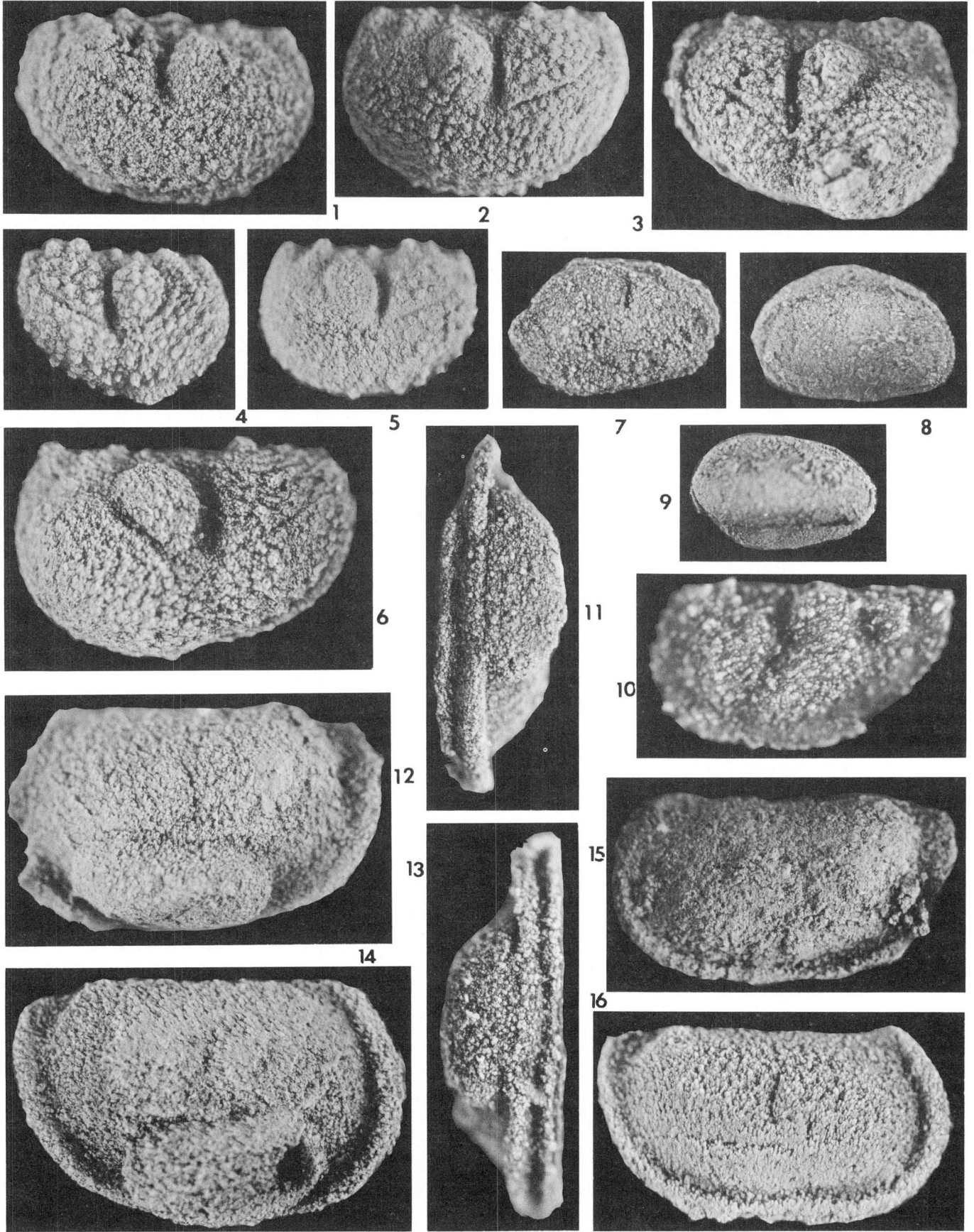
Figure 7. *Eukloedenella soloensis* Berdan and Copeland, 1973; right lateral view of an incomplete valve,  $\times 19$ , Royal Creek section I, 1255–1275 ft, hypotype, GSC 42079.

Figure 8. *Kuresaaria blackstonensis* Berdan and Copeland, 1973; right lateral view of a carapace,  $\times 19$ , Royal Creek section I, 1350 ft, hypotype, GSC 42080.

Figure 9. *Tubulibairdia* sp.; right lateral view of a carapace,  $\times 19$ , Royal Creek section I, 1350 ft, figured specimen, GSC 42081.

Figure 10. *Infractivelum spiculosum* Berdan and Copeland, 1973; left lateral view of a tecnomorphic valve,  $\times 40$ , Royal Creek section I, 1350 ft, hypotype, GSC 42082.

Figures 11–16. *Mesomphalus berdanae* n. sp.; figures 11, 12, ventral and left lateral views of a heteromorphic valve,  $\times 19$ , Royal Creek section I, 1390 ft, paratype, GSC 42083; figures 13, 14, ventral and right lateral views of a heteromorphic valve,  $\times 19$ , Royal Creek section I, 1390 ft, holotype, GSC 42084; figures 15, 16, left and right lateral views of two tecnomorphic valves,  $\times 19$ , Royal Creek section I, 1390 ft, paratypes, GSC 42085, 42086.



## Plate VIII

(Specimens from Road River Formation  
unless otherwise indicated)

Figures 1–5. *Beyrichia* (*Beyrichia*) *henningsmoeni* McGill, 1963; Delorme Range, 62°48'N, 125°21'W, west of Mackenzie River, District of Mackenzie, (unknown formation); figure 1, left lateral view of a tecnomorphic valve,  $\times 22$ , holotype, GSC 20254 (McGill, 1963*b*, Pl. 181, figs. 12, 13); figure 2, left lateral view of a tecnomorphic valve,  $\times 22$ , paratype, GSC 20256a (McGill, 1963*b*, Pl. 181, fig. 10); figure 3, left lateral view of a tecnomorphic valve,  $\times 22$ , paratype, GSC 20256 (McGill, 1963*b*, Pl. 181, fig. 9); figure 4, left lateral view of a broken heteromorphic valve,  $\times 22$ , paratype, GSC 20255 (McGill, 1963*b*, Pl. 181, figs. 7, 8); figure 5, ventral view of a right heteromorphic valve,  $\times 22$ , paratype, GSC 20257.

Figure 6. *Hibbardia* sp.; left lateral view of a tecnomorphic valve,  $\times 40$ , Delorme Formation, sec. IV, loc. 4, figured specimen, GSC 42087.

Figure 7. *Dolichoscapha?* sp.; left lateral view of a valve,  $\times 30$ , sec. II, loc. B-1350T, figured specimen, GSC 42088.

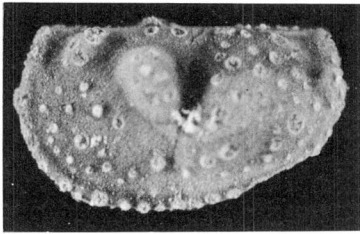
Figures 8–10. *Welleriella sekwiensis* n. sp.; figures 8, 9, right lateral views of two tecnomorphic valves,  $\times 35$ , sec. VIII, loc. S-2-795 and loc. S-1-C, paratypes, GSC 42089, 42090; figure 10, right lateral

view of a heteromorphic valve,  $\times 35$ , loc. M-2480-2500, holotype, GSC 42091.

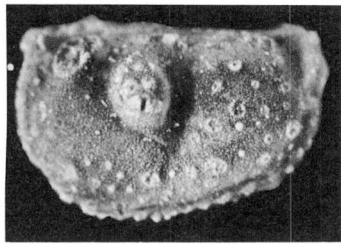
Figures 11–13. *Treposella* sp.; figure 11, left lateral view of a tecnomorphic valve,  $\times 40$ , Royal Creek section II, 640–650 ft, figured specimen, GSC 42092; figure 12, right lateral view of a broken heteromorphic valve,  $\times 40$ , Delorme Formation, sec. V, loc. C-2560, figured specimen, GSC 42093; figure 13, right lateral view of a tecnomorphic valve,  $\times 40$ , Royal Creek section II, 640–650 ft, figured specimen, GSC 42094.

Figures 14, 15. *Pintopsis* sp.; right and left lateral views of two tecnomorphic valves,  $\times 35$ , loc. S-1-C, figured specimens, GSC 42095, 42096.

Figures 16–21. *Cornikloedenina lorangerae* n. sp.; figure 16, ventral view of an anteriorly incomplete heteromorphic left valve,  $\times 40$ , sec. VIII, loc. S-2-795, paratype, GSC 42097; figures 17, 18, left lateral views of two tecnomorphic valves,  $\times 40$ , sec. VIII, loc. S-2-795, and loc. RGR-3-730, (Delorme Formation), paratypes, GSC 42098, 42099; figure 19, right lateral view of an incomplete heteromorphic valve,  $\times 40$ , loc. S-1-C, paratype, GSC 42100; figure 20, left lateral view of an incomplete heteromorphic valve,  $\times 40$ , sec. VIII, loc. S-2-795, paratype, GSC 42101; figure 21, right lateral view of a heteromorphic valve,  $\times 40$ , sec. VIII, loc. S-2-795, holotype, GSC 42102.



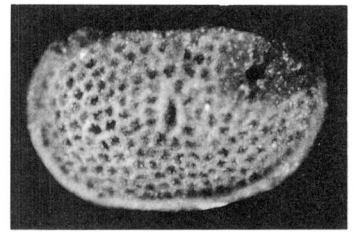
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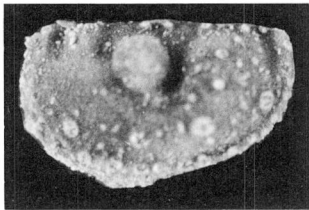
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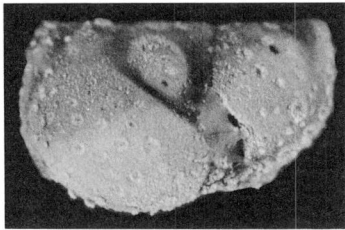
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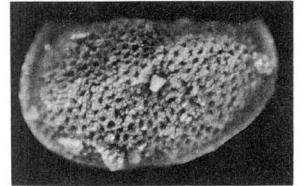
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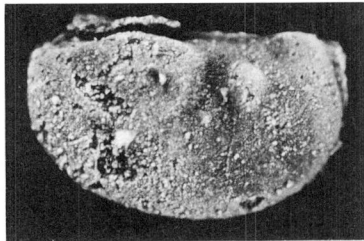
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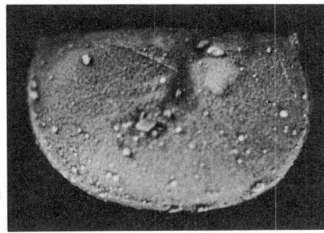
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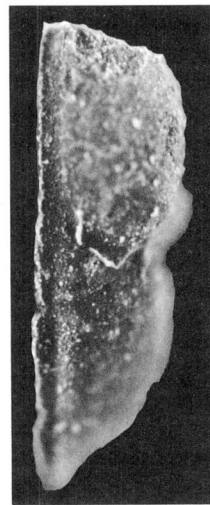
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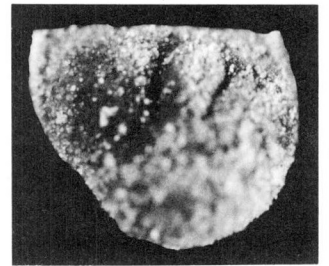
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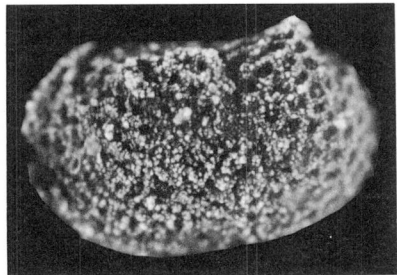
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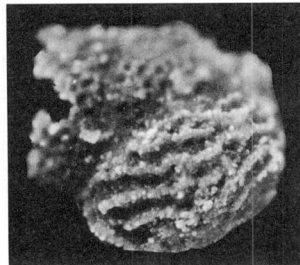
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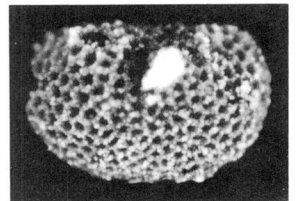
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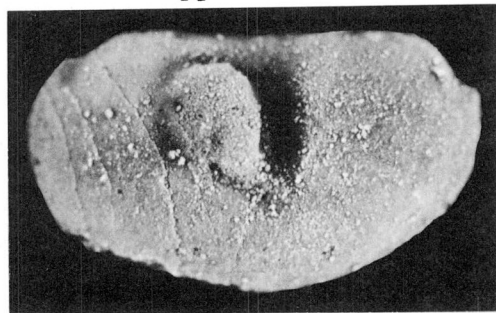
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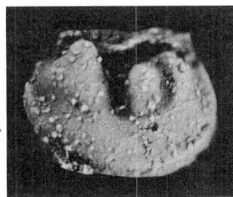
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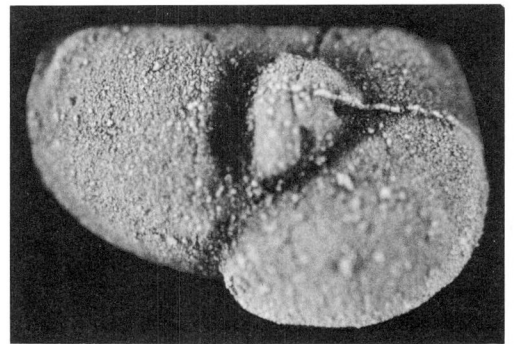
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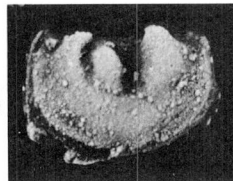
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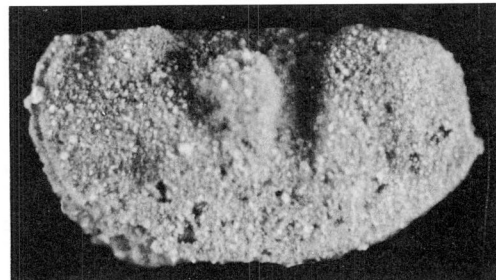
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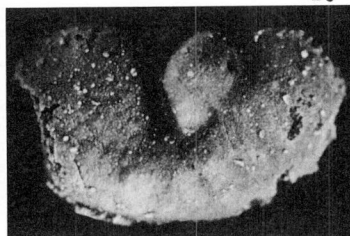
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Plate IX  
(Specimens from Road River Formation  
unless otherwise indicated)

Figure 1. *Cornikloedenina lorangerae* n. sp.; left lateral view of a tecnomorphic valve,  $\times 35$ , loc. M-2480-2500, paratype, GSC 42103.

Figure 2. *Treposeella* sp.; left lateral view of an incomplete tecnomorphic valve,  $\times 35$ , Delorme Formation, sec. IV, loc. 4, figured specimen, GSC 42104.

Figure 3. *Clintiella* sp.; left lateral view of an incomplete tecnomorphic valve,  $\times 40$ , Royal Creek section II, 220 ft, figured specimen, GSC 42105.

Figures 4–7. *Dolichoscapha keslersi* n. sp.; figure 4, right lateral view of a heteromorphic valve,  $\times 35$ , loc. S-1-C, holotype, GSC 42106; figure 5, left lateral view of a heteromorphic valve,  $\times 40$ , Delorme Formation, sec. V, loc. C-2560, paratype, GSC 42107; figures 6, 7, right lateral views of two tecnomorphic valves,  $\times 35$ , loc. S-1-C, paratypes, GSC 42108, 42109.

Figures 8, 9. *Garniella* sp.; Dorsal and right lateral views of two tecnomorphic carapaces,  $\times 25$  and  $\times 30$ , Delorme Formation, sec. II, loc. B-1130, figured specimens, GSC 42110, 42111.

Figures 10–12. *Beyrichia (Beyrichia)* sp. 2; figures 10, 11, right lateral views of two tecnomorphic valves,  $\times 40$ , Royal Creek section

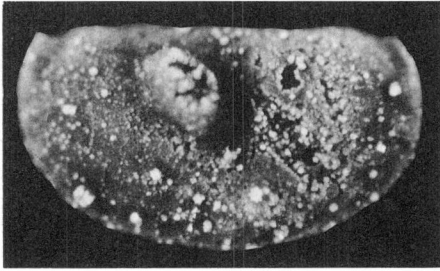
II, 640–650 ft, figured specimens, GSC 42112, 42113; figure 12, left lateral view of a tecnomorphic valve,  $\times 35$ , Royal Creek section II, 640–650 ft, figured specimen, GSC 42114.

Figures 13, 15, 16. *Beyrichia (Asperibeyrichia?) borealis* n. sp.; figure 13, left lateral view of a tecnomorphic valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42115; figure 15, right lateral view of a heteromorphic valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42117; figure 16, right lateral view of a tecnomorphic valve,  $\times 40$ , sec. II, loc. B-1350T, holotype, GSC 42118.

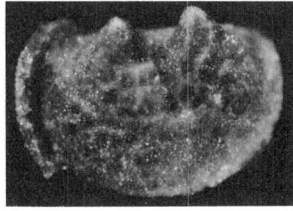
Figures 14, 17–19. *Calcaribeyrichia mackenziensis* n. sp.; figure 14, right lateral view of an immature valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42116; figure 17, left lateral view of an incomplete tecnomorphic valve, showing extreme development of calcarine spine,  $\times 35$ , sec. II, loc. B-1350T, paratype, GSC 42119; figures 18, 19, left and right lateral views of two immature valves,  $\times 30$ , sec. II, loc. B-1350T, paratypes, GSC 42120, 42121.

Figures 20–22. *Beyrichia (Scabribeyrichia) churkini* Berdan and Copeland, 1973; figure 20, right lateral view of a tecnomorphic carapace,  $\times 20$ , Delorme Formation, sec. III, loc. S-4-1650-1655, hypotype, GSC 42122; figures 21, 22, ventral and dorsal views of two tecnomorphic specimens replaced by beekite,  $\times 20$ , Delorme Formation, sec. III, loc. S-4-1650-1655, hypotypes, GSC 42123, 42124.

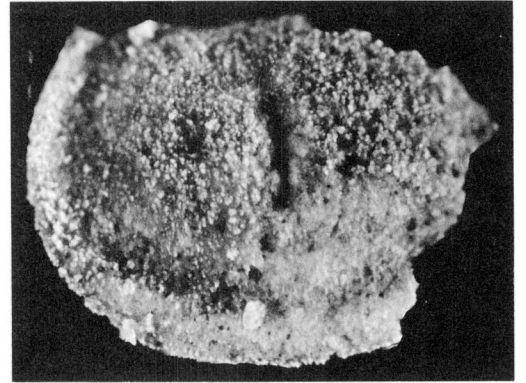




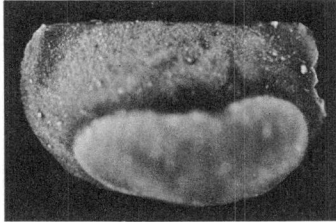
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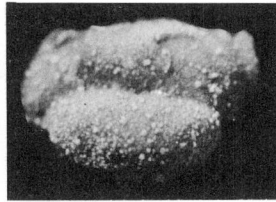
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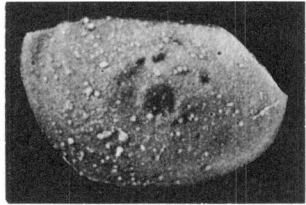
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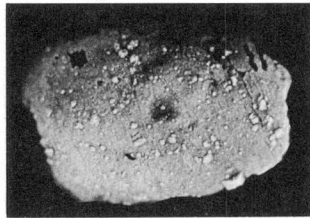
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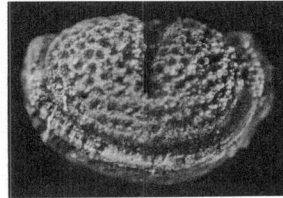
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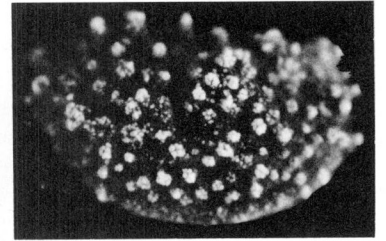
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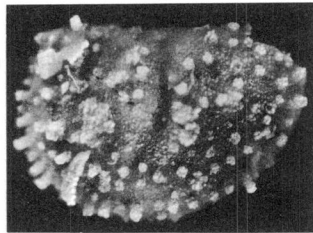
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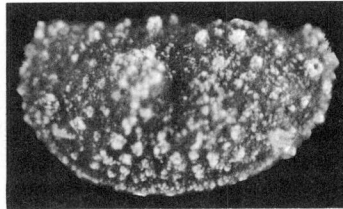
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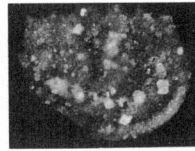
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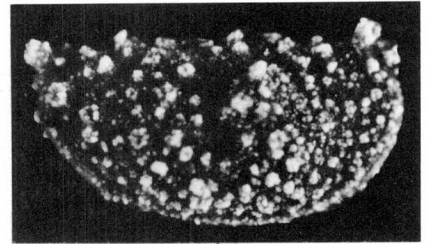
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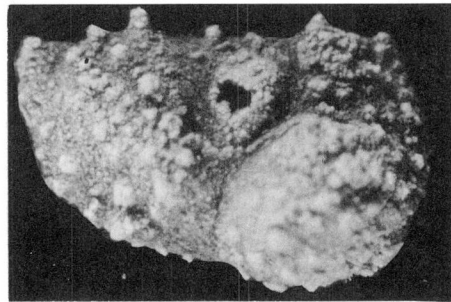
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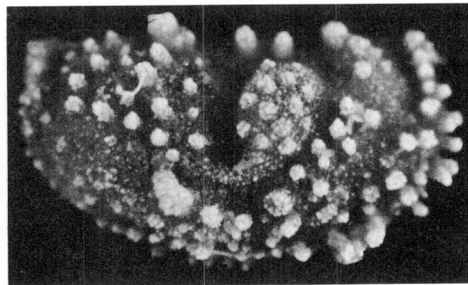
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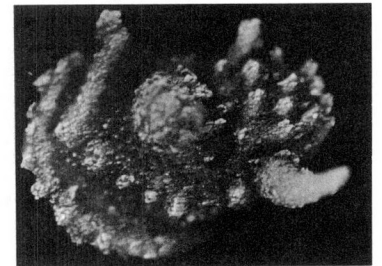
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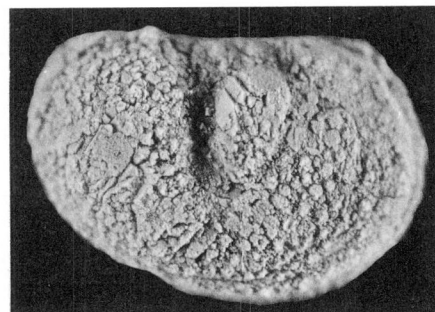
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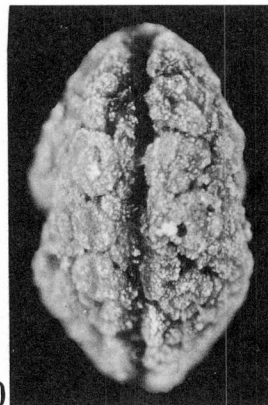
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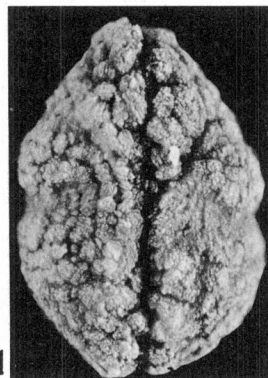
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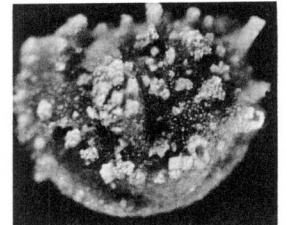
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## Plate X

(Specimens from Road River Formation  
unless otherwise indicated)

Figure 1. Ostracode indet. 1; left lateral view of a valve,  $\times 35$ , Delorme Formation, sec. IX, loc. L-455, figured specimen, GSC 42125.

Figure 2. Ostracode indet. 2; right lateral view of a valve,  $\times 55$ , sec. II, loc. B-1350T, figured specimen, GSC 42126.

Figure 3. Ostracode indet. 3; right lateral view of a valve,  $\times 35$ , sec. II, loc. B-1350T, figured specimen, GSC 42127.

Figures 4, 9, 14–17. *Gannibeyrichia canadensis* n. sp.; figures 4, 9, left lateral views of two immature valves,  $\times 30$ , sec. II, loc. B-1350T, paratypes, GSC 42128, 42129; figure 14, right lateral view of a tecnomorphic valve,  $\times 40$ , sec. II, loc. B-1350T, holotype, GSC 42130; figures 15, 16, left lateral views of two tecnomorphic valves,  $\times 30$ , sec. II, loc. B-1350T, paratypes, GSC 42131, 42132; figure 17, right lateral view of a tecnomorphic valve,  $\times 40$ , sec. II, loc. B-1350T, paratype, GSC 42133.

Figure 5. *Undulirete mackenziensis* n. sp.; left lateral view of a valve,  $\times 50$ , Delorme Formation, sec. IX, loc. L-395, paratype, GSC 42134.

Figures 6, 7. "*Cryptophyllus*" *splendida* n. sp.; figure 6, left lateral view of a valve,  $\times 40$ , Delorme Formation, sec. IV, loc. 4, holotype, GSC 42135; figure 7, right lateral view of a valve,  $\times 40$ , Delorme Formation, sec. IV, loc. 4, paratype, GSC 42136.

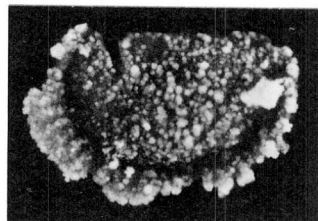
Figure 8. *Calcaribeyrichia mackenziensis* n. sp.; left lateral view of a tecnomorphic valve,  $\times 30$ , sec. II, loc. B-1350T, holotype, GSC 42137.

Figure 10. *Beyrichia* (*Asperibeyrichia*?) *borealis* n. sp.; left lateral view of a tecnomorphic valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42138.

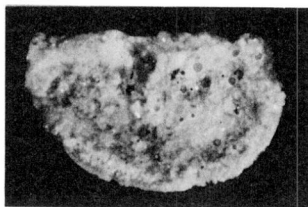
Figures 11–13. *Navibeyrichia*? *dividensis* n. sp.; figures 11, 12, right lateral views of two tecnomorphic valves,  $\times 35$ , Delorme Formation, sec. V, loc. C-2620, holotype, GSC 42139, paratype, GSC 42140; figure 13, left lateral view of an incomplete heteromorphic valve,  $\times 35$ , Delorme Formation, sec. V, loc. C-2620, paratype, GSC 42141.

Figures 18, 21. *Berdanopsis royalensis* n. sp.; figure 18, right lateral view of a tecnomorphic valve,  $\times 35$ , sec. II, loc. B-1350T, holotype, GSC 42142; figure 21, left lateral view of a tecnomorphic valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42145.

Figures 19, 20, 22–25. *Berdanopsis ursensis* n. sp.; figures 19, 20, right lateral views of two tecnomorphic valves,  $\times 25$  and  $\times 40$ , Delorme Formation, sec. IX, loc. L-455, paratype, GSC 42143, holotype, GSC 42144; figure 22, left lateral view of a tecnomorphic valve,  $\times 55$ , Delorme Formation, sec. IX, loc. L-455, paratype, GSC 42146; figure 23, ventral view of an incomplete heteromorphic left valve,  $\times 40$ , Delorme Formation, sec. IX, loc. L-395, paratype, GSC 42147; figures 24, 25, right lateral views of two heteromorphic valves,  $\times 35$ , Delorme Formation, sec. IX, loc. L-395, paratypes, GSC 42148, 42149.



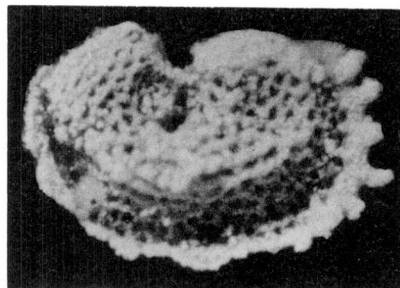
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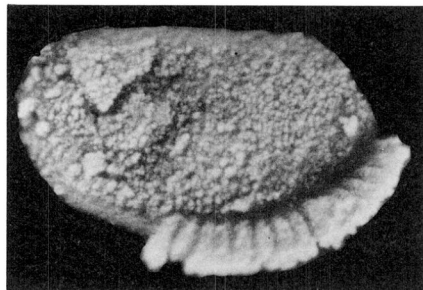
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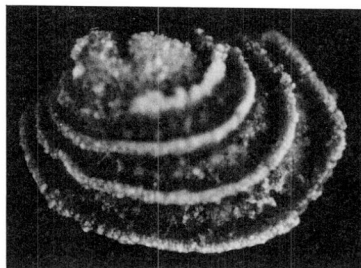
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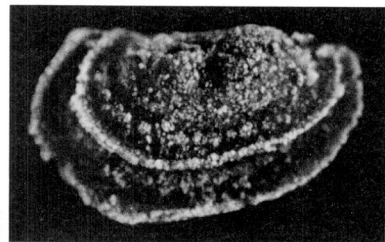
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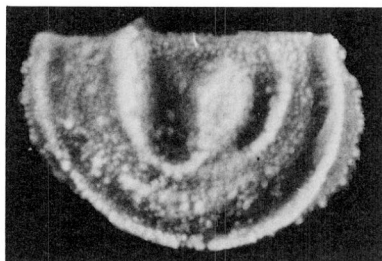
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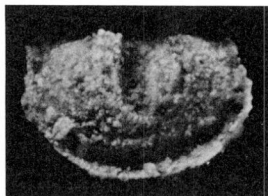
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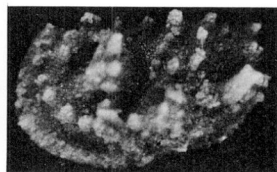
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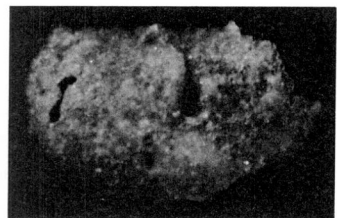
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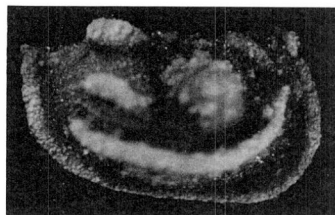
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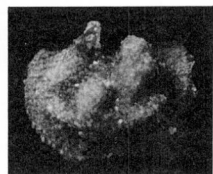
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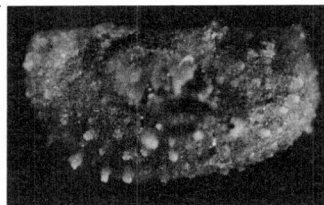
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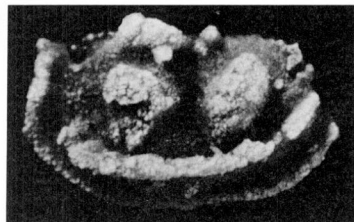
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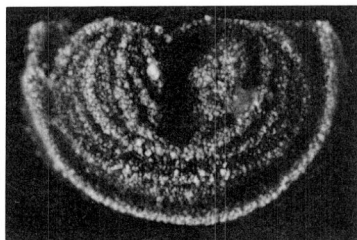
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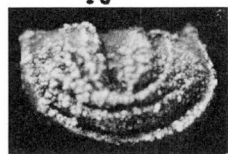
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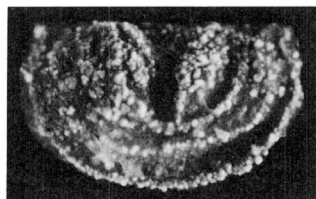
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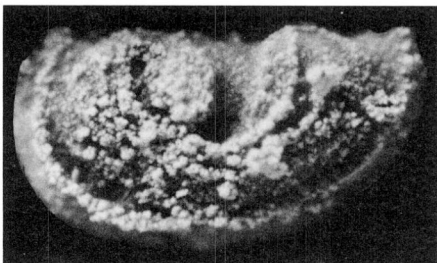
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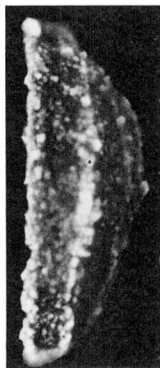
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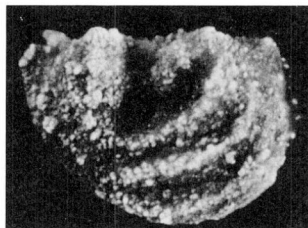
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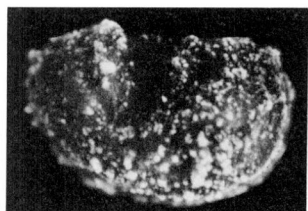
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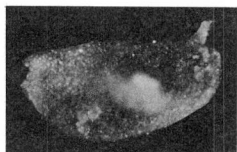
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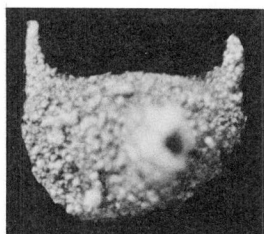
## Plate XI

(Specimens from Road River Formation  
unless otherwise indicated)

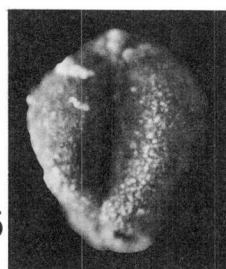
- Figures 1–3. *Ockerella jordani* n. sp.; figure 1, left lateral view of a valve,  $\times 25$ , sec. II, loc. B-1350T, paratype, GSC 42150; figure 2, left lateral view of a valve,  $\times 50$ , Delorme Formation, sec. IX, loc. L-455, paratype, GSC 42151; figure 3, left lateral view of a valve,  $\times 25$ , sec. II, loc. B-1350T, paratype, GSC 42152.
- Figure 4. “*Acanthoscapha*” sp. cf. “*A.*” *alata* Abushik, 1968; right lateral view of a valve,  $\times 30$ , sec. II, loc. B-1350T, hypotype, GSC 42153.
- Figures 5, 6. *Newsomites delormensis* n. sp.; figure 5, dorsal view of a carapace,  $\times 35$ , Delorme Formation, sec. IX, loc. L-395, paratype, GSC 42154; figure 6, right lateral view of a carapace,  $\times 55$ , Delorme Formation, sec. IX, loc. L-395, holotype, GSC 42155.
- Figure 7. *Baschkirina*? sp.; right lateral view of a carapace,  $\times 20$ , Delorme Formation, sec. IX, loc. L-455, figured specimen, GSC 42156.
- Figure 8. *Monoceratina*? sp.; left lateral view of a carapace  $\times 30$ , sec. II, loc. B-1350T, figured specimen, GSC 42157.
- Figures 9, 10. *Primitiopsella globosa* n. sp.; left lateral views of two valves,  $\times 25$ , sec. II, loc. B-1350T, holotype, GSC 42158, paratype, GSC 42159.
- Figures 11–12. *Shidelerites natlaensis* n. sp.; figure 11, right lateral view of a carapace,  $\times 25$ , sec. II, loc. B-1350T, holotype, GSC 42160; figure 12, right lateral view of a carapace,  $\times 25$ , sec. II, loc. B-1350T, paratype, GSC 42161.
- Figure 13. *Shidelerites*? sp.; left lateral view of a carapace,  $\times 25$ , sec. II, loc. B-1350T, figured specimen, GSC 42162.
- Figure 14. *Kirkbyellina* sp. cf. *K. spinosa* Blumenstengel, 1962; right lateral view of a valve,  $\times 60$ , Delorme Formation, sec. IX, loc. L-455, hypotype, GSC 42163.
- Figures 15, 16. *Ovornina (Tricornella) perryi* n. sp.; figure 15, right lateral view of a valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42164; figure 16, dorsal view of a left valve,  $\times 37$ , Delorme Formation, sec. VI, loc. C-47-450, paratype, GSC 42165.
- Figure 17. *Ovornina (Tricornella) caurina* (Berdan and Copeland), 1973; dorsal view of a left valve,  $\times 40$ , Delorme Formation, sec. IV, loc. 4, hypotype, GSC 42166.
- Figures 18, 19. *Tricornina (Tricornina) navicula* Bouček, 1936; figure 18, left lateral view of an incomplete valve,  $\times 37$ , sec. II, loc. B-1350T, hypotype, GSC 42167; figure 19, left lateral view of a valve,  $\times 37$ , Delorme Formation, sec. VI, loc. C-47-150, hypotype, GSC 42168.
- Figures 20, 21. *Acanthoscapha* sp. A (Kesling and Sohn), 1958; figure 20, left lateral view of a carapace,  $\times 30$ , sec. II, loc. B-1350T, figured specimen, GSC 42169; figure 21, left lateral view of a valve,  $\times 30$ , sec. II, loc. B-1350T, figured specimen, GSC 42170.
- Figure 22. *Bairdia mucronata* Rozhdestvenskaya, 1960; right lateral view of a carapace,  $\times 40$ , Delorme Formation, sec. IV, loc. 4, hypotype, GSC 42171.
- Figures 23–25. *Acanthoscapha bohémica* (Bouček), 1936; figure 23, interior view of a left valve,  $\times 40$ , Delorme Formation, sec. IX, loc. L-455, hypotype, GSC 42172; figure 24, right lateral view of a carapace,  $\times 40$ , Delorme Formation, sec. IX, loc. L-455, hypotype, GSC 42173; figure 25, interior view of an incomplete left valve,  $\times 37$ , Delorme Formation, sec. IX, loc. L-455, hypotype, GSC 42174.



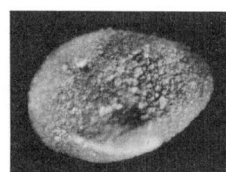
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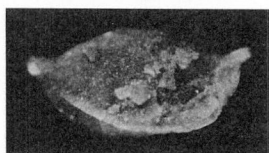
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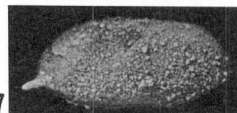
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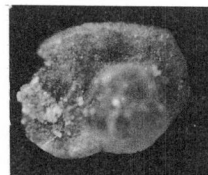
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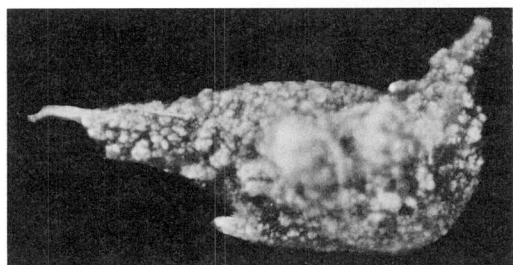
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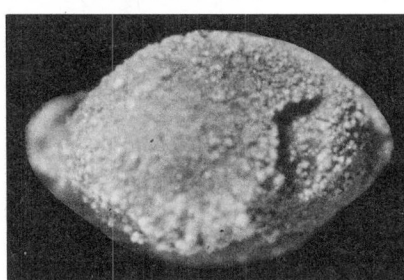
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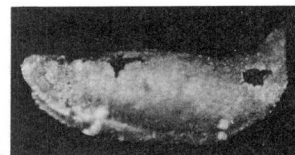
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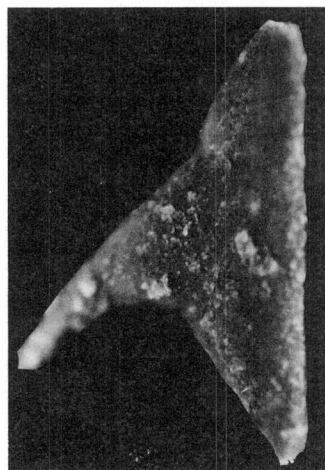
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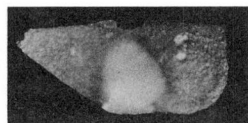
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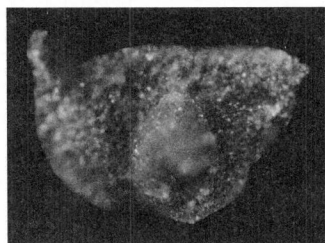
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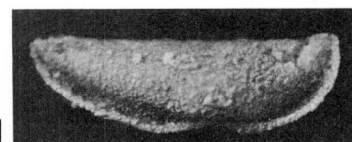
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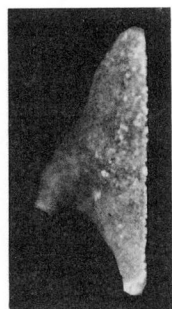
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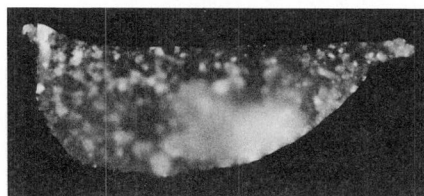
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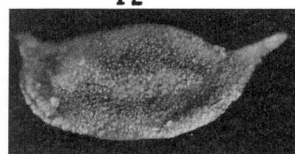
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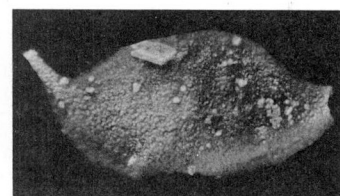
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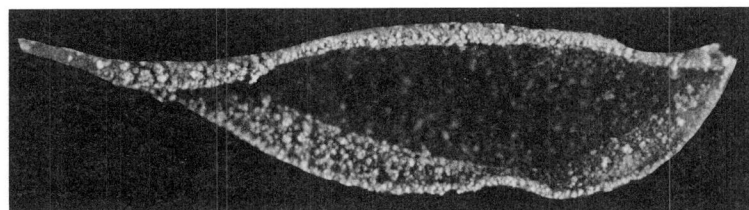
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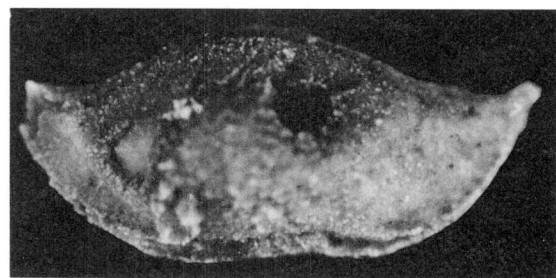
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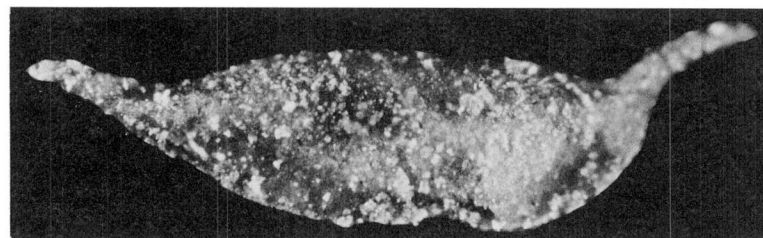
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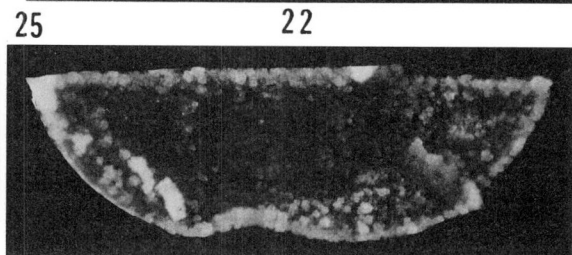
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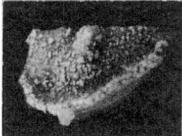


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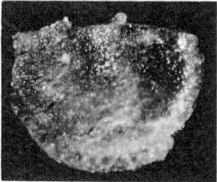
## Plate XII

(Specimens from Delorme Formation  
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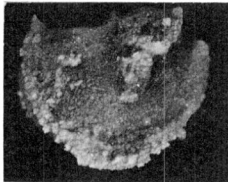
- Figures 1, 2. *Alaskabolbina* sp. cf. *A. nodilineata* Berdan and Copeland, 1973; left lateral views of two immature valves,  $\times 20$ , sec. I, loc. A-1265, hypotypes, GSC 42175, 42176.
- Figures 3–6. *Acantonodella? plana* n. sp.; figures 3–5, right and two left lateral views of three valves,  $\times 25$ , Road River Formation, sec. II, loc. B-1350T, paratypes, GSC 42177–42179; figure 6, right lateral view of a valve,  $\times 25$ , Road River Formation, sec. II, loc. B-1350T, holotype, GSC 42180.
- Figure 7. *Chironiptrum* sp.; right lateral view of an immature carapace,  $\times 35$ , sec. IV, loc. 4, figured specimen, GSC 42181.
- Figure 8. “*Beecherella*” sp.; left lateral view of a valve,  $\times 30$ , Road River Formation, sec. II, loc. B-1350T, figured specimen, GSC 42182.
- Figure 9. *Spinobairdia?* sp.; interior view of an incomplete right valve,  $\times 25$ , Road River Formation, sec. II, loc. B-1350T, figured specimen, GSC 42183.
- Figures 10, 11. *Abditoloculina trilocolata* n. sp.; figure 10, right lateral view of a heteromorphic valve,  $\times 25$ , sec. IX, loc. L-455, holotype, GSC 42184; figure 11, left lateral view of a tecomorphic valve,  $\times 25$ , sec. IX, loc. L-455, paratype, GSC 42185.
- Figure 12. *Libumella* sp.; left lateral view of a valve,  $\times 20$ , sec. IX, loc. L-395, figured specimen, GSC 42186.
- Figure 13. *Voronina?* sp.; left lateral view of a carapace,  $\times 27$ , Road River Formation, sec. II, loc. B-1350T, figured specimen, GSC 42187.
- Figure 14. *Bodzentia mackenziensis* n. sp.; left lateral view of an incomplete carapace,  $\times 60$ , Road River Formation, sec. II, loc. B-1350T, holotype, GSC 42188.
- Figure 15. Ostracode indet. 4; left lateral view of a valve,  $\times 20$ , sec. I, loc. A-1265, figured specimen, GSC 42189.
- Figures 16, 17. *Neocraterellina* sp. cf. *N. oblonga* (Ulrich and Bassler), 1913; right lateral view of two valves,  $\times 35$ , sec. IV, loc. 4, hypotype, GSC 42190, 42191.
- Figure 18. *Libumella* sp. cf. *L. ambigua* (Lundin), 1965; lateral view of a valve,  $\times 30$ , Road River Formation, sec. II, loc. B-1350T, hypotype, GSC 42192.
- Figures 19, 20. *Nezamyssia perforata* n. sp.; left lateral views of two valves,  $\times 35$  and  $\times 42$ , sec. IV, loc. 4, paratypes, GSC 42193, 42194.
- Figure 21. *Infracivelum acuminatum* Berdan and Copeland, 1973; left lateral view of a valve,  $\times 40$ , Road River Formation, Royal Creek section II, 828–848 ft, hypotype, GSC 42195.
- Figure 22. *Nezamyssia circularis* n. sp.; left lateral view of a valve,  $\times 40$ , sec. IV, loc. 4, holotype, GSC 42196.
- Figures 23, 24. “*Aparchites*” sp. cf. “*A. messleriformis instabilis*” Polenova, 1974; lateral views of two valves,  $\times 37$ , Road River Formation, loc. M-2480-2500, hypotypes, GSC 42197, 42198.
- Figure 25. *Microcheilinella?* sp.; interior view of a valve,  $\times 40$ , sec. V, loc. C-47-150, figured specimen, GSC 42199.
- Figures 26–30. *Chironiptrum bilinearis* n. sp.; figures 26, 27, left and right lateral views of two carapaces,  $\times 30$ , sec. II, loc. B-345, paratypes, GSC 42200, 42201; figures 28, 29, dorsal and ventral views of two carapaces,  $\times 30$ , sec. II, loc. B-345, paratypes, GSC 42202, 42203; figure 30, left lateral view of a carapace,  $\times 40$ , sec. IV, loc. 4, holotype, GSC 42204.



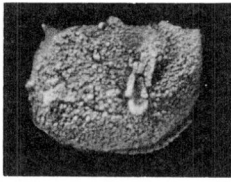
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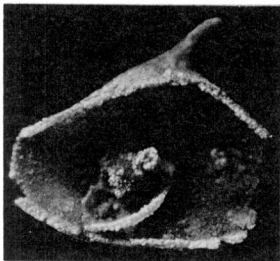
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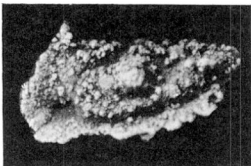
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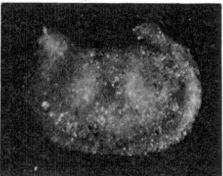
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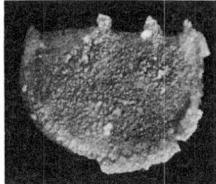
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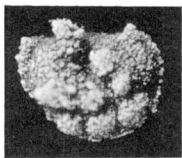
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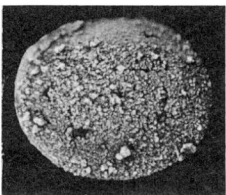
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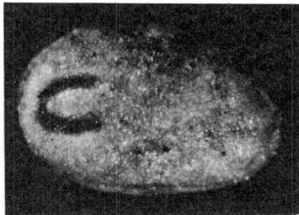
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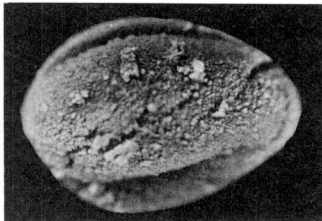
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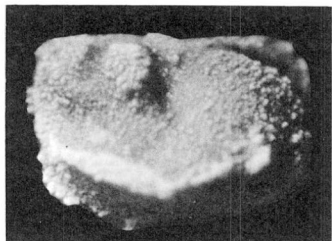
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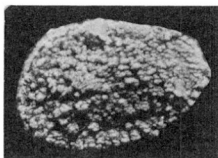
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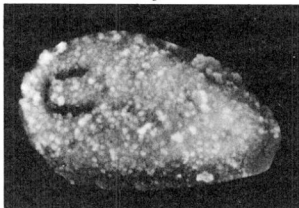
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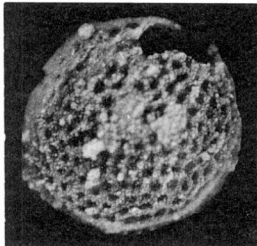
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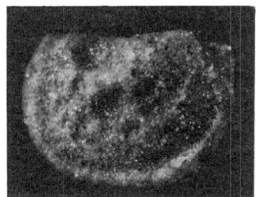
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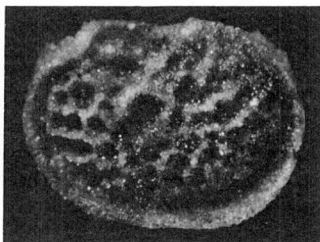
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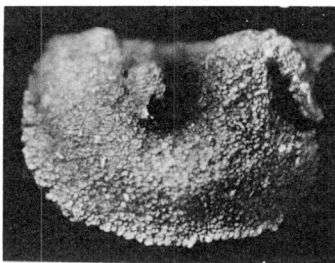
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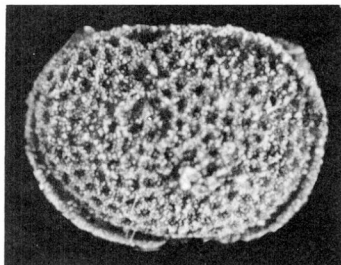
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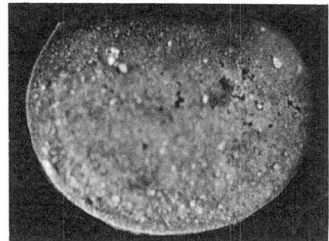
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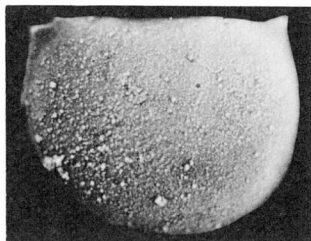
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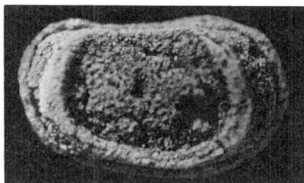
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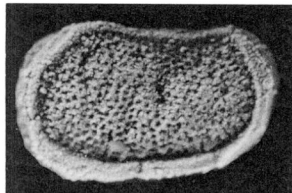
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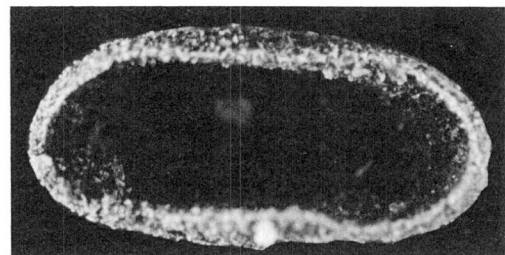
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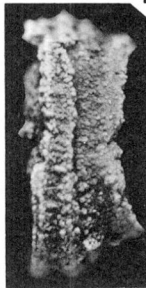
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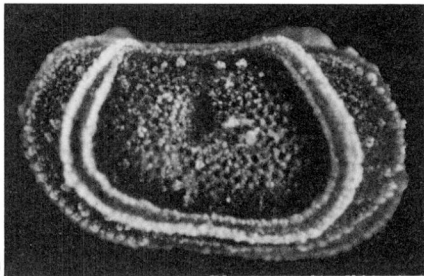
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## Plate XIII

(Specimens from Road River Formation  
unless otherwise indicated)

- Figure 1, 2. *Ampuloides? spinosa* n. sp.; left lateral views of two valves,  $\times 60$  and  $\times 30$ , sec. II, loc. B-1350T, holotype, GSC 42205, paratype, GSC 42206.
- Figures 3–5. *Turiella perryi* n. sp.; figure 3, interior view of a left valve,  $\times 25$ , sec. II, loc. B-1350T, paratype, GSC 42207; figure 4, interior view of a left valve,  $\times 40$ , sec. II, loc. B-1350T, holotype, GSC 42208; figure 5, left lateral view of a valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42209.
- Figures 6, 7, 9. *Cadmea acuta* n. sp.; figures 6, 7, right lateral views of two valves,  $\times 30$ , Delorme Formation, sec. IX, loc. L-455, paratypes, GSC 42210, 42211; figure 9, interior view of a right valve,  $\times 30$ , sec. II, loc. B-1350T, figured specimen, GSC 42213.
- Figure 8. *Bairdiacypris? subarctica* n. sp.; right lateral view of a carapace,  $\times 13$ , Delorme Formation, sec. IX, loc. L-395, holotype, GSC 42212.
- Figures 10, 11. Pachydomellid ostracode indet.; right lateral and dorsal views of a carapace,  $\times 30$ , sec. II, loc. B-1350T, figured specimen, GSC 42214.
- Figure 12. *Yukonibolbina plana* n. sp.; right lateral view of a valve,  $\times 30$ , Delorme Formation, sec. IX, loc. L-455, paratype, GSC 42215.
- Figures 13–16. *Marginia* sp. cf. *M. multicostata* Polenova, 1952; figure 13, right lateral view of a right valve,  $\times 30$ , sec. II, loc. B-1350T, hypotype, GSC 42797; figures 14–16, left lateral views of three valves,  $\times 30$ , sec. II, loc. B-1350T, hypotypes, GSC 42798–42800.
- Figures 17, 18. *Marginia* sp. cf. *M. catagrapha* Polenova, 1952; right lateral views of two valves,  $\times 30$  and  $\times 27$ , sec. II, loc. B-1350T, hypotypes, GSC 42801, 42802.
- Figure 19. *Jenningsina?* sp.; left lateral view of an incomplete valve,  $\times 50$ , Delorme Formation, sec. VII, loc. CH-27-495, figured specimen, GSC 42803.
- Figures 20–22. *Yukonibolbina nodosa* n. sp.; figure 20, left lateral view of a tecnomorphic valve,  $\times 27$ , sec. II, loc. B-1350T, paratype, GSC 42804; figure 21, right lateral view of a heteromorphic valve,  $\times 30$ , sec. II, loc. B-1350T, holotype, GSC 42805; figure 22, right lateral view of a tecnomorphic valve,  $\times 30$ , sec. II, loc. B-1350T, paratype, GSC 42806.
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- Figures 27–30. Pelecypoda indet.; figure 27, left lateral view,  $\times 50$ , Ogilvie Formation, loc. 12P-845-860, hypotype, GSC 42811; figure 28, dorsal view,  $\times 50$ , Ogilvie Formation, loc. 12P-845-860, hypotype, GSC 42812; figures 29, 30, left and right lateral views of two specimens,  $\times 50$ , Ogilvie Formation, loc. 12P-845-860, hypotypes, GSC 42813, 42814.



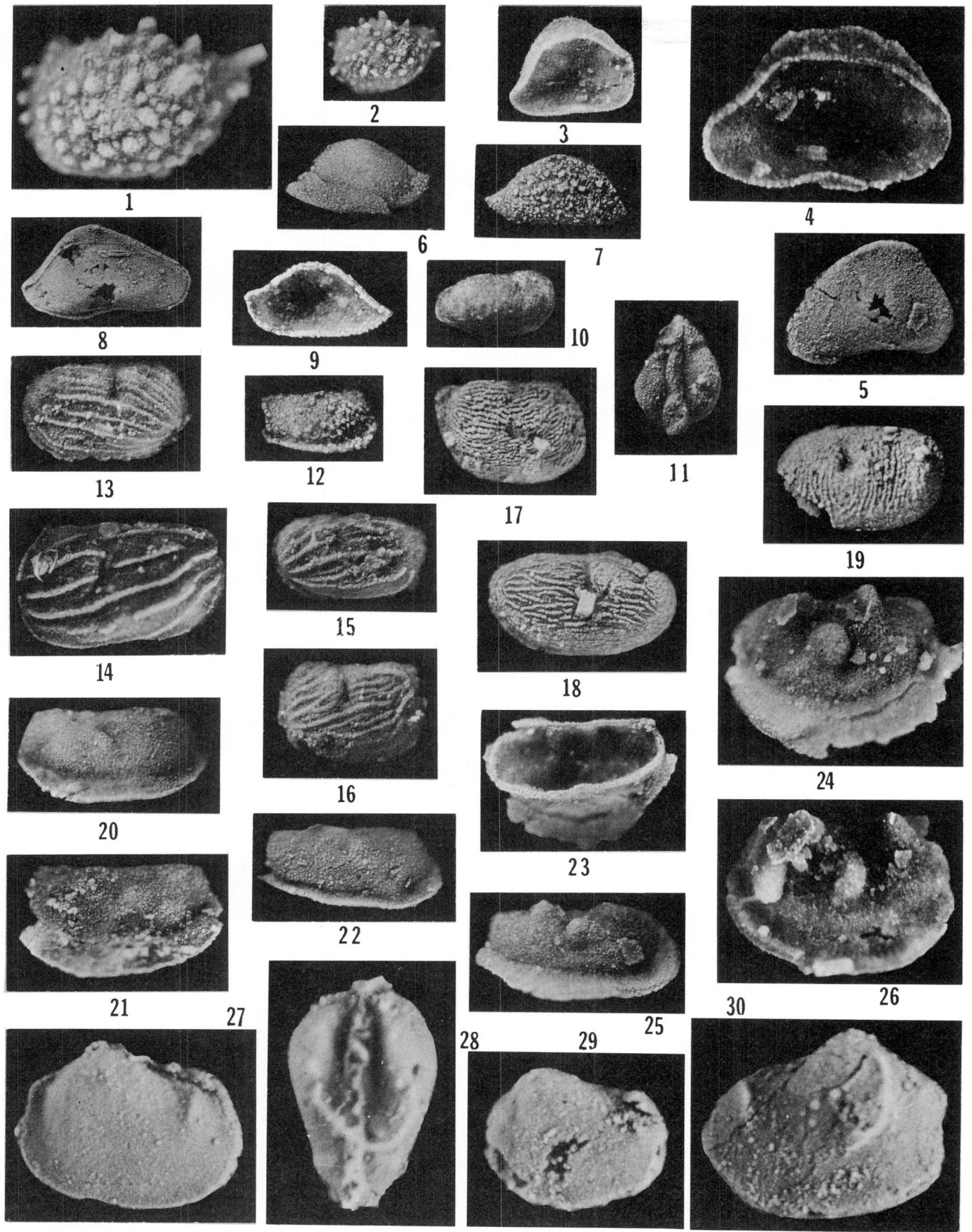


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(Specimens from Delorme Formation  
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Figures 1, 2, 11. *Undulirete mackenziensis* n. sp.; figure 1, left lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-150, paratype, GSC 42815; figure 2, right lateral view of a valve,  $\times 45$ , loc. KB-1-67, 5100–5105 ft, holotype, GSC 42816; figure 11, interior view of a left valve,  $\times 35$ , sec. VI, loc. C-47-150, paratype, GSC 42825.

Figures 3, 4. *Leperditella?* sp. 2; right lateral and left interior views of two valves,  $\times 25$ , sec. IX, loc. L-455, figured specimens, GSC 42817, 42818.

Figures 5, 12. *Scipionis? delormensis* n. sp.; figure 5, right lateral view of a valve,  $\times 40$ , sec. VI, loc. C-47-450, holotype, GSC 42819; figure 12, interior view of a right valve,  $\times 35$ , sec. VI, loc. C-47-450, paratype, GSC 42826.

Figure 6. *Mirochilina?* sp.; left lateral view of a valve,  $\times 50$ , sec. IX, loc. L-455, figured specimen, GSC 42820.

Figure 7. *Kirkbyellina* sp. cf. *K. spinosa* Blumenstengel, 1962; interior view of a left valve,  $\times 50$ , sec. IX, loc. L-455, hypotype, GSC 42821.

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Figures 9, 10. *Gannibeyrichia canadensis* n. sp.; left lateral views of two valves,  $\times 50$ , Road River Formation, sec. II, loc. B-1350T, paratypes, GSC 42823, 42824.

Figure 13. *Evlanella* sp.; right lateral view of a valve,  $\times 50$ , Road River Formation, Royal Creek section II, 640–650 ft, figured specimen, GSC 42827.

Figure 14. *Alaskabolbina paucilineata* n. sp.; right lateral view of a valve,  $\times 45$ , Road River Formation, sec. II, loc. B-1350T, paratype, GSC 42828.

Figure 15. *Hanaites linearis* Berdan and Copeland, 1973; ventral view of a carapace,  $\times 40$ , sec. IV, loc. 4, hypotype, GSC 42829.

Figure 16. *Winchellatia?* sp.; right lateral view of a valve,  $\times 50$ , sec. VI, loc. C-47-450, figured specimen, GSC 42830.

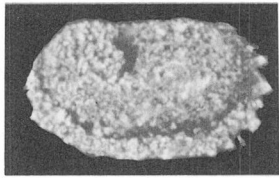
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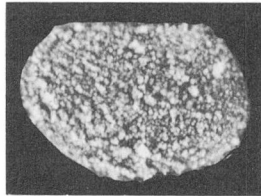
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Figure 21. *Yukonibeyrichia yukonensis* Berdan and Copeland, 1973; left lateral view of a valve,  $\times 35$ , Road River Formation, Royal Creek section II, 479 ft, hypotype, GSC 42835.

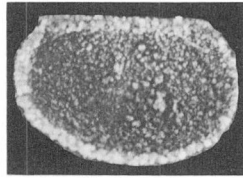




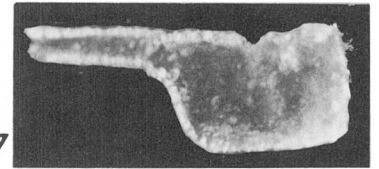
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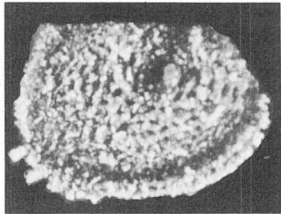
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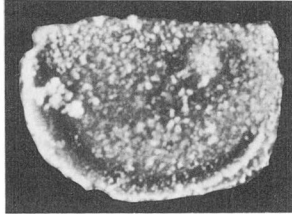
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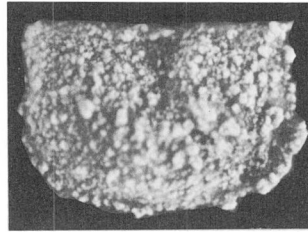
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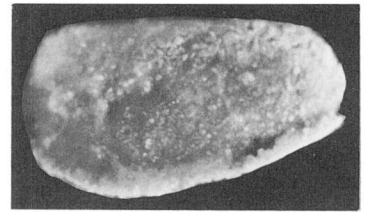
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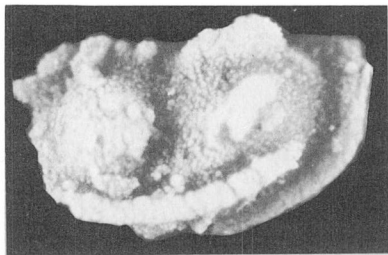
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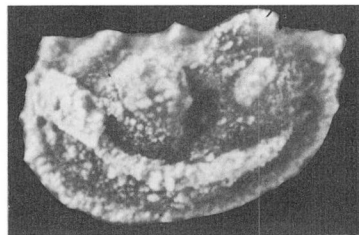
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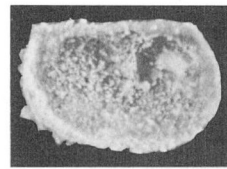
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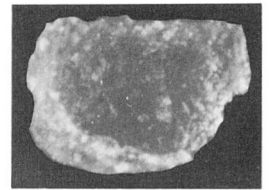
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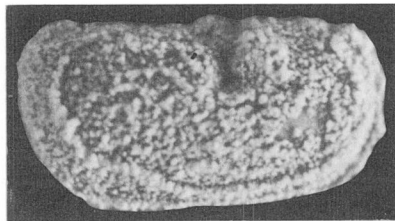
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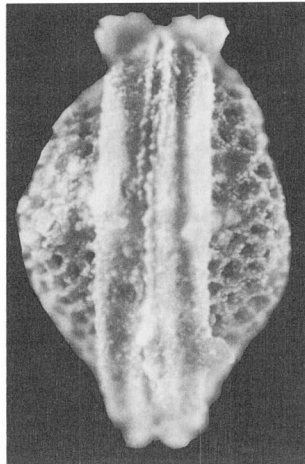
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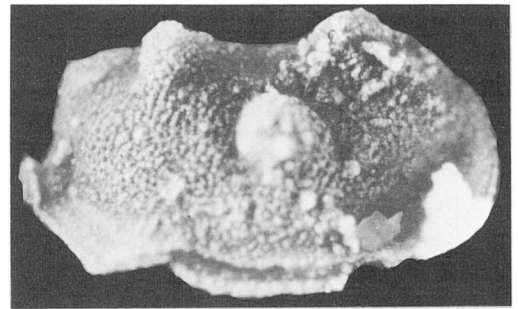
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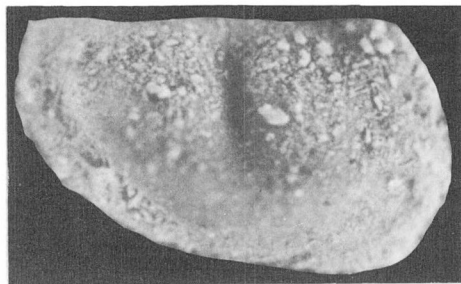
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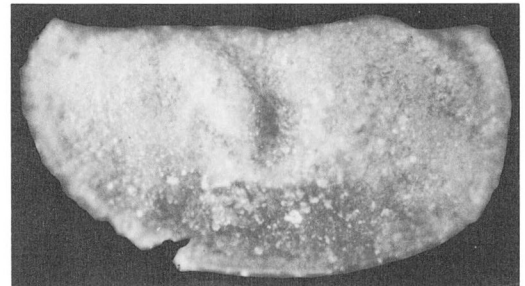
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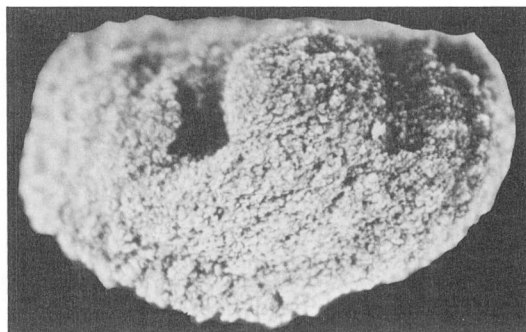
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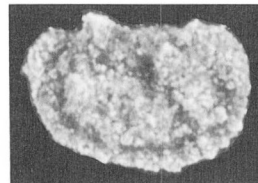
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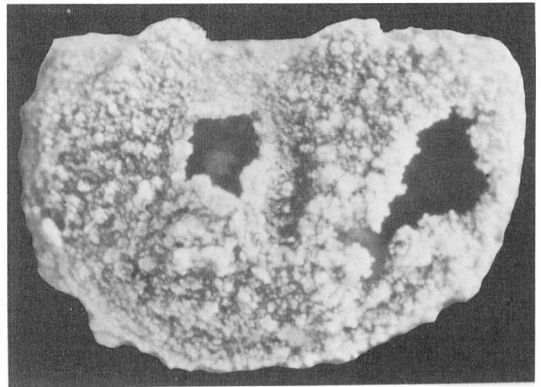


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Figure 1. *Tricornina (Tricornina) navicula* Bouček, 1936; left lateral view of a valve,  $\times 45$ , sec. VI, loc. C-47-450, hypotype, GSC 42836.

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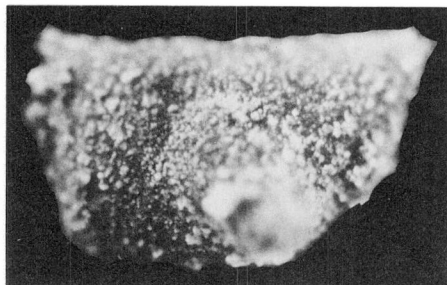
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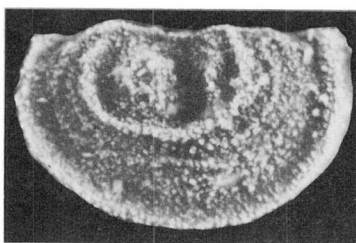
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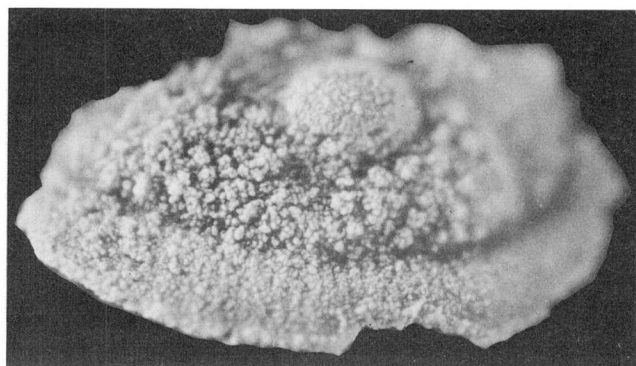
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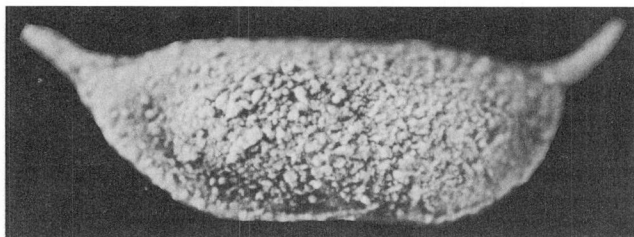
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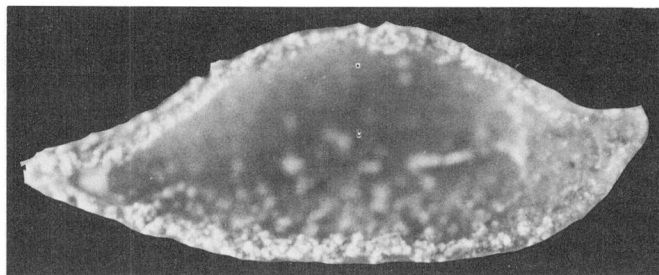
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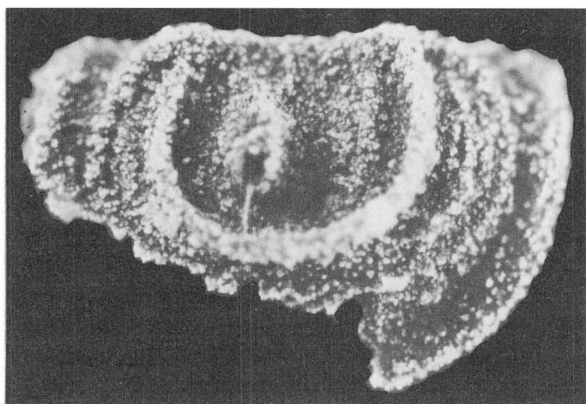
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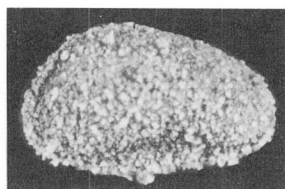
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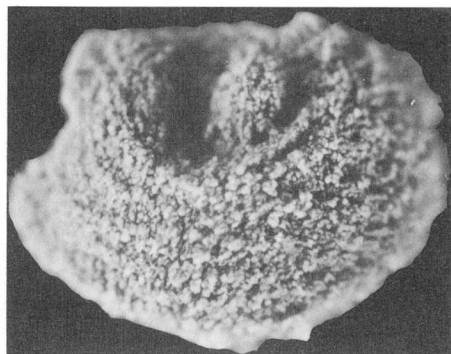
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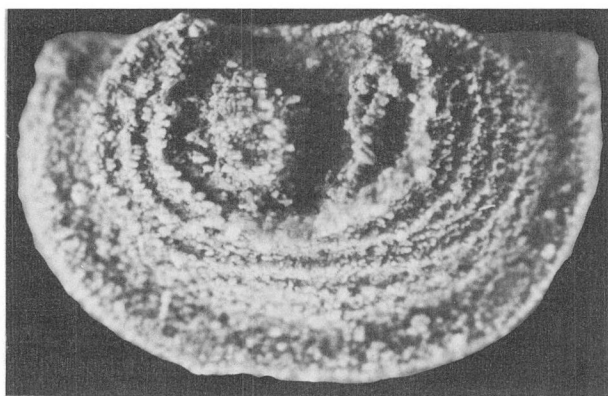
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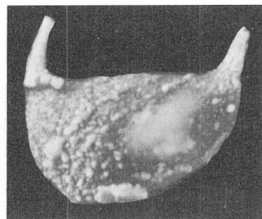
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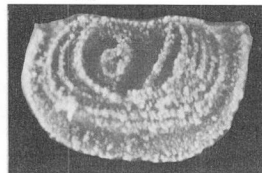
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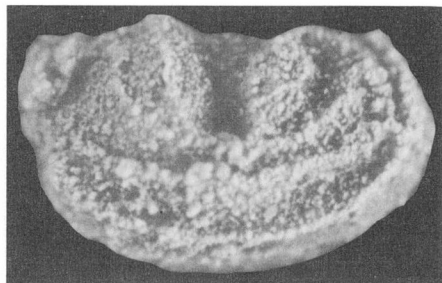


Plate XVI

(Specimens from Delorme Formation  
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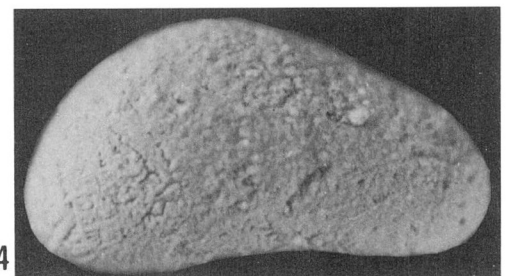
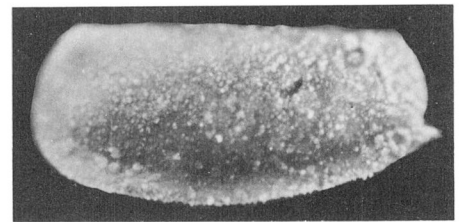
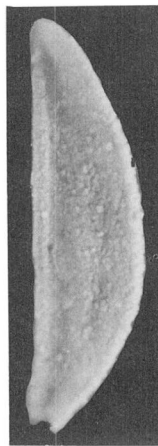
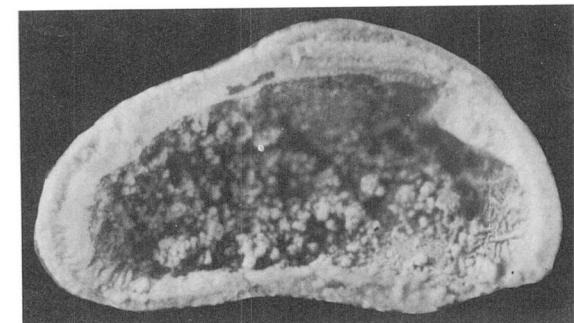
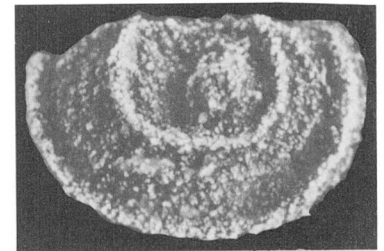
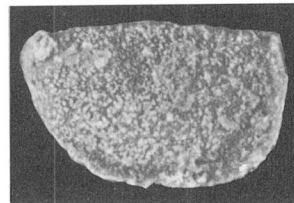
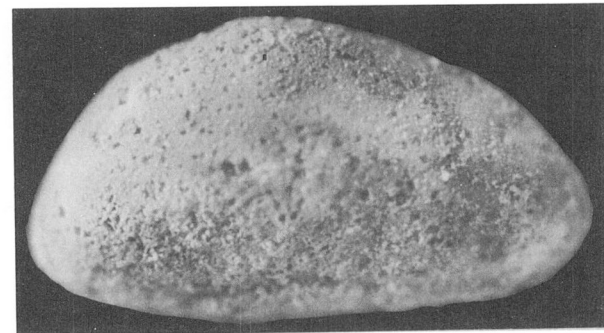
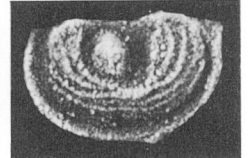
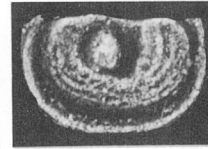
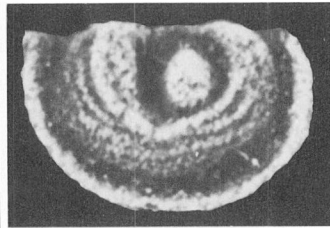
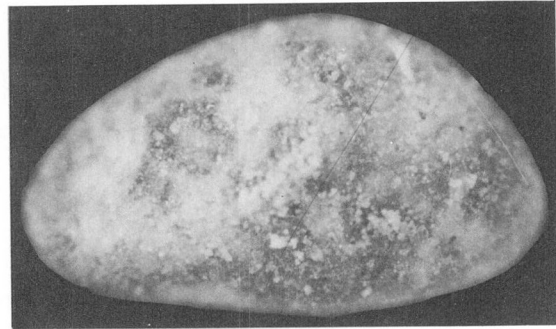
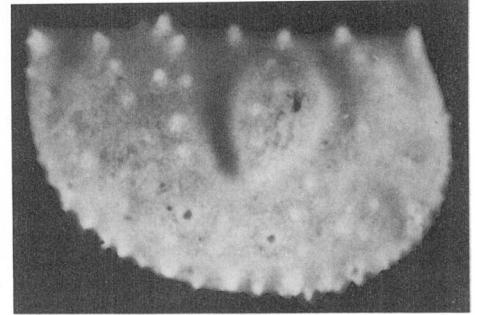
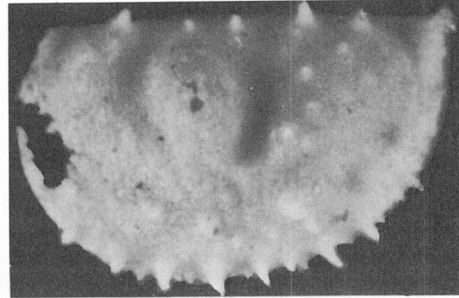
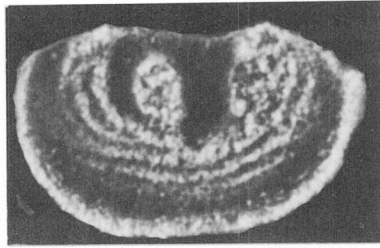
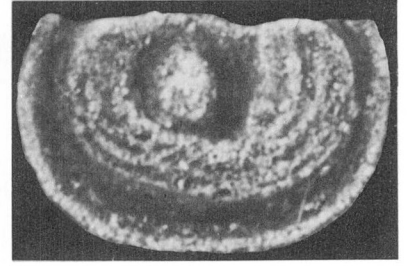
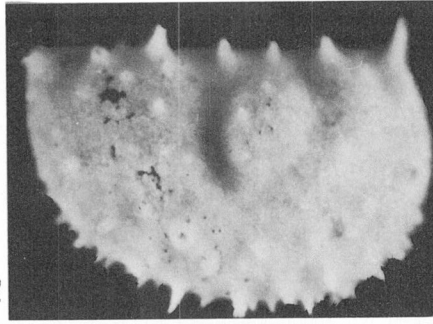
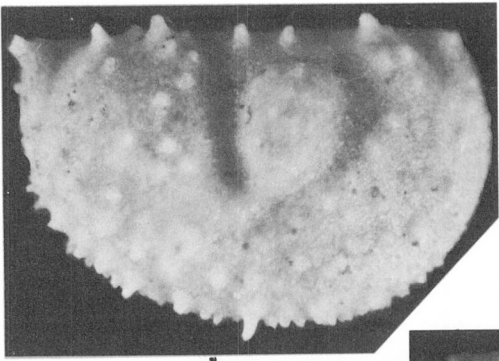
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*Bodzentia mackenziensis* 13, **36**, 76  
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*Chironiptrum bilinearis* 13, **34**, 76  
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*Conchidium alaskensis* 4  
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*Doleroides fauna* 3  
*Dolichoscapha escharota* 18  
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*D.? sp.* 13, **18**, 68  
  
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*Eukloedenella soloensis* 15, **30**, 66  
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*G. canadensis* 13, **23**, 72, 80  
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*G. lineolata* 19  
*G. strepuloides* 19  
*G. sp.* 13, **19**, 70  
*Gibberella cf. G. jejuma* 4  
  
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*H. linearis* 13, 15, **30**, 57, 80  
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*H. sp.* 13, **19**, 68  
*Hogmochilina illytidensis* 4  
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*L. sp. cf. L. scalaris* 4  
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*L. sp.* 13, 15, **33**, 76  
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EARLY PALEOZOIC OSTRACODA FROM SW DISTRICT OF MACKENZIE AND YUKON

<i>O. (Tricornella) caurina</i>	13, 15, 42, 74	<i>S.?</i> sp.	13, 41, 74	<i>Turkestanella acuaria</i>	6
<i>O. (T.) perryi</i>	7, 13, 14, 15, 17, 42, 58, 74	<i>Sieberella-Nymphorhynchia</i> unit	6	? <i>Ulrichia obesa</i>	21
Pachydomellid indet. 1	46	<i>Silensis insolitus</i>	45	<i>Undulirete balticum</i>	37
Pachydomellid ostracode indet.	13, 46, 78	<i>S. mawii?</i>	14, 44, 84	<i>U. mackenziensis</i>	7, 13, 14, 15, 16, 36, 72, 80
? <i>Paraschmidella</i>	33	<i>S. proteus</i>	14, 44, 82, 84	<i>Ursina</i>	43
<i>Pelecypoda</i> indet.	78	<i>Simplicibeyrichia</i>	21	<i>Venzavella costata</i>	31, 36
<i>Pintopsis tricornis</i>	25	<i>Sphenicibysis hypoderota</i>	48	<i>V. subcostata</i>	31
<i>P. sp.</i>	7, 16, 24, 25, 68	<i>Spinobairdia</i>	39	<i>V.?</i> sp.	13, 36, 58
<i>Platybolbina</i>	30	<i>S. dorsicornis</i>	13, 14, 38, 60	<i>Viazoviella</i>	35
<i>P. (Reticulobolbina) lenzi</i>	3, 17, 29, 62	<i>S. kellestae</i>	38	<i>Voronina</i> sp. cf. <i>V. inventa</i>	45
<i>Poloniella</i>	31	<i>S. shideleri</i>	38	<i>V.?</i> sp.	13, 45, 76
<i>Praepaegnium</i>	26	<i>S. sp. A</i>	38	<i>Warthinia binoda</i>	28
<i>Primitiopsella globosa</i>	13, 35, 36, 74	<i>S.?</i> sp.	13, 38, 76	<i>W.?</i> sp. cf. <i>W.?</i> irregularis	17, 27, 62
<i>P. miranda</i>	35	<i>Strophomena-Ceraurus</i> fauna	3	<i>Welleria</i>	24
<i>Processobairdia delormensis</i>	5, 7, 14, 16, 17, 38, 56, 58	<i>Subarctichites serratulus</i>	13, 15, 33	<i>Welleriella prostrata</i>	24
<i>P. nodocerata</i>	39	<i>Tetradella perplexa</i>	3	<i>W. sekwiensis</i>	7, 14, 15, 16, 24, 68
<i>Pseudobeyrichia ventrilirata</i>	21	<i>Treposella borealis</i>	7, 13, 15, 18, 54, 64	<i>Welleriopsis</i>	24
<i>Pseudulrichia</i> sp.	17, 27, 62	<i>T. sp.</i>	13, 14, 15, 18, 68, 70	<i>Winchellatia?</i> sp.	14, 29, 80
<i>Scaphina</i>	41	Treposelline? ostracode indet.	14, 19, 54	<i>Yukonibeyrichia solo</i>	15, 21, 64
<i>Schmidella</i>	33	<i>Tricornina (Tricornina) longula</i>	14, 42, 82	<i>Y. yukonensis</i>	13, 15, 16, 21, 64, 80
<i>Scipionis?</i> delormensis	14, 36, 80		5, 7, 13, 14, 15, 16, 42, 58, 74, 82	<i>Yukonibolbina</i>	26
<i>S. vagus</i>	36	<i>Tublibairdia</i> sp.	15, 16, 46, 66	<i>Y. nodosa</i>	13, 26, 78
<i>Shidelerites natlaensis</i>	13, 41, 74	<i>Turiella composita</i>	38	<i>Y. plana</i>	14, 15, 26, 78, 80, 84
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