

GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.

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APPENDIX I.

ON SOME FOSSILS FROM THE CRETACEOUS AND
LARAMIE ROCKS OF THE SASKATCHEWAN
AND ITS TRIBUTARIES,
COLLECTED BY MR. J. B. TYRRELL IN 1885 AND 1886.*

BY J. F. WHITEAVES.

(A.) CRETACEOUS SPECIES.

LAMELLIBRANCHIATA.

PTERIA LINGUIFORMIS, var. SUBGIBBOSA, Meek.

Avicula subgibbosa, Meek and Hayden. 1860. Proc. Ac. Nat. Sc. Phil., p. 180.

Pteria subgibbosa, Meek. 1864. Smithson. Check-List N. Am. Cret. Foss.

Pteria linguiformis, var. *subgibbosa*, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 33, pl. 28, fig. 12.

Battle River, township 46, range 4, west of the 4th Principal Meridian, 1885.

INOCERAMUS SAGENSIS, var. NEBRASCENSIS, Owen.

Inoceramus Sagensis, Owen. 1852. Geol. Rep. Wisc., Iowa & Minn., p. 582, pl. 7, fig. 3.

Inoceramus Nebrascensis, Owen. 1852. *Ib.*, p. 582, pl. 8, fig. 1.

Inoceramus Sagensis, var. *Nebrascensis*, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 52, pl. 13, figs. 2 a, b.

Inoceramus Sagensis, Whitfield. Pal. Black Hills Dakota, p. 393, pl. 7, fig. 12, and pl. 8, fig. 2.

Mouth of Vermilion River, township 54, range 3, west of the 4th Principal Meridian; North Saskatchewan River, township 54, range 2, west of the 4th Principal Meridian; Nose Creek, section 24, township 44, range 2, west of the 4th Principal Meridian, 1886: one specimen from each of these localities.

* The fossils collected by Mr. Tyrrell in 1884 have already been enumerated or described in "Contributions to Canadian Paleontology, Part I., 1885."

INOCERAMUS VANUXEMI, Meek and Hayden.

- Inoceramus Vanuxemi*, Meek and Hayden. 1860. Proc. Ac. Nat. Sc. Phil., p. 180.
Inoceramus Mortoni, Meek and Hayden. 1860. Ib., p. 428.
Inoceramus proximus, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 53,
 pl. 12, fig. 7; and var. *subcircularis*, Meek, ib., p. 55, pl. 12,
 fig. 2.
Inoceramus Vanuxemi, Whitfield. Pal. Black Hills Dakota, p. 396, pl. 7, figs. 8, 9,
 and pl. 8, figs. 4, 5.

Mouth of Vermilion River, township 54, range 3, west of the 4th Principal Meridian, 1886, five specimens; and North Saskatchewan River, township 54, range 2, west of the same meridian, 1886: two specimens.

GERVILLIA RECTA, var. BOREALIS, Whiteaves.

- Gervillia recta*, var. *borealis*, Whiteaves. 1885. Contr. to Canad. Palæont., vol. I.,
 p. 35, pl. 4, figs. 2, 2 a and 2 b.

Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, 1886: a few characteristic fragments.

TANCREDIA AMERICANA, Meek and Hayden.

- Hettangia Americana*, Meek and Hayden. 1856. Proc. Ac. Nat. Sc. Phil., vol. VIII., p. 274; and 1860, Ib., vol. XII., p. 185.
Tancredia Americana, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 142,
 pl. 38, figs. 1, a-h.

Same locality and date as the preceding species: two very imperfect and badly preserved specimens.

CYPRINA OVATA, Meek and Hayden.

- Cyprina ovata*, Meek and Hayden. 1857. Proc. Ac. Nat. Sc. Phil., vol. IX., p. 144.
 " " Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 146, pl. 29,
 figs. 7 a, b, c, and pl. 30, fig. 11.

Battle River, township 40, range 13, west of the 4th Principal Meridian, and township 40, range 15, west of the same meridian, 1885: a single and barely recognizable specimen from each of these localities.

CYPRINA SUBTRAPEZIFORMIS. (N. Sp.)

Shell small, inequilateral, transversely subtrapezoidal: valves moderately convex, most prominent on the posterior umbonal slopes, which are subangular: height (in the centre) one-third greater than the maximum breadth: length a little more than one-fourth greater than the height. Anterior side short and evenly rounded: posterior side about three times as long as the anterior, its extremity obliquely truncated above and somewhat bluntly pointed below: superior border descending rather abruptly in an obliquely convex curve in front of the beaks, and nearly straight and parallel with the ventral margin behind them: umbones swollen laterally, but scarcely prominent: beaks small, appressed and slightly depressed, placed about half-way between the centre and the anterior margin: lunule none: posterior area subangularly inflected, but very indistinctly defined: ventral margin nearly straight for the greater part of its length, but rounding up abruptly at the anterior end and forming an obtusely subangular junction with the posterior margin behind.

Surface marked with rather coarse, concentric lines of growth: test somewhat thin. Anterior muscular impression subovate: posterior muscular impression rather larger and more nearly circular: pallial line simple and entire: hinge dentition unknown.

Dimensions of the most perfect specimen collected: maximum length, twenty-three millimetres and a half; greatest height, fifteen mm; approximate thickness through the closed valves, ten mm.

Battle River, township 46, range 4, west of the 4th Principal Meridian, 1885: apparently abundant. About thirty specimens were collected at this locality, but of these, only one is quite perfect, with the whole of the test preserved, while the rest are for the most part little more than mere casts of the interior of the closed valves, with portions of the exfoliated test adherent thereto.

The hinge dentition being unknown, it is uncertain to what genus this shell should be referred. It may prove to be a *Cypricardia* or a *Veniella* rather than a *Cyprina*.

PROTCARDIA SUBQUADRATA, Evans and Shumard.

Cardium subquadratum, Evans and Shumard. 1857. Trans. Ac. Nat. Sc. St. Louis, vol. I., p. 39.

Protocardia (Leptocardia) subquadrata, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 175, pl. 29, figs. 8 a, b, c, d, e.

Protocardia subquadrata, Whiteaves, as of Shumard. 1885. Contr. to Canad. Palæont., vol. I., p. 41, pl. 5, figs. 4 and 4 a.

Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, 1886: a few well preserved and characteristic specimens.

PROTOCARDIA BOREALIS, Whiteaves.

Protocardia borealis, Whiteaves. 1885. Contr. to Canad. Palæont., vol. I., p. 41, pl. 6, figs. 1, 1 a, 2, 2 a, and 3.

"The Nose," township 27, range 8, west of the 4th Principal Meridian, 1885: two specimens.

LINEARIA FORMOSA? Meek and Hayden.

Tellina formosa, Meek and Hayden. 1860. Proc. Ac. Nat. Sc. Phil., vol. XII., p. 179.

Abra (?) formosa, Meek. 1864. Smithson. Check-List N. Am. Cret. Fossils, p. 14.

Linearia (?) formosa, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 199, pl. 30, fig. 2.

Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, 1886: a perfect right valve of a small Tellinid which corresponds remarkably well with Meek's figure of the above-named species. In the specimen collected by Mr. Tyrrell, however, only the outer surface is exposed to view, the whole of the characters of the interior being buried in the matrix. No traces of any radiating striæ can be discovered on its test, with a lens, although the markings on its outer surface are beautifully preserved, and its test does not appear to have been "very thin."

PHOLADOMYA SUBVENTRICOSA, Meek and Hayden.

Pholadomya subventricosa, Meek and Hayden. 1857. Proc. Ac. Nat. Sc. Phil., vol. IX., p. 142.

Pholadomya subventricosa, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 217, pl. 39, figs. 8, a, b.

North Saskatchewan River, at Fort Pitt, and in township 54, range 2, west of the 4th Principal Meridian, 1886: one nearly perfect specimen with both valves preserved from each of these localities. A portion of a mould of a shell which may have belonged to this species, was collected on the banks of the same river near the mouth of Moose Hill Creek.

Dr. Hector records finding a *Pholadomya* which he refers to *P. occidentalis* of Morton, but which is probably referable to this species, at Fort Pitt, on the North Saskatchewan, and at the elbow of the South Saskatchewan, in 1857 or 1858.

LIOPISTHA UNDATA, Meek and Hayden.

Pholadomya undata, Meek and Hayden. 1856. Proc. Ac. Nat. Sc. Phil., vol. VIII., p. 81.

Pholadomya (Cymella) undata, Meek. 1864. Smithson. Check-List N. Am. Cret. Inv. Foss., pp. 14 and 34.

Liopistha (Cymella) undata, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 236, pl. 39, figs. 1, a, b.

Nose Creek, township 37, range 9, west of the 4th Principal Meridian, 1885: one characteristic specimen.

SOLECURTUS (TAGELUS) OCCIDENTALIS. (N. Sp.)

Shell transversely elongated, a little more than twice as long as high, very nearly equilateral, strongly compressed at the sides, most prominent on the umbonal slopes, and faintly depressed in the middle below. Anterior and posterior ends both rounded at their margins, but rather more broadly so below than above, while the (presumed) posterior extremity is a very little the narrower of the two. Superior border nearly straight for some distance in front of and behind the beaks, which are inconspicuous, central, appressed and depressed; ventral margin nearly straight or very faintly concave in the centre.

Surface apparently marked only with concentric lines of growth. Hinge dentition, muscular impressions and pallial line unknown.

Approximate dimensions of the only specimen collected: maximum height, twenty-three millimetres; greatest length, sixty-seven mm.; thickness through the closed valves, about fourteen mm.

Battle River, township 40, range 13, west of the 4th Principal Meridian, 1885: an imperfect and badly preserved left (?) valve.

MARTESIA TUMIDIFRONS (N. Sp.)

Shell rather large for the genus, very inequilateral, valves subglobose or semiglobose and abruptly swollen in front, produced and rather rapidly attenuated behind; outline, as viewed from above, somewhat pyriform. Greatest height, as measured in the centre, behind the beaks, about equal to the maximum thickness through the closed val-

ves; greatest height, as compared with the maximum length, about as three to five.

Lateral outline transversely subovate; anterior side very short, its outer margin broadly rounded but somewhat truncated inwardly below the middle; posterior side much more elongated, narrowing gradually at its upper margin and much more rapidly from below upwards, its narrow and conspicuously gaping extremity being apparently somewhat obliquely truncated, though the margins of the cast of the united valves of the only specimen collected are both a little broken at this point. Superior border rounding abruptly downward in front, and nearly straight, but descending very gently behind: ventral margin broadly rounded, most prominent a little behind the middle: umbones swollen and prominent: beaks large, incurved and depressed, with a slight forward inclination and placed very near the anterior end: escutcheon broadly lanceolate and tolerably well defined.

On the umbonal region of the left valve only, a small portion of the test is preserved, and the outer surface of this is marked with concentric and rather irregularly disposed, ridge-like folds, which are often separated from each other by somewhat broader and rather deep concentric furrows. In addition to these, in each valve an elevated but narrow linear ridge runs obliquely backward from the posterior side of the beaks to a little behind the centre of the ventral margin.

Posterior muscular impression narrowly subelliptical, placed very high up, almost within the escutcheon, and a little behind the mid-length; anterior muscular impression, pallial line and accessory valves unknown. The pedal opening in front seems to have been large and broadly rhomboidal in outline.

The measurements of the only specimen collected are approximately as follows: maximum length, about fifty-one millimetres; greatest height, as measured in the centre, immediately behind the umbones, and maximum thickness through the closed valves, both thirty-one mm.

North Saskatchewan River, township 54, range 2, west of the 4th Principal Meridian, 1886: one nearly perfect and well preserved cast of the interior of the closed valves, with a small portion of the test adhering to the left valve. An apparently well characterized and very distinct species.

GASTEROPODA.

HYDATINA PARVULA. (N. Sp.)

Shell small, the outer whorl enveloping all the preceding volutions, strongly inflated and very ventricose, so much so, that its maximum breadth is very little less than the entire height or length—subtruncated

posteriorly, broadest above or behind the middle, narrowing rapidly below or in front and distinctly angular at the base or anterior extremity. Spire narrow, depressed and sunk deeply below the highest level or rounded posterior shoulder of the outer whorl.

Outer lip thin and simple: characters of the aperture and surface markings unknown.

Maximum height or length of the only specimen collected, ten millimetres and a-half; greatest breadth of the same, nine mm.

Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, 1886: one perfect cast of the interior of the shell, with a considerable portion of the inner layer of the test preserved, though the aperture is entirely filled up with the matrix.

This interesting little shell may belong to Conrad's genus *Bullopsis*, rather than to *Hydatina*. It seems to differ from *B. cretacea* of that author in being more expanded posteriorly and more angular in front.

LUNATIA CONCINNA, Hall and Meek. (Sp.)

Natica concinna, Hall and Meek. 1854. Mem. Am. Ac. Arts. and Sc., vol. V., p. 384, pl. 3, figs. 2 a, b, c, d.

Natica Moreauensis, Meek and Hayden. 1856. Proc. Ac. Nat. Sc. Phil., vol. VIII, pp. 64 and 282.

Natica (Lunatia) Moreauensis, Meek and Hayden. 1860. Ib., vol. XII., p. 422.

Lunatia concinna, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 314, pl. 32, figs. 11 a, b, c.

Battle River, township 46, range 3, west of the 4th Principal Meridian, 1885: four imperfect and badly preserved specimens. Sounding Creek, township: 30, range 8, west of the same meridian, 1886: one specimen.

CEPHALOPODA.

BACULITES OVATUS, Say.

Baculites ovatus, Say. 1821. Am. Journ. Sc. and Arts, vol. II., p. 41.—Morton. 1829. Journ. Ac. Nat. Sc. Phil., vol. VI., p. 196, pl. 5, figs. 5 and 6; and 1830. Am. Journ. Sc. and Arts, vol. XVIII., p. 249, pl. 1, figs. 6, 7 and 8; also 1834, Synops. Org. Rem. Cret. Group U. S., p. 42, pl. 5, figs. 5 and 6.—Hall and Meek. 1854. Mem. Am. Ac. Arts and Sc., vol. V., (N.S.) p. 399, pl. 5, figs. 1, a, b, and pl. 6, figs. 1-7.—Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 394, pl. 20, figs. 2, a, b, d, and 1, a, b.

Ghost River, township 25, range 6, west the of 5th Principal Meridian, 1885. North Saskatchewan River, near mouth of Moose Hill Creek; also on the same river, in township 52, range 2, and in township 56, range 5, in each case west of the 4th Principal Meridian. Mouth of Vermilion River, in township 54, range 3, west of the same Meridian, 1886.

A few specimens from each of these localities, some of which seem to belong to the typical form of the species, while others are apparently intermediate in their characters between *B. ovatus* and *B. compressus*.

BACULITES GRANDIS, Hall and Meek.

Baculites grandis, Hall and Meek. 1854. Mem. Am. Ac. Arts and Sc., Boston, vol. V., (N. S.) p. 402., pl. 7, figs. 1 and 2, pl. 8, figs. 1 and 2, and pl. 6, fig. 10. Also, Meek, 1876, Rep. U. S. Geol. Surv. Terr., vol. IX., p. 398, fig. 53, and pl. 33, figs. 1, a, b, c.

Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, 1886: two large but fairly characteristic fragments.

BACULITES COMPRESSUS, Say.

Baculites compressus, Say. 1821. Am. Journ. Sc. and Arts, vol. II., p. 41.—Morton. 1834. Synops. Org. Rem. Cret. Group U. S., p. 43, pl. 9, fig. 1; and Journ. Ac. Nat. Sc. Phil., vol. VIII., p. 211.—Hall and Meek. 1854. Mem. Am. Acad. Arts and Sc., Boston, vol. V. (N.S.), p. 400, pl. 5, fig. 2, and pl. 6, figs. 8 and 9.—Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 400, figs. 55 and 56, and pl. 20, figs. 3, a, b, c.

"The Nose," township 37, range 8, west of the 4th Principal Meridian, and Nose Creek, township 37, range 9, west of the same Meridian, 1885.

North Saskatchewan, near mouth of Moose Hill Creek, apparently grading into *B. ovatus*; same river, in township 56, range 5, west of 4th Principal Meridian; mouth of Vermilion River, in township 53, range 3, west of the 4th Principal Meridian: several distorted fragments apparently also passing into *B. ovatus*; North Saskatchewan River, township 54, range 2, west of the 4th Meridian, 1886.

SCAPHITES NODOSUS, Owen.

Scaphites (Ammonites) nodosus, Owen. 1852. Geol. Rep. Surv. Wisc., Iowa and Minn., p. 580, pl. 8, fig. 4.

North Saskatchewan River, near the mouth of Moose Hill Creek,

1886: a fragment of a mould of the exterior of the shell, which shews the characteristic sculpture of the species, but not enough of the general shape to enable one to say to which of the varieties described and figured by Meek (in the ninth volume of the Rep. U. S. Geol. Surv. Terr.) it should be referred.

PLACENTICERAS PLACENTA, Dekay. (Sp.)

- Ammonites placenta*, Dekay. 1828. Ann. N. York Lyc. Nat. Hist., vol. II, p. 278, pl. 5, fig. 2 (3 by mistake).—Morton. Journ. Ac. Nat. Sc. Phil., vol. VI, p. 195; and Am. Journ. Sc. and Arts, vol. XVIII, pl. 2, figs. 1, 2 and 3; also 1834, Synops. Org. Rem. Cret. Form. U. S., p. 36, pl. 2, figs. 1 and 2.
- Placenticerus placenta*, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX, p. 465, pl. 24, figs. 2, a, b.

Battle River, township 40, range 13, west of the 4th Principal Meridian, 1885: a small fragment.

Sounding Creek, township 30, range 8, west of the same meridian, 1886; a single but nearly perfect specimen which measures nearly nine inches in its greatest diameter.

CRUSTACEA.

PALÆASTACUS (?) ORNATUS. (N. Sp.)

The foregoing is suggested as a provisional name for a rather remarkable specimen of a long tailed decapod, which evidently belongs to the family *Astacomorpha* of Zittel. Of the Cretaceous representatives of this family, it seems to come nearest to such genera as *Palæastacus* and *Hoploparia*, though it differs from each in some important particulars. In many respects it appears to the writer to be still more nearly related to the recent and fresh-water genera *Astacus* and *Cambarus*, but there is good reason for supposing that it will eventually prove to be the representative of a new generic type, which at present there is not sufficient material to define satisfactorily.

Nearly the whole of the under surface of the cephalothorax of the specimen is buried in the matrix, the front margin of the carapace is very imperfect, the tail fin as well as the under part of the five abdominal segments are broken off, and only small portions of the pinching claws and of the other ambulatory legs are preserved or exposed.

The carapace is moderately convex or slightly depressed, and not quite twice as long as broad. It is divided into two nearly equal parts by a single, well marked and deeply impressed neck furrow, which is

arched forward in a shallowly concave curve. Behind this furrow the lateral margins of the carapace are slightly expanded, the test in the branchial region is moderately inflated, and the posterior margin is shallowly concave in the middle. A short distance in advance of the neck furrow, on the outer and lower portion of the carapace, on each side, there is a very short and transverse groove or narrow constriction, which may possibly be confluent with the neck furrow on the strongly inflected lateral margins of this part of the carapace. The exact outline of the anterior margin of the carapace cannot be ascertained, and the tip of the rostrum is broken off. The basal portion which remains is about seven or eight millimetres long. At the base it measures five mm. in breadth, and at the broken anterior extremity its breadth is two mm. Its outer margins are defined by two linear and acute, tuberculated and raised longitudinal ridges, between which the surface is smooth and concavely excavated.

The whole of the outer surface of the carapace is ornamented by rather distant, isolated tubercles. In its posterior moiety these tubercles are somewhat irregularly disposed, though there is a low, very narrow, and rather inconspicuous keel on the median line, on either side of which the cardiac region is comparatively smooth. On the anterior portion of the carapace the tubercles are grouped somewhat obscurely in two or three longitudinal rows on both sides of the narrow median keel, which is continued with greater or less distinctness up to the commencement of the rostrum.

The anterior pinching claws appear to have been unusually short and robust, while their surface is distinctly tuberculated. The portions of the posterior ambulatory legs that happen to be preserved, on the other hand, are very slender, and their surface is minutely granulated. The abdominal segments are badly preserved, but their outer surface seems to have been smooth, though a narrow median keel can be traced throughout the greater part of their dorsal surface.

Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, 1886.

At the same locality and date five detached pinching claws of an apparently second species of decapod were collected in as many concretionary nodules. These claws resemble those of *P. ornatus* in the comparative shortness and robustness of their terminal segments, but the outer surface of the latter is finely granulated rather than coarsely tuberculated.

FISHES.

A well preserved tooth of a Selachian was collected on the Battle River, in township 46, range 3, west of the 4th Principal Meridian, in 1885; and a pectoral fin, apparently of a large selachian, at Sounding Creek, township 30, range 8, west of the 4th Principal Meridian, in 1886.

(B.) LARAMIE SPECIES.

LAMELLIBRANCHIATA.

UNIO DANÆ, Meek and Hayden.

Unio Danæ, Meek and Hayden. 1857. Proc. Ac. Nat. Sc. Phil., vol. IX, p. 145.

“ “ Meek. 1876. U. S. Geol. Surv. Terr., vol. IX, p. 517, pl. 41, figs. 13, a, b, c.

Bow River, opposite mouth of Fish Creek, 1886: a few very badly preserved specimens.

SPHÆRIUM FORMOSUM? Meek and Hayden, Var.

Sphærium formosum? Meek and Hayden, var. Whiteaves. 1885. Contr. to Canad. Palæont., vol. I, p. 61, pl. 9, fig. 3.

Blind Man River, township 40, range 1, west of the 5th Principal Meridian: two or three detached single valves.

As pointed out in the memoir cited, “it is doubtful whether this *Sphærium* should be regarded as merely a local variety of the *S. formosum*, or as a distinct species.”

GASTEROPODA.

LIMNÆA TENUICOSTATA, Meek and Hayden.

Limnæa tenuicostata, Meek and Hayden. 1856. Proc. Ac. Nat. Sc. Phil., p. 119.

Limnæa (Acella) tenuicostata, Meek and Hayden. 1860. *Ib.*, p. 431.

Limnæa (Pleurolimnæa) tenuicostata, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 534, pl. 44, figs. 13, a, b, c.

Blind Man River, township 40, range 1, west of the 5th Principal Meridian, 1885; a few specimens of what appears to be an unusually

fine-ribbed variety of this species, in which there are from eighteen to twenty ribs on the outer whorl, instead of from eight to twelve as in the typical form.

PHYSA COPEI, White, var. CANADENSIS.

Physa Copei, var. *Canadensis*, Whiteaves. 1885. Contr. to Canad. Palæont., vol. I., p. 14, pl. 2, figs. 5, 5 a and 5 b.

Blind Man River, township 40, range 1, west of the 5th Principal Meridian, 1885; one crushed specimen: also Bow River, section 32, township 22, range 29, west of the 4th Principal Meridian, 1885: a fragment which probably belongs to this species.

BULIMULUS (THAUMASTUS) LIMNÆIFORMIS, Meek and Hayden.

Bulimus limnæiformis, Meek and Hayden. 1856. Proc. Ac. Nat. Sc. Phil., vol. VIII., p. 118.

Thaumastus limnæiformis, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 553, pl. 44, figs. 8, a, b, c, d.

“ “ Whiteaves. 1885. Contr. to Canad. Palæont., vol. I., pp. 20, 27 and 72, pl. 3, fig. 3.

Bow River, section 32, township 22, range 29, west of the 4th Principal Meridian, 1885: abundant.

On the Red Deer River (in township 39, range 27, west of the 4th Principal Meridian), a fragment of a slender, reversed land shell, which appears to be congeneric with the *Columna teres* and *C. vermicula* of Meek and Hayden, was collected in 1885. The specimen consists of a natural mould of the exterior of one side of the shell, with portions of the test adherent thereto. In general outline, as well as in the amount of obliquity in its suture, it resembles *C. vermicula* more than *C. teres*, but differs from both in having only eight volutions at most, instead of twelve or thirteen.

GONIOBASIS TENUICARINATA, Meek and Hayden.

Melania tenuicarinata, Meek and Hayden. 1857. Proc. Ac. Nat. Sc. Phil., vol. IX., p. 137.

Goniobasis tenuicarinata, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 566, pl. 43, figs. 14, a, b, c.

“ “ Whiteaves, 1885. Contr. to Canad. Palæont., vol. I., pp. 22 and 27, pl. 3, figs. 5 and 5 a.

Red Deer River, township 39, range 27, west of the 4th Principal Meridian, 1885; and Blind Man River, Crossing of Rocky Mountain House trail, in Township 40, Range 1, west of the 5th Principal Meridian: a single specimen from each of these localities.

VIVIPARUS LEAI, Meek and Hayden.

Paludina Leai, Meek and Hayden. 1856. Proc. Ac. Nat. Sc. Phil., vol. VIII., p. 121.

Vivipara Leai, Meek & Hayden. 1860. Ib., vol. XII., p. 185.

Viviparus Leai, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 577, pl. 44, figs. 6, a, b, c, d.

Viviparus Leai, Meek and Hayden. White. 1883. Rev. Non-Marine Foss. Moll. N. Am., p. 61, pl. 27, figs. 10-14.

Blind Man River, Crossing of Rocky Mountain House trail, in township 40, range 1, west of the 5th Principal Meridian, 1886: a few well preserved and typical specimens.

VIVIPARUS TROCHIFORMIS, Meek and Hayden, Var.

Paludina trochiformis, Meek and Hayden. 1856. Proc. Ac. Nat. Sc., Phil., vol. VIII., p. 122.

Vivipara trochiformis, Meek and Hayden. 1860. Ib., vol. XII., p. 185.

Viviparus trochiformis, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 580, pl. 44, figs. 2, a-e; also, White, 1883, Rev. Non-Mar. Foss. Moll. N. Am., p. 61, pl. 24, figs. 10-16.

Bow River, section 32, township 22, range 29, west of the 4th Principal Meridian, 1885: twelve specimens.

These represent a variety in which the two spiral ridges which are usually characteristic of the species are entirely obsolete, and the minute spiral revolving lines are almost completely undeveloped.

CAMPELOMA MULTILINEATA, Meek and Hayden.

Paludina multilineata, Meek and Hayden. 1856. Proc. Ac. Nat. Sc., Phil., vol. VIII., p. 120.

Vivipara multilineata, Meek and Hayden. 1860. Ib., vol. XII, p. 85.

Campeloma multilineata, Meek. 1876. Rep. U. S. Geol. Surv. Terr., vol. IX., p. 586, pl. 44, figs. 1 a, b.

“ “ White (as of M. & H.) 1860. U. S. Geol. Surv., Contr. to Pal., Nos. 2-8, p. 101, pl. 28, figs. 4 a, b.

“ “ White. (as of M. & H.) 1883. Rev. Non-Marine Foss. Moll. N. Am., p. 63, pl. 27, figs. 1-7.

Same locality and date as the preceding species: three specimens. This shell, in the writer's judgment, is a typical *Lioplax*.

CAMPELOMA PRODUCTA, White.

Campeloma (Lioplax) producta, White. 1883. Rev. Non-Marine Foss. Moll. N. Am., p. 63, pl. 26, figs. 21-27.

Campeloma producta (White.) Whiteaves. 1885. Contr. to Canad. Palæont., vol. I., pp. 24, 28 and 77.

Same locality and date as the two preceding species; also Blind Man River, crossing of Rocky Mountain House Trail, in township 40, range 1, west of the 5th Principal Meridian, 1886: abundant at each of these localities.

Notwithstanding the difference in the generic and specific name, this species seems to be very nearly related to the *Goniobasis Nebrascensis* and *G. tenuicarinata* of Meek and Hayden.

VALVATA BICINCTA, Whiteaves.

Valvata bicincta, Whiteaves. 1885. Contr. to Canad. Palæont., vol. I., p. 25. pl. 3, figs. 8, 8 a, and 8 b.

Blind Man River, township 40, range 1, west of the 5th Principal Meridian, 1885: abundant.

VALVATA FILOSA, Whiteaves.

Valvata filosa, Whiteaves. 1855. Contr. to Canad. Palæont., vol. I., p. 25, pl. 3, figs. 7 and 7 a.

Same locality and date as for the preceding species.

[This Appendix, with illustrations of the new species, will be re-printed in Part II. of the Contributions to Canadian Palæontology, now in course of publication.—J. F. W.]