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II

No. 7.—CAMBRO-ORDOVICIAN BOUNDARY IN BRITISH
COLUMBIA WITH DESCRIPTION OF FOSSILS

WITH PLATE 35

BY

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CAMBRIAN GEOLOGY AND PALEONTOLOGY

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No. 7—CAMBRO-ORDOVICIAN BOUNDARY IN BRITISH COLUMBIA WITH DESCRIPTION OF FOSSILS¹

By CHARLES D. WALCOTT

(WITH PLATE 35)

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In a preliminary description of the Mount Bosworth Section of British Columbia² I placed the summit of the Upper Cambrian at the top of the Sherbrooke formation, it being stated that the highest beds on the summit of Sherbrooke Ridge contained obscure fossils that suggest *Ophileta*, also that the strata near the summit are much broken up owing to a fault line that crosses the ridge. During the summer of 1911 Mr. J. A. Allan, of the Geological Survey of Canada, and Mr. L. D. Burling, of the United States National Museum, visited the locality on the summit of Sherbrooke Ridge and found specimens of *Lingulella isse* (Walcott) and a species of *Ptychoparia* in the upper beds, that correlates the upper limestones with the Cambrian.

¹ Published with the permission of the Director of the Geological Survey of Canada and the approval of Mr. John A. Allan.

² Smithsonian Misc. Coll., Vol. 53, No. 5, 1908, p. 204.

During the past three years Mr. Allan has been making a detailed areal survey of the Ice River Valley region east of Leanchoil on the Canadian Pacific Railway, British Columbia. He found a series of thin-bedded gray argillaceous and calcareous slates, weathering reddish, yellowish, and fawn; underlain by grayish calcareous slates, shales, and argillites, highly cleaved and phyllitic; and weathering greenish, grayish, reddish, yellowish, and buff, about 2500 feet in thickness, which he has named the *Chancellor* formation and which he places above the *Sherbrooke* formation limestones as developed on Mount Dennis, south of Field.

Above the *Chancellor* formation Mr. Allan has named a series of massive blue limestones, with included shaly bands, the *Ottertail* formation, assigning to it a thickness of 1550+ feet. In this limestone he collected a *Lingulella* very much like *Lingulella isse* Walcott, an undetermined species of *Agnostus*, and a rather large but undetermined species of *Ptychoparia*.

Above the *Ottertail* formation there is a great series of interbedded cherts, cherty limestones, dolomitic limestones, and siliceous and calcareous slates and shales, forming the main portion of Mount Goodsir. This great series over six thousand feet in thickness he designates as the *Goodsir* formation. In the lower portion of it he collected several species of fossils which were sent to me for study. In addition to an obscure species of *Agnostus* and one small *Obolus* four species have been identified and named as follows:

- Obolus mollisonensis*, new species
- Lingulella* ? *allani*, new species
- Lingulella moosensis*, new species
- Ceratopyge canadensis*, new species

The discovery of fairly well characterized specimens of the trilobitic genus *Ceratopyge* associated with brachiopods of the same general type as those found in the *Ceratopyge* shale of Sweden is most important, as it gives the first definite suggestion of a base for the Ordovician in the section along the Canadian Pacific Railway west of the Continental Divide. In Sweden the *Ceratopyge* shale and limestone are now by general assent placed at the base of the Ordovician, and with our knowledge of the stratigraphy of the upper portion of this section as determined by Mr. Allan I am inclined to agree with him in placing, at least tentatively, the boundary between the Cambrian and Ordovician at the summit of the *Ottertail* limestone and the base of the *Goodsir* formation.

During the season of 1911 Mr. L. D. Burling examined the eastern side of the Van Horne Range southwest of Otto Creek, west-northwest of Field, and found on the west side of the amphitheater about 4 miles southwest of the mouth of Otto Creek, in the shales of the Goodsir formation and within two hundred feet of the Ottertail limestone, three species of fossils, two of which, *Lingulella moosensis* and *Ceratopyge canadensis*, are identical with species found at about the same horizon in the Ice River region by Mr. Allan. The third species is probably identical with *Lingulella ? allani* of the same formation.

The broad question of the Cambro-Ordovician boundary in other sections of North America is one that is still in process of adjustment owing to the absence of detailed information as to the boundaries between formations and the character of the faunas in the formations.

In the monograph of the Cambrian Brachiopoda,¹ now in press, several formations have been included in the Cambrian or in "passage beds" between the Cambrian and Ordovician that will ultimately be classified with the Ordovician, or, as in the case of the Missouri section² of the Mississippi region, placed in a terrane between the Cambrian and Ordovician.

OBOLUS MOLLISONENSIS, new species

Plate 35, figs. 10-12

In external form this shell is similar to *Obolus (Bröggeria) salteri*³ of the Upper Cambrian and Lower Ordovician of northwestern Europe. It differs in having the area and vascular markings of *Obolus* instead of the very characteristic interiors of *O. (B.) salteri*.

The surface is marked by fine, irregular, concentric lines and striæ of growth, and may be slightly roughened by the irregular lines forming a minute, very irregular pseudo-reticulated surface.

The largest ventral valve has a length of 7 mm. and a width of about 8 mm. The average size is about 5 mm. in length.

Formation and locality.—Lower Ordovician: Goodsir formation (lower part), west side of Moose Creek Valley on east slope of the north ridge of Mount Mollison, elevation 6550 feet, about 10 miles in an air line southeast of Leancoil on the Canadian Pacific Railway, British Columbia.

Collection, J. A. Allan.

¹ Monogr. U. S. Geol. Survey, Vol. 51, 1912. [In press.]

² Ulrich, Bull. Geol. Soc. America, 1911, Vol. 22, pl. 27.

³ Cambrian Brachiopoda, Monogr. U. S. Geol. Survey, Vol. 51, 1912, pl. 13, figs. 1, 1a-n; pl. 15, figs. 4, 4a-d; and p. 424. (In press.)

LINGULELLA MOOSENSIS, new species

Plate 35, figs. 1-6

This fine species is quite abundant in several localities. In size and outline of the valves it is not unlike *Lingulella davisii* (McCoy)¹ of the Ordovician and Upper Cambrian of England and Wales. It differs in being proportionately more elongate and acuminate in the outline of the ventral valve. It may also be compared with *Lingulella ampla* (Owen).²

Two of the largest shells are represented by figures 1 and 6. The form of the valves is best shown by figures 3 and 5.

The surface is marked by fine concentric lines with stronger lines of growth at irregular intervals.

Formation and locality.—Lower Ordovician: Goodsir formation (in lower part), Ice River Valley at head of East Fork, elevation 8000 feet, on the north side of the amphitheater near the top of the ridge overlooking Ottertail Valley; also on northwest side of Mollison Creek, elevation 4800 feet, west slope of Mount Mollison, about 6 to 8 miles east and southeast of Leancoil on the Canadian Pacific Railway, British Columbia, Canada.

The species also occurs on the west side of Moose Creek Valley on east slope of the north ridge of Mount Mollison, elevation 6550 feet, and on west slope of Mount Mollison, elevation 4800 feet, at northwest side of Mollison Creek, about 4 miles southeast of the Ice River Valley as mentioned above. On the east side of Moose Creek near the head of the east fork of the creek it occurs at an elevation of 8100 feet.

Collection, J. A. Allan.

Mr. L. D. Burling found this species at about the same horizon above a cliff of the Ottertail limestone four miles southwest of the mouth of Otto Creek which flows into the Amiskwi River west-northwest of Field, British Columbia, Canada.

LINGULELLA ? ALLANI Walcott

Plate 35, figs. 7-9

In external form this species approaches very closely to *Dicellomus prolificus* Walcott³ from the Middle Cambrian limestones of Utah. It also has a longitudinal median depression on the ventral valve similar to that of *Lingulella buttsii* Walcott.⁴

¹ Cambrian Brachiopoda, Monogr. U. S. Geol. Survey, Vol. 51, 1912, pl. 31, figs. 6, 6a-h.

² Idem, pl. 28.

³ Smithsonian Misc. Coll., Vol. 53, No. 3, 1908, pl. 8, figs. 3 and 3a.

⁴ Idem, pl. 8, fig. 6.

Dimensions.—The average length is about 6 mm. An uncompressed specimen of the ventral valve 6 mm. in length has a width of 5 mm., with a depth of about 1 mm. The dorsal valve is slightly shorter in proportion to the width.

Surface.—The surface is marked by fine concentric lines of growth and a few stronger concentric ridges of growth.

Observations.—There are two or three very imperfect interiors of the ventral valve that appear to have the characters of the interior of *Lingulella*, but it may be that more perfect specimens will prove that the species is more nearly related to *Obolus* (*Fordinia*)¹ than to *Lingulella*.

Formation and locality.—Lower Ordovician: Goodsir formation (lower part), west slope of Moose Creek valley, on the east slope of the north ridge of Mount Mollison, elevation 6550 feet, about 10 miles in an air line southeast of Leancoil on the Canadian Pacific Railway; this species is also found at about the same horizon in Ice River Valley at head of East Fork, elevation 8000 feet, about 4 miles northwest of the Moose Creek locality, British Columbia, Canada.

Collection, J. A. Allan.

Mr. L. D. Burling found this species, which is somewhat doubtfully identified, at about the same horizon above a cliff of the Otter-tail limestone four miles southwest of the mouth of Otto Creek which flows into the Amiskwi River west-northwest of Field, British Columbia, Canada.

Genus **CERATOPYGE** Corda

CERATOPYGE CANADENSIS, new species

Plate 35, figs. 13-22

This species differs from *Ceratopyge forficula* Sars² in the greater length of the frontal limb of the cranium, longer palebral lobes, and narrower fixed cheeks. The pygidium differs most in having a shorter median lobe, broader border, and the side spine springing from the first instead of the second segment.

The thorax of *C. canadensis* has ten transverse segments with a strong transverse furrow on each segment that terminates on each pleural lobe in a blunt point about two-thirds the distance from the median lobe to the slightly falcate ends of each segment.

¹ Smithsonian Misc. Coll., Vol. 53, No. 3, 1908, p. 64.

² Moberg and Segerberg, 1906. Medd. från Lunds Geol. Fältklubb, Ser. B, No. 2 (Aftryck ur K. Fysiografiska Sällskapets Handl., N. F., Bd. 17), pl. 5, figs. 2-5.

The strong lateral spine on each side of the pygidium is a continuation of the first segment instead of the second as in *C. forficula* Sars. In view of the close similarity of the cranidium in the two species, I do not consider the difference in position of the pygidial spine as more than of specific value.

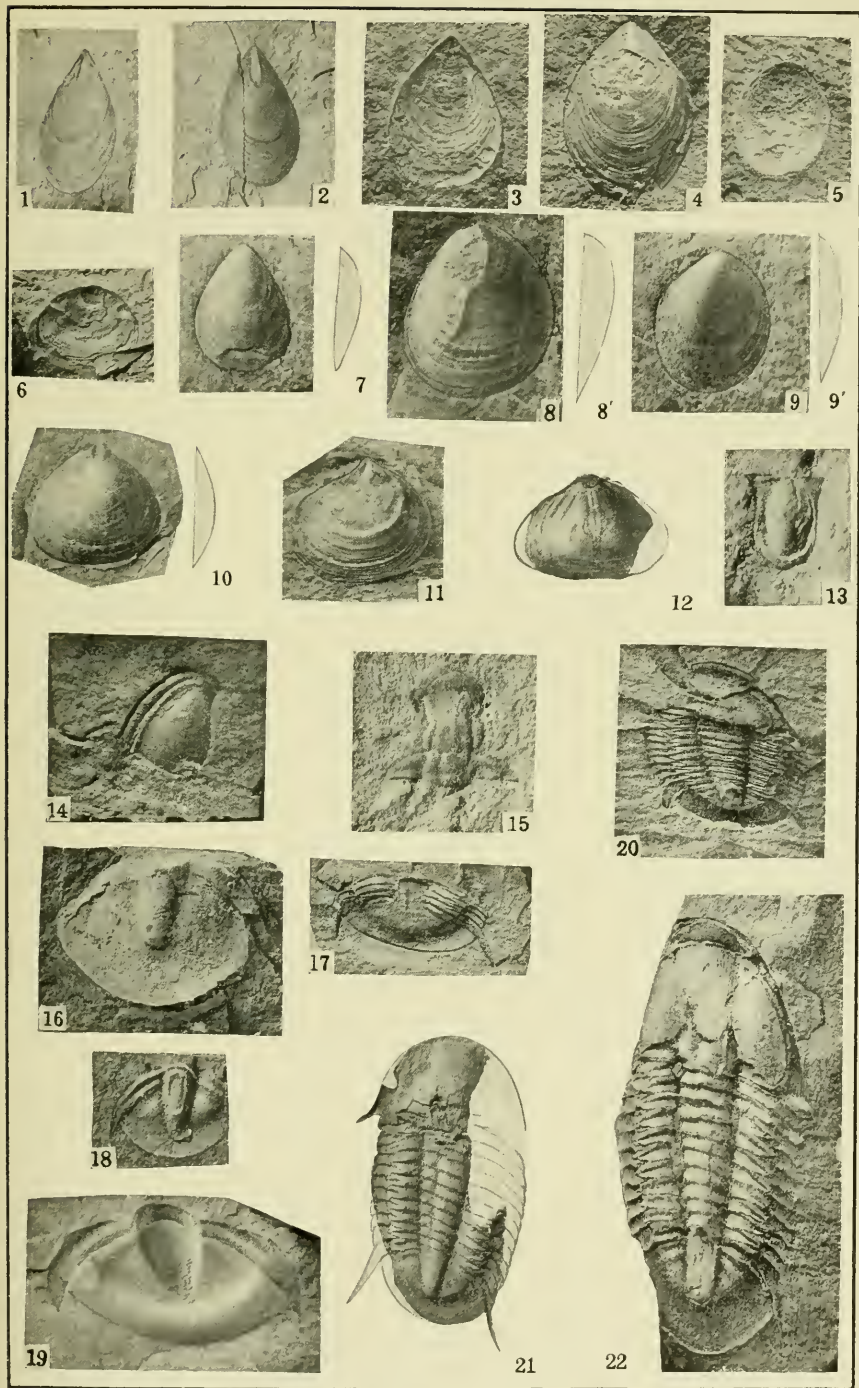
Formation and locality.—Lower Ordovician: Goodsir formation (lower part), at northwest side of Mollison Creek, elevation 4800 feet, on west slope of Mount Mollison; Ice River Valley, about 10 miles southeast of Leancoil; west slope of Moose Creek Valley on the east slope of the north ridge of Mount Mollison, elevation 6550 feet; Ice River Valley at head of East Fork, elevation 8000 and 8100 feet, on the north side of the amphitheater near the top of the ridge overlooking the Ottertail Valley, about 8 miles southwest of Leancoil on the Canadian Pacific Railway, British Columbia, Canada.

Collection, J. A. Allan.

Mr. L. D. Burling found this species at about the same horizon above a cliff of the Ottertail limestone four miles southwest of the mouth of Otto Creek which flows into the Amiskwi River west-northwest of Field, British Columbia, Canada.

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FIG. 1. (Natural size.) Interior of a ventral valve, showing a trace of the pedicle furrow. U. S. National Museum, Catalogue No. 58342.	
2. (Natural size.) Matrix of the specimen illustrated by fig. 1. U. S. National Museum, Catalogue No. 58342.	
3. (X 2.) Interior of a ventral valve that appears not to have been distorted. U. S. National Museum, Catalogue No. 58343.	
4. (X 2.) Partly exfoliated ventral valve, that is somewhat broader posteriorly than the specimen represented by fig. 3. U. S. National Museum, Catalogue No. 58344.	
5. (X 2.) Imperfect interior of a dorsal valve. U. S. National Museum, Catalogue No. 58345.	
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