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ON TWO NEW TRILOBITES FROM THE
CHAZY NEAR OTTAWA

By PERCY E. RAYMOND.

NEW TRILOBITES FROM THE CHAZY NEAR OTTAWA

ON TWO NEW TRILOBITES FROM THE CHAZY NEAR OTTAWA.*

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BATHYURUS SUPERBUS SP. NOV. PLATE II, FIGS. 1—3.

Entire test broadly oval in outline, the breadth varying from .6 to .8 of the length. Dorsal furrows deep on thorax and pygidium, but shallow on the cephalon. Axial lobe narrow and rather low, not being raised much above the general level of the surface.

Cephalon short and wide, surrounded by a very narrow concave border. Glabella nearly smooth, expanding slightly in front of the eyes; marked by two pairs of faint furrows. Eyes very large, low, extending back to the neck furrow and forward to the middle of the glabella. Free cheeks wide, convex, the genal angles drawn out into spines which extend back to the fifth or sixth segment of the thorax. Surface of the test smooth except for fine striæ which are rather prominent on the inner margin of the free cheek.

Thorax of nine segments. Axial lobe narrow. Pleura with deep furrows.

Pygidium nearly semicircular in outline, with a broad concave border and a low, smooth axial lobe. The pleural lobes are marked by four pairs of wide, unfurrowed ribs which can be traced across the concave border. The axial lobe is crossed by one prominent ring, and two fainter ones. Behind the rings are a series of pairs of hardly visible pits. Test covered with faint irregular striæ.

The hypostoma is about as broad as long, almost straight in front, semicircular behind; muscular attachments in front of the middle; side wings narrow. It is very similar to the hypostoma of *Bathyurus extans*, but broader in front.

Length of the largest specimen 74 mm., width 58 mm. A smaller specimen is 40 mm. long and 25 mm. wide. One pygi-

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dium is 18 mm. long and 30 mm. wide, while another is 12 mm. long and 21 mm. wide. A very large cephalon is 27 mm. long and 58 mm. wide.

This species is closely related to *Bathyurus extans* (Hall), but differs from that species in being wider, in having a much less convex axial lobe, a depressed and rounded, instead of a very convex and subtriangular pygidium, and a much wider concave border on the pygidium. The surface of the glabella of *B. extans* is quite granulose, while the test in this species is smooth. The species also attains a much larger size than *B. extans* or any other species of the genus.

LOCALITY.—This species seems to be rather common in a layer of dark gray dolomitic limestone southwest of the outcrop of the Black River and Lowville at La Petite Chaudière, Mechanicsville, Ontario, and has not yet been observed in any other stratum. This layer is supposed to belong to the Chazy.

The entire specimen, which is probably the largest *Bathyurus* known, was collected by Mr. J. E. Narraway, and is in his collection. The other specimens figured were collected by the writer and are in the collection of the Geological Survey. Mr. Narraway has a pygidium of this species which he collected some years ago from a loose fragment of rock in Ottawa South.

The only other *Bathyurus* known from the Chazy is *B. angelini* Billings, a species which is peculiar in that the axial lobe of the pygidium extends across the border to the posterior margin.

ISOTELUS ARENICOLA SP. NOV.

For a number of years fragments of a large *Isotelus* have been found in the sandstone of the Chazy about Ottawa, but as the cephalon was unknown, it was not possible to determine what species was represented. It has usually been listed as *Asaphus* or *Isotelus canalis*. (See Sowter, T. W. E., OTTAWA NATURALIST, Vol. II., pp. 11-15, 1888; Ami, H. M., Appendix to Dr. Ells' "Geology of Ottawa and Vicinity," 1901). A free cheek recently found by the writer at Britannia supplies the missing information, and this, with the large headless specimen collected by Richardson at Deschenes, furnishes the material for the description which follows.

DESCRIPTION.—Cephalon, judging from the free cheek, nearly three-fourths as long as broad, surrounded by a wide concave border. Eyes large, situated less than their own length from the posterior margin of the cephalon. Free cheek broad, with the genal angle drawn out into a short, broad, flat spine. Thorax of eight segments, the axial lobe narrow for the genus—one-third the total width. Pygidium roughly triangular in out-

Fig. 1. *Isotelus arenicola*. Outline of free cheek and portion of cranidium from Britannia. One-third natural size.

Fig. 2. *Isotelus arenicola*. Outline of the specimen collected by Richardson at Deschenes. One-third natural size.

line, three-fourths as long as wide; border concave. On the specimen described, which is a cast of the interior, there are two rather distinct ribs on each of the pleural lobes. The axial lobe is hardly distinguishable.

Width of thorax at back of fourth segment, 135 mm., width of axial lobe at same point, 45 mm.; length of pygidium, 98 mm., width, 130 mm. The specimen is only very slightly flattened. The total length of this specimen appears to have been about ten inches. Another specimen, described below, seems to have been at least four inches longer.

This species is more closely allied to *Isotelus gigas* than to any other species, the pygidia of the two forms being almost alike. The axial lobe of the thorax of the species here described is, however, much narrower than in either *I. gigas* or *I. maximus*. *I. gigas* has no genal spines at maturity, and *I. maximus* has a shorter and more nearly semicircular pygidium. *I. harrisi* has a wider and shorter cephalon, and *I. platymarginatus* has a much wider concave border around the pygidium.

A rather remarkable specimen of this same species was found by W. C. King, Esq., on the shore of Lake Deschenes at Britannia. This specimen is an impression of the lower surface of the trilobite, and shows a longitudinal ridge corresponding to the central furrow along the axis of the ventral side of the animal, 10 pairs of transverse furrows, and the impression of the hypostoma—first noticed by my friend, Mr. Narraway. The doublure of the pygidium has also left a wide smooth impression, but in the cephalic region the hypostoma is the only portion of which there are any traces remaining. The specimen was found by Mr

King on a waterworn surface of the beach, partially covered by the shingle, and many details of the structure have doubtless been removed since it was first exposed to the action of the elements. The outline of the hypostoma is rather faint on the specimen, but the excellent photograph made by Miss Bentley brings it out clearly. The forks are rather short and far apart, and the anterior portion is narrow, so that the general form of the hypostoma is more like that of *Isotelus harrisi* than *I. gigas*. The total length is 75 mm., the greatest width, 65 mm.; length of the body portion, 53 mm., width, 50 mm.

The transverse furrows are the impressions left by the gnathobases of the basal joints of the legs. These gnathobases were evidently long and very heavy, but the specimen has been so abraded that all details are obscured. The first six pairs of impressions are longer and deeper than the four behind. The first eight pairs seem to belong to the thoracic appendages, while the last two belong to the pygidium. From the posterior tips of the hypostoma to the first gnathobases of which traces are present there is a distance of about 22 mm. without impressions. In *Isotelus gigas* the hypostoma normally extends back to the posterior margin of the cephalon, so that it seems that in this specimen the impressions of the first two pairs of gnathobases under the thorax may not have been preserved. In that case, the six pairs of strong impressions may represent the last six pairs of thoracic segments, and the pygidium might begin with the first of the fainter ones.

Two specimens of *Isotelus*, somewhat similarly preserved, have been figured. One is Billings' specimen from the Trenton at Ottawa, and the other was described by Mickleborough and by Walcott from a specimen found near Cincinnati. Both of these specimens, however, show the trilobite itself, as well as the impression. Both show the long heavy gnathobases of the coxopodites, and it becomes evident that, as the coxopodites are attached directly under the dorsal furrows, the increase in the width of the thoracic lobe, which is so marked a feature in *Isotelus*, is due to the great development of these gnathobases. The writer believes that this impression on the ripple-marked sand of the Chazy gives a clue to the development of the gnathobases. Apparently *Isotelus* was a bottom crawler, and the gnathobases may have served as ambulatory appendages. In both the specimens of *Isotelus* mentioned above as retaining the appendages, the gnathobase of a thoracic appendage is nearly as long as the remainder of the appendage, and being a single rod, and not jointed, is much more useful as a lever. On all the specimens known, the gnathobases are strongly developed on the thorax, and only feebly so on the pygidium. Beecher found

that the appendages under the pygidium of *Triarthrus* were flattened and adapted for swimming, while those under the thorax could be used either in swimming or crawling. It would seem that this sort of specialization had gone still further in *Isotelus* than in *Triarthrus*. Here there is a large pygidium, probably provided with swimming organs (Walcott found traces of them under the pygidium of the specimen he described), and under the thorax the inner portions of the appendages were strengthened to function as ambulatory appendages. In *Triarthrus*, a form adapted primarily for swimming and secondarily for crawling, the appendages are very long, and extend far beyond the outer margins of the test, while in *Isotelus* the appendages are hardly long enough to reach the outer margins. The swimming power had to some extent been sacrificed in the adaptation to crawling. *Triarthrus* depended on its swiftness in swimming to escape from its enemies, and lacked the power of enrolment. *Isotelus*, a slower moving, but heavier-shelled animal, protected itself by complete enrolment.

Fig. 3. Diagram of the trails on a slab of sandstone found at Deschenes. 1 is the trail shown in the photograph on the plate, and 1 and 3 are supposed to have been made by an *Isotelus*.

Certain trails found by the writer on the surface of slabs of sandstone from the Chazy at Deschenes tend to confirm the suspicion that the gnathobases were used as ambulatory organs. A diagram and photograph of one of these trails is here reproduced, and it will be seen that it is exactly the sort of marking that would theoretically be produced by a trilobite which was crawling with the aid of the gnathobases only. The trail numbered 1 in the diagram can be traced for about 100 mm. on the slab, and consists of a series of pairs of approximately parallel ridges, arranged on opposite sides of a narrow furrow. The ridges are inclined at angles of from 30 to 60 degrees to the direction of the furrow. Each ridge is about 10 mm. long, and the furrow is from 3 to 5 mm. wide. The slab is a mould of the

impression made in the sand, and the ridges correspond to the depressions made by the gnathobases. The trail numbered 3 is similar to the one described, but the one numbered 2 is of a different sort.

The increase in width of the axial lobe, caused by the development of the gnathobases in the adaptation to the crawling mode of life, explains the parallelism which exists between certain genera of the *Asaphida*, and the parallelism between *Nileus* and some of the *Illænidæ*. A number of forms, arising from different stocks, were becoming adapted to near-shore life, and all found that enlarged gnathobases assisted them in their new mode of life. Thus the narrow-axised *Asaphus* produced *Onchometopus*, *Isoteloides* produced *Isotelus*, and *Symphysurus* developed into *Nileus*, just as some as yet unknown form developed into the *Illænurus* of the sands of the Potsdam.

LOCALITY.—This species is represented in the collections at the Museum of the Geological Survey by a thorax and pygidium from Deschenes, and a free cheek from Britannia, which are holotype and paratype respectively. There is also a partial thorax and pygidium collected by James Richardson in 1853 from the sandstone of the Chazy at West Hawkesbury. The pygidium of this specimen is 72 mm. long and about 110 mm. wide, and shows a single rib on each pleural lobe. The axial lobe of the thorax is very narrow, being only 33 mm. in width. The total width appears to have been somewhat over 100 mm. The fourth specimen was found loose at Point Claire, but was undoubtedly from the Chazy, which outcrops there. This specimen shows the posterior portion of the hypostoma and portions of six thoracic segments. The forks of the hypostoma are very short, and the body portion is convex. The axial lobe of the thorax is 53 mm. wide, and the total width of the thorax is 160 mm.

EXPLANATION OF PLATE II.

1. *Bathyrurus superbis* Raymond. A small cranidium. About natural size.
2. The same species. An imperfect thorax and pygidium. Slightly smaller than natural size.
3. The same species. A nearly complete specimen. About natural size.
4. Trail, supposed to be that of an *Isotelus*.
5. Impression of the ventral surface of a trilobite, presumably *Isotelus arenicola*. About one-fifth natural size.