

XIII. NOTES ON ORDOVICIAN TRILOBITES: ILLÆNIDÆ  
FROM THE BLACK RIVER LIMESTONE NEAR  
OTTAWA, CANADA.

BY PERCY E. RAYMOND AND J. E. NARRAWAY.

INTRODUCTION.

This is one of a series of papers on the trilobites of the Ordovician, and deals with some new or little known species of Illænidæ from the Lowville and Black River Limestones at Ottawa, and a few related species from the Chazy and Trenton Limestones.

The material on which this study is based is a large collection obtained by Mr. Narraway from the Ordovician formations about Ottawa. Mr. Narraway has been fortunate in obtaining many entire specimens of species which are rare, so that we are able to supplement the description of some species previously known only from fragments.

Whole specimens of trilobites are very rare, and for material for comparative study, we have been obliged to draw upon the resources of some of the older museums.

This survey of the material has shown that in the past the boundaries of some of the species have been somewhat loosely drawn, and several forms with a general resemblance have been placed in the same species. While such a course is one of great convenience, especially to the student who wishes to identify the ordinary imperfect material in his collection, it is a source of confusion when certain kinds of work are undertaken. This lax identification of species makes particularly difficult the study of zoölogical provinces and the distribution of isolated or connecting basins in the Paleozoic seas. As an example, take the case of *Bumastus milleri* Billings. At Ottawa there occurs a distinct group of trilobites of the genus *Bumastus*, all very much alike and all having nine segments. To call these animals *Bumastus milleri* invites attention to this distinctive characteristic, but to include these trilobites under the name *Bumastus trentonensis* with other fossils from New York having from eight to ten segments and with forms from Minnesota having eight or nine segments, obscures the evidence which might be obtained from them. All the forms are closely related, and a



description can be drawn up which will include them all, but if they are all put under one name, there is nothing to show the fact that certain forms have been isolated and have developed into a race with fixed characters. Some may question the propriety of a course which seems to give to geographic variations the rank of species, and we ourselves should have hesitated to give a new name under such conditions, even though we feel that there should be some way of designating such forms. In this particular instance however, it is only necessary to revive a name previously given by an acute student of these organisms.

The following is a list of the trilobites which have thus far been found in the Black River Limestone in the vicinity of Ottawa.

<i>Bathyrurus extans</i> (Hall),	<i>Illænus latiaxiatus</i> sp. nov.,
<i>B. spiniger</i> (Hall),	<i>Thaleops ovata</i> Conrad,
<i>Asaphus romingeri</i> Walcott,	<i>Bumastus milleri</i> (Billings),
<i>Isotelus gigas</i> Dekay,	<i>Bumastus indeterminatus</i> (Walcott),
<i>Illænus conradi</i> Billings,	<i>Ceraurus pleurexanthemus</i> Green,
<i>I. angusticollis</i> Billings,	<i>Cybele ella</i> Narraway and Raymond,
	<i>Pterygometopus callicephalus</i> (Hall).

### Sub-Kingdom ARTHROPODA.

#### Class CRUSTACEA.

#### Sub-Class TRILOBITA.

#### Order OPISTHOPARIA Beecher.

#### Genus *Illænus* Dalman.

#### *Illænus latiaxiatus* sp. nov.

(PLATE LX, FIGURES 4-8.)

This species presents many points of similarity to *Illænus americanus* Billings, but the pygidia are so markedly different that we are unable to refer them to that species. No complete specimens have yet been found, but enough material is at hand to enable us to describe all the parts except the free cheeks.

#### DESCRIPTION.

Cephalon apparently a little less than half as long as wide, strongly arched, nearly semicircular in outline. The dorsal furrows are deep.



at the posterior margin of the cephalon, but quickly become shallow and fade out less than half way to the front. They converge slightly for the greater part of their length, but at the anterior ends turn outward a little. On the cast they are more strongly defined, wider, and reach further forward and outward. Midway in their course they pass through two lunate depressions, thus making a sigmoid curve, as described by Billings in *Illænus americanus*. The surface of the cranidium is covered with punctæ with the exception of the posterior border. The punctæ are especially strong on the glabella, but perfect specimens show four smooth, oval areas on either side of the median line of this region. The arrangement of these smooth areas, which is shown in Fig. 8, Plate LX., suggests the form of the glabellar lobes of many trilobites. They probably indicate points of attachment of muscles.

The eyes are rather large, and are situated less than half their length from the posterior margin of the cephalon.

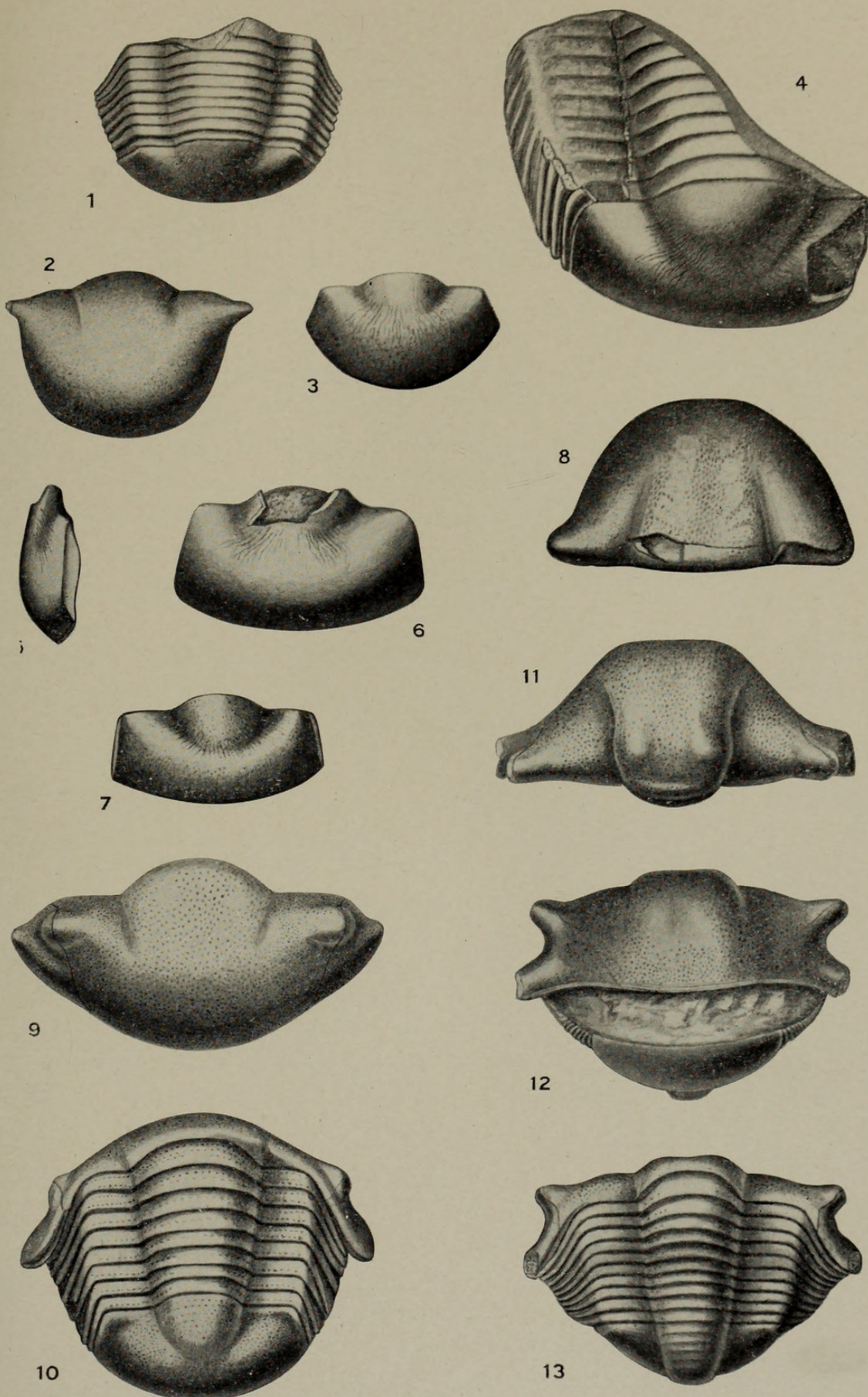
The thorax shows ten wide, flat segments. The axial lobe is rather strongly arched, and over one third the total width of the thorax. The pleura are flat for about one half their width, then abruptly deflected.

The pygidium is about as long as the thorax, somewhat rectangular in outline, three-fifths as long as wide. Its most remarkable feature is the abrupt truncation of the sides, which are at almost right angles with the anterior margin. Axial lobe strongly convex on the anterior margin, outlined by deep furrows at the sides, and by a shallow furrow around the posterior end. The lobe is about half the length of the pygidium. From the axial lobe radiate faint cracks, as in *Illænus americanus*. These cracks are formed by the confluence of the numerous punctæ.

This species differs from *Illænus americanus* chiefly in the form of the pygidium, which is much more strongly truncated at the sides, less arcuate posteriorly, and has a more convex and prominent axial lobe. The cephalon differs in that it is wider in proportion to the length, and has shorter, straighter, and shallower dorsal furrows.

*Locality.*—This species occurs in the Black River Limestone at Tetreauville and Mechanicsville, near Ottawa, Canada, and also at Pattersonville and Newport, New York. Probably many of the specimens of *Illænus americanus* reported from the Black River at various localities really belong to this species. The cotypes are in the private collection of Mr. Narraway.





*Sydney Prentice del.*

Trilobites from the Black River Formation.







***Illænus conradi* Billings.**

(PLATE LX, FIGURES 9, 10.)

*Illænus conradi* Billings, 1859, Canadian Naturalist and Geologist, Vol. IV., p. 372.*Panderia conradi* Vodges, 1893, Occasional Papers California Academy of Sciences, No. 4, p. 330.

We are able to add but little to Billings' elaborate description of this species, but have introduced figures of this rare trilobite to show its relation to *Illænus angusticollis*. From that species it differs in the greater width of the axial lobe and the glabella, the direction of the dorsal furrows, and the less extended genal spines. On the axis of the pygidium, annulations are suggested by faint lines or rows of punctæ, but the rings are not so definitely marked as in *Illænus angusticollis*. The first two thoracic segments are marked by two or three parallel rows of punctæ, while the other six segments usually show one row each.

*Locality*.—This species occurs in the Black River Limestone about Ottawa, but perfect specimens are very rare. In several years of collecting Mr. Narraway has found only ten entire specimens, four of which were enrolled. These specimens have been obtained at Tetreauville and Mechanicsville, on opposite banks of the Ottawa River, at La Petite Chaudière, near Ottawa, Canada.

***Illænus angusticollis* Billings.**

(PLATE LXI, FIGURES 1-5.)

*Illænus angusticollis* Billings, 1859, Canadian Naturalist and Geologist, Vol. IV., p. 376, figs. 10a-10d.

Only the cephalon of this species was known to Billings, but Mr. Narraway has been fortunate enough to secure several entire specimens. From this material the following description has been drawn up.

## DESCRIPTION.

Body ovate, the greatest width exceeding the length. Dorsal furrows deep, extending upon both cephalon and pygidium. Length of an average specimen, about 12 millimeters.

Cephalon wide, the anterior margin gently arcuate, somewhat contracted in front of the eyes, the free cheeks extended into short spines. The dorsal furrows are deeply incised, outlining a narrow glabella.



The course of the furrows, from the posterior margin, is first diagonally inward, while crossing the neck ring, which is not otherwise defined, and then straight forward, parallel to the line of the axis. Just before they fade out at the summit of the cephalon they turn abruptly outward. In favorable light three pits may be seen at the bottom of each furrow.

The cephalon is covered with fine punctæ, those on the median lobe being much larger and more numerous than those scattered over the remainder of the surface. The eyes are large, rather prominent, but not pedunculated.

In ten out of twelve whole individuals the thorax has eight segments. The other two have nine. The segments are narrow, run nearly straight across the body, and turn downward and backward at the sides. Axis about one fifth the width of the dorsal surface, and moderately convex, while the pleura are nearly flat. The first four segments are thickly marked with fine punctæ arranged in almost straight lines across the thorax, four or five rows to the segment. On the remaining segments there are very few punctæ.

Pygidium short and wide, somewhat square in front, rounded posteriorly. Axis elevated, convex, about half as long as the pygidium. It is isolated by deep furrows at the sides and a slight furrow behind. On the cast the posterior end of the axial lobe is abruptly divided, and back of the axis is a shallow groove which extends nearly to the posterior margin. Some of the specimens show three, others four, rings on the axial lobe. The surface is minutely punctate.

The species approaches *Thaleops ovata* in having its axial lobe sharply defined on the pygidium and thorax, and in the narrow, strongly outlined glabella. The genal angles also show a tendency toward the formation of spines. On the other hand its close relationship to *Illænus conradi* connects it with *Illænus* rather than *Thaleops*.

It is remarkable that in so specialized a group as the *Illænidæ* there should occur such a primitive character as variation in the number of the thoracic segments. This character has been observed in other species of the group, notably in *Bumastus trentonensis*, which may have eight, nine, or ten segments. Clarke, in commenting on *Bumastus trentonensis*, observes that "Such variations in the degree of segmentation are not, indeed, usual in the mature condition of a species; they are, however, altogether in harmony with the laws of morphogeny, and deviations from the normal Trenton type with ten segments are



to be interpreted as phylogenetically immature or senile phases of the specific type." In the case of *Illænus angusticollis*, the specimens showing eight segments are smaller in size than those with nine, and may possibly be immature individuals.

*Locality.* — This species has not so far been reported from other than Canadian localities. Billings cited the Island of St. Joseph and the west side of Grant's Island, Lake Huron, and La Petite Chaudière, Hull, Quebec. The specimens with eight segments here described are from both sides of the Ottawa River at La Petite Chaudière. Those with nine segments were obtained from the basal beds of the Black River, at Pelton's Quarry, about six miles south of Ottawa, Canada.

#### Subgenus **Thaleops** Conrad.

Conrad, 1843, Proceedings Academy Natural Sciences, Philadelphia, Vol. I, p. 332.

Hall, 1847, Paleontology of New York, Vol. I, p. 259.

Clarke, 1897, Paleontology Minnesota, Vol. III, pt. 2, p. 716.

This subgenus, as defined by Conrad, could hardly be differentiated from *Illænus*, and was therefore accorded scant recognition until Clarke brought out the salient characters in describing specimens of *Thaleops ovata* from Minnesota. These characters, as remarked by Clarke, are the "peculiar extension of the palpebra and the long, attenuate, and projecting cheeks."

In the various descriptions of the typical species, much stress has been laid upon the complete isolation of the axial lobe, but this same characteristic is seen in *Illænus angusticollis*. *Illænus angusticollis* and *I. conradi* are two forms which almost bridge the gap between the typical *Illænus* and *Thaleops*.

#### **Thaleops ovata** Conrad.

(PLATE LX, FIGURES 11-13; PLATE LXI, FIGURES 6, 7.)

*Thaleops ovata* Conrad, 1843, Proceedings Academy Natural Sciences, Vol. I, p. 332.

*Thaleops (Illænus) ovatus* Hall, 1847, Paleontology New York, Vol. I, p. 259, Pl. 67, figs. 6a, 6a, 6b.

*Illænus ovatus* Whitfield, 1882, Geology Wisconsin, Vol. IV, p. 238, Pl. 5, figs. 1, 2.

*Illænus herricki* Foerste, 1887, Fifteenth Annual Report Geological and Natural History Survey of Minnesota, p. 479, fig. 2.



*Thaleops ovata* Clarke, 1897, Paleontology Minnesota, Vol. III, pt. 2, p. 716, figs. 25-28.

Not *Thaleops ovatus* Raymond, 1902, Bulletin American Paleontology, Vol. III, Pl. 18, fig. 9.

Not *Thaleops ovata* Raymond, 1905, Annals Carnegie Museum, Vol. III, p. 352, Pl. 13, fig. 5.

This species is well known and has been so frequently described that it is only necessary to add here a description of the genal spines. As shown by the figures, these spines are strong, rather heavy, with a prominent keel on the upper surface, making the spine triangular in section. This character of the genal spines is especially well shown on specimens from Ottawa, and is also exhibited by Conrad's types, which are preserved in the American Museum of Natural History, New York City.

Entire specimens of this species are very rare in the vicinity of Ottawa, while fragments are very common. The entire specimens vary in length from 19 to 47 millimeters.

### ***Thaleops arctura* (Hall).**

(PLATE LXI, FIGURE 8.)

*Illænus arcturus* Hall, 1847, Paleontology of New York, Vol. I, p. 23, Pl. 4 bis, fig. 12.

*Illænus arcturus* Emmons, 1855, American Geology, Vol. I, pt. 2, p. 235, Pl. 3, fig. 12.

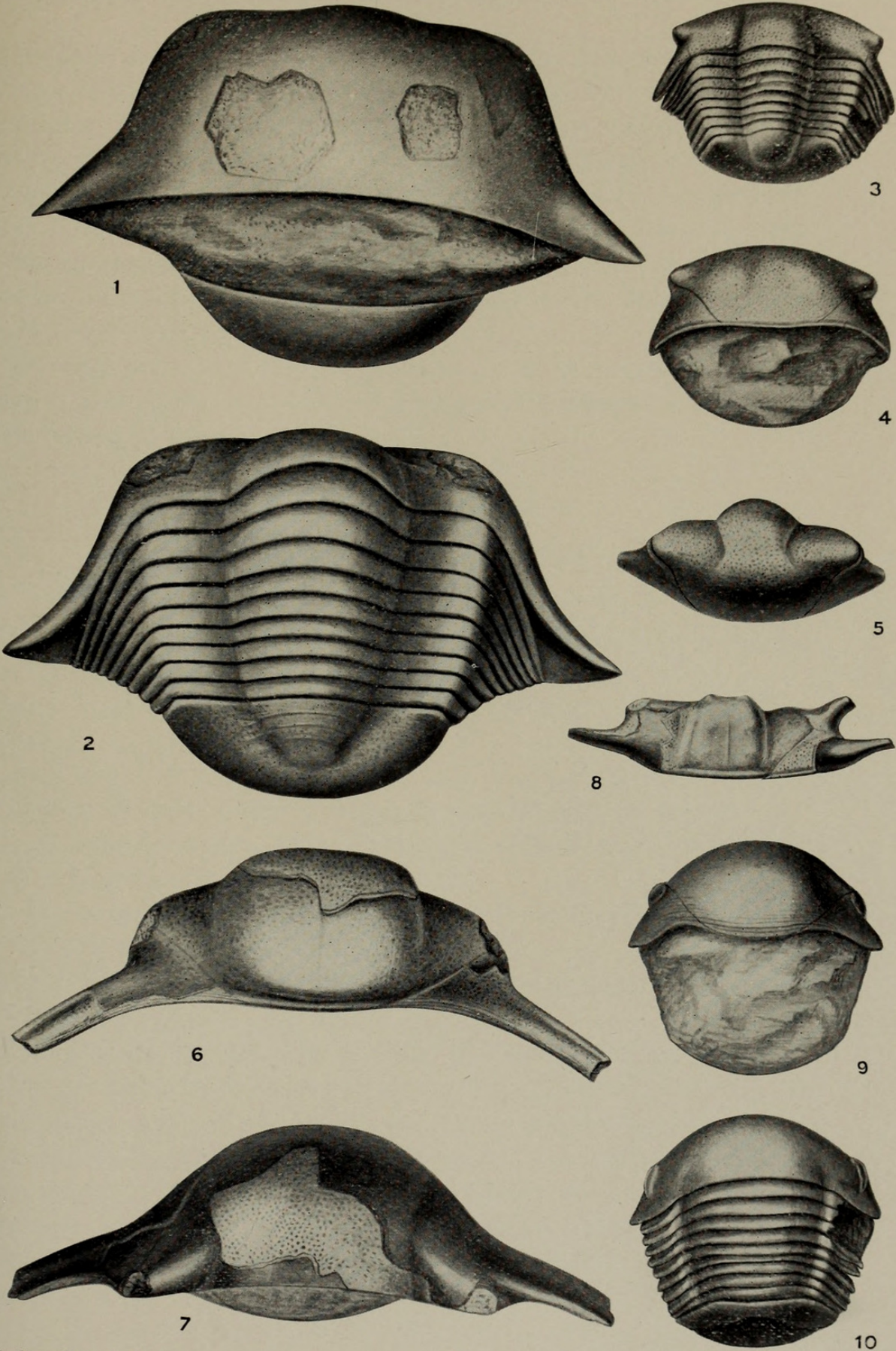
*Thaleops arctura* Clarke, 1897, Paleontology of Minnesota, Vol. III, pt. 2, p. 718.

*Thaleops ovatus* Raymond, 1902, Bulletin of American Paleontology, Vol. III, Pl. 18, fig. 9.

*Thaleops ovata* Raymond, 1905, Annals Carnegie Museum, Vol. III, p. 352, Pl. 13, fig. 5.

At the time this species was described by Raymond in the articles cited above, he was unable to compare the Chazy specimens with any well-preserved specimens from the Trenton and none of the published descriptions allude to the rather minor characters which separate *Thaleops arctura* from *Thaleops ovata*. In *Thaleops ovata*, the palpebral lobes are depressed, and are at the same level as the summit of the fixed cheeks, while in *Thaleops arctura* the eyes are much more prominent and rise at an angle of about 30 degrees with the surface of the fixed cheeks. Furthermore, the genal spines in the





Sydney Prentice del.

Trilobites from the Black River Formation.







Chazy form are much smaller than those of the Trenton specimens, and nearly circular, instead of triangular, in cross section.

Judging from Clarke's figures of *Thaleops ovata* (Paleontology of Minnesota, Vol. III, pt. 2, p. 718, fig. 28) it is possible that *Thaleops arctura* occurs in the Trenton. The genal spines of the specimen there delineated approach much more closely to the form observed on our specimens from the Chazy at Crown Point and elsewhere than they do the spines on the specimens collected by Mr. Narraway in the Black River near Ottawa.

We have not yet been able to seize upon characters which will serve to distinguish the specimens usually found, namely, the detached cranidia and pygidia.

#### Subgenus **Bumastus** Murchison.

#### **Bumastus milleri** (Billings).

(PLATE LXI, FIGURES 9, 10; PLATE LXI, FIGURES 3-5.)

Cf. *Illænus trentonensis* Emmons, 1842, Geology New York, Report of Second District, p. 390, fig. 3.

*Illænus milleri* Billings, 1859, Canadian Naturalist and Geologist, Vol. IV, p. 375, fig. 10.

*Illænus milleri* Walcott, 1877, Advance Sheets, Thirty-first Annual Report, New York State Museum Natural History, p. 20.

*Illænus milleri* Walcott, 1879, Thirty-first Annual Report New York State Museum Natural History, p. 71.

Cf. *Bumastus trentonensis* Clarke, 1897, Paleontology of Minnesota, Vol. III, pt. 2, p. 718, figs. 30-35.

Cf. *Bumastus trentonensis* Weller, 1902, Paleontology New Jersey, Vol. III, p. 194, Pl. 14, figs. 8-13.

In the "Paleontology of Minnesota," Dr. Clarke referred to *Illænus milleri* as a synonym of *Bumastus trentonensis* (Emmons), reviving the latter name for the smaller of the *Illæni* described by Emmons. (See the description of the following species for a fuller account of these names.) Emmon's name *Illænus trentonensis* was applied to a specimen found in the Black River or Trenton Limestone at Watertown, New York, and though figured, this specimen was not described. The present location of this specimen does not appear to be known, so only the figure is left to define the species. Under these circumstances we cannot agree with Dr. Clarke in superseding Billings'



name, which is supported by a good description and a figure, by a name which is dependent only on a rather poor figure. Moreover, as we now know more than one species of *Bumastus* from the Black River and Trenton formations, it is not at all certain that Emmons and Billings described the same species. The specimens from Ottawa invariably show nine segments, while Emmons' figure represents a specimen with only eight. Clarke has described two specimens of *Bumastus* from the Trenton at Trenton Falls, New York, one with eight, and one with ten segments. The specimen with ten segments differs from the specimens found in the Black River Limestone at Ottawa in having a longer and narrower form, fainter dorsal furrows on the cephalon and more delicate thoracic segments in addition to having one more segment. In these smooth trilobites, all apparently descended from the same stock, it is very difficult to seize upon distinguishing characters, even where the whole aspect of each animal is quite characteristic. Where the form is constant, as in the specimens at Ottawa, it seems important that there should be some ways of designating it. In this case it is only necessary to revive Billings' name for the *Bumastus* at Ottawa, leaving to *Bumastus trentonensis* the forms described by Clarke.

This species has been too fully described by Billings to require a formal description here. It is very abundant in the Black River Limestone about Ottawa, and though the collection contains specimens varying in length from eight to thirty millimeters, all have nine segments.

***Bumastus billingsi* sp. nov.**

(PLATE LXI, FIGURES 1, 2.)

Cf. *Bumastus trentonensis* Emmons, 1842, Geology New York, Report of Second District, p. 390, fig. 1.

Cf. *Illænus trentonensis* Hall, 1847, Paleontology New York, Vol. I, p. 230, pl. 60, fig. 5.

Cf. *Bumastus orbicaudatus* Clarke, 1897, Paleontology Minnesota, Vol. III, p. 722, fig. 36.

The history of the species *Bumastus trentonensis* Emmons and *Illænus trentonensis* Emmons has been given by Clarke (Paleontology of Minnesota, 1897, p. 718), but a part of it will have to be repeated in order to explain the names here adopted for the species called *Bumastus trentonensis* and *Illænus milleri* by authors and collectors.



*Bumastus trentonensis* was figured by Emmons (Geology New York, Report of the Second District, 1842, p. 390, fig. 1) from a specimen obtained from a boulder at Hogansburg, New York. The figure shows a trilobite with a wide, yet defined axial lobe on the thorax, and faint, arcuate dorsal furrows on the cephalon. The original specimen was lost before Hall studied the material for Vol. I, "New York State Paleontology," but Hall figured a plaster cast of the specimen.<sup>1</sup> Hall's figure differs from that given by Emmons in showing no dorsal furrows on the thorax. Clarke remarks that, as thus figured, it is "an excellent *Bumastus*," while the figure given by Emmons leads one to consider it an *Illænus*. The figure given by Hall corresponds in size and proportions with a *Bumastus* found in the Trenton Limestone at Ottawa, and which is known to local collectors as *Bumastus trentonensis*. These specimens from Ottawa differ from Hall's figure only in the direction of the dorsal furrows on the cephalon. Hogansburg is just south of the St. Lawrence, 60 miles southeast of Ottawa and only 40 miles south of the Ottawa Valley, so that it seems very possible that Emmons' specimen may have come from that region.

*Illænus trentonensis* was the name given by Emmons to a small trilobite figured on the same page of the "Geology of New York" as the species discussed above. Emmons says, in explanation of the figure :

"No. 3. For this small trilobite, I am indebted to Dr. Crawe, of Watertown. It seems to be rather rare, though it has been found in the Valley of the Mohawk. The specimen from which the drawing was taken was found at Watertown."

This small *Bumastus* was taken by Clarke as the type of *Bumastus trentonensis*.

If, however, the No. 1 of Emmons' figures is also a *Bumastus*, as seems probable, the same specific name can not be used for both, and the larger form would be entitled to the name *Bumastus trentonensis*. To make this transference of names now would lead to endless confusion. Since the type of Emmons' No. 1, *Bumastus trentonensis* is lost, it is not possible to say positively what his species was, and it will simplify matters to follow Clarke in retaining the name for the smaller specimen, and describe the large form under a new name.

<sup>1</sup> The plaster cast of Emmons' specimen is still preserved in the collection of the American Museum of Natural History.



## DESCRIPTION.

Entire test oblong, the width about six tenths the length. Dorsal furrows almost obsolete on the thorax, entirely so on the pygidium, but fairly strong on the cephalon. One entire specimen is 60 millimeters long and 38 millimeters wide at the genal angles; another is 83 millimeters long and 49 millimeters wide.

Cephalon regularly rounded in front, with very slight constrictions in front of the eyes. Free cheeks small, the eyes situated very far apart and about half their own width from the posterior margin of the cephalon. Neck ring faintly defined on the cast; not distinguishable on testiferous specimens. The dorsal furrows on the cephalon are far apart, and rather faint on the test, but strongly defined on the cast. Their course from the posterior margin is first diagonally inward for a short distance, and then straight forward, until they merge into large lunate markings, which, in the cast, appear as depressions. Thorax of ten segments, which are smooth, rather wide, and nearly flat. At the dorsal furrows, which are very far apart and almost obsolete, the segments are bent downward and a little backward, but the deflection is not abrupt as in other *Illæni*. The pygidium is large, regularly arched, a little wider than long. It shows no trace of the axial lobe. On the cast there are four or five transverse lines, suggestive of annulations, and two rather large oval prominences which may correspond to scars of muscular attachments on the inside of the test.

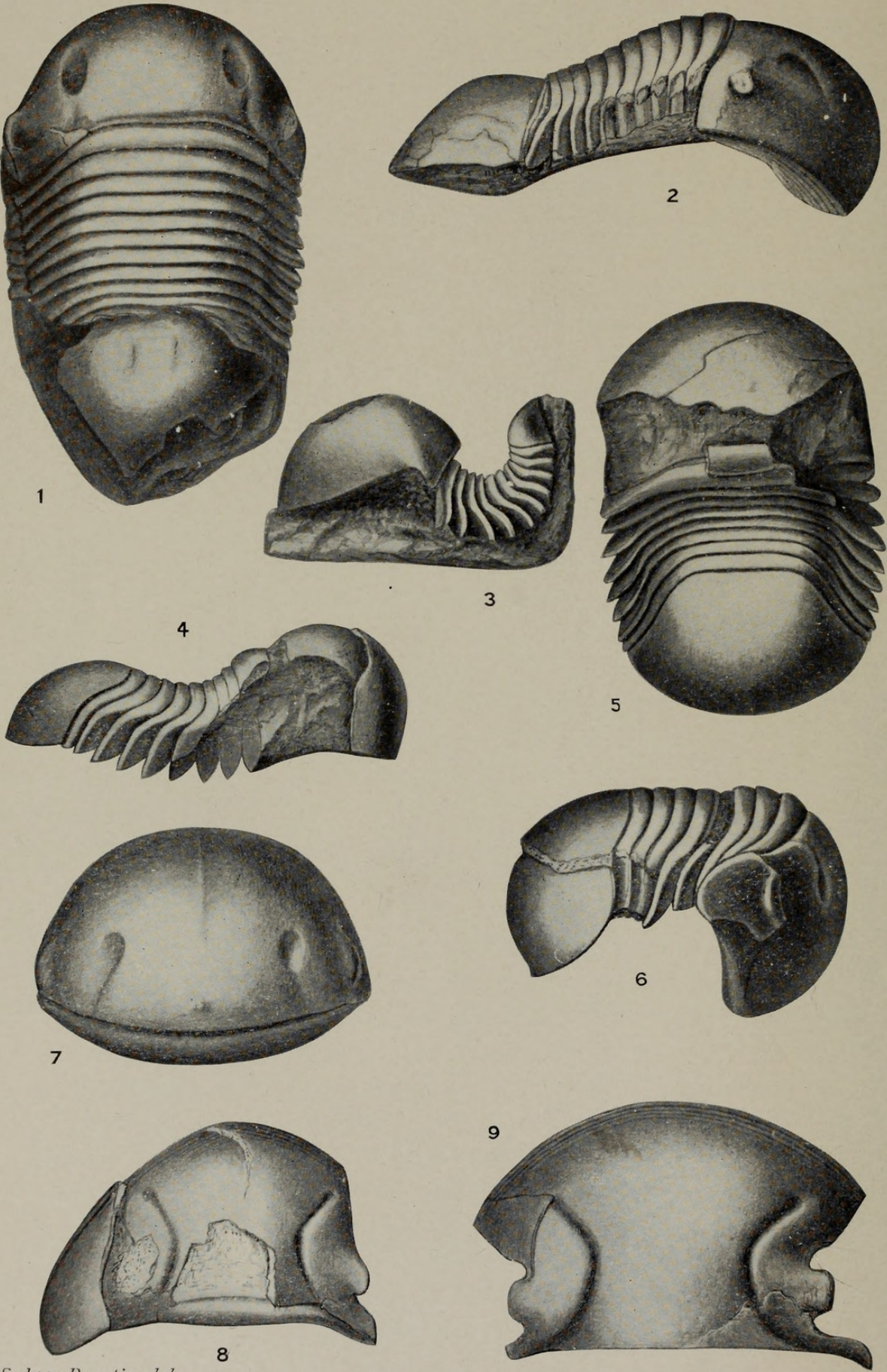
This species differs from *Bumastus trentonensis* and *B. milleri* in the following particulars: the size is much greater, the dorsal furrows on the cephalon are stronger, and on the thorax are further apart and fainter, the cephalon is more strongly arched and incurved in front, the lunate scars of the cephalon are further forward and stronger, and the thoracic segments are proportionally wider. The most striking difference is, of course, the size. Under most circumstances we would not attach much importance to this, but our smallest specimen is twice the size of the largest specimen of *B. trentonensis* figured by Clarke, and none of the specimens of *B. milleri* from Ottawa, with nine segments, seem to exceed 30 millimeters in length.

*Locality.* — So far as is known, this species is confined to the Trenton Limestone. The specimens figured are from Hull, Quebec, Canada, and are in Mr. Narraway's private collection.









Sydney Prentice del.

Trilobites from the Black River and Trenton Formations.



**Bumastus bellevillensis** sp. nov.

(PLATE LXI, FIGURES 6, 7.)

Another species of *Bumastus* which is very interesting in connection with the preceding forms, has been found in the Trenton Limestone at Belleville, Canada, by Mr. W. R. Smith. These specimens have eight segments, and on first sight seemed to be the young of *Bumastus billingsi*, but the presence of a small median pustule on the posterior margin of the cephalon precludes that possibility. This characteristic also separates it from any other *Bumastus* now known from the Ordovician. This species differs from *Bumastus milleri* in its wider segments and more arched and incurved cephalon, two characters which separate *Bumastus billingsi* from *B. milleri*. The specimens of the present species are also considerably wider than are specimens of *Bumastus milleri* of the same length.

One of the specimens, which is exfoliated, shows a small median pustule on the posterior margin of the cephalon. Another which retains the test shows a small pustule over each of the lunettes formed by the dorsal furrows on the cephalon. These lunettes are raised, instead of depressed, as in most species of *Bumastus*.

The best entire specimen in the collection is twenty-two millimeters long and twenty-one millimeters wide at the genal angles. The thorax is eight millimeters long, the cephalon fourteen millimeters, and the pygidium thirteen millimeters. The width between the eyes is nineteen millimeters.

The type is from the Trenton Limestone at Belleville, Canada, and is in the Carnegie Museum.

**Bumastus indeterminatus** (Walcott).

(PLATE LXII, FIGURES 8, 9.)

*Illænus indeterminatus* Walcott, 1877, Advance Sheets, Thirty-first Annual Report New York State Museum Natural History, p. 19.

*Illænus indeterminatus* Walcott, 1879, Thirty-first Annual Report New York State Museum Natural History, p. 70.

*Illænus* cf. *I. indeterminatus* Clarke, 1897, Paleontology of Minnesota, Vol. III, pt. 2, p. 716, fig. 24.

Cf. *Illænus indeterminatus* Raymond, 1905, Annals Carnegie Museum, Vol. III, p. 347, Pl. 13, figs. 1, 2.

Three imperfect cranidia of this species have been found in the



Black River Limestone at the falls of La Petite Chaudière. One specimen shows the larger part of a free cheek. In this specimen the genal angle is rounded, not drawn out into a spine as in the specimens from the Chazy referred to this species by Raymond. The dorsal furrows on the specimens from the Chazy are also much straighter than those of the specimens from the Black River. It seems very possible that the form from Valcour Island represents another, but closely allied, species.

A specimen from Mechanicsville shows fragments of four thoracic segments, similar in size and shape to those of *Bumastus billingsi*. Walcott says of the thorax of his specimens: "Thorax uniformly arched, not trilobed; nine segments only can be counted; the crushing together of the segments may have forced one beneath the head." From the shape of the thorax as shown by these two specimens, it seems probable that this species should be referred to *Bumastus*.

*Locality.* — This species is found rather rarely in the Black River Limestone at Mechanicsville, Ontario, and Tetreauville, Quebec.

#### SUMMARY.

In the preceding pages, one new species of *Illænus* from the Black River, and two new species of *Bumastus* from the Trenton Limestone have been described. The thorax and pygidium of *Illænus angusticollis*, previously unknown, have been described, and the differences between *Thaleops ovata* and *Thaleops arctura* pointed out. Reasons are given for retaining the specific name *milleri* for the small *Bumastus* described by Billings, and *Bumastus indeterminatus* is figured for the first time from specimens obtained in the Black River formation.

#### EXPLANATION OF PLATES.

##### PLATE LX.

1. *Illænus americanus* Billings. Thorax and pygidium of a specimen from the Trenton Limestone, Hull, Canada. One third larger than natural size.
2. The same species. A cranidium, viewed from the front. Same magnification as the preceding.
3. The same species. The same pygidium as shown in Fig. 1, looked at from above. One third larger than natural size. Compare Fig. 1 with 4, and 3 with 6 and 7.
4. *Illænus latiaxiatus* Narraway and Raymond. An imperfect thorax and pygidium. One third larger than natural size.
5. The same species. A pygidium viewed from the side.



6. The same pygidium, viewed from above. One third larger than natural size.
7. The same species. Another pygidium. Same enlargement as the preceding.
8. The same species. A cranidium, one third larger than natural size.
9. *Illænus conradi* Billings. The cephalon of a perfect specimen. Twice natural size.
10. The same species. A dorsal view of the same specimen.
- 11, 12, 13. *Thaleops ovata* Conrad. Three views of a nearly perfect specimen. Twice natural size.

PLATE LXI.

- 1, 2. *Illænus angusticollis* Billings. Two views of a specimen with nine thoracic segments. Enlarged four diameters.
- 3, 4, 5. The same species. A specimen with eight segments. Enlarged two diameters.
- 6, 7. *Thaleops ovata* Conrad. Two views of a cephalon. Enlarged two diameters.
8. *Thaleops arctura* (Hall). The front view of a nearly complete specimen. Natural size.
- 9, 10. *Bumastus milleri* (Billings). Two views of a very small specimen. Four times natural size.

PLATE LXII.

- 1, 2. *Bumastus billingsi* Narraway and Raymond. Two views of a nearly complete but exfoliated specimen. Natural size.
3. *Bumastus milleri* (Billings). An incomplete specimen from the Lowville Limestone. Twice natural size.
- 4, 5. The same species. Two views of another specimen. Twice natural size.
- 6, 7. *Bumastus bellevillensis* Narraway and Raymond. Two views of the same specimen. Twice natural size.
8. *Bumastus indeterminatus* (Walcott). An incomplete cephalon, showing one free cheek. Natural size.
9. The same species. A somewhat larger cranidium. Natural size.

The specimens from which figures 11, 12, 13, Plate LX, figures 3, 7, 9, 10, Plate LXI, and figures 3-7, Plate LXII, were made are in the Carnegie Museum. The others, with the exception of the original of figure 8, Plate LXI, are in Mr. Narraway's collection. The original of figure 8, Plate LXI, is in the Cornell University Museum. With the exception of the specimen of *Thaleops arctura*, all the specimens figured were collected by Mr. Narraway. Casts of all figured specimens are in the Carnegie Museum.





Raymond, Percy E. and Narraway, J. E. 1908. "Notes on Ordovician Trilobites: Illaenidae from the Black River Limestone near Ottawa, Canada." *Annals of the Carnegie Museum* 4(3-4), 242–255. <https://doi.org/10.5962/p.328726>.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/122993>

**DOI:** <https://doi.org/10.5962/p.328726>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/328726>

**Holding Institution**

California Academy of Sciences

**Sponsored by**

California Academy of Sciences Library

**Copyright & Reuse**

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.