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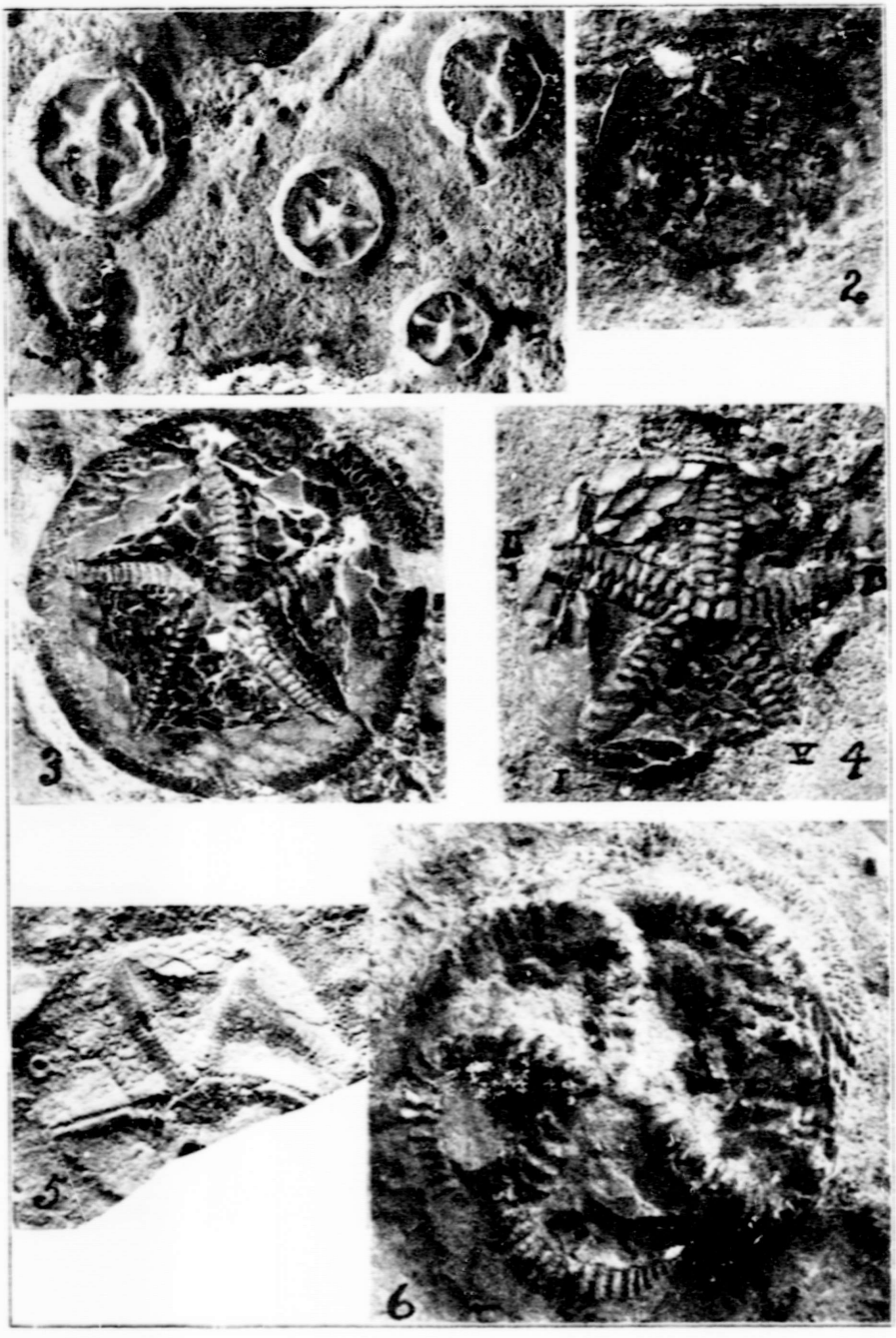

Illustrating Dr. Raymond's paper "Revision of the Canadian Species of 'Agelacrinites.'"

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VOL. XXIX. AUGUST-SEPTEMBER, 1915 Nos. 5 and 6

REVISION OF THE CANADIAN SPECIES OF "AGELACRINITES."

By Percy E. Raymond*

There are two famous regions for these pretty medallion-like little fossils, one in the Trenton formations of Ontario, and the second in the younger Cincinnatian and Richmond strata of southern Ohio and Indiana. The localities in Ontario have produced by far the more perfect specimens, but those found in the higher strata of the "Cincinnati dome" are generally larger. The specimens found in the latter region are almost always attached to a shell of some sort, most often a brachiopod, generally a *Rafinesquina*. In Ontario it is very unusual to find a specimen attached to any foreign object, though such specimens do occur.

It has been the custom to refer all the Canadian specimens to two species, *Agelacrinites billingsi* Chapman and *A. dicksoni* Billings, while a third name, *Agelacrinites chapmani*, has been current, and ascribed to Billings, though I cannot find that such a species was ever described. In the present paper several new species are described. More adequate illustrations will be given in a paper soon to be published in the Bulletin of the Victoria Memorial Museum.

Genus Lebetodiscus Bather.

Lebetodiscus, Bather, Geol. Mag. dec. 5, 5, 1908, p. 550. Type, *Agelacrinites dicksoni* Billings.

Dr. Foerste in his recent "Notes on Agelacrinidae"† remarks that a new name is required for the Ordovician species usually referred to *Agelacrinites* or *Lepidodiscus*. It seems, however, that a name proposed by Dr. Bather in the third of his Studies in Edrioasteroidea, entitled "Lebetodiscus, N.G. for Agelacrinites Dicksoni, Billings," may possibly supply the want.

Bather proposed the name after studying the incomplete specimen of *Agelacrinites dicksoni* collected by Bigsby and figured by Billings as figs. 4 and 4a of plate 8 of the third of the "Decades."

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†Bull. Denison Univ. 17, p. 400, 1914.

Specimens of this species are rare and the best one known is that figured by Dr. (now Sir James) Grant in the OTTAWA FIELD NATURALIST. During my incumbency as Invertebrate Paleontologist to the Geological Survey, this specimen was donated, among other valuable fossils, to the Victoria Memorial Museum, and after comparing it with Billings' and Bather's figures, I am convinced that it is a real *Agelacrinites dicksoni*. Bather states that *Lebetodiscus* differs from *Agelacrinites*, first, in the absence of a differentiated marginal zone; this I believe is due to the imperfection of the specimen he studied; second, he regarded it as having a less flattened and less sessile habit; this also proceeds from the study of an incomplete specimen; third, "It seems clear that the side plates, here called flooring plates, are homologous with the flooring plates of *Edrioaster*. Whether those plates have homologues in the Agelacrinidae is a matter for debate; at any rate, no genus of that family has similar plates with intervening depressions so like pores." I may have misunderstood the figures and descriptions of both writers, but as I understand it, the "flooring plates" of Bather in *Lebetodiscus* are the same as the "outer covering plates" of Foerste, and Bather's specimen was not so preserved as to enable him to get at the real flooring plates, which in a Canadian specimen, are concave and single, not double. (Compare Dr. Bather's fig. 1, p. 545, with Dr. Foerste's figs. 1, pl. 1, fig. 4, pl. 2, and fig. 4, pl. 3, or, for the genus *Thesherodiscus*, fig. 8, pl. 1). The small plates which Dr. Bather took for the real covering plates are the "median or intercolated covering plates" of Foerste. I see no real difference between the structure of the subvective system of *Lebetodiscus* and such a typical (Ordovician) *Agelacrinites* as *A. pileus*, except in the large pores between the lateral covering plates. These may, however, be of such importance as to justify the restriction of *Lebetodiscus* to the species *L. dicksoni* and *L. loriformis*, and the creation of two new genera for the reception of the other species here described.

LEBETODISCUS DICKSONI BILLINGS.

Billings, Rept. Progress, Geol. Sur. Canada, 1857, p. 294; Can. Org. Rem., dec. 3, 1858, p. 84, pl. 8, figs. 3, 3a, 4, 4a; Chapman, Expos. Min. Geol. Canada, 1864, p. 110; Grant, Trans. Ottawa Field-Nat. Club, 1, No. 2, 1881, fig. 9; Jaekel, Stamm. Pelmat. 1899, p. 50, pl. 2, fig. 2; Clarke, Bull. N. Y. State Mus. 49, 1901, p. 191, fig. 3; fig'd without name by Sowerby, Zool. Journal, 1825, 2, p. 318, pl. 11, fig. 5.

Of this rare species, the Museum of the Geological Survey contains the type, another poor specimen collected by Billings (No. 1415), a specimen collected by Mr. Fitzpatrick at Peter-

boro, Ontario, (No. 1412), and the beautiful specimen donated by Sir James Grant, and figured by him in 1881.

The type is a very poorly preserved specimen, as is also the one numbered 1415. This specimen has been cut so as to expose a section across arms II and III, and the section of the anterior arm shows that the structure is the same as in *Agelacrinites pileus*, there being a single concave flooring plate, and two roofing plates meeting above the groove thus formed.

Sir James Grant's specimen of *Agelacrinites dicksoni* is the finest one of this species which has been found, and it seems undeniable that it belongs to the same species as the specimen described by Dr. Bather. It has the same large pores along the sides of the rays, and the same large inter-ambulacral plates. The super-oral series is well shown, and is of the same type as in *Agelacrinites pileus*, *billingsi*, and others. There is a single plate behind the center opposite the anal inter-radius, and two in front, between rays II and III, and III and IV. On each side of the lower plate there are two narrow side plates, and two more small plates outside the upper plates. The breaking up of these plates and the introduction of some of the proximal ray plates into the disk probably accounts for the large number of supra-oral plates seen in the specimen figured by Dr. Bather.

The inter-ambulacral areas are beautifully preserved in this specimen, showing between the arms the very large plates which are so characteristic of the species, the smaller but still large plates just outside the arms, and the very small plates of the outer border.

Finally, there is the Bigsby specimen on which Dr. Bather based the genus *Lebetodiscus*. It agrees with other specimens of *A. dicksoni* in having five contra-solar rays, subequally spaced, in having the outer covering plates but slightly inter-locking over the rays, in having very large inter-radial plates and in the size and position of the anal structure. It differs in lacking the outer border, but after an inspection of Dr. Bather's photograph, one is easily persuaded that that is due entirely to an accident of preservation, as half the known specimens of *A. dicksoni* lack the border entirely or in greater part. There appears to be a difference between the supra-oral region of the Bigsby specimen and that of the other specimens known. In that specimen the arms seem to be more or less massed together to form a sort of supra-oral disk, somewhat as in *L. inconditus*. It is not possible to make out the orientation of these plates without seeing the specimen, but as stated above, it seems possible that the appearance of a large disk is due to the disturbed condition of the plates.

Horizon and locality:—All the specimens of this species

whose exact locality is known have been found in the Cystid beds of the Prasopora zone, and about 180 feet below the top of the Trenton. Beside Peterboro and Ottawa, a specimen has been listed by Dr. Ami from Pakenham, Ontario. The specimens from Kirkfield identified by Mr. Springer as this species are almost if not entirely all *L. multibrachiatus*.

LEBETODISCUS LORIFORMIS SP. NOV.

(Plate 1, fig. 6).

This specimen has long been known to the collectors about Ottawa as one of the prizes of Dr. Van Cortlandt's collection. (Now in the Museum of the Geological Survey, No. 1414). It has always been considered as an abnormal, long-rayed specimen of *Agelacrinites dicksoni*, and there can be no doubt that it is very closely related to that species, but since it forms one of the "connecting links" with the species of the later formations, I propose to give it a new name. It may be described briefly as a *Lebetodiscus* with rays so long that each one nearly touches its neighbor, all rays contra-solar, and equally spaced, the outer border of small plates narrow, supra-oral structure apparently as in *L. dicksoni*. This species is believed to be ancestral to the very long rayed forms for which Hall erected the genus *Streptaster*.

The holotype is 23 mm. in greatest diameter, and is from the Trenton at Ottawa, Ontario. Probably from the "Cystid beds," about 180 feet below the top of the formation. It is No. 1414 in the Victoria Memorial Museum.

LEBETODISCUS BILLINGSI (CHAPMAN).

Agelacrinus billingsi Chapman, Canadian Journal, 5, 1860, pp. 358, 204.

Hemicystites (*Agelacrinites*) *billingsi* Sladen, Quart. Jour. Geol. Soc. London, 35, 1879, p. 750.

Agelacrinites billingsi Chapman, Ann. Mag. Nat. Hist. third ser. 6, 1860, p. 157, fig. ; Billings, Canadian Journal, n. s. 6, 1861, p. 516, fig. 86; Chapman, ibid., n. s. 8, 1863, p. 199, fig. 180; Expos. Min. Geol. Canada, 1864, p. 110, fig. 86, p. 171, fig. 180.

Hemicystites billingsi Jaekel, Stammes. Pelmat. 1, 1899, p. 49.

Local collectors have for a long time recognized two forms of *Agelacrinites billingsi* in Ontario, one with straight, and one with curved rays.

Chapman's original specimen, collected at Peterboro, was of the straight-rayed variety. The species has never been properly described or figured, though fairly common. I am

now restricting Chapman's name to the form with straight rays and the plate ornamentation described below.

DESCRIPTION.

Specimens small, circular in outline, not ordinarily resting upon any foreign object. Rays five in number, narrow, straight, and tapering but little toward the distal end, the two rays enclosing the anal inter-radius a little further apart than the others. Each ray has about thirteen pairs of alternately placed lateral covering plates, which are truncated at the ends, so that they interlock along the median line. The points of these plates are curved, so that when the ray is slightly sagged apart, alternating pores are seen between the covering plates. Over the central area, presumably covering the mouth, there are three principal plates, a large one next to the anal inter-radius and two smaller ones anterior to it.

For convenience in speaking of these fossils, the anal inter-radius is called posterior, the ray opposite to it anterior, and the rays numbered in clock-wise (solar) order, beginning with the one at the left of the anal inter-radius.

The single large plate of the supra-oral series is then, between rays I and V, and its great width is due to the enlargement of the posterior inter-radius by the anal opening. The other two plates are inter-radial in position, one being between rays II and III, and the other between III and IV. There are also two other narrow, five-sided plates accessory to the supra-oral system, one between rays I and II, and the other between IV and V. These plates at their proximal edges abut against the anterior supra-oral plates. Numbering these plates according to the inter-radial areas which they oppose, we have the broad posterior one as 5, the next one to the left 1, the first anterior lateral 2, second anterior lateral 3, and the right posterior lateral 4.

There can be no reasonable doubt that Chapman's specimen had this structure. In his principal description, in the Ann. Mag. Nat. Hist. he says: "These rays, at their origin, leave a small central space covered by larger and somewhat rhombic plates. The latter appear to be five in number, and to constitute the first ray plates, one being common to two adjacent rays."

None of the covering plates, either of the rays or of the supra-oral system, seem to be in any way joined together, but were probably all movable. The three principal supra-oral plates, Nos. 2, 3, and 5, are of such form and strength as to suggest that they could have functioned as jaws.

The inter-radial spaces are covered with small imbricating

plates. The anal opening is surrounded by a small pyramid of six triangular plates.

Just outside the tips of the rays there is a ring of large, thick plates ornamented with pits and rather large granules. There are two or three of these plates opposite each inter-radius except the posterior one, which has four. These plates are much thicker and less scale-like than is usual in this group of fossils, and such ornamentation of the plates is unique in the family.

Chapman says that his specimen was ¼ inch in diameter. Specimen 1413 is 12 mm. in diameter, while another, 1408E, is only 10 mm.

The plate structure as here described seems to be common to several species of *Agelacrinites* and *Cytaster*.

Horizon and locality: This species, as now restricted, is fairly common, but only at the type-locality. The original specimen was found at Peterboro, Ontario. At this city, specimens of *Agelacrinites* have been found in some numbers in an old quarry near the entrance to Jackson Park, and it is presumed that the original specimen came from that locality. If so, it was from the "Cystid" beds of the "Prasopora zone."

LEBETODISCUS YOUNGI SP. NOV.

(Plate 1, fig. 4).

This species is very like *L. billingsi*, having straight rays, the same supra-oral structure, and about the same size. It differs in lacking the thick, ornamented plates of the outer ring and the rays are broader. The inter-ambulacral areas are covered with large transversely elongated, scale-like, imbricating plates, about fifteen to each of the lateral and anterior areas, while in the posterior inter-radius the plates are somewhat smaller and more numerous. The anal opening is surrounded by two circles of small plates, five or six of which are in the inner circle. Outside the area to which the rays extend is a narrow margin of smaller imbricating plates.

The holotype (No. 3234, Vict. Mem. Mus.) is from lot 12, Con. I, Eldon, Ontario, where it was collected from strata belonging to the upper part of the "Prasopora zone" of the Trenton by Mr. W. A. Johnston. The name is in honor of Dr. G. A. Young, of the Geological Survey.

LEBETODISCUS CHAPMANI SP. NOV.

(Plate 1, fig. 3).

This species may be described briefly by saying that it differs from *L. youngi* in having longer and more slender rays, all of which show a slight curvature in the contra-solar direction.

and also in having a wider border of small plates. The plate arrangement is the same at in *L. youngi*, but the lateral covering plates are not so narrowly pointed on their inner ends. No median covering plates have been seen.

The specimen selected as the holotype is 18 mm. in diameter.

This is one of the forms which have been identified usually as *A. billingsi*, but as it persistently differs from it, as well as from *L. youngi*, in the points mentioned, and through them is intermediate in characteristics between *L. billingsi* and *L. pileus* of the Upper Ordovician, it seems to be worthy of a specific name.

Ray I of this species is almost straight, the only curvature being just at the point where it joins the peristomal plates. At the outer end there is no curvature.

Ray IV is the most curved of any on the type, and all show the greatest curvature at about half way between center and margin.

Horizon and locality:—The holotype (No. 3235, Vict. Mem. Mus.) is from an abandoned quarry near the entrance to Jackson Park, Peterboro, Ontario, and was collected by Mr. W. A. Johnston. The horizon is the "Cystid beds" in the "Prasopora zone" of the Trenton. The same form has been found in the "Prasopora zone" at Fenelon Falls and Brechin, Ontario, and in the "Cystid beds" at Ottawa and Hull.

LEBETODISCUS PLATYS SP. NOV.

(Plate 1, fig. 5).

This species is based upon a single specimen which has long been in the Museum of the Geological Survey. It is imperfect, having been cut off by a joint along the anal side, thus losing the distal ends of rays I and V. The specimen is otherwise quite well preserved. The outline is rounded pentagonal and the rays are long, reaching nearly to the margin. The rays are nearly straight, though the anal rays probably curved toward each other somewhat, partially enclosing the anal structures. Such a curvature is suggested by such parts as remain. The anal structure is entirely missing, but it would appear to have been small and far from the mouth. The inter-radial spaces are covered with small, thin imbricating plates, those near the margins being much larger and stronger than the others. The plates along the rays alternate in position, there being about twenty-four to twenty-six pairs. The inner ends are diagonally truncated and pointed, so that, where undisturbed, they fit together very closely. Where they have been displaced, as is the case with most of the arms, they are somewhat drawn apart, and thus leave alternating openings.

The plates above the mouth are like those in *L. billingsi*,

the anterior pair between rays II and III, and III and IV, being clearly seen, and the posterior one less distinctly. At the end of each ray is a small, central terminal plate, suggesting the ocular of a starfish.

The greatest diameter is 24 mm.

This species is quite like *L. chapmani* but differs from it in its larger size, longer and more slender arms, less circular outline, and the curvature of rays I and IV.

Horizon and locality:—The type and only known specimen (No. 7941, Vict. Mem. Mus.) was collected at Ottawa by the late T. C. Weston in 1881. It is presumed to be from the "Cystid beds," probably from the foot of Parliament Hill or Queen's Wharf.

LEBETODISCUS MULTIBRACHIATUS SP. NOV.

(Plate 1, fig. 2).

This is a small *Lebetodiscus*, and remarkable for the possession of eight rays, instead of the usual five. Rays I and V are far apart and curve somewhat toward each other, thus partially embracing the anal area. All the other rays are approximately straight. Rays I, II and IV, are all bifurcated, I and II near the center, while IV bifurcates half way between the center and the margin. The disc is not symmetrical, ray III being crowded to the right of its normal position, and rays I and II taking up as much space as rays III, IV, and V. All the rays are short and the border outside them is wide, with rather large imbricating plates opposite the inter-ambulacral areas, and a margin of small plates outside. The supra-oral plates are of the simple type of *L. billingsi*, *chapmani*, *youngi* and *pileus*, No. 5 being a large wide plate, and the two plates anterior to it small. The inter-ambulacral areas are small, and are covered with small plates. Unfortunately the anal area is not well preserved. The type is 10 mm. in diameter.

This form, since it has numerous arms, naturally suggests the recently described *Thresherodiscus ramosus* Foerste, but is really not allied to that species, which has three primary rays, all of which bifurcate at least twice. The present species is much more closely allied to *L. chapmani* and to *L. billingsi*, and when first noted several years ago, was supposed to be an abnormal specimen of one of these species. It is of interest to note that this form is found at the same horizon, the "Crinoid layers" (Hull or Curdsville formation) in the lower part of the Trenton, as *Thresherodiscus ramosus*, these being the oldest of the *Agelacrinitidae*. Unfortunately the specimens found at Kirkfield are usually very badly preserved, so that it is not known how many of the specimens so far found are to be referred to this

species. A second specimen seems to have only six rays, and the normal number may prove to be seven.

The holotype is No. 7789 in the Victoria Memorial Museum, and is from the Crinoid beds (Hull formation) at the Kirkfield Lift Lock, Ontario.

LEBETODISCUS INCONDITUS SP. NOV.

(Plate 1, fig. 1).

This is the form which is so common in the "Cystid bed" below Parliament Hill and at Queen's Wharf, Ottawa, and which has always been identified as *Agelacrinites billingsi*. It differs in several respects from that species.

DESCRIPTION.

Specimens circular in outline with a broad border of small plates. Rays five in number, rather stout, broad at the proximal end and tapering rapidly. They are almost straight in small specimens while in large ones they are slightly curved, four of the rays having a contra-solar turn, and the fifth curved a little in the opposite direction, so as to embrace the posterior inter-radius. In some specimens, rays I, II, and III, are contra-solar, and IV and V solar, while in the one selected as the holotype, IV is almost straight. The rays bear short interlocking lateral covering plates, about twelve to fifteen pairs to a ray. Median covering plates have not been seen. An appearance of unusual width is given to the rays by the fact that the plates of the inter-radii which abut against the rays are somewhat higher than the remainder of the plates of the inter-radial spaces.

The supra-oral area is large, and covered by numerous small plates. Their arrangement is difficult to make out, because of the way the inter-ambulacral plates are mixed in with ray and supra-oral series. In the center of the disc there appears to be a central plate dove-tailing with two plates which are between rays I and V, and abut on the posterior inter-radius. At the sides and in front of the central plate are five more small plates, one on each side and three in front of the central plate. Two of the plates are inter-radial in position, one between rays II and III, and one between III and IV. This is on the type. On the small specimen next to it in the figure, there seem to be only five plates which really belong to the supra-oral series, the central, two posteriors, and two anterior laterals, between rays II and III and III and V.

The inter-radial areas are covered with small imbricating plates, the plates of the inner part of the outer marginal band being somewhat larger and wider than the plates between the rays. The posterior inter-radius is wider than the others, and

the anal pyramid is large and distinct. It is situated a little more than half way from the center to the margin, and is composed of a ring of seven or eight long triangular plates. In some specimens it is situated half way between rays I and V, while in others it is eccentric, and nearer V than I, as in the type.

The holotype is a large specimen, 15.5 mm. in diameter. Other specimens on the same slab with it (all figured) are 11.5, 10, and 9 mm. respectively.

This species differs from *L. dicksoni* in having shorter rays, one or two of which are solar, and in having much smaller interradial plates. It is most like *L. platys*, but has more numerous supra-oral plates. While small specimens of *L. inconditus* have straight, broad arms, they may readily be distinguished from *L. billingsi* or *L. youngi* by the more numerous supra-oral plates.

Horizon and locality:—This species is common in the "Cystid bed" in the "Prasopora zone" on both the Ottawa and Hull sides of the Ottawa River. It occurs at Peterboro also.

The holotype is No. 1409 in the Geological Survey Museum and was collected by Mr. T. C. Weston. It is undoubtedly from the "Cystid zone" at Queen's Wharf, Ottawa, Ont.

EXPLANATION OF PLATE.

1. *Lebetodiscus inconditus* Raymond. Four specimens in natural position, resting on the sea bottom, showing that they were not attached to shells or other objects. With the decay of the animal the central portion sinks in, leaving an elevated ring of marginal plates. The largest specimen is the holotype. x 1.5.

2. *Lebetodiscus multibrachiatus* Raymond. The holotype, showing the branching arms. The specimen does not lend itself readily to photography. x 3.8.

3. *Lebetodiscus chapmani* Raymond. The holotype. x 3.

4. *Lebetodiscus youngi* Raymond. The holotype. x 3.8.

5. *Lebetodiscus platys* Raymond. The holotype. x 1.5.

6. *Lebetodiscus loriformis* Raymond. The holotype, a large part of the surface of which is concealed by shale. x 2.8.

Figs. 1 and 5 were made at the Geological Survey photographic laboratories. Figs. 2, 3, 4, and 6 were made by Mr. Nelson at the Museum of Comparative Zoology, through the kindness of Director Samuel Henshaw.

MINERALS FROM BAFFIN LAND.

BY T. L. WALKER, UNIVERSITY OF TORONTO.

The Royal Ontario Museum of Mineralogy has recently received from R. J. Flaherty, Esq., M.E., of the North Lands Exploration, Limited, a fine series of minerals collected by him on his recent visit to Baffin Land. Most of the material came from near the shore to the south of Amadjuak Lake.

The geological character of this region is indicated in the following passages from the reports of Dr. Robert Bell*;—

> "The distinguishing feature in the geology of the southern part of Baffin Land is the great abundance, thickness and regularity of the limestones associated with the gneisses. At least ten immense bands, as shown on the accompanying may, were recognized, and it is probable that the two others, discovered in North Bay, are distinct from any of these. There would, therefore, appear to be twelve principal bands as far as known, to say nothing of numerous minor ones, between Icy Cape and Chorkback Inlet. The limestones are for the most part, nearly white, coarsely crystalline and mixed with whitish felspars. The individual crystals in some parts of the limestone masses would measure two or three inches in diameter and the crystallization of the felspar is occasionally equally coarse."
>
> "The limestones usually contain scattered grains of graphite and among the other minerals which commonly occur in the various bands are mica, garnet, magnetite, pyrite, and hornblende. Serpentine of a dark colour was abundantly disseminated as grains and small irregular masses in a band which crosses the head of Canon Inlet. Disseminated specks of bright green and blue serpentine were found in another band at White Bluff Harbour and similar specks of both colours occur in the eastern band at the head of North Bay. The late Mr. Ashe gave me a crystal of sphene, an inch and a half in diameter, which had been brought to him by an Eskimo from North Bay—probably obtained from the limestone there."

The series of minerals contained in Mr. Flaherty's collection is such as might be expected from an archaean region where cyrstalline limestones alternate with gneiss in a great complex. In many respects the collection suggests the mineral association found in Ottawa County to the north of the Capital.

* Report Geol. Survey of Canada, New Series, Vol. XI., p. 24M.

SCAPOLITE. Macdonald Island.

This mineral occurs in crystals some of which are five inches in diameter. The only forms observed are the prisms (100) and (110) and the unit pyramid of the first order (111). The mineral is white in colour and possesses a vitreous lustre.

ROSE QUARTZ. Amadjuak Bay.

The specimens of this mineral consist of a large number of fragments devoid of crystal form and varying in colour from deep rose to colourless. It is worthy of note that those fragments spotted by lichens and evidently from the very surface are either very pale rose or colourless, while the deeper tinted specimens are usually free from lichens. This contrast seems to give support to the view commonly held as to the gradual bleaching of rose quartz when exposed to bright sunlight.

GRAPHITE. Amadjuak Bay. North side; Fair Ness.

This mineral has been reported from this region by several explorers. The graphite from Amadjuak Bay consists of large, flat cleavage plates sometimes two inches in diameter. That from Fair Ness is very pure and more or less coarsely fibrous. The quality of the graphite from both localities suggests the possibility of commercial development in case the deposits are of sufficient dimensions.

GARNET. Garnet Island (about Long 72° 30′, Lat. 63° 45′).

The rock in which the garnet occurs is somewhat schistose, fine grained and consists almost entirely of small scales of dark biotite and felspar which the microscope shows to be microperthite. The felspar constitutes at least nine tenths of the rock. The garnet is found only in the form of large, more or less rounded crystal masses sometimes four inches in diameter. It possesses a fine, deep blood red color and is so free from cracks that some at least could be used for gemstones.'

OPHICALCITE.

Pure white calcite is mixed with about an equal amount of very beautiful sulphur yellow serpentine which is remarkable for the uniformity and delicacy of its colour. Unfortunately, the exact locality of this exceedingly beautiful ornamental stone is not available.

SERPENTINE.

This material is greyish, greenish or yellowish in colour, fine grained and massive as a rule but sometimes intersected by veinlets of chrysotile.

PHLOGOPITE.

The colour of this mineral varies from amber brown to a almost white. The largest crystals are about four inches across but are too imperfect to be of economic value.

DIOPSIDE, Macdonald Island.

Crystals of diopside sometimes three inches in length occur in calcite. They are olive green in colour with very fresh, brilliant surfaces in the prism zone while the terminal faces are often rounded and even corroded. The habit of the crystals is peculiar in that the most prominent end face is the positive orthodome (I01). Basal cleavage or parting is so well developed that most of the crystals have been broken across showing very smooth cleavage surfaces. The material is much brighter and fresher than the diopside found to the north of the city of Ottawa. Owing to the unusual crystal habit and the degree of corrosion this mineral merits further study.

SPINEL, Locality unknown.

The mineral occurs in the form of octahedra whose edges are sometimes truncated by the rhombic dedecahedron. The largest crystals are about half an inch in diameter. The crystals are lilac in colour but too much fractured to be of value for gem purposes.

CORDIERITE, Garnet Island (Long 72° 30′, Lat. 63° 45′).

The specimens of cordierite consist of irregular fragments of vitreous lustre which are sometimes two inches in diameter. It is associated with white felspar rock and probably occurs as lenses in gneiss. The mineral is deep blue in colour and some of the fragments are sufficiently free from flaws to suggest its use as a gem mineral. Cordierite has up to the present been a very rare mineral in Canada so that its discovery in Baffin Land has considerable mineralogical interest.

In thin sections under the microscope the mineral is seen to be polysynthetically twinned so that it is difficult to believe that the section is not composed of plagioclase. A subordinate part of the cordierite consists of an intimate intergrowth of twinned mineral in which the two portions present a vermicular intergrowth.* It is also characteristic that though the cordierite as seen in thin sections there are distributed many small inclusions of rutile or zircon, each of which is surrounded by a deep pleochroic aureole, orange in colour.

* Walker and Collins., Rec. Geol. Survey of India, Vol. XXXVI., p. 1.

ACTINOLITE, West side of Ottawa Island, Hudson's Bay.
This mineral approaches the variety asbestus but it is too splintery to be of commercial value. It is greenish grey in colour. The fibrous masses are sometimes six inches in length. It will be noted that this mineral is found in quite a different region from the others referred to in this paper.

The chief points of interest connected with this series of minerals are:

1. The remarkable agreement between the variety of minerals found in south Baffin Land and those found in other regions where crystalline limestones form a prominent part of the gneiss complex.
2. The presence of cordierite, spinel, garnet, rose quartz and ophicalcite suggests that in the future Baffin Land may produce minerals valued for ornamental purposes.
3. Mica, graphite, serpentine and actinolite are minerals frequently mined economically.

UNIVERSITY OF TORONTO,
JUNE 15th, 1915.

QUEBEC DRAGON-FLIES.

BY REV. T. W. FYLES.

A few weeks ago I had the pleasure of a visit from Prof. E. M. Walker, editor of the "Canadian Entomologist." Dr. Walker is an authority on the Odonata, and he kindly examined some of the dragon-flies taken by me in Quebec Province. He identified several of them, and verified the names of the rest. The following is a list of the insects, giving the locality in which each was taken. It should be regarded as an appendix to my paper on the *Dragon-flies of the Province of Quebec*, which appeared in the 31st Annual Report of the Entomological Society of Ontario.

LIST.

Names.	Localities.
AGRIONIDÆ.	
Calopteryx maculata Beauv.	"The Beaver Meadow," Hull.
" *æquabilis* Say.	Cowansville.
" *amata* Hagen.	St. David's, near Levis.

LIST—continued

Names.	Localities.
Lestes unguiculatus Hagen.	"The Beaver Meadow," Hull.
" *disjunctus* Selys.	"
Amphiagrion saucium Burm.	"
Ennallagma hageni Walsh.	"
" *calverti* Morse.	"
" *exsulans* Selys.	"
ÆSHNIDÆ	
Ophiogomphus rupinsulensis Walsh.	"The Gomin," Bergerville.
Gomphus brevis Hagen.	"The Beaver Meadow," Hull.
" *vastus* Walsh.	Levis Heights.
" *notatus* Ramb.	Hull.
Cordulegaster diastatops Selys.	"
Boyeria vinosa Say.	River St. Charles, Quebec.
Æshna sitchensis Hagen.	Island of Orleans.
" *eremita* Scudder.	"The Beaver Meadow," Hull.
" *canadensis* E. Walker.	"
" *umbrosa* E. Walker.	"
" *constricta* Say.	Island of Orleans.
Anax junius Drury.	"Mer de Papon." Levis.
LIBELLULIDÆ.	
Didymops transversa Say.	Levis Heights.
Macromia illinoiensis Walsh.	"
Tetragoneuria cynosura simulans Muttkowsky.	"The Gomin."
Tetragoneuria canis Maciachlan.	"The Beaver Meadow."
Libellula quadrimaculata Linneus.	"The Gomin."
Libellula pulchella Drury.	"Mer de Papon," Levis.
" *lydia* Drury.	"The Beaver Meadow."
Leucorrhinia intacta Hagen.	Bergerville.
" *proxima* Calvert.	"
" *hudsonica* Selys.	"The Beaver Meadow."
Sympetrum costiferum Hagen.	"
" *obtrusum* Hagen.	"
" *vicinum* Hagen.	"
" *scoticum* Donovan.	"The Gomin."

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