

ART. XLVII.—On some new Species of Paleozoic Fossils;* by
E. BILLINGS, F.G.S.

Genus HYOLITHES *Eichwald.*

In the following description of new species of *Hyolithes*, I shall call the side of the fossil which is most flattened, or from which there is a projection in front of the aperture, "the ventral side." Directly opposite is the "dorsum." The lateral walls, whether consisting of two sloping planes, as in fig. 2, or rounded as in the other figures, I shall designate simply "the sides." The "width" of the aperture is the greatest distance between the two most projecting points of the sides. This is

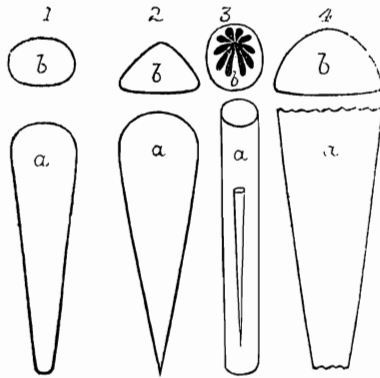


Fig. 1. *Hyolithes communis*. 2. *H. Americanus*. 3. *H. ? micans*. 4. *H. princeps*.

In these diagrams *a* represents the rate of tapering of the shell on the ventral side; *b*, the transverse section (except in 3 *b*, which is the inner surface of an operculum enlarged two diameters). The small figure in 3 *a* represents the apical portion of a specimen. N. B.—All these species vary slightly in the rate of tapering.

sometimes close to the ventral side, as in fig. 2. The "depth" is the distance between the median line of the ventral side and the dorsum, and is at right angles to the width. That part of the ventral side which projects beyond the aperture is the "lower lip." The "ventral limb" of the operculum is that side which is in contact with the lower lip, when the operculum is in place, in the aperture. The "dorsal limb" is the opposite side of the operculum, in contact with the dorsum. In some of the opercula there is a point around which the surface markings are arranged concentrically; this is the "nucleus."

The following species occur in the pebbles and boulders of a

* Extracted from the Canadian Naturalist of December, 1871.

conglomerate which constitutes an important formation on the south shore of the St. Lawrence, below Quebec. The age of the rock in which these pebbles are found, is not yet certainly determined, but it is, at all events, near that of the Potsdam.

H. communis.—This species attains a length of about eighteen lines, although the majority of the specimens are from ten to fifteen lines in length. The ventral side is flat (or only slightly convex) for about two-thirds the width, and then rounded up to the sides. The latter are uniformly convex. The dorsum, although depressed convex, is never distinctly flattened, as is the ventral side. The lower lip projects forward for a distance equal to about one-fourth or one-third the depth of the shell. In a specimen whose width is three lines, the depth is two lines and a half.

The operculum is nearly circular, gently but irregularly convex externally, and concave within. The ventral limb is seen on the outside as an obscurely triangular, slightly elevated space, the apex of the triangle being situated nearly in the center of the operculum. The base of the triangle forms the ventral margin. This limb occupies about one-third of the whole superficies of the external surface. The remainder, constituting the dorsal limb, is nearly flat, slightly elevated from the margin toward the center. On each side of the apex of the ventral limb there is a slight depression, running from the nucleus out to the edge. On the inside there is an obscure ridge, corresponding to each one of the external depressions. It is most prominent where it reaches the edge. These two ridges meet at the center, and divide the whole of the inner surface of the operculum into two nearly equal portions.

The surface of the operculum is concentrically striated. The shell itself in some of the specimens is covered with fine longitudinal striæ, from five to ten in the width of a line. The shell varies in thickness in different individuals. In some it is thin and composed of a single layer, but in others it is much thickened by concentric laminæ, and thus approaches the structure of a *Salterella*. There are also fine engirdling striæ, and sometimes obscure sub-imbriating rings of growth.

This species has been found at Bic and St. Simon.

Fig. 1 *b*, representing the transverse section, is not so distinctly flattened on the ventral side as it is in most specimens.

Collected by T. C. Weston.

H. Americanus.—Length from twelve to eighteen lines, tapering at the rate of about four lines to the inch. Section triangular, the three sides flat, slightly convex or slightly concave, the dorsal and lateral edges either quite sharp or acutely rounded. Lower lip rounded, projecting about two lines in full-

grown individuals. Surface finely striated, the striæ curving forward on the ventral sides, and passing upward on the sides at nearly a right angle, curve slightly backward on the dorsum. In a specimen eighteen lines in length, the width of the aperture is about six lines and the depth about four, the proportions being slightly variable.

The operculum has a very well-defined conical ventral limb, the apex of which is situated above the center, or nearer the dorsal than the ventral side. The dorsal limb forms a flat margin, and is so situated that when the operculum is in place, the plane of this flat border must be nearly at right angles to the longitudinal axis of the shell. In an operculum six lines wide, the height of the lower limb to the apex of the cone is two and a half lines, and the width of the flat border, which constitutes the dorsal limb, about one line.

This species occurs at Bic and St. Simon; also at Troy, N. Y., where it has been found abundantly by Mr. S. W. Ford of that city. It is *Theca triangularis* of Hall, Pal. N. Y., vol. i., p. 213, 1847. As that name was preoccupied by a species previously described by Col. Portlock, Geol. Rep. on Londonderry, p. 375, pl. 28 A, figs. 3a, 3b, 3c, 1843, it must be changed. It is a very abundant species, and varies a good deal.

The Canadian specimens were collected by T. C. Weston.

H. micans.—This is a long, slender, cylindrical species, with a nearly circular section. The rate of tapering is so small, that it amounts to scarcely half a line in length of eighteen lines, where the width of the tube is from one to two lines. The largest specimen collected is two and a half lines wide at the larger extremity, and if perfect would be four or five inches in length.

The operculum does not show distinctly a division into a dorsal and ventral limb. It is of an ovate form, depth somewhat greater than the width, the nucleus about one-third the depth from the dorsal margin. Externally it is gently concave in the ventral two-thirds of the surface; a space around the nucleus is convex, and finely striated concentrically. On the inner surface there is a small pit at the dorsal third of the depth, indicating the position of the nucleus. From this point radiate ten elongate ovate scars, arranged in the form of a star, the rays toward the ventral side being the longest. None of these scars quite reach the margin.

The shell and operculum are thin and of a finely lamellar structure, smooth and shining.

Occurs at Bic and St. Simon; also at Troy, N. Y.

Collectors, T. C. Weston and S. W. Ford.

Sometimes numerous small specimens, from half a line to three lines in length, are found with the operculum on the same slab.

This shell appears to me at present to constitute a new genus,

differing from the majority of the species of *Hyolithes* in its circular section, the operculum not divided into dorsal and ventral limbs, and in the remarkable system of muscular impressions on the interior. Barrande has figured an operculum of the same type, differing from this in having only three instead of five pairs of impressions. They are, however, arranged on the same plan in both the Canadian and Bohemian species.* It is possible that our species may be a *Salterella*.

H. princeps.—Shell large, sometimes attaining a length of three or four inches, tapering at the rate of about three lines to the inch. In perfectly symmetrical specimens, the transverse section is nearly a semicircle, the ventral side being almost flat, usually with a slight convexity, and the sides and the dorsum uniformly rounded. In many of the individuals, however, one side is more abruptly rounded than the other, in consequence of which the median line of the dorsum is not directly over that of the ventral side, and the specimen seems distorted. This is not the result of pressure, but is the original form of the shell. Sometimes, also, there is a rounded groove along the median line of the dorsum. The latter is somewhat more narrowly rounded than the sides. Lower lip uniformly convex, and projecting about three lines in a large specimen. Surface with fine striae and small sub-imbriating ridges of growth. These curve forward on the ventral side. In passing upward on the sides, they at first slope backward from the ventral edge, and then turn upward and pass over the dorsum at a right angle to the length.

When the width of the aperture is seven lines, the depth is about five. The operculum has not been identified.

Collected by T. C. Weston at Bic and St. Simon.

Genus OBOLELLA Billings.

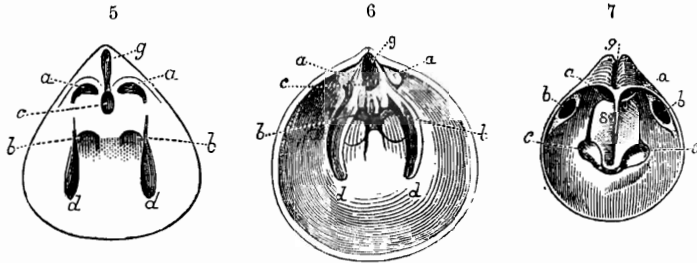


Fig. 5. Interior of the ventral valve of *O. gemma*, enlarged about five diameters. *aa*, the two small scars at the hinge; *bb*, the two central scars; *c*, the small pit near the hinge; *dd*, the two principal muscular scars; *g*, the groove in the area.

6. Interior of the ventral valve of *O. desquamata* Hall.† enlarged $2\frac{1}{2}$ diameters.

7. Interior of the ventral valve of *Obolus Apollinis* Eichwald, copied from Davidson's "Introduction to the study of the fossil Brachiopoda."

* *Système Silurien*, &c., vol. iii, pl. 9, fig. 16 H, and fig. 17.

† Engraved from a figure kindly drawn for me by Thos. Davidson, Esq., F.R.S., of Brighton, England. The specimen is from the original locality of the species, Troy, N. Y. Collected by T. C. Weston.

Generic Characters.—Shell unarticulated, ovate or sub-orbicular, lenticular, smooth, concentrically or radiately striated, sometimes reticulated by both radiate and concentric striæ. Ventral valve with a solid beak and a small more or less distinctly grooved area. In the interior of the ventral valve there are two elongated sub-linear or petaloid muscular impressions, which extend from near the hinge line forward, sometimes to points in front of the mid-length of the shell. These are either straight or curved, parallel with each other or diverging toward the front. Between these, about the middle of the shell, is a pair of small impressions, and close to the hinge line a third pair, likewise small, and often indistinct. There is also, at least in some species, a small pit near the hinge line, into which the groove of the area seems to terminate. In the dorsal valve there are six impressions corresponding to those of the ventral valve, and sometimes an obscure rounded ridge along the median line.

If we compare the interior of the ventral valve of an *Obolella* with that of *Obolus Apollinis*, we see that there are six muscular impressions in each, but not arranged in the same manner. The two small scars *aa*, at the hinge line, are most probably the same in both genera. The two lateral scars *bb* of *Obolus* have no homologue in *Obolella*, unless they be represented by the two large ones *dd*. Should this be the case, however, the great difference in their position would no doubt be of generic value. I think it more probable that the large scars *dd* of *Obolella* represent the central pair *cc* of *Obolus*. Again, Eichwald says that in the interior of the ventral valve of *O. Apollinis* there is a longitudinal septum (shown in the above fig. 7 at *s*), which separates the two adductors *cc*, and extends to the cardinal groove (I suppose he means the groove *g* on the area).* No such septum occurs in any species of *Obolella*. I have not seen any description of the dorsal valve of the *O. Apollinis* sufficiently perfect to afford a means of comparison with that of *Obolella*, but the differences in the ventral valve alone are so great that the two genera can scarcely be identical. They are, however, closely related, and occur in nearly the same geological horizon.

In the rocks below Quebec and at the Straits of Belle Isle, we find the following species of *Obolella*:—

1. *O. desquamata* Hall, = *Avicula*? *desquamata*, Pal. N. Y., vol. i, p. 292, pl. 80, fig. 2. Occurs at Troy, N. Y.

2. *O. crassa* Hall, = *Orbicula*? *crassa*, op. cit. p. 299, pl. 79, fig. 8. Occurs at Troy.

* Speaking of the adductors, he says: "Une crête longitudinale occupe le milieu des dernières impressions et arrive jusqu'au sillon cardinal." (Lethæa Rossica, vol. i, p. 925).

3. *O. cœlata* Hall, = *Orbicula cœlata*, op. cit. p. 290. pl. 79, fig.
9. Occurs at Troy.
4. *O. gemma*, n. sp.
5. *O. circe*, n. sp.
6. *O. chromatica* Billings; has been found as yet only at the Straits of Belle Isle.

The following are new species:

O. gemma.—Shell very small, about two or three lines in length, ovate, both valves moderately convex and nearly smooth. Ventral valve ovate, the anterior margin broadly rounded, with sometimes a portion in the middle nearly straight; greatest width at about one-third the length from the front, thence tapering with gently convex or nearly straight sides to the beak, which is acutely rounded. The area is about one-fifth or one-sixth the whole length of the shell, with a comparatively deep groove, which extends to the apex of the beak. The dorsal valve is nearly circular, obscurely angular at the beak, and rather more broadly rounded at the front margin than at the sides.

In the interior of the ventral valve there are two small muscular impressions of a lunate form, close to the cardinal margin, one on each side of the median line. A second pair consists of two elongate sub-linear scars, which extend from the posterior third of the length of the shell to points situated at about one-fourth the length from the front margin. These scars are nearly straight, parallel or slightly diverging forward, and divide the shell longitudinally into three nearly equal portions. Between them, about the middle of the shell, are two other small obscurely defined impressions. There is also a small pit close to the hinge line and in the median line of the shell. In the interior of the dorsal valve there is an obscure rounded ridge which runs from the beak along the median line almost to the front margin. Close to the hinge line there is a pair of small scars, one on each side of the ridge. The other impressions in this valve have not been made out.

The surface of both valves is in general nearly smooth, but when well preserved shows some obscure concentric striæ.

This species is closely allied to *O. chromatica*, the species on which the genus was founded, only differing from it, so far as the external characters are concerned, in being much smaller, and the beak of the ventral valve more extended.

Occurs at Bic and St. Simon. Collected by T. C. Weston.

O. circe.—Ovate, front and sides uniformly rounded, posterior extremity more narrowly rounded than the front, length and width about equal, greatest width at the mid-length, rather strongly and uniformly convex, surface nearly smooth, but with fine concentric striæ. Length seven lines, width a little

less. The rostral portion of the shell is much thickened for about one-fifth the length, and in this part there is a deep and wide groove. In front of the thickened portion the muscular impressions are indistinctly seen, but appear to be formed on the same plan as those of the ventral valve of the genus.

The above description is drawn up on one exterior, and several interiors of the same valve, apparently the ventral valve. The exterior is very like that of *O. desquamata*, and is of the same size, but the interior shows it to be an entirely distinct species.

Length of the largest specimen seen, seven lines; width about the same, or slightly less.

Occurs at Trois Pistoles. Collected by T. C. Weston.

Platyceus primævum.—Shell minute, consisting of about two whorls, which as seen from above are ventricose, but most narrowly rounded at the suture; the inner whorl scarcely elevated above the outer. The under side is not seen in the specimen. Diameter, measured from the outer lip across to the opposite side, one line; width of last whorl at the aperture, about one-third of a line.

Collected at Bic by T. C. Weston.

Proposed new genus of Brachiopoda.

Genus **MONOMERELLA**, gen. nov.

Generic characters.—Shell unarticulated, ovate or orbicular; ventral valve with a large area and with muscular impressions like those of *Trimerella*. Dorsal valve with muscular impressions in the central and posterior portion of the shell, nearly like those of *Obolus*. In the ventral valve there is only a single septum, which extends from the cardinal line a greater or less distance forward. There are two cavities in the shell beneath the area. In the dorsal valve there are no cavities in the shell. The main difference between this genus and *Trimerella* are, thus, as follows:—

Trimerella.—Cavities in both valves.

Monomerella.—Cavities in the ventral valve, but none in the dorsal.

The above description is intended to be merely introductory. As Mr. Davidson will soon fully describe and illustrate the genus from both Canadian and Swedish specimens, no more need be said about it here.

This genus was discovered in the spring of 1871, at Hespelar, Ontario, in the Guelph limestone, by T. C. Weston. Before venturing to describe it, I sent a specimen to Mr. Davidson, and on returning it he stated that he considered it to be a new genus, "very closely allied to *Trimerella*" Lately I received a letter from him in which he states that he has obtained the same genus

from Wisby, Island of Gothland, and he requested me to name it, as he was about to publish the Swedish species.

We have two distinct species, both occurring in the Guelph limestone. This formation I consider to be about the age of the Aymestry limestone of the English geologists. I shall characterize our species briefly as follows. Full descriptions and figures will be given hereafter.

M. prisca.—Ventral valve ovate, greatest width at about the anterior third of the length, thence tapering with gently convex sides to the narrowly rounded beak; front margin broadly rounded; septum about one-third the length of the shell. Dorsal valve about one-fourth shorter than the ventral, and more broadly rounded at the anterior extremity. On a side view the outline of the ventral valve would be, so far as we can judge from a cast of the interior, somewhat straight, or only gently arched from the beak to the front margin. The dorsal valve, on the other hand, is rather strongly convex, most prominent in the anterior half. It is evident that the general cavity of the shell of the dorsal valve extends a short distance under the area.

Length of ventral valve, eighteen lines; greatest width, thirteen or fourteen lines; length of dorsal valve about fourteen lines. There are some fragments in the collection which indicate a larger size.

Occurs in the Guelph limestone at Hespelar, Ontario. Collected by T. C. Weston.

M. orbicularis.—Broadly ovate, nearly circular, lenticular, both valves moderately convex; septum about one-third the length. The casts seem to show that a thin plate extends forward a short distance from the cardinal edge, supported by the septum. The length and width appear to be about twelve or fifteen lines.

Occurs with *M. prisca*. T. C. Weston, collector.

Both *Trimerella* and *Monomerella* are sub-genera of *Obolus*.

There is, beside the above, a third group which differs from the other two in having no cavities in either valve.* It includes the species I have called *Obolus Canadensis* and *O. Galtensis*. For this group I would propose the name *OBOLELLINA*. It differs from *Obolus Apollinis* in the form of the area of the ventral valve, and in having a small pair of muscular impressions in the dorsal valve, in front of the large central pair. In all

* Since the above was published in the Can. Nat., in Dec. last, I have ascertained that cavities may exist both in *Monomerella* and *Obolellina*. Where they do occur, however, in species of these genera, they are small or rudimentary as compared with their great size in *Trimerella*. They occur in some individuals of *O. Galtensis*, but not in others. When, therefore, they are only slightly developed, they are not even of specific value. But when very large, they may be of sub-generic importance.

three of these sub-genera there are species which have the large muscular impressions of the ventral valve obliquely striated or grooved. This seems to show that the muscles were not single, but composed of several bands. The three genera pass gradually into each other, and yet I think some sort of a subdivision is required. It seems almost absurd to place such shells as *T. grandis* and *O. Canadensis* in the same generic group.

Proposed new genus of Pteropoda.

Genus HYOLITHELLUS, gen. nov.

Since the sheet containing the description of *Hyolithes micans* was printed off, I have arrived at the conclusion that a new genus for its reception should be instituted. I propose to call it *Hyolithellus*. It differs from *Hyolithes*, in its long slender form and in the peculiar structure of its operculum.

Montreal, 23d March, 1872.