

GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.
ALFRED R. C. SELWYN, C.M.G., LL.D., F.R.S., DIRECTOR.

CONTRIBUTIONS
TO
CANADIAN
MICRO-PALÆONTOLOGY.

PART III.

BY

PROF. T. RUPERT JONES, F.R.S., F.G.S.



PUBLISHED BY AUTHORITY OF PARLIAMENT.

MONTREAL:
WILLIAM FOSTER BROWN & CO.

1891.

440

GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.

ALFRED R. C. SELWYN, C.M.G., LL.D., F.R.S., DIRECTOR.

CONTRIBUTIONS

TO

CANADIAN

MICRO-PALÆONTOLOGY.

PART III.

BY

PROF. T. RUPERT JONES, F.R.S., F.G.S.



PUBLISHED BY AUTHORITY OF PARLIAMENT.

MONTREAL:

WILLIAM FOSTER BROWN & CO.

1891.

This document was produced
by scanning the original publication.

Ce document est le produit d'une
numérisation par balayage
de la publication originale.

The title of the present volume having been found to be too restricted in its scope, it has been decided to change it from "Contributions to the Micro-Palæontology of the Cambro-Silurian Rocks of Canada," to "Contributions to Canadian Micro-Palæontology."

Part III., now presented, which has been kindly prepared by Prof. T. Rupert Jones, F.R.S., consists of an illustrated Report on Ostracoda from the Cambro-Silurian, Silurian and Devonian rocks at various localities in the Dominion, with a critical note on the species described by him in 1858, and figured in Decade 3 of "Canadian Organic Remains."

It contains forty-one pages of letter press, illustrated by four full page lithographic plates and five woodcuts. The pagination and the numbering of the plates have been made consecutive with those of Parts I. and II. by A. H. Foord and E. O. Ulrich.

Part IV., to be issued shortly, will consist of an illustrated Report on some Radiolaria from the Cretaceous rocks of Manitoba, collected by Mr. Tyrrell. For this Report the Survey is indebted to the kindness of Dr. D. Rüst, of Hanover, Germany.

ALFRED R. C. SELWYN.

GEOLOGICAL SURVEY DEPARTMENT,
OTTAWA, August, 1891.

CONTENTS.

INTRODUCTION.

A. FROM THE CAMBRO-SILURIAN ROCKS.

1. *Aparchites mundulus*, *nov.* Trenton, Lorette Falls, P.Q. - - -
2. ——— *Tyrrellii*, *nov.* Chazy, Black Island, Lake Winnipeg -
3. *Primitia Logani*, *Jones*. Chazy and Trenton, Aylmer, P.Q., &c. - -
4. ——— *mundula*, *Jones*, var. *effossa*, *nov.* Chazy? Quebec City -
5. ——— *mundula*, var. *incisa*, *nov.* Trenton, Lorette Falls, P.Q. -
6. *Beyrichia clavigera*, *nov.* Chazy, Aylmer, P.Q. - - - -
7. ——— *clavigera*, var. *clavifracta*, *nov.* Chazy, Aylmer, P.Q. -
8. ——— *quadrifida*, *nov.* Trenton, Lorette Falls - - - -
9. *Isochilina Ottawa*, *Jones*, var. *intermedia*, *nov.* Chazy, Ottawa, &c. -
10. ——— *Whiteavesii*, *nov.* Trenton, Lorette Falls - - - -
11. ——— *Amii*, *nov.* Trenton, Lorette Falls - - - -
12. ——— *labellosa*, *nov.* Chazy, Aylmer, &c. - - - -
13. *Leperditia Balthica* (*His.*) var. *primæva*, *nov.* Chazy, Carleton Co.,
Ont. - - - - -
14. ——— sp. (comp. *L. Hisingeri*), Chazy, Aylmer - - -
15. ——— *obscura*, *nov.* Trenton, Lorette Falls - - - -

B. FROM THE SILURIAN ROCKS.

1. *Primitia mundula*, *Jones*. Arisaig, N.S. - - - - -
2. *Beyrichia æquilatera*, *Hall*. Arisaig - - - - -
3. ——— *tuberculata* (*Kloeden*). Arisaig - - - - -
4. ——— *tuberculata*, var. *pustulosa*, *Hall*. Arisaig - - -
5. ——— *tuberculata*, var. *strictispiralis*, *nov.* Arisaig - - -
6. ——— *tuberculata*, var. *Noetlingi*, *Reuter*.[†] Arisaig - -
7. *Isochilina grandis*, var. *latimarginata*, *nov.* Long Point, Lake
Winnepogosis, and Saskatchewan River - - - -
8. *Leperditia Balthica* (*His.*) var. *Guelphica*, *nov.* Durham, Ontario -
9. ——— *Hisingeri*, *Schmidt*. Long Point, Lake Winnepogosis -
10. ——— *Hisingeri*, var. *fabulina*, *nov.* Long Point; and Grand
Rapids, Saskatchewan River - - - -
11. ——— *Hisingeri*, var. *gibbera*, *nov.* Long Point, Lake Winni-
pegosis - - - - -

CONTENTS.

12.	Leperditia	Hisingeri, var. egena, nov.	Grand Rapids, Saskatchewan River	-	-	-	-	-	-	-
13.	—	alta (Conrad).	Schoharie, N. Y.	-	-	-	-	-	-	-
14.	—	phaseolus (Hisinger).	Roche Rouge, Saskatchewan River	-	-	-	-	-	-	-
15.	—	phaseolus, var. Guelphica, nov.	Durham, Ontario	-	-	-	-	-	-	-
16.	—	marginata, Schmidt.	Long Point, Lake Winnipegosis	-	-	-	-	-	-	-
17.	—	Whiteavesii, nov.	Chemahawin and Cedar Lake	-	-	-	-	-	-	-
18.	—	cœca, nov.	Below Cedar Lake and Grand Rapids	-	-	-	-	-	-	-
19.	—	Selwynii, nov.	Jupiter River, Anticosti	-	-	-	-	-	-	-

C. FROM THE DEVONIAN ROCKS.

1.	Aparchites	mitis, nov.	Hay River and Athabasca River	-	-	-	-	-	-	-
2.	Primitia	scitula, nov.	Hay River.	-	-	-	-	-	-	-
3.	Isochilina	bellula, nov.	Hay River	-	-	-	-	-	-	-
4.	—	Dawsoni, nov.	Island on west side of Dawson Bay, Lake Winnipegosis	-	-	-	-	-	-	-
5.	Elpe	Tyrrellii, nov.	Island on west side of Dawson Bay, Lake Winnipegosis	-	-	-	-	-	-	-
6.	Leperditia (?)	exigua, nov.	Island Z, Lake Winnipegosis	-	-	-	-	-	-	-
7.	Ulrichia	Conradi, Jones.	Theford, Ontario	-	-	-	-	-	-	-
8.	Primitopsis	punctulifera (Hall).	Theford, Ontario	-	-	-	-	-	-	-
9.	Kirkbya (?)	Walcotti, Jones.	Theford, Ontario	-	-	-	-	-	-	-

APPENDIX.

Notes on the species of Ostracoda described and figured in Decade III, 1858.

EXPLANATION OF PLATES X, XI, XII, XIII.

GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.

CONTRIBUTIONS TO CANADIAN MICRO-PALÆONTOLOGY.*

PART 3.

BY PROF. T. RUPERT JONES, F.R.S., F.G.S.

5. *On some Ostracoda from the Cambro-Silurian, Silurian, and Devonian rocks.*

INTRODUCTION.

Most of the specimens referred to in the present Report were collected by members of the Staff of the Geological Survey, at the localities and dates mentioned in the text, and were sent to Prof. T. Rupert Jones, F.R.S., for examination and study, in 1890 and 1891. A few, however, are from the private cabinets of W. R. Billings, T. W. E. Sowter, and Dr. G. J. Hinde.

In the Quarterly Journal of the Geological Society of London for November, 1890, Prof. Jones published preliminary notes on most of the species represented among the specimens sent to him prior to that date; but none of the species now reported on have hitherto been adequately described or figured, and many are now characterized and illustrated for the first time.

Under the three divisions A, B, and C the genera and species are arranged in an approximately natural order. It was at first intended to follow the same plan with the figures in the plates; uncertainty, however, as to the geological stages of some of the

* Being a continuation of the "Contributions to the Micro-Palæontology of the Cambro-Silurian rocks of Canada." It has been found desirable to alter the original title of the present volume and to enlarge its scope so as to include therein reports upon fossils of any age which require the use of the microscope for their examination.

specimens in plate 10, in the first place interfered as to plates 10 and 11; and afterwards the acquisition of new material, which had to be shown in plates 12 and 13, made it necessary to place the species just as the convenience of figuring and the exigencies of circumstances allowed. Nor could the highly desirable plan of having a uniform scale throughout for magnifying the objects be adopted. The descriptions have taken a long time; but with this unavoidable delay many opportunities have arisen for the widening of experience, the collating of the results of other workers, and the forming of definite opinions—such, for instance, as relates to the evidence of Cambro-Silurian (Lower Silurian) forms being direct predecessors of Silurian (Upper Silurian) species. Nor are such links wanting between these Lower Palæozoic and some Upper Palæozoic species.

There was at first considerable doubt as to the geological position of *Isochilina grandis*, var. *latimarginata* and its associates; but Mr. Tyrrell informed me, in January last, that “during the past summer a practically complete section has been obtained up the Saskatchewan River, showing that the Ostracod-bearing series overlies several hundred feet of Niagara Limestone, and on Lake Manitoba is overlain by a dolomite containing a few fossils that have been provisionally referred to the Guelph. The beds are also very similar in character to those in Wisconsin that contain *Leperditia alta*, and that have been referred by Prof. Chamberlin to the Lower Helderberg.

The Ostracodal beds of Lake Winnipegosis, therefore, have a taxonomic position somewhere between the upper beds of the Niagara and the Lower Helderberg.”

Thus *Isochilina grandis*, var. *latimarginata* and the other Ostracods occurring with it belong either to the top of the Niagara or to the Lower Helderberg formation; both fossils and strata pointing in that direction.

The geological order of the localities from which the fossils herein described have been obtained is as follows:—

- | | | |
|----------------------------------------------------------------|---|------------------|
| 1. Black Island, Lake Winnipeg. Chazy. | } | Cambro-Silurian. |
| 2. Nepean, Ontario. Chazy. | | |
| 3. Ottawa, Ontario. Chazy. | | |
| 4. Drill Shed, Quebec. Chazy? | | |
| 5. South of Montcalm Market, Quebec. Chazy? | | |
| 6. Pointe-aux-Pins, Aylmer, Prov. of Quebec. Chazy. | | |
| 7. Broad Street, Aylmer. Chazy. | | |
| 8. Gloucester, Carleton Co., Ontario. Birdseye or Black-river. | | |
| 7. Lorette Falls, River St. Charles. Trenton. | | |

A. FROM THE CAMBRO-SILURIAN ROCKS.

1. APARCHITES MUNDULUS (sp. nov.)

Plate 10, figs. 12 a and b.

Length 1·13 (hinge-line ·6), height ·86, thickness of carapace ·6, mm.

Subcircular, with a straight hinge-line [not so long as in the drawing, having been restored too boldly at the broken end], modifying the upper edge of the outline, which, if the curvature were continued, would be a short, broad oval. The free margin is almost symmetrically rounded. The surface is smooth and moderately convex. This sublenticular species closely approaches *Aparchites decoratus*, Jones (Ann. Mag. Nat. Hist., ser. 6, vol. IV, 1889, p. 272, pl. xv, fig. 12), from the Llandovery beds at Wisby, but it has a relatively longer hinge-line [though not so long as in the figure] than *A. decoratus*, no ornament, and rather less convexity.

I propose to name this *neatly* formed species APARCHITES MUNDULUS.

One specimen: so much imbedded that at first it was taken for a *Polycope*, see Quart. Jour. Geol. Soc., vol. XLVI, p. 553. From the dark grey, hard Trenton Limestone, with small organisms, at the Falls of Lorette,* on the River St. Charles, Province of Quebec, collected by Mr. H. M. Ami in 1888. A small but obscure allied form occurs also in the same limestone, with *Trinuclaus concentricus* and *Ceraurus pleurexanthemus*.

A similar but smaller specimen, possibly a *Polycope*, is in fine-grained grey limestone (Chazy?), Quebec City, where it was collected by Mr. H. M. Ami.

2. APARCHITES TYRRELLII (sp. nov.).

Pl. 13, figs. 14 a, 14 b and c.

Length ·5 (hinge-line ·35), height ·32, thickness ·17, mm.

Many minute, suboviform ostracoda, the valves of which are represented by pyrites, are imbedded in a fine grained sandstone, with a siliceous cement. The matrix is grey and the valves dark olive; hence the stone is of a dark grey in colour; but weathers to a creamy white, the

* For notes on the limestones in Quebec and at Lorette, see the "Geol. and Nat. Hist. Survey of Canada: Second Report on the Geology of a portion of the Province of Quebec." By R. W. Eills, LL.D., &c., 1888. Also, Mr. H. M. Ami's paper in the *Bullet. Geol. Soc. America*, vol. II, 1891.

ostracods and other small fossils having disappeared, leaving the quartz grains translucent and the cement yellowish. The pyrites is partially decomposed here and there, and gives the usual taste of sulphate of iron. Some of the little ostracodous bodies appear of different shapes, on account of different degrees of imbedment. Some minute round bodies are probably other organisms.

The valves of the suboviform specimens show no evidence of overlap at their margins, even in natural sections; nor are there any real structural marks, either ocular or muscular, though occasional adhesions or abrasions give those appearances.

I name it after J. B. Tyrrell, Esq., M.A., B.Sc., F.G.S., of the Geological Survey of Canada, who collected it at Black Island,* Lake Winnipeg.

3. PRIMITIA LOGANI, Jones.

Beyrichia Logani, Jones. Ann. Mag. Nat. Hist., ser. 3, vol. I, 1858, p. 244, pl. ix, figs. 6-10 (including varieties); Geol. Surv. Canada, Org. Remains, Decade III, 1858, p. 91, pl. xi, figs. 1-5 (including varieties).

Primitia Logani, Jones and Holl. *A. M. N. H.*, ser. 3, vol. XVI, 1865, p. 417.

Primitia Logani, Jones. Proceed. Geol. Assoc., Pal. Biv. Entom., 1869, p. 13, figs. 3 and 4 (two varieties.)

Primitia mundula, var.; *P. mundula* (?); and *Primitia*, sp., Jones. Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 553.

This *Primitia* has characteristically a straight dorsal line, with the terminal angles recognizable, but not very strong; a convex ventral margin, often contracted in the antero-ventral region, so as to make the front moiety of the valves narrower (lower) than the hinder part, see Decade III, pl. xi, fig. 4 and especially fig. 5 (var. *leperditoides*). In some instances the curve of the ventral margin is very full (Decade III, pl. xi, fig. 1, var. *reniformis*, and fig. 2); in others (as in fig. 3) the ventral margin is nearly straight, and the valves are much like those of a long *P. mundula*. The surface is somewhat depressed, sometimes smooth, often punctate, and always impressed with the mid-dorsal furrow or short sulcus.

Primitia corresponding to *P. Logani*, with contracted antero-ventral region, as represented by fig 9, pl. v, and fig. 4, pl. xi, that is, more boat-shaped than oblong, occur in the Chazy shales (dark coloured,

* See "Summary Report of the Geological Survey Department for the year 1890," 8vo Ottawa, 1891, p. 25. The fossiliferous rock referred to above belongs to the "considerable thickness of soft Paleozoic sandstones, apparently of the age of the Chazy (St. Peter's Sandstone) of Minnesota, which at the southwest end of the Island are found to run up conformably into the Trenton Limestone" (*loc. cit.*).

micaceous, shaly mudstone, somewhat ferruginous) at Broad street, Aylmer, Quebec; in the Trenton Limestone at the Lorette Falls, River St. Charles, and in Chazy (?) Limestone at Quebec, south of Montcalm Market, where they were collected by Messrs. Sowter and Ami.

At first sight these and others, more or less obscured by imbedment or imperfection, passed for long varieties of *P. mundula*, but after prolonged and repeated examination they evidently fell into another group.

4. *PRIMITIA MUNDULA*, Jones. Var. *EFFOSSA*. (nov.).

Pl. 10, fig. 8.

Length 1.0 (hinge-line .76), height .6 mm.

Of the four or five *Primitiæ* in the dark, fine grained Chazy (?) limestone from the south of Montcalm Market, Quebec City (coll. Mr. H. M. Ami and Mr. N. J. Giroux), this is one of the least imbedded specimens, and has a simple, suboblong, bean-shaped form, straight on the back, fully rounded behind, but with a short, sloping curve in front, continued on the antero-ventral margin, so that the front is not quite so high as the hinder part of the valve. Surface smooth, impressed with a narrow dorsal sulcus, running into a large oval central pit, which has swollen sides. A narrow, flattened rim is traceable along the free margin much more distinctly in some specimens than in others.

This is related to both *Primitia Logani* and *P. mundula*, Jones, but its high convexity separates it from the former, and its relatively elongate shape, and its large oval pit and almost closed sulcus are features distinguishing it from the latter type and making it a noticeable variety. It may be known as *P. mundula*, var. *EFFOSSA*. It is referred to at p. 553, Quart. Jour. Geol. Soc., vol. XLVI.

A similar dark coloured, fine grained limestone near the Drill Shed in Quebec contains several small, obscure *Primitiæ*, which, perhaps, belong to *P. mundula*. These were collected by Mr. H. M. Ami, in 1888.

5. *PRIMITIA MUNDULA*, Jones. Var. *INCISA* (nov.).

Pl. 10, figs. 9 a, b, and c.

Length .86 (hinge-line .66), height .53 mm.

In dark grey, hard Trenton Limestone (with encrinital joints and small brachiopods), from Lorette Falls on the River St. Charles, Pro-

vince of Quebec, there are many small ostracoda, and among these are many varieties of *Primitia mundula*. Some are relatively longer and narrower than the type and approaching *P. Logani*, with the sulcus either mid-dorsal or nearer to one end.

Another variety, here figured (pl. x, fig. 9), is¹ peculiar in having an obliquely triangular sulcus, with high sides, which make the valve very convex.

Although at first I thought these several forms might be of specific value (Quart. Jour. Geol. Soc., vol. XLVI, p. 553), it does not so appear to me now, and they will stand as noticeable varieties. This figured specimen may be called *var. INCISA*. Collected by Mr. H. M. Ami, in 1888.

6. *BEYRICHIA CLAVIGERA* (sp. nov.).

Pl. 11, fig. 7.

Beyrichia, sp. nov. Quart. Jour. Geol. Soc., vol. XLVII, 1890, p. 553.

Length 4·1 (hinge-line 2·0), height 2·5 mm.

Subovate, with a straight, short hinge-line; broad-lobed; the two main lobes are of nearly equal bulk, but the hinder one is the larger of the two; they unite with a broad curved junction below; the middle lobe is isolated, of an irregular club-shape (reversed); a low, subsidiary ridge is just within the margin of the obliquely curved, projecting, posterior margin. Individuals vary in their proportions, besides being modified by pressure. Abundant in dark coloured, micaceous, shaly mudstone, somewhat ferruginous. Chazy Shales, Broad street, Aylmer, Quebec. Collected by Mr. T. W. E. Sowter.

7. *BEYRICHIA CLAVIGERA* (sp. nov.) *Var. CLAVIFRACTA* (nov.).

Pl. 11, fig. 8.

Length 3·4 (hinge-line 2·0), height 2·3 mm.

In this form the middle lobe is divided into two small lobes or tubercles, corresponding to the moieties above and below the constriction of the mid-lobe in fig. 7; and the upper part of the anterior lobe has developed a small tubercle; all the surface is punctate, and the posterior margin is not so oblique and projecting as in the type.

Accompanying the foregoing in the Chazy Shales of Aylmer, Quebec. Collected by Mr. T. W. E. Sowter.

8. BEYRICHIA QUADRIFIDA (sp. nov.).

Pl. 11, figs. 9 a and b.

Beyrichia, sp. nov. Quart. Jour. Geol. Soc., vol. XLVI, 1890, p. 553.

Length 1·3 (hinge-line 1·3), height ·8, thickness ·5 mm.

Semicircular on the ventral and straight on the dorsal margin; four-lobed, lobes narrow; the two behind are nearly equal in length, parallel, slightly curved upwards, joined below, and passing into the base of the front lobe, which, with the divided mid-lobe, is variable.

Though at first sight very different from *Beyrichia clavigera* (figs. 7 and 8), yet this form presents a passage from it to the four-ridged *Beyrichia* (plurijugatæ), to which Mr. E. O. Ulrich proposes to apply a distinct specific term. The definite, equal, parallel, narrow lobe in fig. 9 is a development of the subsidiary swelling behind the gigot-lobe in figs. 7 and 8, and, as in these latter, the mid-lobe forms two small, unequal and oblique lobes or tubercles, within the somewhat *Bollia*-like curve of the two chief lobes.

Rather frequent in a dark grey, hard limestone, (Trenton), with Ostracoda, encrinital remains, and brachiopod shells at Lorette Falls, River St. Charles, Province of Québec. Collected by Mr. H. M. Ami in 1888.

9. ISOCHILINA OTTAWA, Jones.

Leperditia (*Isochilina*) *Ottawa*, Jones, Ann. Mag. Nat. Hist., ser. 3, vol. I, 1858, p. 248, pl. x, fig. 1.

————— Jones. Geol. Surv. Canada, Org. Rem., Decade III, 1858, p. 97, pl. xi, fig. 14.

Isochilina Ottawa, Jones. Ann. Mag. Nat. Hist., ser. 5, vol. XIV, 1884, p. 345.

VAR. INTERMEDIA (nov.).

Pl. 10, figs. 10 a, b, and 11 a, b.

Isochilina Ottawa, Jones, var. Quart. Jour. Geol. Soc., vol. XLVI, 1890, p. 553.

	Mm.	Mm.	Mm.	
Fig. 10—Height.....	4½	(Hinge-line.. 3)	Height.. 2½	} Var. <i>intermedia</i> .
Fig. 11—.....	4½	(..... 3½)	..... 3	
Fig. 1 (1858)—Height... 4	(..... 3)	..... 2	Type.	

Numerous individuals, in limestone belonging to the Chazy Forma-

tion, from Ottawa * and Nepean †, Ontario, and Pointe-aux-Pins, Aylmer ‡, Province of Quebec, and constituting in each case nearly all the rock-mass, are very similar among themselves, and approximate closely to *Isochilina Ottawa*. There are some slight differences, however, from that species. The outline is not so oblong, the postero-dorsal angle being less prominent, and the antero-ventral margin rather less fully curved. The eye-spot is more isolated and distinct in some than in others, and the sulcus or depression behind it is variously developed, but always stronger than in the original specimens. The radiating vascular lines (seen only in the casts formerly) stream off backwards from the muscle-spot; otherwise the valves are smooth.

In shape some of these specimens (see figs. 10 and 11) approach *I. gracilis*, Jones, but the ventral margin is too boldly and deeply curved. The surface is not punctate, and individuals with pitted margins are rare.

As they agree with neither *I. Ottawa* nor *I. gracilis* in all respects, and come nearest to the former in shape, I regard them as representing an intermediate variety and call it *I. Ottawa* var. *INTERMEDIA*.

The species was first obtained from the Calciferous Sandrock at Grenville, and the Chazy Limestone of L'Original, in both instances forming an *Isochilina*-limestone, as at Ottawa, Nepean, and Aylmer. At L'Original and Grenville the individuals vary much in size, some having a length of six mm., others only three mm., and some are relatively shorter and higher than others. As it is so variable a species, we are not surprised at finding a noticeable variety with close affinities to the known types.

Isochilina gracilis, Jones (Ann. Mag. Nat. Hist., ser. 3, vol. I, 1858, p. 248, pl. x, fig. 2; Geol. Surv. Canada, Org. Rem., Decade III, 1858, p. 98, pl. ix, fig. 15), is more slender anteriorly than the variety *intermedia*, and much more so than *I. Ottawa*. It measures: Length, $3\frac{1}{2}$ mm.; hinge-line, $2\frac{1}{4}$ mm.; height, 2 mm. (at the hinder moiety only). Its surface is more or less punctate, and its marginal lip is neatly pitted. The valves form a layer in the Birdseye Limestone, at the White Horse Rapids, Isle Jesus.

* Abundant on the bed-planes of a piece of thin-bedded limestone, from a loose block in Sussex street, Ottawa, and probably belonging to the upper part of the Chazy Formation (coll. Mr. H. M. Ami). Quart. Jour. Geol. Soc., vol. XLVI, 1890, p. 551.

† Constituting, with a few bivalve molluscs, the greater part of an easily broken grey limestone from Nepean, Ontario, belonging to the Chazy Formation (coll. Mr. H. M. Ami). *Op. cit.*, p. 551.

‡ Abundant in a dark grey limestone of the Chazy Series (coll. Mr. T. W. E. Sowerby). *Op. cit.*, p. 553.

10. *ISOCHILINA WHITEAVESII* (sp. nov.).

Pl. 10, figs. 13 a and b.

Length 2·0 (hinge-line 1·6), height 1·25 (less than in the drawing), thickness of carapace 1·1 mm.

Black, smooth, sublenticular, with straight dorsal and well curved ventral border (drawn too deep in fig. 12 a), ends boldly rounded, but not quite equally, the postero-dorsal angle being stronger than the other; convexity moderate, stronger in front than behind. A shallow subtriangular furrow on the front third of the dorsal region. At first sight it was thought to be an abnormal *Primitia*, (Quart. Journ. Geol. Soc., vol. XLVI, p. 552).

In general outline this specimen has some resemblance to *Aparchites Whiteavesii*, J. (Ann. Mag. Nat. Hist., ser. 6, vol. III, 1889, p. 384, pl xvii, fig. 10, and p. 385, woodcuts, figs. 5 and 6), from Manitoba, but it is more oblong, the hinder moiety extending farther backwards, its hinge-line being relatively longer, and more especially there being a dorsal depression, or feeble nuchal furrow, in the front moiety of the valve, like that in fig. 16 a, and pl. xi, fig. 16 a; the greatest convexity (fig. 13 b) is towards the front and below the sulcus at the same part of the valve as in fig. 10 b. The presence of a dorsal furrow separates this form from *Aparchites*, and, with the absence of ventral overlap, allows us to place it in *Isochilina*.

In shape this approaches *Primitia pusilla*, J. & H., 1865; but the latter is very small and depressed and has no dorsal angles.

As a new species I name this after the eminent paleontologist of the Geological Survey of Canada.

From the Trenton Limestone of Lorette Falls, River St. Charles, Province of Quebec, collected by Mr. H. M. Ami in 1888.

11. *ISOCHILINA AMI* (sp. nov.).

Pl. 10, figs. 14 a, 14 b.

Length 2·3 (hinge-line 1·5), height 1·5, thickness of carapace 1·0 mm.

A small black valve, ovate-oblong; dorsal border long and straight; anterior end evenly and posterior elliptically rounded; ventral edge neatly curved and obscurely crenulated. Surface marked with small scattered pits; greatest convexity at the hinder moiety.

This seems to differ from all known forms. It has the Leperditian shape of *Isochilina*, although no sulcus nor tubercle is visible, and may be named *I. AMI*, after Mr. H. M. Ami, M.A., F. G. S., of the Geological Survey of Canada, who has done much in furthering our study of the Palæozoic Ostracoda.

From the Trenton Limestone of Lorette, Province of Quebec, collected by Mr. H. M. Ami in 1888.

12. *ISOCHILINA LABELLOSA* (sp. nov.).

Pl. 10, figs. 16 a, b, c, 17, and 19.

Leperditia, sp. nov.? Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 553.

	Length,	(hinge-line,) height,	thickness.
Fig. 16.....	1·2	(·86)	·86
Fig. 17.....	1·2	(·93)	·73
Fig. 19.....	2·7		1·4 mm.

Small, dark coloured, convex carapaces, having the dorsal line straight and long, the greatest ventral curve in the middle or nearly so, the front end subangular and the hinder end well rounded. The greatest height and greatest thickness are a little behind the middle. These have a Leperditian form, with slight sulcus and tubercle in some, but none apparent in others. Though the individuals vary in relative proportions, they have the same characteristics as to general shape and conditions of the valves. They are proportionally longer than *Isochilina Whiteavesii*, (fig. 13 a,) and are narrower in front, with a shelving antero-ventral margin. Although so very Leperditian in shape, the valves meet ventrally without overlap, as in *Isochilina*; but the left valve is slightly thicker at its edge than the other. This feature, however, does not correspond with the overlap in *Leperditia*, as it is not on the overlapping valve of that genus. Having rather thick lips, this form may be termed *I. LABELLOSA*.

Abundant, especially on the bed-planes, in a black limestone of the Chazy Series, at Broad street, Aylmer, Quebec (figs. 16 and 17). Coll. Mr. T. W. E. Sowter. Also free specimens from the Bird's-eye and Black-river Limestone (see fig. 19), associated with *Tetradium fibratum*, *Orthoceras multicameratum*, *Bathyrurus extans*, &c., at Lot 3, Concession 3, River Front 1, Gloucester Township, Co. Carleton, Ontario: where it was collected by Mr. W. R. Billings, of the Public Works Department, Ottawa.

13. *LEPERDITIA BALTHICA* (Hisinger), var. *PRIMÆVA*, (nov.).

Pl. 10, fig. 18.

Length 3·3 (hinge-line 2·3), height 2·3 mm.

This small *Leperditia* occurs with *Isochilina labellosa* in Carleton Co., Ontario. It was at first confused with the latter species; but, though much of the same shape, and with no external markings, it has a true Leperditian ventral edge, and is of large size. It is so much like *L. balthica* in its outline that I venture to regard it as an early representative or predecessor of that species.

14. *LEPERDITIA* (sp.). Woodcut, fig. 4. (Compare *L. HISINGERI*, Schmidt).

Fig. 4. *Leperditia*, cfr. *L. Hisingeri*, Schmidt. Side view of the cast of the interior of a left valve; much enlarged.

Leperditia? Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 553, No. 2.

Length 3·0 (hinge-line 2·3), height 1·8 mm.

A single neat, somewhat compressed cast of the interior of the left valve of a small *Leperditia*, without any characteristic feature except its outline, the eye-spot, muscle-mark, and ventral flange not being shown. The greatest ventral curve is in the postero-ventral region. The postero-dorsal angle is very distinct, over a limited ogee curve. The front angle is broken off.

The outline is like that of *Leperditia Hisingeri*, Schmidt, as figured in the *Ann. Mag. Nat. Hist.*, ser. 2, vol. XVII, 1856, pl. 7, fig. 3, and by Schmidt, *Mém. Acad. Imp. Sc.*, sér. 7, vol. XXX, *Miscell. Silur.*, 1883, p. 14, pl. 1, fig. 6. This species may probably have had representatives before the later Silurian period.

In dark-coloured, micaceous, shaly mudstone, somewhat ferruginous; Chazy Shales. Broad street, Aylmer, Quebec Province. Collected by Mr. T. W. E. Sowter.

15. *LEPERDITIA* (?) *OBSCURA* (sp. nov.).

Pl. 10, figs. 15 a, b, and c.

Leperditia, sp. nov.? Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 553.

Length 2·7 (hinge-line 2·0), height 1·5, thickness 1·3 mm.

Oblong and *Leperditian* in shape, without apparent sulcus or tubercle, but with obscure indications of a ventral overlap. The ends are nearly equally rounded; ventral border gently curved; dorsal straight, with a long hinge line, and the postero-dorsal angle stronger than the front angle. Surface smooth, with the convexity greatest at the anterior moiety (see fig. 15 b). The ventral aspect of the carapace shows along the edge of the left valve, which lies uppermost, a narrow, flattened area, suited to receive the overlap of the right valve, as indicated by the diagrammatic outline of the junction, fig. 15 c. The test of the latter (larger) valve has disappeared, leaving only a rough and somewhat crenulated cast of the interior of its overlapping edge.

In outline this somewhat resembles the little *Aparchites matutinus*, J. and H., *Ann. Mag. Nat. Hist.*, ser. 3, vol. XVI, 1865, p. 418, pl. viii, fig. 7, and at first sight it might, perhaps, be taken for Schmidt's *Leperditia Nordenskjöldi*, *Miscel. Silur.* III, 1883, p. 25, pl. 1, fig. 31, but these differ in important particulars.

The specimen under notice was collected from the Trenton Limestone (dark grey and containing *Lituities undatus*) at the Falls of Lorette, Province of Quebec, by Mr. W. R. Billings, nephew of the late Mr. Elkanah Billings, and an ardent palæontologist.

B. FROM THE SILURIAN ROCKS.

1. PRIMITIA MUNDULA, Jones.

- Beyrichia mundula*, Jones. Ann. Mag. Nat. Hist., ser. 2, vol. XVII, 1855, p. 90, pl. v, fig. 23; p. 174, pl. xvi, figs. 28-31, and variety, fig. 26 (" *B. simplex*, var").
- Primitia mundula*, Jones and Holl. *Op. cit.*, ser. 3, vol. XVI, 1865, p. 419; ser. 6, vol. III, 1889, p. 376, fig. 2 (wood-cut), pl. xvi, figs. 6 and 9, pl. xvii, fig. 1, and p. 378 (varieties), pl. xvi, figs. 1, 4, 5, 7, and 8.
- Primitia mundula*, Jones. Proceed. Geol. Assoc., Pal. Div. Entom., 1869, p. xiii, fig. 2 (a rather scaphoid form).

As mentioned in the Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 552, *Primitia mundula*, Jones, as a small variety, occurs in a limestone at Stonehouse Brook, Arisaig. This is probably the *Primitia* mentioned at p. 492, lines 38-41, *op. cit.*, vol. XXVI, 1870, but not the species referred to in lines 36-37.

Another *Primitia* is associated with it, namely, *Primitia ovata* (?), Jones and Holl, an obscure oval cast; probably the same form as that referred to in 'Geol. Mag.,' 1881, p. 344.

2. BEYRICHIA ÆQUILATERA, Hall.

Pl. 11, fig. 6.

- Beyrichia æquilatera*, Hall. Canadian Naturalist and Geologist, vol. V, 1860, p. 158, fig. 20.
- Beyrichia æquilatera*, Dawson. Acadian Geology, 2nd edit., 1868, p. 608, fig. 217; 3rd edit., 1878, p. 609, fig. 217.
- Beyrichia æquilatera*, Jones. Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 18, pl. ii, fig. 6, and p. 552.

Pl. 11, fig. 6. Length 1·5 (hinge-line 1·5), height 1·1.

Q. J. G. S., 1890, pl. ii, fig. 6: Length ·8 (hinge-line ·8), height ·52 mm.

This is the best specimen of *B. æquilatera* (all casts) met with in the series sent by the Geological Survey of Canada for examination. Of its three lobes the smallest is in front and the largest (*gigot*) lobe is behind. The latter curves ventrally to meet the base of the middle lobe, and the front lobe curves away from the base of the last. Neither

the posterior, nor either of the other lobes is sulcated. A broad, flattened area is distinct all round within the margin. There are two specimens like that figured in the Q. J. G. S., 1890, pl. ii, fig. 6, but differing slightly from it in the proportions of the lobes. I have not yet met with a specimen having a lobe quite divided into two parts, as in the woodcut, fig. 20, published in 1860. The fig. 6 just referred to has the third lobe slightly modified by a faint oblique sulcus, but it is not actually divided. It was kindly submitted for examination by Prof. R. P. Whitfield, of New York, and is labelled "*B. equilatera*." It is not, however, like the figure published in the "Canadian Naturalist and Geologist," 1860, which seems to have a strong curved ridge, a small central lobe, and two little lobes (not mentioned in the description) representing a third ridge. Indeed, the little woodcut (1860) here referred to has a relatively large, curved posterior lobe, a small isolated mid-lobe high up towards the back, and two separate small lobes anteriorly. Were it not that we have some *named* specimens from Arisaig and a special description at p. 198, "Canad. Nat. Geol.," 1860 (copied in "Acad. Geology," 1868 and 1878), we might think that this obscure little figure was intended for some such small form of *B. tuberculata* as the one shown in our fig. 1, pl. xi.

Dr. Honeyman mentioned this species in the Quart. Journ. Geol. Soc., vol. XX, 1864, p. 344, as occurring in his group D of the Arisaig strata. The original of pl. xi, fig. 6, is from Stonehouse Brook, Arisaig, Nova Scotia, in the limestone containing *Primitia mundula*, *P. ovata*?, and *Beyrichia tuberculata*.

We have here a rather difficult point to consider. Is the *description* or the *figure* given both by Prof. James Hall, in 1860, and repeated by Principal (now Sir W.) Dawson afterwards, to guide us as to the *species* with which these specimens are to be collocated? I think that really there is no doubt that the *figure* is that of a small *Beyrichia tuberculata*, or one of its varieties, and that the *description* is that of such a *Beyrichia* as has been sent labelled and named as *B. æquilatera*, and is figured in the Quart. Journ. Geol. Soc., 1890, pl. i, fig. 6, and in pl. xi, fig. 6 of the present paper; the only difference being that the middle lobe in the *description* is quite isolated, whereas in the figures here referred to—in the former it obscurely joins the ventral curvature of the front and hind lobes—and in the latter it quite unites therewith, bringing this form very near to *B. Klædeni*. These three stages of difference may well be due to varying states of preservation in the specimens, as they are all *casts*.

The two separate lobules at one end of fig. 20, p. 158 (1860, and fig. 217, 1868 and 1878) do not belong to the *description* at all, but they

definitely correspond to the same features in our pl. xi, fig. 1; so, also, the isolated and oval middle lobe, and the long, strong, curved posterior lobe of the same figure.

It will, I think, be most convenient to accept the published *description* (1860) as belonging to *B. æquilatera*, Hall, and to regard the little *woodcut* on the same page as belonging to the other species occurring so abundantly with *B. æquilatera*.

3. BEYRICHIA TUBERCULATA (Kloeden).

Pl. 11, fig. 3.

- Battus tuberculatus*, Kloeden (pars). Versteinerungen der Mark Brandenburg, 1834, p. 115-117, pl. i, figs. 21-23.
- Beyrichia tuberculata*, Boll. Palæontographica, vol. I, 1847, p. 127; Archiv des Vereins der Freunde der Naturgeschichte in Meklenburg; 16 Jahr., 1862, p. 119, pl. i, figs. 1 a, 1 b.
- Agnostus tuberculatus*, Quenstedt. Petrefactenkunde, 1852, p. 302, pl. xxiii, figs. 25-28.
- Beyrichia tuberculata*, Bronn and Roemer. Lethæa geognostica, 1854, vol. I, p. 538, pl. x³, figs. 9 a-d.
- Beyrichia tuberculata*, Jones. Ann. Mag. Nat. Hist., ser. 2, vol. XVI, 1855, p. 86, pl. v, figs. 4-9 b; Proceed. Geol. Assoc., Pal. Div. Entom., 1869, p. 12, figs. 12 a, b, c; Geol. Mag. Dec. 2, vol. III, 1881, p. 344, pl. x, figs. 8-10; Ann. Mag. Nat. Hist., ser. 6, vol. I, 1888, p. 402, pl. xxi, fig. 12.
- Beyrichia tuberculata*, Roemer. Lethæa palæozoica, 1876, pl. xix, figs. 9 a-d.
- Beyrichia tuberculata*, Krause. Zeitschr., d. Deutsch. geol. Gesell., vol. XXIX, 1877, p. 30, pl. i, figs. 12 a, b.
- Beyrichia tuberculata*, Hoernes. Palæontologie, 1884, p. 379, figs. 525 c. d.
- Beyrichia tuberculata*, Reuter. Zeitschr. d. D. g. Ges., vol. XXXVII, 1885, p. 632, pl. xxv, figs. 1 A, 1 B.
- Beyrichia tuberculata*, Zittel. Handb. Palæontol., vol. II, 1885, p. 553, figs. 739, 740.
- Beyrichia tuberculata*, Verworn. Zeitschr. d. D. g. Ges., 1887, p. 31, pl. iii, fig. 12.

Referring to the memoirs by Krause and Reuter, above noticed, the student will find the names of several other authors who have referred to this species, from either a geological or a paleontological point of view.

Several *varieties* of this species are noticed, and in many cases figured and named in some of the memoirs above enumerated.

It may be remarked here that the tubercles present on the surface of the lobes and margins of perfect valves are missing on casts of the insides, as is well shown among the figures on pl. x of the "Geol. Mag.," 1881.

Pl. xi, fig. 3. Length 4·5 (hinge line 4·3), height 2·7 mm.

This is much like Kloeden's "almost fully grown" type (*op. cit.*, 1834, pl. i, fig. 21), but the anterior lobe is more completely divided in our *cast*, the middle lobe is isolated, and the hinder lobe is less distinctly palmate. It is, also, to some extent, like one of Boll's typical figures (1862, fig. 1 b); but the oblique segments of the gigot (hinder) lobe of this internal *cast* show a more palmate arrangement, and not the quasi-spiral aspect that the outside of the valve usually suggests. It is like Krause's "third variety," *op. cit.*, 1877, p. 31, pl. ii, fig. 3, except that the margin and the divided front lobe are not tuberculate, our *casts* not having retained any evidence of the tubercles. Compare, also, Reuter's "*tuberculata-gibbosa*," *op. cit.*, 1885, p. 634, pl. xxv, fig. 2 A; this has tubercles on the lobes and margin, and the sausage-lobe is constricted, not divided. The ventral portion of the gigot-lobe in our fig. 3 shows some indication of at least two elevations or tubercles, hence this *cast* approaches still more nearly to *B. Bronni*, Reuter, *op. cit.*, p. 638, pl. xxv, figs. 6 A and 6 B, though no evidence of tubercles on the other lobes is visible. In fact the varietal gradations among the above-mentioned forms, and between them and others, are so numerous and shifting that I prefer to treat of the *cast*, fig. 3, as a representative of the type sufficiently good to bear its name.

From Stonehouse Brook, Arisaig, Nova Scotia, in dark-grey limestone, with hæmatitic stains, and made up of small organisms, such as the Ostracoda, together with 14 species* of mollusca, brachiopoda, and trilobites, and some encrinital remains. Upper Silurian (Upper-Ludlow) Formation. Dr. Honeyman's "Arisaig Group †, Division D". (Collected by Mr. Weston.)

There are also hollow casts of *B. tuberculata* and some varieties in the sandstone of the same formation at McAdam's Brook, Arisaig. See further on.

* Determined by Mr. H. M. Ami, namely: *Murchisonia Arisaigensis*, Hall, *M. Nova-scotica*, H., *Nuculites erectus*, H., *N. cuneatus*, H., *N. subovatus*, H., *Megambonia cancellata*, H., *Pterinea*, sp., *Pholidops squamiformis*, H., *Lingula*, sp., *Rhynchonella*, sp., *Chonetes tenuistriata*, H., *Spirifera subreticulata*, var. *perlata*, H., *Crania Acadiensis*, H., *Calymene*, sp., *Dalmania Loganii*, H., *Beyrichia pustulosa*, H., *Cornulites flexuosus*, H., var. *gracilis*, H.

† See Quart. Journ. Geol. Soc. vol. XX, 1864, pp. 333-345, and vol. XXVI, 1870, pp. 490-492; also 'Acadian Geology,' 3rd edit., 1878, pp. 565-570.

4. *BEYRICHIA TUBERCULATA* (Kloeden). Var. *PUSTULOSA*, Hall.

Pl. 11, fig. 2.

Beyrichia pustulosa, Hall. Canad. Nat. Geol., vol. V, 1860, pp. 157, 158, fig. 19; Dawson, Acad. Geol., 2nd edit., 1868, and 3rd edit., 1878, pp. 608, 609, fig. 216.

Beyrichia tuberculata, Jones. Quart. Journ. Geol. Soc., vol. XXVI, 1870, p. 492; Geol. Mag., 1881, p. 344, pl. x, figs. 8, 9, and 10.

Beyrichia Baueri, Reuter. Zeitschr. d. D. g. Ges., vol. XXXVII, 1885, p. 640, pl. xxv, figs. 7 A, 7 B.

Beyrichia tuberculata, Boll, var. *pustulosa*, Hall. Jones, Q. J. G. S., vol. XLVI, 1890, p. 18, pl. ii, figs. 1 a, b, c, and p. 552.

Length 5·0 (hinge-line 4·5), height 3·0, thickness of carapace 2 mm.

Fig. 1, Quart. Journ. Geol. Soc., 1890, is one of the Nova Scotian forms of this *Beyrichia*, and, being an internal cast, is comparable with fig. 8, pl. x, 'Geol. Mag.', 1881, but it has lost its anterior fourth by fracture; and the hypertrophy of its antero-ventral lobe makes a difference. Although the hinder lobe in fig. 8, 'Geol. Mag.', is partly broken off, the two specimens may have agreed in this region. As for the valve itself, fig. 9, 'Geol. Mag.', is quite equivalent (though shorter) to the cast shown in fig. 8, and to the specimen fig. 1, 1890, except that the latter has the hypertrophied lobe, which, however, is not at all an essential or specific feature.* The tubercles (pustules) on the gigot lobe are traceable on each specimen.

This fig. 1, if restored with its valve complete, may be regarded as equivalent to Boll's *B. tuberculata*, having the enlarged lobe, fig. 1 a, Archiv Meklenburg, 1862, p. 119, without any tubercles on the gigot. This form, and the same without the big lobe, are described and figured by Reuter, Zeitschr. D. g. Ges., 1885, p. 634, pl. xxv, fig. 2 A and 2 B, as *B. tuberculata-gibbosa*. Fig. 10, 'Geol. Mag.', is not quite perfect along the antero-dorsal margin, but may be regarded as a large growth of *B. tuberculata*, with tubercles on the gigot lobe, and with the lower portion of the large anterior lobe preserved. Reuter's *B. Baueri* has a close affinity.

The specimen fig. 1, 1890, labelled "*Beyrichia pustulosa*, Arisaig, Nova Scotia," is a sandstone cast of the inside of a right valve, coated with hæmatite. It lies on a small piece of fine-grained micaceous sandstone, almost wholly stained red, but whitish here and there.

Fig. 2, pl. x, is a cast in the same limestone as that containing *B. tuberculata*, fig. 3; and, excepting as to its hypertrophied antero-ventral

* Ann. Mag. N. H., April, 1866, pp. 339-342.

valve, it is near to Reuter's *B. Baueri* (*op. cit.*, 1885), but with fewer tubercles or pustules on the gigot lobe, there being only three instead of five or six.

Beyrichia pustulosa, Hall, as shown by the woodcut in the "Canad. Nat. Geol.," 1860, p. 158, fig. 19 (reproduced in the "Acadian Geology"), has the anterior lobe divided, the middle lobe isolated and the posterior lobe and its pustules represented by a broad, subtriangular gigot with four small tubercles. This lobe is described (p. 157) as being broadly curved and forming a ridge "high and angular, with a small prominent tubercle at the dorsal extremity, and from four to six smaller spine-like tubercles along its curve." In these features the valve closely resembles that of *B. Baueri*, Reuter, *op. cit.*, pl. xxv, fig. 7 B, and matches fig. 2 in pl. xi, except that the latter has its antero-ventral lobe hypertrophied (a feature of no essential value), and its tubercles do not exactly correspond with those in the little] obscure woodcut.

The species is said (p. 158) to resemble very nearly the *B. tuberculata* (Kloeden), as described and figured in the "Ann. Mag. N. H.," 1855, but with some differences from it, and subject to slight variations of surface-markings.

As a name for this variety, that given by Prof. James Hall has precedence.

This form occurs in the limestone of Stonehouse Brook, referred to above, and in a brown ferruginous cavernous band or bed-plane in a dark grey micaceous sandstone, with casts of polyzoa, encrinital joints, brachiopods, trilobites, &c., from McAdam's Brook *, below the falls and fort, Arisaig, Nova Scotia. Dr. Honeyman's Division D.

5. *BÉYRICHIA TUBERCVLATA* (Kloeden). *Var. STRICTISPIRALIS* (NOV).

Pl. 11, fig. 1.

Length 2·4 (hinge-line 2·0), height 1·7 mm.

This is essentially like one of Boll's typical figures, namely, fig. 1 b, pl. i, *op. cit.*, 1862, but its gigot lobe is narrow and has the look of being closely coiled or spiral, with three (instead of two) oblique sulci.

From Stonehouse Brook, Arisaig, Nova Scotia. In the same limestone as that already referred to.

* See 'Quart. Journ. Geol. Soc.' vol. XX, p. 342.

6. *BEYRICHIA TUBERCULATA* (Kloeden). Var. *NOETLINGI* (Reuter).

Pl. 11, figs. 4 a, 4 b, 5.

Beyrichia Noetlingi, Reuter. Zeitschs. d. D. g. Ges., vol. XXXVII, 1885, p. 637, pl. xxv, figs. 5, A, 5 B.

Fig. 4, length 3·0 (hinge-line 2·7), height 1·8, thickness of carapace 1·5 mm.

Fig. 5, length 4·3 (hinge-line 4·2), height 2·5 mm.

Fig. 4 is nearest to *B. Noetlingi*, Reuter, *op. cit.*, fig. 5 A, in which the tubercles representing the gigot lobe are separate and form two rows. In fig. 4, however, the outer two tubercles coalesce, and are not divided.

In fig. 5 the tubercles constituting the gigot are evidently in two rows, but are not deeply divided one from the other. This specimen, also, seems to have had a supernumerary lobule (broken off) at the antero-dorsal angle, and its mid lobe shows a slight constriction at top.

From Stonehouse Brook, Arisaig, Nova Scotia, in the same limestone as the foregoing; also from McAdam's Brook, in the sandstone previously mentioned.

7. *ISOCHILINA GRANDIS*, Jones. Var. *LATIMARGINATA* (nov).

Pl. 10, figs. 1 a, b and c, 2 a, b and c, and 3, 4.

Leperditia marginata, Keyserling (?), Jones. Ann. Mag. Nat. Hist., ser. 2, vol. XVII, 1856, pp. 94 and 100, pl. vii, figs. 14 a-d.*Isochilina grandis*, Schrenk, Jones. *Op. cit.*, ser. 5, vol. VIII, 1881, p. 347.*Isochilina grandis*, Jones. *Op. cit.*, vol. IX, 1882, p. 171.

	Mm.	Mm.	Mm.	Mm.		
Specimen not figured—Length	} 28 (hinge-line...19),	height..18,	thicknes of carapace..	10		
Fig. 1—Length.....11 (——.....15),				.....13,	.....	8
Fig. 2—Length.....14 (——.....10),				.....8,	.....	6
Fig. 14 (1856) Length 18 (——.....13),				.....11½,	.....	7

Carapace valves obliquely suboval, or, rather, ovate-oblong; convexity greatest in the anterior moiety, and lessening gradually backwards, but suddenly depressed at the anterior and ventral margins to form a flat marginal rim, which continues to the ends of the dorsal border; straight above, along the hinge-line, which is about two-thirds of the length of the valve, with its terminal angles well defined; ellip-

tically curved below; ends rounded, narrower (lower) in front than behind, but a left valve, rather crushed, seems to have been less contracted at the antero-ventral margin.

The anterior or ocular tubercle is distinct in figs. 1 and 2, more prominent in a larger specimen, and less prominent in some other specimens; behind it is a sulcus, forking downwards; its hinder side is swollen in some degree, and between the fork is the relatively large, oval, convex muscle-spot. In some cases this shows an acutely-ovate area neatly reticulated (see fig. 3), and associated with a set of faint, radiating, slightly tortuous, vascular lines. In one instance the reticulation is obsolete, and the radii start from the sulcus, which is impressed with a row of minute oblong pits (fig. 4), bordering the lower edge of the oval tubercle. In the hollow moulds of the outside of the valve this has a granulate appearance, showing that the network had shallow pits between the meshes.

A somewhat similar sculpturing is figured by Dr. F. Schmidt, for *Leperditia grandis*, Schrenk, in his *Memoir on Silurian Leperditie* ("Mém. Acad. Imp. Sci. St.-Pétersbourg," sér. 7, vol. XXI, No. 2, 1873, pp. 10-12, figs. 3, 5 and 6, and by Barrande for his *Isochilina (Leperditia) formosa*, "Syst. Silur. Bohême," vol. I, Supplém, p. 534, pl. xxxiv, figs. 1-3, and *Isochilina (Lenerd.) gigantea*, * *op. cit.*, p. 535, pl. xxxiv, figs. 4-6.

Of F. Schmidt's figures of *L. grandis* (*loc. cit.*), fig. 5 is the most like our figs. 1 and 2, but there are characteristic differences in outline and contour.

Although no doubt exists of these valves (figs. 1-4), being of the same species with that figured and described by me in 1856, yet there is a slight variance. 1st. In outline, the specimen from Rupert's Land being rather more oblique by the downward and backward extension of the postero-ventral region. 2nd. In the ocular tubercle being stronger and more isolated in fig. 14 (1856) than even in fig. 2. 3rd. In the presence of a slight oblique furrow passing from the hinder edge of the sulcus to the middle of the posterior border. 4th. In the marginal rim not being so broad as in the specimens now figured. Hence it will be right to treat these latter as representing a *variety*, which may be called *LATIMARGINATA*.

Several specimens were collected by Mr. J. B. Tyrrell, in 1889, in the white limestone on the west side of Long Point on the east side of Lake Winnipegosis (or Winnipegos), in lat. 52°55' N. and long. 99°45' W.

* This is intended for F. Roemer's *L. gigantea*, regarded by Barrande doubtfully as an *Isochilina*, but F. Schmidt (*loc. cit.*) states that Barrande's figure is not quite correctly restored, and that, the right valve slightly overlapping; the left at the middle of the ventral edge, it is a *Leperditia*, and the same as Schrenk's *L. grandis*.

There are two other loose specimens from harder cream-coloured limestone at the north end of Mossy Portage, Cedar Lake, collected by Mr. Tyrrell in 1890. These latter have the test preserved, but resembling the matrix.

The drawings of these specimens from the white limestone have been made from trustworthy plaster-casts of the natural hollow impressions (moulds) of the outsides of the valves, the artist having, also, the original specimens before him.

Specimens Nos. 1-6, from the east side of Lake Winnipegosis.

Specimen No. 1—Hollow mould of a right valve. The plaster-cast is figured (fig. 1).

———— No. 2—Hollow mould of a left valve (not figured), rather yellowish.

———— No. 3—Hollow mould of a right valve. The plaster-cast is figured (fig. 2).

———— No. 4 a—Hollow mould of a left valve; ocular tubercle strong; muscle-spot and radii visible.

———— No. 4 b—Convex left valve. Test attenuated probably by solution.

———— No. 5—Convex left valve. Test present; muscle-spot good.

———— No. 6—Hollow mould of a left valve; like No. 3. Muscle-spot figured (fig. 3).

Specimens Nos. 7-8, from the north end of Mossy Portage, Cedar Lake.

Specimen No. 7—Convex right valve, attenuated by solution. Muscle-spot figured (fig. 4).

———— No. 8—Convex left valve, attenuated by solution.

This species has been found also as follows: A small specimen, not well exposed, about 7 mm. long, in a hard, rough, buff-coloured limestone, at Cross Lake Rapids (at the eastern exit of the lake), on the Saskatchewan River, east of Cedar Lake. Geological position a little above that of the Roche Rouge. Three specimens, with some *Leperditia* (*L. Hisingeri*, var., and *L. cæca*) and many mollusca, in a white, hard, thin-bedded limestone from the Grand Rapids below Old Portage, near the mouth of the Saskatchewan. All collected by Mr. Tyrrell in 1890.

8. *LEPERDITIA BALTHICA* (Hisinger). var. *GUELPHICA*, Nov.

Pl. 13, figs. 12 a, b, 13 a, b, c.

Cytherina balthica (part), Hisinger. Anteckningar, Phys. och Geogn., etc., vol. V, 1831, pp. 109, 132, pl. viii, fig. 2; Lethæa Suecica, 1837, p. 10, pl. i, fig. 2.

Leperditia balthica (part), Jones. Ann. Mag. Nat. Hist., ser. 2, vol. XVII, 1856, p. 85, pl. vi, figs., 12, 4, and 5.

Leperditia balthica, var. a. Kolmodin. Bidrag till Kannedomen om Sverges Siluriska Ostracoder, 1869, pp. 13, 14, figs. 1, 2, and 3.

Leperditia baltica, Schmidt. Mém. Acad. Imp. Sci., St. Petersburg, Ser. 7, vol. XXXI, No. 2, 1875, p. 15; and *ibid.* vol. XXXI, no. 5, 1883, p. 11, pl. i, figs. 2 and 3.

	Length. (hinge-line).	height.	thickness of carapace.	
Fig. 12.....	10.7?	(8.7?)	7.	4. mm.
Fig. 13.....	8.6	7.	5.3	3.3 mm.
Baltic specimen, 1856	20.	(15.)	13.	9. mm.

This has the usual *Leperditian* form; and, though half the size, closely resembles that of *Leperditia balthica*, especially the figures given by F. Schmidt, above-quoted. Our fig. 13 *a* represents a perfect small left (the overlapped) valve, having a rather more strictly oblique ventral margin, and with the submedial convexity rather lower down in the valve, than Schmidt's figs. 3 *a*, *b*; and it has a marginal thickening or narrow swelling at the posterior moiety of the hinge-line, somewhat like that in *L. gibbera*, Jones, but thinner and longer, being equal to a third of the valve's length.

Our figs. 12 *a*, *b*, of a right (the overlapping) valve of larger growth, though not in perfect preservation, show a thickening on the edge of the ventral margin, where it is turned in, and a rather bolder postero-ventral curvature than in either Schmidt's (1875), or my own figures (1856). In both fig. 12 and fig. 13 the eye-spot and its escutcheon, and the muscle-spot are very apparent. There is also a small left valve which is somewhat gibberous (slightly swollen at its dorsal edge.)

The relatively small size of these valves, the marginal thickening of the ventral border in one, and of the dorsal border in the other,—and the full postero-ventral curve of the right valve, though non-essential differences from the type, are worthy of notice,—and give cause for this form to be regarded as a *variety* (Var. GUELPHICA). It may be added that the strong backward and downward ventral curve approaches that of *L. Hisingeri*; but, there being no hollow ogee curve below the postero-dorsal angle, the hinge-line is relatively longer than in that species, and its proportion is thus kept nearer to that in *L. balthica*. The proportions closely approach those of some specimens of *L. gibbera*, Jones. The left valve of Baron von Toll's *L. Kotelnysensis*, Mém. Acad. Imp. Sci., St.-Petersbourg, Ser. 7, vol. XXXVII, no. 3, 1889, p. 42, pl. iii, fig. 9 *a*, has much resemblance to our fig. 13 *a*; but it is longer, and its postero-ventral region is not nearly so full, nor so oblique. Both have a marginal thickening in the postero-dorsal region; but the posterior dorsal angle is much more pronounced in our figs. 12 and 13 than in von Toll's fig. 9 *a*.

A few specimens of casts of valves, retaining remnants of the test, from the Guelph Limestone of Durham, Ontario, have been supplied

by Mr. Whiteaves for comparison. This is a cream-coloured limestone, and lies immediately on and conformable to the Niagara Limestone.

Another *Leperditia*, associated with the foregoing, seems to be a variety of *L. phaseolus* (Hisinger). See further on, page 86.

9. *LEPERDITIA HISINGERI*, Schmidt.

Pl. 13, figs. 1 and 9.

10. *VARIETAS FABULINA*, Nov.

Pl. 10, figs. 5 and 7; pl. 12, figs. 15; pl. 13, figs. 2, 3 and 5.

11. *Var. GIBBERA*, Nov.

Pl. 13, fig. 4.

12. *Var. EGENA*, Nov.

Pl. 12, fig. 8.

Cytherina balthica (part), Hisinger. *Lethæa Succica*, 1837, p. 30, fig. 1.

Leperditia balthica (part), Jones. *Ann. Mag. Nat. Hist. ser. 2*, vol. XVII, 1856, p. 85, pl. vi, figs. 3 a-c.

Leperditia balthica, var. b. Kolmodin. *Bidrag till Kannedomen om Sveriges Siluriska Ostracoder*, 1869, p. 14, figs. 4, 5.

Leperditia Hisingeri, Schmidt. *Mém. Acad. Imp., St. Pétersbourg*, ser. 7, vol. XXXI, No. 2, 1873, p. 16, figs. 22, 23; *Ibid.* vol. XXXI, No. 5, 1883, p. 14, pl. v, figs. 5-7.

Leperditia Schmidtii, Kolmodin. *Ofvers, k. Vet.-Akad. Forh.* vol. XXXVI, 1880, p. 133.

Leperditia balthica, Jones. *A. M. N. H.*, ser. v, vol. VIII, 1881, p. 333, pl. xix, figs. 10 and 11.

	Length, (hinge-line),	height,	thickness.	
<i>L. Hisingeri</i> (1856)	15.5	(10.)	11.5	7. mm.
Pl. 10, fig. 5	10.5	(7.)	6.5	4.5 mm.
Pl. 10, fig. 7	7.	(5.)	5.5	— mm.
Pl. 12, fig. 15	7.3	(5.7)	4.1	3. mm.
Pl. 13, fig. 1	8.7	(5.7)	5.7	3.7 mm.
Pl. 13, fig. 2	4.3	(3.3)	2.6	— mm.
Pl. 13, fig. 3	6.3	(5.)	4.	2.6 mm.
Pl. 13, fig. 4	5.6	(3.6)	3.	— mm.
Pl. 13, fig. 5	4.	(3.)	2.5	— mm.

Among the specimens which we have here figured several match some of Schmidt's figures of *L. Hisingeri*, and a few have almost the same outline. Thus, though pl. xii, fig. 15 and pl. xiii, fig. 3 (two right

valves) are not deep enough in the postero-ventral curve to match Schmidt's figs. 5, 6, and 11, pl. 1, 1883, yet pl. xiii, figs. 1, 2, and 5 of the left valve, match Schmidt's pl. 1, figs. 9 and 10; and our pl. xiii, fig. 9, is near Schmidt's pl. 1, fig. 12, though rather contracted in front.

L. Hisingeri is smaller than *L. balthica*, obliquely-subovate, and not suboblong like that species; it has a relatively shorter hinge-line, with strong dorsal angles, and a more obliquely-curved postero-ventral region than *L. balthica* shows.

Pl. xiii, figs. 1 and 9 correspond with the typical *L. Hisingeri* in these features. Several other individuals, for instance, pl. xiii, fig. 2, 3, and 5, approach closely to the foregoing in character, but have a rather longer hinge-line (var. *FABULINA*). In this respect, however, they are like some of Schmidt's figures of the species, *Mém. Acad. Imp. St.-Pétersbourg*, 1883, and may be retained as a variety under the specific name.

Pl. xiii, fig. 4, is an elongate, oblique, narrow, left valve, with its dorsal edge thickened for nearly all its length. We may call it var. *GIBBERA*. Fig. 9 of Baron von Toll's *L. Kotelnyensis*, already referred to (page 81), may be compared with our fig. 4; but the latter is much smaller, more oblique on the ventral margin, and has a relatively shorter hinge-line, and the dorsal thickening is longer and more distinct.

Pl. xii, fig. 15 pl. xiii, fig. 2 are from a soft yellowish limestone, with remains of Mollusca, at the foot of the Grand Rapids on the Saskatchewan River.

A small right valve, length 6' (hinge-line 4'5), height 4', thickness 2'5, mm., not figured here, from Long Point, Lake Winnipegosis, is much like pl. xii, fig. 15, in shape, but rather smaller, and is scarcely distinguishable from *Leperditia Louckiana*, Jones (*Ann. Mag. Nat. Hist. ser. 3, vol. II, 1858, p. 245, pl. ix, fig. 16*), except that the postero-ventral region is less obliquely projected and the hinder dorsal angle less marked in the latter. The outlines of pl. xiii, figs. 2, 3, and 5 are also much like that of *L. Louckiana*, but they differ from it as to the dorsal angles, and more or less in the antero-ventral slope; they are also too much rounded in front. From pl. x, fig. 5, it differs mainly in having a bolder and deeper curvature of the ventral margin.

Thus it is evident that *L. Louckiana* is nearly a prototype of the long-backed varieties of *L. Hisingeri*, just as *L. anticostiensis* and *L. amygdalina* are two allied predecessors of the short-backed forms.

Another specimen referable to *L. Hisingeri*, as one of its relatively long-backed forms that have a sufficient downward obliquity in the hinder moiety to separate them from *L. balthica*, is pl. x, fig. 5. It

is comparable with pl. xiii, fig. 3, from the same locality, namely Long Point, Lake Winnipegosis. At first sight, pl. x, fig. 5, is not readily distinguishable from *L. fabulites* (*L. Josephiana*); but it is fuller in the antero-ventral outline. Indeed the specimens before us are not only higher (deeper) in the antero-ventral moiety, but have less postero-dorsal slope, are not quite so convex, and show usually some slight marginal rim.

This is No. 9 of the series, and was collected at Long Point on the east side of Lake Winnipegosis, by Mr. J. B. Tyrrell in 1889.

Other specimens collected by Mr. Tyrrell at the same time and place, and more or less closely resembling fig. 5, but differing in size, are:

	Mm.	Mm.	Mm.
No. 10—Left valve.....	Length.. $10\frac{1}{2}$ (hinge-line.. $5\frac{1}{2}$)	height.. $6\frac{1}{4}$	
No. 11—Left valve.....	..... .. $5\frac{1}{2}$ (..... .. 4 )	..... .. $3\frac{1}{2}$	
No. 13—Right valve.....	..... .. 6 (..... .. 3 )	..... .. 3	
No. 14 (fig. 7) {	—Left valve..... .. 7 (..... .. $4\frac{1}{2}$)	..... .. $4\frac{1}{2}$	
{	—Right valve..... .. $6\frac{1}{2}$ (..... .. 5 )	..... .. 4	

In this case also we have evidence of an old prototype, or analogous predecessor, of a Silurian (Upper Silurian) species; both the older and the newer representative form having approximate varieties, peculiar to zones and localities.

From the white, hard, thin-bedded limestone at the Grand Rapids, another similar form occurs as casts, without any surface-marks, pl. xii, fig. 8 (x4). Its shape is nearly that of pl. xii, fig. 15 (x3), and pl. xiii, fig. 3, (x3), but its bareness, its poor dorsal angles, and the absence of marginal rim, go far to distinguish it. This may be another variety (*egena*) of *Leperditia Hisingeri*.

13. LEPERDITIA ALTA (?), Hall.

Pl. 13, figs. 10, 11a, and 11b.

For the synonyms of and notes on this species, see Quart. Journ. Geol. Soc., vol. xlvi, 1890, pp. 25-27.

There is great apparent discordance in the figures and descriptions of the specimens commonly referred to *L. alta*, and abundant in the Schoharie Limestone (Lower Helderberg), of New York State. Pl. xiii, figs. 10 and 11 are from a slab of the limestone, and though regarded as *L. alta*, they do not match any of the various published figures of this species, which yet requires close critical examination. Both fig. 10 (the left and smaller valve), and fig. 11 (the right and larger valve)

show the interior only, as usual on the slabs of the limestone. They are near to *L. Hisingeri* in outline, though the hinge-line is rather too long, and the antero-ventral margin has too full a curvature (compare fig. 9). The specimens figs. 10 and 11 are associated with *Klædenia notata* in the black Tentaculite limestone of Schoharie, State of New York. Collected by Dr. G. J. Hinde, F.G.S. They were chosen for illustration here because of the neat crenulation within the dorsal margin (hinge-line) of each valve, which feature corresponds with the delicate and fainter crenulation seen on the outside of the dorsal margin, in figs. 9 a and 9 b, of *L. Hisingeri* from Long Point, Lake Winnepegosis. An analogous crenulation is shewn in Kolmodin's figures of *L. phaseolus*, Öfversigt, etc., 1880, pl. xix, figs. 4 b and c.

It seems to me that more than one species has been included under *L. alta*, and that some at least of the published figures show a varietal relationship to *L. Hisingeri*.

14. LEPERDITIA PHASEOLUS (Hisinger.)

Pl. 13, figs. 7 and 8.

Cytherina phaseolus, Hisinger. Anteckn. Phys. Geogn., vol. V, 1831, pp. 110-135, pl. viii, fig. 3; Lethœa Suecica; 1837, p. 9, pl. i, fig. 1.
Leperditia Angelini, Schmidt. Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 7, vol. XXI, No. 2, 1873, p. 13. figs. 13-18.
Leperditia phaseolus, Kolmodin. Ofvers, k. Vet.-Akad. Förhandl., vol. XXXVI, 1880, p. 134, pl. xix, figs. 4 and 5.
Leperditia phaseolus, Schmidt. Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 7, vol. XXXI, No. 5, 1883, p. 9.

	Length, (hinge-line),		height,	thickness.
	mm.	mm.	mm.	mm.
Pl. 13, fig. 7.....	12·	(8·2)	7·	4·6
Pl. 13, fig. 8.....	11·	(6·)		
Kolmodin's pl. 19, fig 4.....	12·5	} About $\frac{3}{4}$ ths the length of the valve.		
Kolmodin's pl. 19, fig 5.....	14·			

Pl. 13, figs. 7 and 8 are more like Kolmodin's fig. 4 b than his other figures, as to the ends of the hinge-line, and like his 5 b in the more equal curvature of the ventral border.

The typical *L. phaseolus* is smaller and relatively longer than *L. Hisingeri*, having less ventral depth. Our specimens, figs. 7 and 8, which approach *L. phaseolus*, have a more equal or symmetrical ventral curvature than the type. The specimen shewn by the woodcut of *L. phaseolus*, var. *Guelphica*, the form (No. 15) next to be considered, has moreover a greater height from the ventral to the dorsal border, and it may be regarded as a recognizable variety.

Among the specimens from Roche Rouge, Saskatchewan River, between Cross Lake and Lake Winnipeg are—(1) several individuals of *Isochilina grandis*, var. *latimarginata*, in a thin-bedded, yellowish limestone, weathering white; (2 and 3) the specimens figured on pl. xiii, figs. 7 and 8, in a buff-coloured, hard, rough limestone; and in the same limestone a more broadly-ovate *Leperditia*, not well exposed, but perhaps like pl. xiii, fig. 1. The geological position of these specimens is above those at the foot of the Grand Rapids. Collected by Mr. Tyrrell, August 27, 1890.

15. *LEPERDITIA PHASEOLUS* (Hisinger). Var. *GUELPHICA*, nov.

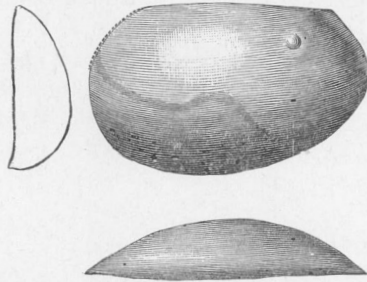


Fig. 5. *Leperditia phaseolus* (Hisinger), var. *guelphica*, nov. Durham, Ont. Magnified $\frac{1}{3}$.

Length 12·3 (hinge-line 8·6), height 9·3, thickness 5·3 mm.

This is more ovate than figs. 7 and 8 on pl. xiii, being deeper from above downwards, and rather more convex; but the outline approximates to that of our figures above quoted, and to Kolmodin's pl. xix, fig. 5 *b*, as to the curvature of the ventral margin.

In Guelph Limestone from Durham, Ontario, with *L. balthica*, var. *guelphica*. See page 80.

16. *LEPERDITIA MARGINATA*, Schmidt.

Pl. 10, figs. 6 *a*, *b* and *c*.

Leperditia marginata, Schmidt. Mém. Acad. Imp. Sci. St.-Pétersbourg, Ser. 7, vol. XXI, No. 2, 1873, p. 19, figs. 29-31; *ibid.* vol. XXXI, 1883, p. 18, pl. i, figs. 13-19.

Length 6·5 (hinge-line 5'), height 4', thickness 3 mm.

Of this somewhat variable species, Schmidt's fig. 30 (1873) and fig.

14 (1883) agree best with our fig. 6 *a*. Other forms described by Schmidt from the Russian territory vary from oblong to subovate. They were from the Upper Silurian dolomitic limestone near the mouth of the Waschkina River, in the Timantundra, bordering the Arctic Ocean.

It is difficult to discriminate the specimen under notice from *Leperditia labrosa*, Jones (Ann. Mag. N. H., ser. 3, vol. I, 1858, p. 245, pl. ix, fig. 13), belonging to the Calciferous Sandrock of Canada; but in this latter the marginal rim is wider and the convexity greater; and it certainly indicates a very similar, and so far an analogous form having existed in still earlier times.

From the white limestone of the west side of Long Point on the east side of Lake Winnipegosis, collected by Mr. J. B. Tyrrell in 1889.

There is some resemblance in both *L labrosa* and the present specimen, fig. 6, to the drawing of a young individual of the Scandinavian *L grandis*, Schrenk, given by Schmidt in the Mém. Acad. Imp. Sci., St. Pétersbourg, ser. vii, vol. xxi, No. 2, 1873, p. 10, fig. 6.

17. LEPERDITIA WHITEAVESII, sp. nov.

Pl. 12, figs. 11, 12, 13, 14, and woodcut fig. 6.

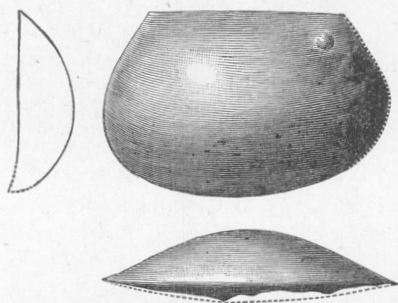


Fig. 6. *Leperditia Whiteavesii*, nov. (Interior extremity damaged.) Chermahawin, Saskatchewan River. Magnified $\frac{1}{3}$.

	Length,	(hinge-line),	height,	thickness.
	mm.	mm.	mm.	mm.
Pl. 12, fig. 11.....	12·	(8·)	8·?	—
fig. 12.....	13·	(7·5)	9·	5·
fig. 13.....	9·?	(6·?)	6·	3·5
fig. 14.....	10·?	(6·5)	7·	—
Woodcut fig. 6.....	12·6	(8·6)	8·3	5·3

Suboblong, rounded unequally at the ends (figs. 11 and 12), being

lower in front than behind; ventral curvature of the right valve (woodcut, fig. 6) gentle and nearly uniform; of the left valve (figs. 12, 13, and 14) oblique; the straight hinge-line has two-thirds of the length of the valve; dorsal angles apparent, but not strongly developed. Surface smooth, with its convexity usually quite in the middle; eye-spot well marked and simple; the muscle-spot not visible. These specimens are mostly casts, only fig. 13 retaining some of the test; and on this there is an accidental mark simulating the muscle-spot.

In some respects this form approaches *Leperditia Balthica*; but the right valve is too nearly oblong,* and the left valve is too oblique on its lower margin; nor are the dorsal angles sufficiently pronounced.

The species is named in honour of J. F. Whiteaves, Esq., F. G. S., Palæontologist of the Geological Survey of Canada, whose kind courtesy has enabled me to examine this valuable series of Canadian Palæozoic Ostracoda.

Pl. xii, figs. 11 and 12 are among eight specimens in a hard cream-coloured limestone from Chemahawin, on the Saskatchewan River, north west of Cedar Lake, and geologically a little above the beds at Roche Rouge. Collected by Mr. Tyrrell in 1890. One right valve has its ventral edge slightly swollen after the fashion of the specimen shown in fig. 12 a, pl. xiii.

Pl. xii, fig. 13, is from Old Fort Island, Cedar Lake, in a yellowish crystalline limestone, of the same geological zone as the last mentioned specimen. Collected by Mr. Tyrrell in 1890.

18. *LEPERDITIA OÆCA*, sp. nov.

Pl. 12, figs. 6, 7, and 9.

	Length,	(hinge-line),	height.	
Fig. 7.....	5·7	(3·)	4·	mm.
Fig. 9.....	11·?	(6·5)	7·5	mm.

Broadly oblong casts; straight on the back, and gently curved below; rounded at the ends, almost semicircular in front, and with a slight slope in the upper part of the hinder curve fig. 7, (x4). Fig 9 (x2) makes this postero-dorsal slope too steep, the specimen being damaged there. The ventral margin of the left valve (fig. 7) is turned

* Fig. 11 makes the outline of the ventral curve much too full by the dotted line; the woodcut, fig. 2, gives it exactly, but fails in representing the front extremity, which is much damaged in that specimen. This woodcut has the figure magnified three times to compare with those similarly enlarged on pl. xiii.

sharply inwards, and bears minute pimples (casts of little pits) along the marginal angle. Surface not very convex, smooth and destitute of any visible ocular and muscular spots.

These casts are common (fig. 6) in hard, white, thin bedded limestone from the foot of the Grand Rapids below Old Portage, near the mouth of the Saskatchewan River. Together with them are many other *Leperditia*, such as pl. xii, figs. 8 and 15, and pl. xiii, fig. 2, see page 107. Fig. 9 is from a hard, rough, buff-coloured limestone, weathering grey, on the Saskatchewan River below (east of) Cedar Lake,* which is not far north of Lake Winnipegosis. Besides one *Ischilina grandis*, var. *latimarginata*, four specimens of this rock contain three *Leperditia* not well exposed. Pl. xii, fig. 9 is one of them; and there was a small left valve (not figured) with a sharply inturned ventral margin. Collected by Mr. Tyrrell. *L. Eichwaldi*, Schmidt (Mém. Acad. Imp. Sci. St. Pétersbourg, Ser. 7, vol. XXI, No. 2, 1873, p. 17; and vol. xxxi, No. 5, 1883, p. 11, pl. i, fig. 1), is one of the few *Leperditia* that present such a subquadrate outline as the foregoing.

19. *LEPERDITIA SELWYNII*, sp. nov.

Pl. 12, figs. 1-5.

	Length,	(hinge-line),	height,	thickness of surface.
Fig. 1.....	11·	(7·)	7·5	4· mm.
Fig. 2.....	12·	(9·)	8·5	5· mm.
Fig. 3.....	10·	(6·5)	6·5	4· mm.

Neatly Leperditian in shape; straight on the back, with definite dorsal angles; curved on the free margins, more fully behind than in front; surface smooth and of a brownish colour; traces of a muscle-spot observable in one broken and weathered large specimen. The specimens vary in size according to age; for the left valves, figs. 1 *a* and 2 *a*, differ in the obliquity of the ventral margin, and the smaller (younger) individual, fig. 3 *a*, which is the overlapping and therefore the relatively larger valve, is less oblique on the ventral margin than fig. 1 *a*, and much less oblique than fig. 2 *a*; probably an older right valve would have a more oblique ventral curvature.

The subcentral convexity of these valves varies slightly. The ven-

* "The rock outcropping on Cedar Lake was found to be the same as that on the northeast shore of Lake Winnipegosis. It was, however, here found to contain a much larger number of fossils, which clearly determine its age as about that of the Niagara formation of Iowa and Wisconsin. The rock through which the river has cut its gorge at the Grand Rapids also belongs to the same formation." Mr. Tyrrell, in the "Summary Report of the Geol. Surv. Department for 1890," p. 23.

tral edge of both valves (figs. 1 *b* and 3 *b* is inturned; but the right overlapping valve (fig. 3 *b*) has a roundly overturned edge; and the left or overlapped valve has a sharply inturned flat edge (figs. 1 *b* and 4), against which the opposite edge rested when the carapace was closed. Compare figs. 1 *b*, 2 *b*, 4 *c*, and 7, in pl. vi, 'Ann. Mag. Nat. Hist.' ser. 2, vol. XVII, 1856. Inside the lip of the left valve is ornamented with delicate minute dentilures and striæ (fig. 5), as in other instances (see figs. 4 *b*, 5 *b*, of the same pl. vi, 1856).

These valves approach in outline those of *Leperditia Tyraica*, Schmidt, Mém. Acad. Imp. Sci. St. Pétersbourg, Ser. 7, vol. XXI, No. 2, p. 13, figs. 10 and 11; but they are less angular at the ends of the hinge, are without marginal ledges, and are quite smooth, without eye-spot. These specimens are from Jupiter River, Anticosti (collected by Prof. Macoun in 1883), on seven small slabs of compact grey limestone, probably composed of small organisms and fragments of larger forms; weathering light brown. They belong to the "Division No. 2" of Billings's "Anticosti Group," and are at about the horizon of the Clinton Formation of New York and Ontario.

This distinct species I propose to name after the eminent Director of the Geological Survey of Canada, A. R. C. Selwyn, C.M.G., F.R.S., &c., under whose auspices this memoir has been undertaken.

Besides this addition to the Silurian fauna of Anticosti, we must remember the six Beyrichian forms shown in plate xi, and the nine other Ostracoda described and figured in the Quart. Jour. Geol. Soc., vol. XLVI, 1890, pp. 545-550.

C. FROM THE DEVONIAN ROCKS.

Of the Devonian species here described some are from Thedford, Ontario, namely, the specimens represented by figs. 10-13 of pl. xi. Although already referred to in the Quart. Journ. Geol. Soc., these have not hitherto been sufficiently described and figured.

Of the others (the original of figs. 14-16, pl. xi) were collected by Mr. McConnell on the Hay River, which runs into Great Slave Lake, and the rest by Mr. Tyrrell at two different localities on Lake Winnipegosis.

Primitopsis punctulifera, figs. 10 and 11, is known only in the Hamilton group, but the *genus* is also known in the Upper Silurian of Europe.

Of the other genera, *Kirkbya* ranges from the Silurian to the Carboniferous; *Ulrichia* is also Silurian; *Primitia* ranges from the Cambro-Silurian to the Carboniferous; *Aparchites*, *Isochilina*, *Elpe* and *Leperditia* are Cambro-Silurian and Silurian also.

1. APARCHITES MITIS, (sp. nov.).

Pl. 11, figs. 15 a & b.

Length 1 (hinge-line .7), height .55, thickness .4 mm.

Elongate-subovate, straight on the back, rounded behind, gently curved on the ventral margin, obliquely curved at the antero-ventral region, but with a fuller curve than the same edge has in *Primitia concinna* *, Jones (Ann. Mag. Nat. Hist., ser. 3, vol. I, 1858, p. 249, pl. x, figs. 3, 4, and vol. XVI, 1865, p. 424, and Geol. Surv. Canada, Org. Rem., Dec. III, 1858, p. 99). The convexity also differs from the neatly elliptical outline of the latter, and seems to be fuller at the anterior moiety.

The specimen before us having no trace of a sulcus or of a central pit, nor of any overlap, must be taken as an *Aparchites*, and may be distinguished as *A. MITIS*, sp. nov.

Attached to a *Spirifera disjuncta* from the Devonian Rocks of Hay River (Great Slave Lake), at about 40 miles above its mouth, collected by Mr. R. G. McConnell in 1887.

This species, or one extremely like it, occurs in a grey, compact, Devonian limestone from the Athabasca River. Collected by Mr. McConnell in 1890.

2. PRIMITIA SCITULA, (sp. nov.).

Pl. 11, figs. 14 a, 14 b.

Length .77 (hinge-line .5), height .5, thickness .4 mm.

This is a small *Primitia*, suboblong (short oblong with rounded ends) straight on the dorsal, gently curved on the ventral edge; anterior extremity symmetrically rounded, and bordered with a flattened rim, Postero-dorsal angle sufficiently pronounced to interfere with the symmetry of the hinder curve. Surface more convex behind than before, bearing a central pit, and marked with a coarse and shallow punctation.

Primitia trigonalis, J. & H., Ann. Mag. Nat. Hist., ser. 3, vol. XVI; 1865, p. 421, pl. viii, fig. 4, from the Wenlock Limestone of Shropshire exhibits some of the features seen in the form under notice, and *P. sigillata*, J. op. cit., vol. I, 1858, p. 242, pl. ix, fig. 5, and vol. VI, 1865,

* In the Quart. Journ. Geol. Soc., vol. XLVI, 1890, pp. 7-9, I have shown that this is probably the same as d'Eichwald's *Leperditia minuta*, and possibly equivalent to some of the specimens grouped under Dr. James Hall's *Leperditia (Isochilina) cylindrica*.

p. 418, from the Wenlock Limestone of Beechey Island, is still more like it, but has the normal sulcus instead of the central pit, and has not so definite a marginal lip.

The trivial name *SCRITULA* will suit this pretty little *Primitia*. One individual is attached to a specimen of *Strophodonta demissa*, and one to an *Orthis*, from the Devonian rocks of the Hay River (which runs into Great Slave Lake), at about 40 miles above its mouth collected by Mr. R. G. McConnell in 1887.

3. ISOCHILINA BELLULA, (sp. nov.).

Pl. 11, figs. 16 a, 16 b.

Length 1.0 (hinge-line .65), height .6, thickness .4 mm.

Suboblong, upper and lower edges nearly straight, ends rounded, front margin neatly curved, the hinder margin sloping down from the back with an oblique curve. Surface smooth, with a mid-dorsal subtriangular depression; the greatest convexity at the posterior third; marginal lip at the free edges.

This is evidently allied to *Isochilina lineata*, Jones (Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 21, pl. ii, figs. 5 and 8), from the Hamilton group at Monteith Point, Canandaigua, State of New York.

This neat little form may well deserve the name *ISOCHILINA BELLULA* as a new species.

One specimen was found attached to a *Strophodonta demissa* and another to *Atrypa reticularis*; both were collected by Mr. R. G. McConnell in 1887, from the Devonian rocks of the Hay River, Great Slave Lake, at about 40 miles above its mouth.

4. ISOCHILINA DAWSONI, (sp. nov.)

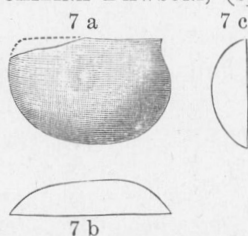


Fig. 7. *Isochilina Dawsoni*, sp. nov., a, left valve, cast; b, edge view; c, end view. Magnified 15 diameters.

Size: Length 1.5 (hinge-line 1.3); height 1.0; thickness of carapace .66 mm.

Five specimens of a white polyzoan limestone, of Devonian age, were

collected by J. B. Tyrrell in 1889 from a small island on the south-east side of Dawson Bay, Lake Winnipegosis. In this limestone, which is made up of organic remains, there are a few minute internal casts of Ostracoda; but only two are distinct enough for figuring and description.

One of these small white casts (woodcut, fig. 7) is that of a left valve, leperditoid in shape, suboblong, not so fully rounded in front as behind; hinge line long; front dorsal margin obscured by matrix; hinder angle sharp, with curve below it. Subconvex, with the greatest fullness rather above the median line and in the posterior moiety of the valve. A very faint, circular, subcentral depression is just traceable.

This may be a true *Isochilina*, and I wish to associate with it the name of the talented and enthusiastic Geological Surveyor, Dr. G. M. Dawson, after whose father the Bay itself was named.

5. *ELPE TYRRELLII*, (sp. nov.).

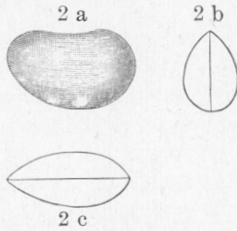


Fig. 8. *Elpe Tyrrellii*, sp. nov. a, side view; b, edge view; c, end view. Magnified 15 diameters.

Size: Length 1·13 (hinge-line ·66); height ·76; thickness ·46 mm.

This is a white cast of a small carapace, subreniform, obliquely rounded and narrow in front, full with a semicircular curve behind; ventral margin boldly curved; dorsal margin somewhat depressed and hollow in the middle. Surface convex, and most so below the median line and in the posterior moiety.

This is much like Meek's *Cythere Cincinnatiensis* (Proceed. Acad. Nat. Sci., 1872, p. 331, and Geo. Surv. Ohio, Paleont., vol. I, 1873, p. 158, pl. xiv, figs. 1 a-d); but is contracted at the anterior moiety. The Ohio form is variable and may be represented by more than one species (Meek). It is, however, much more like some drawings of the same species, kindly sent to me in 1888 by Mr. E. O. Ulrich of Newport, Ky. The proportions are only slightly different, a Cincinnati specimen having—Length 1· (hinge-line ·72); height ·66;

thickness .55; but the greatest convexity in this latter form is above (not below) the median line; and the concavity of the dorsal line is more pronounced, the valve being swollen on each side at the ends of the hinge-line, but more so behind than in front.

Mr. Ulrich informed me, in 1888, that he had met with more than one species of this kidney-shaped form in the Cincinnati beds, with a smooth surface and slight ventral overlap, and that in his MS. of 1881, unfortunately destroyed by accident, he had separated them as a distinct genus under the name *Leioditia*; and there is no doubt that we have here a specimen of the same kind, though slightly different, and from a much later horizon. After further research, Mr. Ulrich suggested, by letter, in 1890, that *Cythere Cincinnatiensis*, Meek, a variety of the same, *C. irregularis*, Miller, and *Leperditia radiata*, Ulrich, might probably be grouped under Barrande's genus *Elpe*, having much in common with each other and with it, except that he found *C. Cincinnatiensis* and *L. radiata* to have a subcentral pit and a radiate structure of shell, which features, however, are of course, wanting in casts. Although Barrande's *Elpe pinguis** is more globose, and much larger than these American specimens, yet it is quite feasible to suppose that they may belong to the same genus; the above mentioned forms presenting the necessary gradations.

Taking *Elpe*, then, as being probably the genus to which this little fossil from Dawson Bay, Lake Winnipegosis, belongs, I propose to call it *E. Tyrrellii* after the energetic member of the Canadian Geological Survey who collected it.

6. LEPERDITIA (?) EXIGUA, (nov).

Pl. 12, fig. 10.

Length .74 (hinge-line .56), height .48 mm.

Small, subovate or ovate-oblong; rounded at the ends, but smaller in front than behind; straight on the back, dorsal angles blunt; smooth and convex. This little left valve has somewhat the same outline as the much larger right valve of *L. Schwynii*, fig. 3 a; but it is relatively fuller behind, and has no frontal slope. It may also be compared with fig. 13 a, and even with pl. xiii, fig. 11 a; but, though it looks like a *Leperditia*, its small size and poor state of preservation

A unique cast, from M. Barrande's stratum f. 2 of the stage F, of his Fauna III (Upper Silurian) near Mnienian, Bohemia. "Syst. Silur. Bohème," vol. I, Supplem. 1872, p. 510, pl. xxvi, fig. 15.

hinder a definite determination of its generic place. It has a faint resemblance in shape to a large Carboniferous *Leperditia* of Belgium.

In a whitish limestone of Devonian age, with other small obscure organisms, from a small island (Island Z.) on the east side of Lake Winnipegosis, about thirty miles south of Long Point. Collected by Mr. Tyrrell in 1889.

7. ULRICHIA CONRADI, Jones.

Pl. 11, fig. 13.

Ulrichia Conradi, Jones. Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 544, woodcut, fig. 2.

Length .8 (hinge-line .65), height .45 mm.

A small, left valve, suboblong, straight on the back, obliquely curved below, rounded at the ends, the posterior higher and fuller than the anterior. Two largish prominent knobs, oval in section and obliquely peaked, divide the dorsal region into three nearly equal portions; the front tubercle is smaller than the other. The surface of the valve is faintly reticulated, and has along the free borders a neat marginal ridge.

This small bituberculate and punctate valve is near *P. Morgani*, Jones, Q. J. G. S., vol. XLVI, p. 5, pl. iv, fig. 5; but it is more oblong, margined with a distinct raised rim, and has the two tubercles (which take the place of the sulcus of *Primitia*) obliquely peaked. This species was named in memory of T. A. Conrad, who was one of the first to describe the fossil Ostracoda of North America.

From the Hamilton Formation at Thedford (formerly Widder), Ontario, Canada. Collected by Dr. G. J. Hinde, F.G.S.

8. PRIMITIOPSIS PUNCTULIFERA (Hall).

Pl. 11, figs. 10, 11 a, 11 b.

Leperditia punctulifera, Hall. Thirteenth Report of the Regents of the University of New York, 1860, p. 92.

Primitiopsis punctulifera, Jones. Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 9, pl. ii, figs. 7, 12, 13.

The occurrence at Thedford, Ontario, of numerous specimens of *Primitiopsis punctulifera* (Hall) in various stages of development as to

size, reticulation, tubercles, and smoothness of ends (nothing of the last in the very young state; length $\cdot 9$, height $\cdot 5$ mm.), is mentioned at page 28 of the February number of the Quart. Journ. Geol. Soc., 1890.

Some interiors of small valves of *Primitiopsis punctulifera* are shown on one of the pieces of grey limestone (composed of small brachiopods, &c.) from the same place. They are $1\cdot 25$ mm. long, and $\cdot 75$ mm. high, and not full grown, but rather larger than fig. 7, pl. ii, Q. J. G. S., February, 1890. They show distinctly that the front border is bevelled inwards, the ventral edge of the right valve is somewhat in-turned at its hinder moiety, the posterior edge is thin, and the dorsal edge straight, with a simple groove along its length, slightly overlapped by the outside edge of the valve brought over at the middle.

From the Hamilton group, at Thedford, Ontario. Collected by Dr. G. J. Hinde, F.G.S.

9. KIRKBYA (?) WALCOTTI, Jones.

Pl. 11, figs. 12 a, 12 b.

Primitia (?) *Walcotti*, Jones. Quart. Journ. Geol. Soc., vol. XLVI, p. 543, woodcut, fig. 1.

Length $\cdot 95$ (imperfect), height $\cdot 47$ mm.

This imperfect, but very interesting specimen, is far more nearly related to some forms of *Kirkbya*, such as *K. costata* (McCoy), Ann. Mag. Nat. Hist., ser. 5, vol. XV, 1885, pl. iii, fig. 13, than to *Primitia*, to which genus it was at first referred with doubt. Gradations from the ribs of *K. costata*, as shown by *K. Scotica*, figs. 16 and 17, of the same plate*, lead towards such obliquely anastomosing, close set, and tortuous riblets or wrinkles as seen in the specimen under notice.

This is, unfortunately, broken at one end and partly buried along the edges. It has a central pit, and is elegantly ornamented with narrow curved ridges and furrows (of about equal width). These are nearly straight, and somewhat inosculating on the dorsal, tortuous and interrupted on the ventral region. Small pits occur here and there along the furrows, as if marking obsolete meshes.

This was named as a species in honour of C. D. Walcott, F.G.S., of Washington, U.S., who has discovered and described several very interesting forms of North American Ostracoda.

From the Hamilton group at Thedford, Ontario. Collected by Dr. G. J. Hinde, F.G.S.

* It may be mentioned that *K. costata* and its allies on the same plate tend towards *Eutomis*, while *K. rigida* and *K. Urei* (figs. 18 and 19) lead to *Streptula*.

APPENDIX.

NOTES ON THE SPECIES OF OSTRACODA DESCRIBED AND FIGURED IN
DECADE III, OF THE GEOLOGICAL SURVEY OF CANADA,
PUBLISHED IN 1858.

Since the date of this publication a better knowledge of these and their allied forms has been obtained; and, their grouping and relationship being better understood, changes in their nomenclature have taken place.

1. *Beyrichia Logani*, p. 91, pl. xi, figs. 1-5.

This (with its varieties *reniformis*, fig. 1, and *leperditioides*, fig. 5, was referred to the genus PRIMITIA in the 'Ann. Mag. Nat. Hist.,' ser. 3, vol. XVI, 1865, pp. 416, 417, by Jones and Holl, on account of its simple sulcus or pit and the absence of Beyrichian lobes.

2. *Leperditia Canadensis*, var. *nana*, p. 92, pl. xi, figs. 6, 7, 9, 10.

This is the typical *L. canadensis*. At first some *Leperditia*, allied to Conrad's *L. fabulites*, were grouped with the foregoing, and in the preparation of the memoir in Decade III, the relatively small size of the latter gave rise to the varietal term *nana*, which is not really required. Fig. 7 may be regarded as a smooth and rather elongate variety.

3. *Leperditia Canadensis*, var. *labrosa*, p. 93, pl. xi, fig. 8.

This was originally proposed as a variety in the "Ann. Mag. Nat. Hist.," ser. 3, vol. I, 1858, p. 245, where there is no mention of "*nana*." It may well be specifically distinct.

This small *Leperditia* has an oblong shape and a definite lip or flat margin at each extremity.

As formerly indicated, this form, now regarded as a species, is more nearly allied to *L. Canadensis* than to *L. fabulites*.

Note.—*Leperditia Josephiana*, *Louckiana*, and *labrosa* are known from the Trenton Limestone of Canada. *L. Josephiana*, also from the Trenton Limestone of Tennessee, and *L. labrosa* from the Black-river Limestone of Canada.

4. *Leperditia Canadensis*, var. *Louckiana*, p. 93, pl. xi, fig. 11.

Leperditia Canadensis (?), Jones. Ann. Mag. Nat. Hist., ser. 3, vol. I, 1858, p. 245, pl. ix, fig. 16 (afterwards var. *Louckiana*).

Leperditia Canadensis, var. *Louckiana*, Jones. Geol. Surv. Canada, Org. Rem., Decade III, 1858, p. 93, pl. xi, fig. 11.

Leperditia fabulites (Conrad), var. *Louckiana*, Jones. Ann. Mag. Nat. Hist., ser. 5, vol. VIII, 1881, p. 343.

Leperditia Louckiana, Jones. *Op. cit.*, vol. XIV, 1884, p. 340.

5. *Leperditia Canadensis*, var. *Pauquettiana*, p. 94, pl. xi, fig. 12.

6. " " " *Josephiana*, p. 94, pl. xi, fig. 16.

- Cytherina fabulites*, Conrad. Proc. Ac. Nat. Sc., Philadel. 1843, vol. I, p. 332.
- Leperditia fabulites*, Jones. Ann. Mag. Nat. Hist., ser. 2, vol. XVII, 1856, p. 897, ser. 2, vol. I, p. 146; ser. 5, vol. VIII, 1881, pp. 342-4.
- Leperditia Canadensis*, var. *Josephiana*, Jones. Ann. Mag. Nat. Hist., ser. 3, vol. I, 1858, p. 341; Geol. Surv. Canada, Dec. III, 1858, p. 94, pl. xi, fig. 16.
- Leperditia fabulites* (Conrad), var. *Josephiana*, Jones. Ann. Mag. Nat. Hist., ser. 5, vol. VIII, 1881, p. 344, pl. xix, fig. 7, pl. 20, figs. 7 and 8, and p. 345, pl. xx fig. 4?
- Leperditia fabulites*, Whitfield. Report Geol. Surv. Wisconsin, vol. I, 1883, p. 160, fig. f.
- Leperditia Josephiana*, Jones. Ann. Mag. Nat. Hist., ser. 5, vol. XIV, 1884, p. 341.
7. *Leperditia Canadensis*, var. *Anticostiana* [*Anticostiensis**], p. 95, pl. xi, fig. 17.

In the 'Ann. and Mag. Nat. Hist.' ser. 5, vol. VIII, 1881, pp. 343, 344, these had been referred to *Leperditia fabulites* (Conrad); and, although *Josephiana* was separated from *fabulites*, *op. cit.*, vol. XIV, 1884, pp. 341, 342, yet it is probably best either to keep it as a variety of *fabulites*, as stated *op. cit.*, 1881, p. 344, or, better still, as the same as *L. fabulites* itself. *L. Louckiana* and *L. Anticostiensis* are treated as "species," *op. cit.*, 1884, pp. 340-342.

The several Canadian *Leperditia* were grouped by me in Ann. and Mag. Nat. Hist., November, 1881, p. 343, in three sets, namely, 1. *Lep. Canadensis*, Jones, with its var. *nana* and var. *labrosa*. 2. *Lep. fabulites* (Conrad), with varieties *Josephiana*, *Anticostiana* (more properly *Anticostiensis*), *Louckiana*, and *Pauquettiana*. 3. With *Lep. amygdalina*, Jones, as a separate type. In 1884 I thought it advisable to treat the varieties as "species."

Some elegant specimens in the Museum of the McGill University, Montreal, which had been collected from the Trenton Limestone of Murray Bay, Canada, were the basis of my note on *L. Josephiana* in the Ann. Mag. Nat. Hist., November, 1884, p. 341. Like the previously figured specimens, these vary somewhat among themselves and from others, especially as to the outline of the front end, which is often obliquely truncate for a short distance below the dorsal angle. Some have a slight lip at one extremity of the valve and some have it at the other.

8. *Leperditia Anna*, p. 96, pl. xi, fig. 13.

This retains its status.

9. *Leperditia amygdalina*, p. 96, pl. xi, figs. 18, 19.

This also holds good. See 'Ann. and Mag. Nat. Hist.,' Novemb., 1881, pp. 343, 344.

* Being named after a place and not after a person.

ISOCHILINA, p. 97. This is now regarded as a distinct genus, and not as a subgenus of *Leperditia*.

10. *Leperditia (Isochilina) Ottawa*, p. 97, pl. xi, fig. 14.

11. *Leperditia (Isochilina) gracilis*, p. 98, pl. xi, fig. 15.

These are true *Isochilinae*.

CYTHEROPSIS, p. 98. This is not now applied as a generic term to any fossil Ostracoda.

12. *Cytheropsis concinna*, p. 99 ('A. M. N. H.,' April, 1858, p. 254, pl. x, figs. 3 and 4).

Being quite smooth and furrowless, it is an *Aparchites*; but, if it showed any sign of a dorsal sulcus or central pit it would come under *Primitia*, and probably be equivalent to *Primitia minuta* (Richwald). See Quart. Journ. Geol. Soc., vol. XLVI, 1890, p. 7.

13. *Cytheropsis siliqua*, p. 99 (*op. cit.*, p. 249, pl. x, fig. 6).

This is probably a *Macrocypris* figured in a reversed position.

14. *Cytheropsis ? rugosa*, p. 100 (*op. cit.*, p. 249, pl. x, fig. 5).

This pretty little carapace was almost certainly figured in a reversed position. Its generic position has not been determined. It may possibly belong to *Cytherella*.

GENERIC AND SPECIFIC NAMES NOW ADOPTED.

1. *Primitia Logani*, Jones, pl. xi, figs. 1-5; var. *reniformis*, fig. 1, and var. *leperditioides*, fig. 5.
2. *Leperditia Canadensis*, Jones, figs. 6, 7, 9, 10.
3. " *labrosa*, Jones, fig. 8.
4. *Leperditia Louckiana*, Jones, fig. 11.
5. *Leperditia Pauquettiana*, Jones, fig. 12.
6. *Leperditia fabulites* (Conrad), fig. 16 (including *Josephiana*).
7. *Leperditia Anticostiensis*, Jones, fig. 17.
8. *Leperditia Anna*, Jones, fig. 13.
9. *Leperditia amygdalina*, Jones, figs. 18; 19.
10. *Isochilina Ottawa*, Jones, fig. 14.
11. *Isochilina gracilis*, Jones, fig. 15.
12. *Aparchites concinnus*, Jones, page 99.
13. *Macrocypris ? siliqua*, Jones, page 99.
14. *Cytherella ? rugosa*, Jones, page 100.

PLATE X.

- Figure 1. *Isochilina grandis*, Jones, var. *latimarginata*, nov. a, right valve; b, ventral view; c, end view. Nat. size.
- " 2. The same. a, right valve; b, ventral view; c, end view. Nat. size.
- " 3. The same. Muscle-spot. Magn. twice.
- " 4. The same. Muscle-spot of another individual. Magn. three times.
- " 5. *Leperditia Hisingeri*, Schmidt, var. *fabulina*, nov. a, left valve; b, ventral edge; c, end view. Magn. twice.
- " 6. *Leperditia marginata*, Schmidt. a, right valve; b, ventral edge; c, end view. Magn. twice.
- " 7. *Leperditia Hisingeri*, Schmidt, var. *fabulina*, nov. Two valves of a small individual, more or less imbedded. Magn. twice, Figs. 1-7 from Long Point, Lake Winnepegosis.
- " 8. *Primitia mundula*, Jones, var. *effossa*, nov. Right valve. Magn. 15 diam. Quebec City.
- " 9. *Primitia mundula*, Jones, var. *incisa*, nov. a, right valve; b, ventral edge; c, end view. Magn. 15 diam. Lorette Falls.
- " 10. *Isochilina Ottawa*, Jones, var. *intermedia*, nov. a, left valve; b, ventral view. Magn. 5 diam. Aylmer, Prov. Quebec.
- " 11. The same, var. *intermedia*. a, right valve; Magn. 5 diam.; b, portion of marginal rim; Magn. 25 diam.
- " 12. *Aparchites mundulus*, sp. nov. Right valve. Magn. 15 diam. [The dorsal line is made too long in the figure.] Lorette Falls.
- " 13. *Isochilina Whiteavesii*, sp. nov. a, left valve [the ventral margin is brought down too low in the figure]; b, ventral edge. Magn. 10 diam. Lorette Falls.
- " 14. *Isochilina Amii*, sp. nov. a, left valve; b, ventral view. Magn. 10 diam. Lorette Falls.
- " 15. *Leperditia ? obscura*, sp. nov. a, carapace left valve shown; b, ventral view of carapace, (the right valve represented only by its internal cast). Magn. 7 diam. Lorette Falls.
- " 16. *Isochilina labellosa*, sp. nov. a, right valve; b, ventral view. Magn. 15 diam. Aylmer, Prov. Quebec.
- " 17. The same. Left valve. Magn. 7 diam., Aylmer, Prov. Quebec.
- " 18. *Leperditia balthica* (Hisinger), var. *primæva*, nov. Right valve. Magn. 7 diam. Carleton Co., Ontario.
- " 19. *Isochilina labellosa*, sp. nov. Ventral view. Magn. 7 diam. Aylmer, Prov. Quebec.

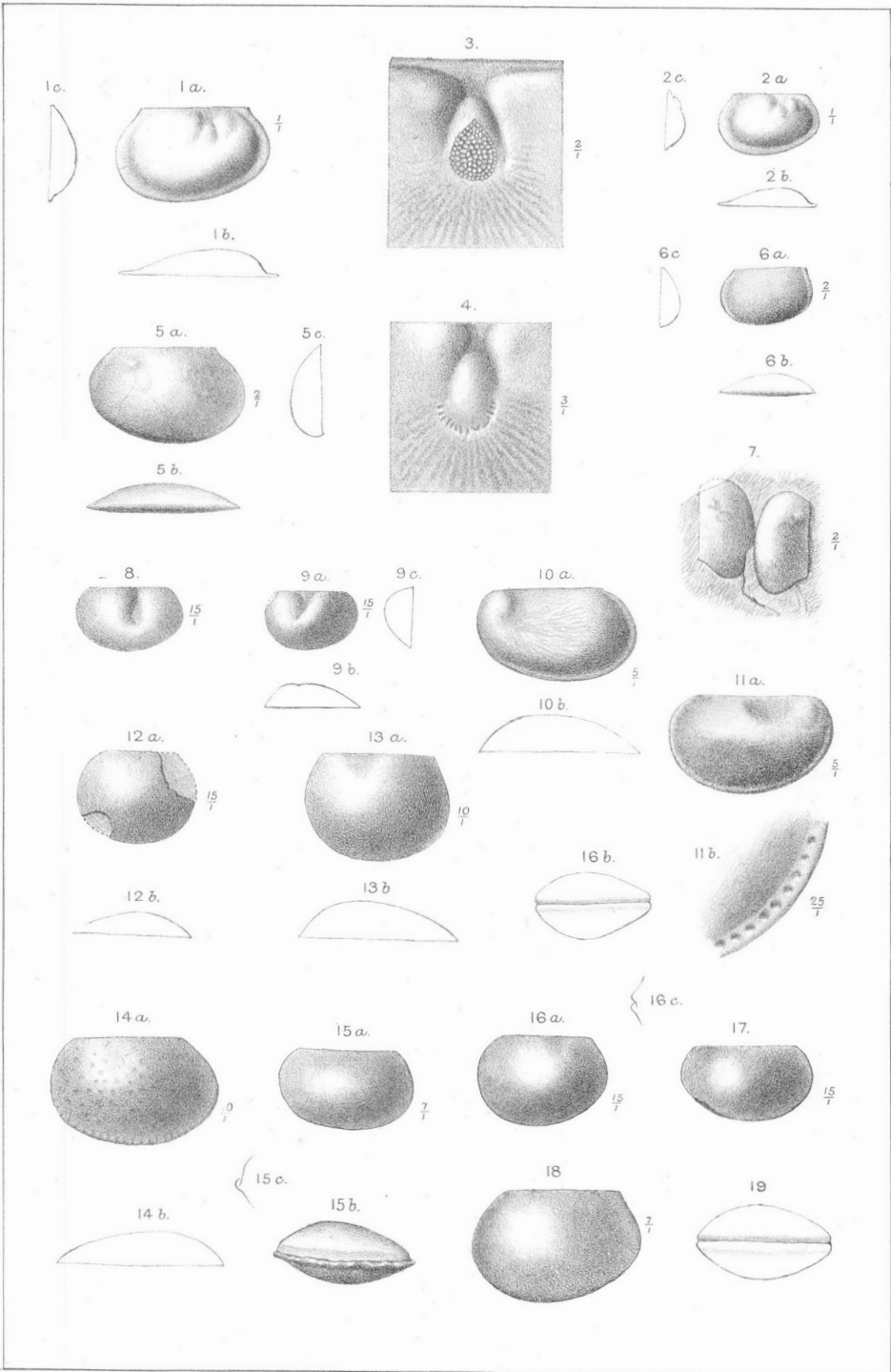


PLATE XI.

- Figure 1. *Beyrichia tuberculata* (Kloeden), var. *strictispiralis*, nov. Right valve (cast). Magn. 7 diam. Arisaig, N. S.
- " 2. The same, var. *pustulosa*, Hall. Right valve (cast). Magn. 7 diam. Arisaig.
- " 3. The same. Type. Right valve (cast). Magn. 7 diam. Arisaig.
- " 4. The same, var. *Noellingi*, Reuter. a, right valve (cast); b, ventral aspect. Magn. 7 diam. Arisaig.
- " 5. The same, var. *Noellingi*, Reuter. Right valve (cast). Magn. 7 diam. Arisaig.
- " 6. *Beyrichia xquilatera*, Hall. Left valve (cast). Magn. 7 diam. Arisaig.
- " 7. *Beyrichia clavigera*, sp. nov. Left valve. Magn. 7 diam. Aylmer, Quebec.
- " 8. The same, var. *clavifracta*, nov. Right valve. Magn. 7 diam. Aylmer, Quebec.
- " 9. *Beyrichia quadrifida*, sp. nov. a, left valve; b, ventral aspect. Magn. 15 diam. Lorette Falls.
- " 10. *Primitiopsis punctulifera* (Hall). Young individual. Right valve. Magn. 30 diam. Thedford.
- " 11. The same. Young individual. a, inside of left valve; Magn. 20 diam.; b, the inner aspect of the dorsal edge; Magn. 40 diam. Thedford, Ont.
- " 12. *Kirkbya* ? *Walcotti*, Jones. a, partly imbedded valve; Magn. 30 diam.; b, portion; Magn. 60 diam. Thedford.
- " 13. *Ulrichia Conradi*, Jones. Left valve. Magn. 30 diam. Thedford.
- " 14. *Primitia scitula*, sp. nov. a, right valve; b, ventral view. Magn. 20 diam. Hay River.
- " 15. *Aparchites mitis*, sp. nov. a, left valve; b, ventral view. Magn. 30 diam. Hay River.
- " 16. *Isochilina bellula*, sp. nov. a, left valve; b, ventral view. Magn. 30 diam. Hay River.

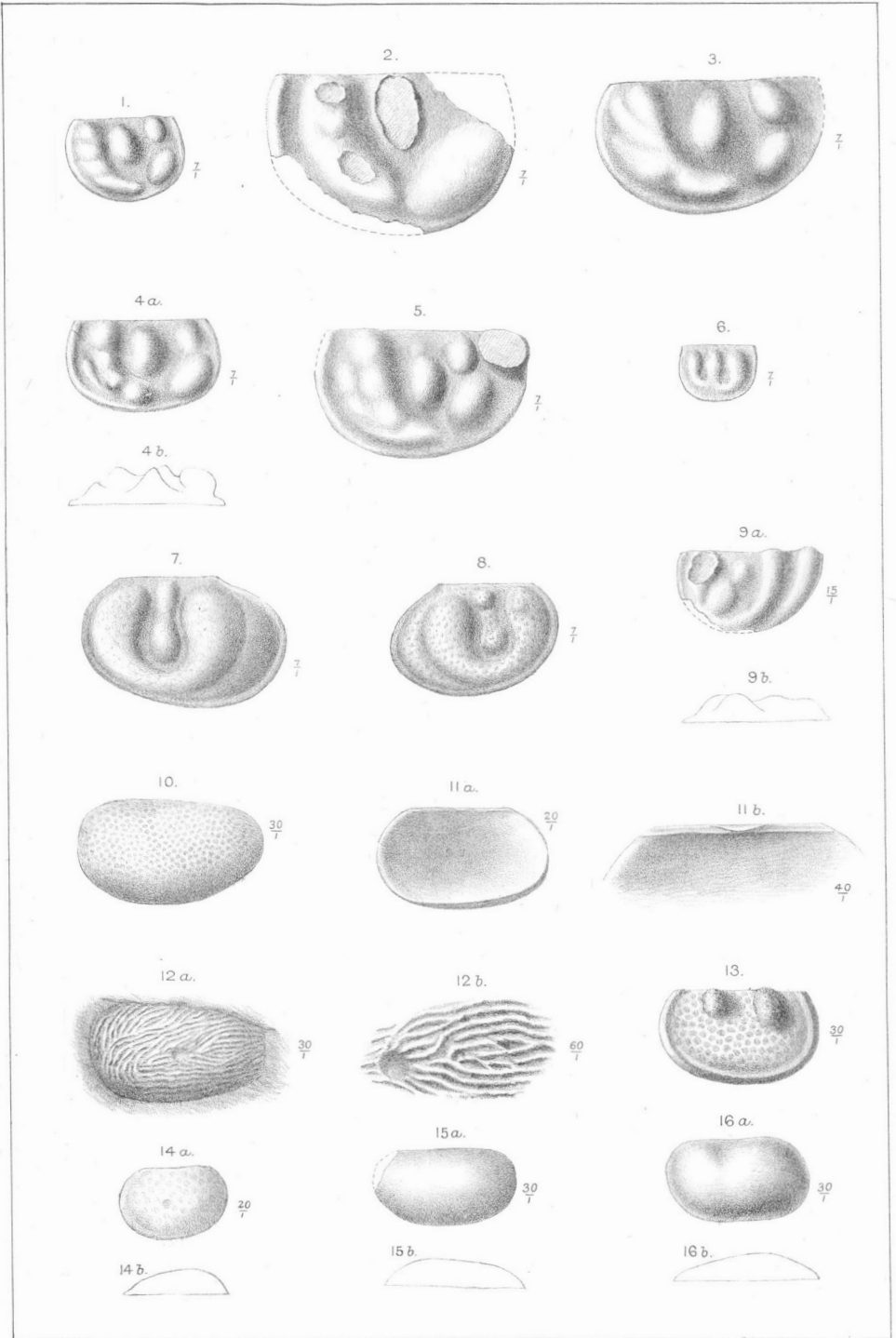
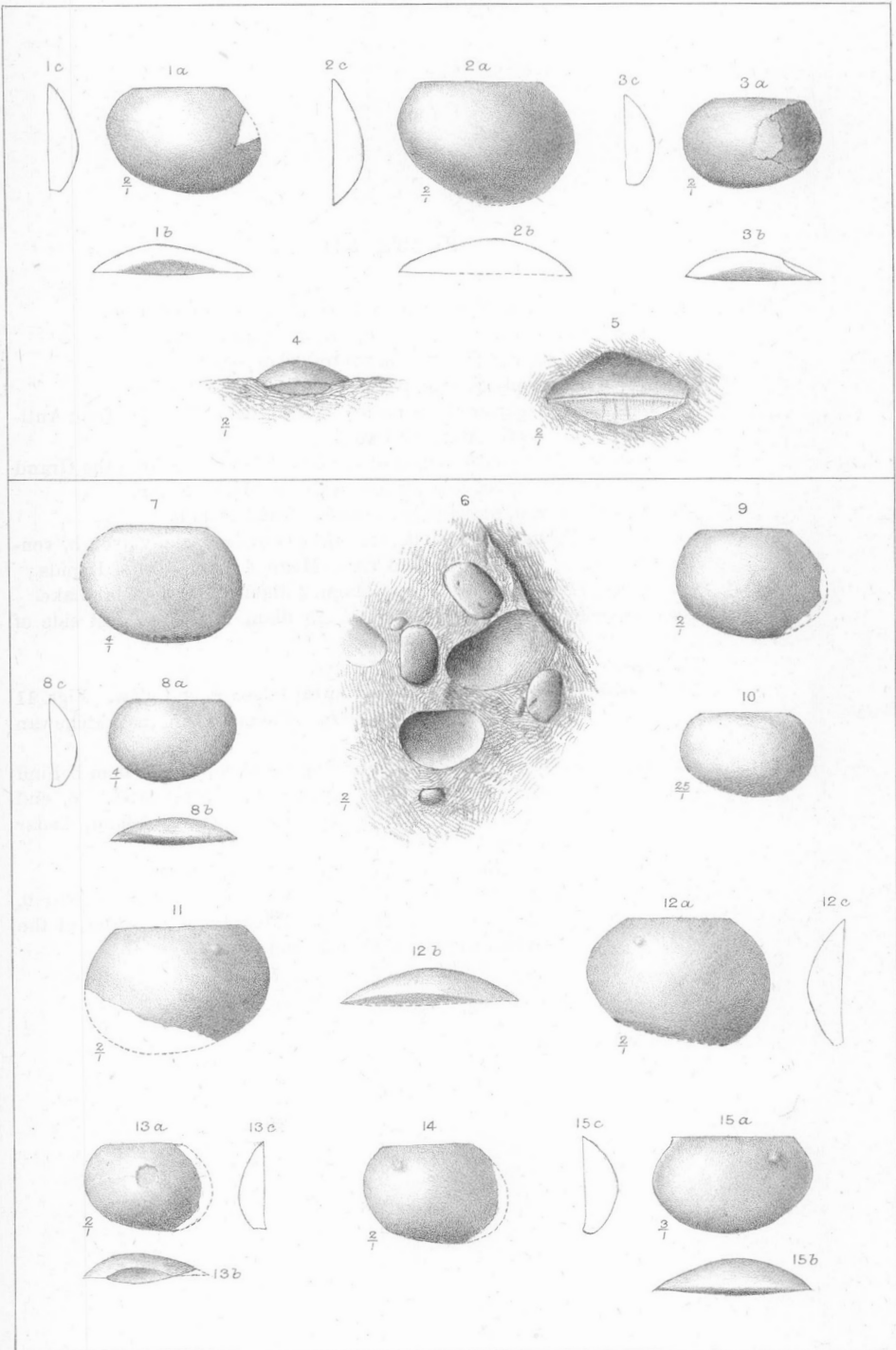


PLATE XII.

- Figure 1. *Leperditia Selwynii*, sp. nov. a, left valve; b, ventral edge.
 " 2. The same. a, left valve; b, edge view; c, end view.
 " 3. The same. a, right valve; b, ventral edge; end view.
 " 4. The same. Ventral edge, partly exposed, of a left valve.
 " 5. The same. Interior of the united ventral edges. Figs. 1-5 from Anticosti. Magn. 2 diam.
 " 6. Portion of slab with casts and moulds of *Leperditia* from the Grand Rapids, Saskatchewan River. Magn. 2 diam.
 " 7. *Leperditia caeca*, nov. Magn. 4 diam. Grand Rapids.
 " 8. ——— *Hisingeri*, Schmidt, var. *egena*, nov. a, right valve; b, ventral edge; c. end view. Magn. 4 diam. Grand Rapids.
 " 9. ——— *caeca*, nov. Left valve. Magn. 2 diam. Below Cedar Lake.
 " 10. ——— *exigua*. Left valve. Magn. 25 diam. Island on east side of Lake Winnipegosis.
 " 11. ——— *Whiteavesii*, nov. Right valve.
 " 12. ——— a, left valve; b, ventral edge; c, end view. Figs. 11 and 12. Magn. 2 diam. Chemahawin, Saskatchewan River.
 " 13. ——— a, left valve retaining its shell, but broken behind and damaged at the centre; b, ventral aspect; c, end view. Magn. 2 diam. From Old Fort Island, Cedar Lake.
 " 14. ——— Left valve. Magn. 2 diam. Chemahawin.
 " 15. ——— *Hisingeri*, Schmidt, var. *fabulina*, nov. a, right valve; b, ventral edge; c, end view. Magn. 3 diam. Foot of the Grand Rapids, Saskatchewan River.



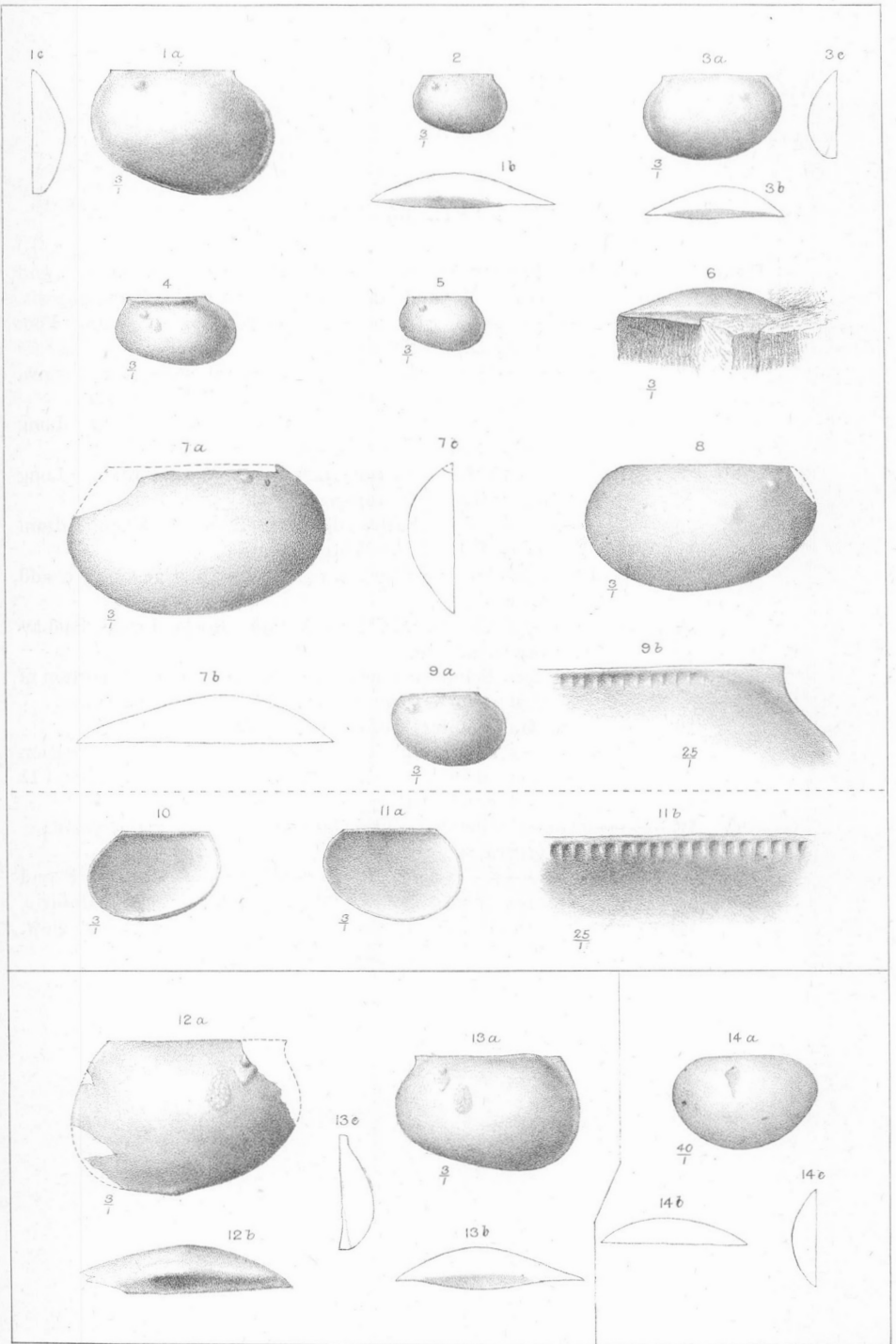
E. C. K. del. et lith.

OSTRACODA.

West, Newman, imp.

PLATE XIII.

- Figure 1. *Leperditia Hisingeri*, Schmidt. a, left valve; b, ventral edge; c, end view. Magn. 3 diam. Long Point, Lake Winnipegosis.
- " 2. ———— var. *fabulina*, nov. Left valve. Magn. 3 diam. Foot of the Grand Rapids.
- " 3. ———— a, right valve; b, ventral edge; c, end view. Magn. 3 diam. Long Point, Lake Winnipegosis.
- " 4. ———— var. *gibbera*, nov. Left valve. Magn. 3 diam. Long Point, Lake Winnipegosis.
- " 5. ———— var. *fabulina*, nov. Left valve. Magn. 3 diam. Long Point, Lake Winnipegosis.
- " 6. ———— Ventral edge of a left valve. Magn. 3 diam. Long Point, Lake Winnipegosis.
- " 7. *Leperditia phaseolus* (Hisinger). a, right valve; b, edge view; c, end view.
- " 8. ———— Right valve. Magn. 3 diam. Roche Rouge, Saskatchewan River.
- " 9. ———— *Hisingeri*, Schmidt. a, left valve; Magn. 2 diam.; b, portion of postero-dorsal region. Magn. 25 diam. Long Point.
- " 10. ———— *alta*, Hall. Interior of left valve. Magn. 3 diam.
- " 11. ———— a, interior of right valve; Magn. 3 diam.; b, portion of inside of hinge-line. Magn. 25 diam. Figs. 10 and 11 from Schoharie.
- " 12. ———— *balthica* (Hisinger), var. *Guelphica*, nov. a, right valve; b, ventral edge.
- " 13. ———— a, left valve; b, ventral edge; c, end view. Figs. 12 and 13. Magn. 3 diam. Durham, Ontario.
- " 14. *Aparchites Tyrrellii*, nov. a, right valve; b, edge view; c, end view. Magn. 40 diam. Black Island, Lake Winnipeg.



E. C. K. del. et lith.

West, Newman, imp.

OSTRACODA.