

A NEW MIDDLE CAMBRIAN MEROSTOME CRUSTACEAN

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Frank Beckwith, of Delta, Utah, recently sent to the United States National Museum for identification a photograph of a fossil collected by Emory J. John, of Clear Lake, Utah, in the banded argillaceous limestones of the Marjum formation in Weeks Canyon, House Range, Utah, stating that if the animal represented was not a trilobite, or if it was rare, he would be pleased to present it to the National Museum. Since this is the first example of a merostome from either the horizon or geographic region, it is, naturally, a rare form, and Mr. Beckwith's generous offer was accepted at once.

In order to check my interpretations, I sent photographs of this interesting fossil to Dr. Rudolf Ruedemann at Albany, N. Y., and to Gilbert O. Raasch at Madison, Wis., the only geologists known to me who are specializing in this group. It is interesting to note that their opinions agreed quite closely and fully confirmed my interpretations.

The first known Cambrian merostome was discovered many years ago in Wisconsin and described in 1863 by Hall as *Aglaspis barrandei*.¹ A second species from the same general region was described by Whitfield in 1882 as *A. eatoni*.² Since that time the Upper Cambrian beds of Wisconsin have produced many of these crustaceans, descriptions of which by Raasch are about to appear. He has founded nine genera, seven of which contain one or more species based on specimens preserving the entire test. In addition to these and the eurypterid *Strabops thacheri* Beecher,³ from the Upper Cambrian of Missouri, we have merostomes from Middle Cambrian beds at several places, particularly from the Burgess shale (*Molaria*, *Habelia*, *Emeraldella*, *Sidneyia*, and *Amiella*). Finally, the Lower Cambrian has furnished several forms, such as *Amiella prisca* Man-

¹ 16th Ann. Rep. New York State Cab. Nat. Hist., p. 181, pl. 4, figs. 7-16, 1863.

² Geology of Wisconsin, Survey of 1873-1879, vol. 4, pt. 3, p. 192, pl. 10, fig. 11, 1882.

³ Amer. Journ. Sci., vol. 12, p. 364, pl. 7, 1901.

suy⁴ from southern China and *Roddyia typa*⁵ from southern Pennsylvania. In addition to those mentioned, scattered fragments, as yet undescribed, indicate the possible existence of still other types. The great number of Silurian eurypterid species belonging to highly varied genera indicates that their ancestry extended far back. Now that we know merostomes among the oldest recorded fossils, we are beginning to comprehend some details of this ancestry.

BECKWITHIA, new genus

Diagnosis.—Merostome with a large cephalothorax having a flattened rim, ending in genal spines. Eyes rather large, possibly crescentic, situated well forward. Eight abdominal segments. Pleurae bent down at a considerable angle at the middle and also rearward, at an increasing angle from front to back. Pleural terminae bluntly truncated.

Body terminated by a spiniform telson with an extraordinarily large basal plate. The spine arises anterior to the center and apparently extended upward and backward for a distance equal to the length of pygidium.

Surface of cephalothorax strongly pustulose, remainder of body more finely granulated.

Comparisons.—Detailed comparisons with other merostomes are incorporated in the specific description, but the consensus of opinion among those who have seen this specimen is that it agrees most closely with *Aglaspis*.

Genotype.—*Beckwithia typa*, new species.

Range.—Middle Cambrian, Marjum formation, central Utah.

BECKWITHIA TYPA, new species

PLATE 1, FIGURE 3

Body.—General form ovate in outline, being nearly twice as long as broad with the greatest width across the genal angles. In life the animal must have been fairly highly arched, especially transversely; at least the wrinkling of the cephalon and the shape of the thoracic segments indicate a moderate degree of compression suffered by the fossil.

Cephalothorax.—Semicircular, nearly twice as broad as long. The posterior margin forms a slight sigmoid curve on each side from the center of the head to the genal angles. The lateral and anterior margins, on the other hand, are regularly rounded, forming an outline that is but a little more curved than a semicircle. A flattened border runs all around and projects into short genal spines, indicating the existence of a rather wide doublure.

⁴ Memoires du Service Géologique de l'Indochine, vol. 1, fasc. 1, p. 31, pl. 4, fig. 6, 1912.

⁵ Resser, Proc. U. S. Nat. Mus., vol. 76, art. 9, p. 13, pl. 2, fig. 5, 1929.

The eyes are ovate or crescentic, pointed obliquely inward, situated not quite one-third the length of the cephalothorax behind the anterior margin, and separated from each other by about the same distance as they lie from the outer margin. As the eye lobes are exfoliated their original convexity and surface can not be determined.

Abdomen.—The dorsal side of the abdomen shows eight flat ungrooved segments. The anterior segment appears to be straight, although it is broken away on the right side and covered by the rotated cephalon on the left, so that one can not be sure of all details relating to its shape and size. Each segment back of the first increases the angularity of its outer pleural portions to the middle axial part, until in the eighth segment the lateral thirds of the pleurae are bent back at an angle of 37° . The third segment appears to be the longest and bears a short spine on the middle of the axis, near its posterior edge.

The extremities of the segments are rounded in front but sharply angular at the rear. An axis of considerable width is very faintly outlined, more by a slight flattening in the slope of the pleurae than by an actual dorsal furrow.

Pygidium.—The body terminates with a broad pygidial shield bearing a strong telson spine. Its frontal margin is angulated to fit the last thoracic segment, but the lateral and rear margins are curved, forming an ovate shield. The strong spine arises on the axis a little forward of the center and extends upward and backward and may have exceeded the pygidium in length. At any rate it must have projected beyond the rear margin.

Surface.—The cephalothorax is covered by fairly coarse pustules. These are particularly strong over what was the higher portion, diminish in size toward the posterior margin, and become much smaller on the rim. Small pustules are rather evenly distributed on the thoracic segments. The rear segments and pygidium seem to be nearly or quite smooth.

Measurements.—Length of animal, 57 mm.; width of cephalothorax, 37.5 mm.; length of cephalothorax, 22.4 mm.; distance of eyes apart, 14.5 mm.; length of genal spine, about 5 mm.; length of thorax, 25 mm.; length of third segment, 31 mm.; length of pygidium, 9.6 mm.; width of pygidium, 15 mm.

Comparisons.—Comparison must first be made with *Aglaspis eatoni*, to which *Beckwithia* is apparently most closely related, at least as far as the characters in the cephalothorax are concerned. *Beckwithia* agrees with *Aglaspis* in its pustulose test and the size of the eyes, but differs in the wider spacing of the eyes and the absence of a "glabella" or median lobe defined by a dorsal furrow.

In general the abdominal segments agree in shape and relative size, but *Beckwithia* practically or altogether lacks an axis, and has eight instead of seven segments anterior to the telson. In the telson

Beckwithia departs more widely from the other merostomes, since in the new form the plate from which the telson spine arises is as large as and similar to the pygidium of a large-tailed trilobite, while in *Aglaspis* the pygidial plate is relatively small and triangular. No trace of segmentation of this large telson plate is visible under a lens.

Beckwithia recalls *Strabops*⁶ in the absence of longitudinal lobation, but the pustulose test, the more central position of the eyes, the presence of genal spines and, above all, the 8 instead of 12 abdominal segments, and finally the large pygidial plate instead of the spiniform telson serve to distinguish it at once.

Raasch states that the texture of *Beckwithia* resembles that of fragments occurring in the lower Eau Claire formation and suggests that, in view of the extremely early Upper Cambrian age of those remains, they might represent the new genus.

No confusion with *Sidneyia* is possible, and *Amiella* is so incompletely preserved that comparisons with it are not profitable. The absence of longitudinal trilobation serves to distinguish *Beckwithia* from all the other Burgess shale merostome genera.

Formation and locality.—Middle Cambrian, Marjum formation; Weeks Canyon, House Range, Utah.

Holotype.—U.S.N.M. No. 84170.

OBOLUS JOHNI, new species

PLATE 1, FIGURES 1, 2

Five brachiopods are attached to the dorsal surface of *Beckwithia typa* and about a dozen other, chiefly fragmentary, specimens occur in the matrix. This association is likely merely commensal. From the fact that these brachiopods efface the surface features, it would seem that they lived for a long time on this particular test, and were not merely compressed on the shell during fossilization.

Comparison.—This species of *Obolus* compares fairly closely with *O. mcconnelli pelias* Walcott⁷ from the *Neolenus* zone of the Marjum formation, in Wheeler Amphitheatre, which is a few miles north of Weeks Canyon. The new species differs in its broader shape, which results in a somewhat rounder outline. It is also considerably smaller. Its posterior outline is also more circular, lacking the flattening of the described species.

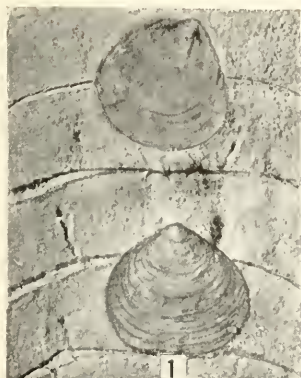
The specific name is given in recognition of the work of Emory J. John, who gives much time to collecting in the desert ranges of Utah.

Formation and locality.—Middle Cambrian, Marjum formation; Weeks Canyon, House Range, Utah.

Cotypes.—U.S.N.M. No. 84171, on *Beckwithia typa* No. 84170.

⁶ Beecher, Amer. Journ. Sci., vol. 12, p. 364, pl. 7, 1901.

⁷ Mon. U. S. Geol. Surv. 51, p. 398, pl. 23, figs. 3b, 3c, 1912.



OBOLUS JOHNI AND BECKWITHIA TYPA

1, 2, *Obolus johni*, new species, $\times 4$, retouched figures of the five brachiopods on the test of *Beckwithia*; 3, *Beckwithia typa*, new species, $\times 2$, slightly retouched figure of the holotype