ART. XVII.—*Remarks on the Distribution of the Fossils in the Lower Potsdam Rocks at Troy, N. Y., with descriptions of a few new species*; by S. W. FORD.

WHEN, in the summer of 1871, I published a brief notice of my investigations among the ancient rocks overlooking the Hudson River upon the east in the vicinity of Troy,* I hoped to be able to present shortly thereafter a more detailed account of these rocks, and of their intimate stratigraphical arrangement. Several circumstances have, however, prevented the carrying out of my intended labors in this direction with any degree of satisfaction to myself, and I shall therefore leave the further consideration of this subject to a future occasion. In the present paper I shall confine myself mainly to a few observations relating to the distribution of the fossils in these rocks; and to the description of the remainder of the new species which they have afforded, in so far as these are sufficiently well preserved to admit of being characterized.

The only rocks of the Lower Potsdam at Troy that have thus far proved fossiliferous are certain thin limestone masses, associated with the great body of coarse slates of which the formation at this place is principally composed. These masses are four in number, or at least occur in four distinct north and south ledges. They all occur within a tract not to exceed half a mile from west to east and considerably less than a quarter of a mile from north to south. Within this tract there are several other ledges, some of them holding thin deposits of limestone; but in these I have not as yet succeeded in finding any fossils. The following is a section across the Hudson River at Troy, not drawn to scale, but designed simply to show the general arrangement of the rocks in this vicinity.

At the point of the section indicated by the vertical dotted line a great dislocation most probably occurs, bringing up the more ancient strata *c* and causing them to overlap or stand above the newer *b*. This would, however, hardly be suspected from the physical structure of the region; since, so far as I have been able to ascertain, the rocks throughout the entire length of the section have the same average (easterly) inclination. I have nowhere observed the precise line of contact between the rocks of *b* and *c*, unless it be in a high ridge about a mile and a half north of this city, where the hard dark-colored slates and thin gray sandstones of the Lower Potsdam appear to overlap conformably the newer shales. At Troy there is a considerable space between them covered with drift.

* "Notes on the Primordial Rocks in the vicinity of Troy, N. Y." This Journal for July, 1871.

The limestones of *c*, which I have for convenience sake designated simply as limestones 1, 2, 3 and 4, are those already re-

- a*. Shales of the Hudson River formation holding *Trinucleus concentricus*, *Leptaena sericea*, and graptolites. The above species occur at Dry River, opposite Troy.
b. Black shales with thin layers of sandstone, holding graptolites, most probably of either the Hudson River or Utica formations.
c. Slates, sandstones, limestones and limestone conglomerates of the Lower Potsdam group.
 1-2. Conglomerate limestone interstratified with coarse slates.
 3-4. Even-bedded limestone similarly situated.

ferred to as being the only portions of the Lower Potsdam at Troy that have proved fossiliferous. The annexed table presents a list of the species obtained from them so far as described; and shows also the manner of their distribution among them.

Table showing the distribution of the fossils in the Lower Potsdam group at Troy, N. Y.

	Limestones,	1	2	3	4
1. <i>Archæocyathellus</i> Rensselaericus*	-----	--	*	?	--
2. <i>Obolella</i> desquamata	-----	*	*	*	*
3. " <i>crassa</i>	-----	--	*	*	--
4. " <i>cælata</i>	-----	--	*	*	*
5. " <i>nitida</i>	-----	--	*	*	*
6. <i>Stenotheca</i> rugosa	-----	*	*	*	*
7. <i>Scenella</i> retusa	-----	*	*	*	--
8. <i>Hyalithellus</i> micans	-----	*	*	*	*
9. <i>Hyalithes</i> Americanus	-----	--	*	*	*
10. " <i>impar</i>	-----	--	*	*	*
11. " <i>Emmonsii</i>	-----	--	*	*	*
12. <i>Leperditia</i> Troyensis	-----	--	--	*	--
13. <i>Microdiscus</i> speciosus	-----	--	*	*	*
14. " <i>lobatus</i> †	-----	--	*	*	*
15. <i>Conocephalites</i> trilineatus	-----	--	*	*	*
16. <i>Olenellus</i> asaphoides	-----	--	*	*	*
17. <i>Agnostus</i> nobilis	-----	--	--	--	*
18. Bivalve of undetermined relations.	-----	*	*	*	*

It will be seen from the above table that out of the eighteen species enumerated, thirteen are common to limestones 3 and 4;

* This species was described in the March No. of this Journal for the present year, and referred by me provisionally to the genus *Archæocyathus*, Billings. I now consider it entirely distinct from that genus, and have adopted here the generic name at that time proposed for it in the event of its proving to be an independent form. The characters of *Archæocyathellus* are those of this species.

† This species equals the *Agnostus lobatus* of Hall (Pal. N. Y., vol. i, p. 258, pl. lxvii, figs. 5 a-f), and appears to me to belong to *Microdiscus* rather than to *Agnostus*. It occurs in great numbers in the limestones at Troy, but I have never seen a specimen of it showing all the parts in connection.

thirteen to Nos. 2, 3 and 4; fifteen to Nos. 2 and 3; while five are found in all four. No. 1 does not present as good facilities for examination as the others, and has yielded but five species; but when further studied it will, I have no doubt, furnish a larger number. Enough evidence has, however, I think, been obtained and here presented to prove that the limestones in question, with their associated beds, all belong to a single great series of strata. That some repetitions occur in this series I have but little question; but I have been unable, thus far, to identify with certainty the rocks of any of the exposures examined with those of other exposures situated either to the east or the west of them. The thickness of this series remains still undecided. I do not conceive that limestone No. 4 forms the eastern limit of this series: on the contrary, there is much to lead me to suspect that the formation has a rather wide spread beyond; but as the beds to the east of this band that I have examined have, up to this time, proved barren of fossils, I have made the section to terminate with it.

This series I consider for the present to occupy a lower geological horizon than the typical Potsdam sandstone of the New York survey; and to be of nearly if not exactly the same age with the *Olenellus* or Georgia slates of Vermont, and the *Olenellus* limestones on the north shore of the Straits of Belle Isle, determined by Mr. Billings. It may yet prove to be a trifle more ancient or more recent than the above named strata, but there can, I believe, at any rate be no great difference between them in this respect. The fauna of this series is wholly distinct specifically from that of the Upper Potsdam of Wisconsin and the true Potsdam of New York, as well as from that of the more ancient St. John's or Menevian group of New Brunswick and its equivalent in the Primordial of Newfoundland; although connected generically with each of them and strongly so with both that of the Upper Potsdam and Menevian. It will be observed that in this fauna the genus *Microdiscus* is represented by two species. This genus is new to the fauna of the Lower Potsdam, but it will probably yet be found to range throughout the Primordial, since it is known from both the Longmynd and Menevian groups of Wales, the St. John's group of New Brunswick, the Lower Potsdam as above stated, and may possibly be present in the Upper Potsdam of Wisconsin, in the shape of certain minute pygidia referred by Prof. Hall with doubt to *Agnostus* (16th Reg. Rep. 1863, p. 180). It occurs also, as is well known, in Augusta county, Virginia, where it is associated, according to Dr. Emmons, with graptolites. The genus *Archæocyathellus* is, so far as known, peculiar to the fauna of the Troy limestones.

On the south shore of the St. Lawrence, in Canada, there occurs a great series of strata referred by the Geological Survey

of Canada to the Potsdam group, the conglomerates of which have afforded several of the species found in the Lower Potsdam at Troy, as well as several occurring in the Lower Potsdam of Vermont and Labrador, with many others. The exact age of the formation holding these conglomerates is not yet positively settled; but it is, by Mr. Billings, regarded as at least not far from that of the Potsdam.

The fauna of the Troy limestones appears to me to supply in part a long-recognized blank in the Paleontology of our State. The Primordial fauna with us has hitherto been a meager one, being confined, with the exception of *Scolithus*, to the few species found in the Potsdam sandstone at Keeseville, Essex County. In the Troy limestones we now have, however, quite an extensive and strongly-marked fauna, establishing many important relations between these rocks and the Primordial of other regions and other horizons, both at home and abroad. This fauna is probably yet far from complete; and should these rocks be further investigated, I have no doubt that many additions will be made to it in the future. My own opportunities for study in this field have been very far from what I could have desired; and have prevented me from giving to it that connected and systematic investigation of which I believe it eminently deserving.

Descriptions of new species of Fossils from the Lower Potsdam group at Troy, N. Y.

Microdiscus speciosus, sp. nov.

Description.—Head destitute of eyes and sutures, semi-elliptical, with a conspicuous border all around, thickened at the edge, which in the majority of cases carries from 5 to 6 minute tubercles on each side; border expanded in front. Glabella long, conical, prominent, smooth, without neck furrow, extend-

Fig. 2. *Microdiscus speciosus*. a. Head; b. Pygidium. Natural size. The parts figured belong to two different individuals.

ing in an obscurely triangular projection slightly beyond the posterior outline, separated from the cheeks by rather wide and deep dorsal furrows, sometimes, though only in very rare instances, obscurely lobed by from three to four faint furrows on each side. Cheeks convex, prominent, well defined by the dorsal and marginal furrows. Posterior angles narrowly rounded.

Thorax with four equal segments. Pleuræ pointed, straight except at their extremities, which are bent down and slightly recurved, deeply grooved for nearly their whole length. The rings of the axis have a slight groove across them in the posterior half of each. The fourth or hindmost ring appears to be ankylosed

to the pygidium, at least it invariably accompanies it when the latter is found isolated.

Pygidium as long as the head and of nearly the same shape, but slightly narrower, taking the extreme measurements, and more rapidly tapering; gracefully curved in outline. Marginal rim distinct all around, widest anteriorly, distinctly raised or thickened at the edge. Axis conical, sometimes acutely so, long and slender, extending very nearly to the margin, divided by faint cross furrows directed slightly backward into eleven rings or segments. Side-lobes highly convex and without furrows. The axis and side-lobes appear to overhang the marginal rim at the posterior extremity, giving the border the appearance of being only about half as wide behind as it is in front.

The entire surface is finely punctate. In one specimen of the pygidium, out of a large number of perfect specimens examined, there appears to be a twelfth ring in the axis.

Length of a specimen of the usual size with all the parts in place, but too imperfectly preserved to be figured, half an inch. Length of thorax 0.13 of an inch. I have seen but a single specimen showing conclusively the true number of thoracic segments. This species had the habit of rolling itself up into a ball, and is quite often found in this state. In the specimen just noticed, the pygidium is bent slightly under the body. Nearly all of the specimens that I have seen, that were in a perfect condition before extraction, exhibit this tendency to coil themselves up, which appears to account for the thorax breaking away in most cases.

This pretty little trilobite occurs in both even-bedded and conglomerate limestones of the Lower Potsdam at Troy; also at Bic Harbor, Canada, where it has been collected by Mr. T. C. Weston of the Geological Survey of Canada. The Troy specimens were collected by the writer. It is a rather common fossil at Troy, the head and pygidium usually occurring detached from the thorax. The head sometimes attains a length of 0.38 of an inch, but this is quite unusual.

This species closely resembles *Microdiscus punctatus* (Salter), from the Menevian group of Wales;* but it differs from that species in not possessing a neck spine, in the greater number of its caudal rings, and in having the marginal rim of the head tuberculated. The head, compared with that of *Microdiscus Dawsoni* from the St. John's group of New Brunswick (Acadian Geology, Dawson, 1868, p. 654), is proportionally longer, and is wanting in the grooves of the border of that species.

Leperditia Troyensis,† sp. nov.

The following description is based upon a single right valve, the only specimen of this species that I have seen.

* Quart. Jour. Geol. Soc., Aug., 1864, p. 237.

† Figures of this and the following species will be given hereafter.

Description.—Minute, obscurely pentagonal in outline, greatly narrowed in front, broad behind, narrowed at either extremity, posterior one somewhat obtusely angular. Dorsal margin straight, ventral margin gently rounded. Surface depressed convex, convexity greatest a little behind the mid-length. Eye-tubercle prominent. Marginal rim well-defined all around except at the hinge. A distinct marginal groove can be traced entirely around the carapace, but it is very faint in the upper portion. It is most distinct along the forward half of the ventral outline. Surface smooth and polished.

Length 0·18 of an inch; breadth 0·12. Occurs in even-bedded limestone of the Lower Potsdam at Troy. Collected by the writer.

The characters of this species agree very closely with those of *Ieperditia Solvensis* Jones,* from the Menevian group of Wales; but our species is larger, a little different in shape, and provided with a distinct eye-tubercle. They appear, however, to be very nearly related.

In the limestones at Troy there occur certain small lamellibranchiate-like shells whose affinities I shall leave for the present an open question. They are very abundant, and are represented up to this time by a single species. Externally they present something of the appearance of a small *Modiolopsis*. As no undoubted lamellibranchiates have, however, been hitherto detected in strata certainly more ancient than the Calciferous Sandrock, it is quite possible that, when they come to be better understood, they will be found to belong to some as yet imperfectly known group of crustaceans. While I am unable to decide to what class they belong (although inclining to the belief that they are lamellibranchiates), I consider some notice of them needful here and shall describe them as fully as the material will allow, without for the present giving them a distinct name. The following is the description:

Bivalve of uncertain class, gen. nov.?

Description.—Shell transversely oblong or suboval in outline, convex, widest posteriorly, narrowed at either extremity, with an oblique posterior ridge, and small depressed umbones situated anteriorly, sometimes presenting an obscurely bi-lobed appearance in front. Dorsal margin nearly straight, ventral margin uniformly rounded. In the interior of the left valve, as shown by a gutta-percha cast of an impression in stone of this valve, there is a wide and deep furrow with a slightly raised line along the middle of it corresponding to the oblique ridge on the outside; and a distinctly impressed line passing

* Annals and Magazine of Natural History, 2d series, vol. xvii, Feb., 1856, p. 95.

from the lower anterior into the upper posterior portion of the valve following the curved ventral edge, from which it is separated by a broad flattened border. This line is deeply sunken anteriorly, becomes almost obsolete or discontinuous in passing the oblique internal furrow, beyond which, in the posterior portion of the shell, it is less distinct, though clearly shown. Just in front of and above the anterior limit of this line there is a slight conical protuberance. Further than this nothing can be made out, owing to the imperfection of the material. The shell is thick, with the surface finely striated concentrically.

I have never observed a specimen of this singular little shell with the two valves together, but they are frequently found side by side in the same hand-specimen of stone.

Length rarely more than 0·16 of an inch; usual width about 0·10. Occurs in both even-bedded and conglomerate limestone of the Lower Potsdam at Troy. Collected by the writer.

Besides the foregoing species I have from the Troy limestones several specimens of an *Orthis*, but too imperfect to describe; and also a few specimens of what seems to be an undescribed *Lingulella*, which cannot at present be dealt with for the same reason.

Troy, N. Y., May 14th, 1873.