II.—OBSERVATIONS ON THE GENUS *PORAMBONITES*.

By THOMAS DAVIDSON, F.R.S., F.G.S.

(PLATE III.)

IN 1830 Pander proposed the genus *Porambonites* for a remarkable group of Lower Silurian Brachiopoda, which abound in the neighbourhood of St. Petersburg, in Esthonia, and other parts of Russia; as well as in rocks of a similar geological age in Great Britain, Portugal, and other countries.

From the great difficulty of obtaining well-preserved internal casts, or interiors of the valves, much uncertainty has prevailed respecting its true characters, as well as with reference to the position the genus should occupy in the class. Some Palæontologists have referred it to *Terebratula*, others to *Spirifer*, *Orthis*, *Pentamerus*, *Isorhynchus*, and it has likewise been classed among the *Rhynchonellidae* by D'Orbigny and others. After many years of patient search, and at different intervals, I have been able, through the kindness and liberality of Dr. Volborth and Prof. F. Schmidt, of St. Petersburg, to procure some good internal casts of three species, as well as several detached valves and fragments showing every portion of the interior of both valves in an admirable state of preservation. These I now propose to briefly describe and illustrate.

The external characters of the different species composing the genus have been correctly described and figured by several palæontologists, and therefore all we need mention is, that the individuals composing each species vary a good deal in form, and especially so at different periods of their growth, as may be seen by inspecting a series of examples of *P. æquiostriis* from the dimensions of one line in length to that of nearly an inch. All the species are sub-circular, transversely oval, or sub-quadrate; the dorsal valve being the deepest or most convex, while there exists in the anterior half of the ventral valve a depression or sinus of greater or lesser depth. The beaks in both valves are so very much inflated and incurved, that they generally are nearly in contact, and leave scarcely any available space for the passage of the peduncular fibres of attachment.

In each valve, under the incurved beak, there exists a small narrow area and triangular fissure; the beak ridges are likewise sometimes very strongly defined. In a great number of specimens the extremity of both beaks, and especially that belonging to the ventral valve, present a circular hole. In some examples the aperture is so regular in shape as almost to lead one to conjecture that it may not have been entirely accidental, but it is more probable that these holes have been caused by friction, due to the opening and closing of the valves, the shell being very thin at that part. Externally all the known species are smooth, or rather ornamented by radiating rows of small pits, the shell structure, according to Dr. Carpenter, being impunctate.

The genus is composed of several well-defined species; the largest, *P. gigas* (F. Schmidt), Pl. III. Fig. 10, from Lychholm, in Esthonia,

measuring two inches and a quarter in length, by three inches in breadth, and nearly two inches in depth.

The valves articulate by means of two strong teeth in the ventral valve, which fit into corresponding sockets in the dorsal one.

In the interior of the *ventral* valve much difference is not only observable in different species, but likewise so in specimens of the same species, as may be seen from Figures 6, 7, and 8. The general character would, however, consist in the presence of a long median flattened tongue-shaped space, slightly raised near its anterior angular extremity. This narrow longitudinal flattened space extends from under the incurved beak to a little in advance of half the length of the valve. The dental plates, which are very large, projecting, and thickened in some examples (Fig. 8), at first converge, and afterwards run close to, and parallel with, the sides of the median flattened space above described, and to within a short distance of its anterior extremity.

In other examples, such as in Fig. 6, the base of the inner sides of the dental plates, or septa, as they approach the middle, become so much thickened as to come into contact, leaving only a flattened lozenge-shaped area at the anterior portion of the tongue-shaped space.

Again, in some species, such as in *Porambonites* (*Pentamerus*) *ventricosa* (Kutorga), Fig. 11, the mesial flattened space is, comparatively, wide and divided at about half its length by a narrow horizontal slope. The position, and partly the shape of the dental plates or septa, is sometimes seen through the transparency of the shell, or upon specimens where the shell has been worn away (Fig. 2).¹

In some species, such as in *P. æquirostris* (Figs. 6, 7), there exists a narrow raised ridge, which extends from the anterior extremity of the tongue-shaped mesial space to near the middle of the frontal margin, but this ridge is totally absent in other species, such as in *P. ventricosa*.

On the flattened surface of the anterior half of the mesial tongue-shaped space are situated the adductor muscular scars, flanked by the divaricator or cardinal impressions, and in this respect agreeing in position with what prevails in *Meristella* and several other genera among the Brachiopoda. The vascular impressions consist of two pair of primary vessels; one lateral pair partly surround the ovarian spaces, the other pair, after dividing the adductor from the divaricator muscular impressions, run to some distance towards the front margin of the shell, as is seen in Fig. 11a.

In the interior of the *dorsal* valve the converging socket ridges form two projecting sharp or much thickened plates or septa, shorter than in the ventral valve, and which sometimes show two dark lines on the surface of the cast (Fig. 2). These vary considerably

¹ At p. 112 of his "Monograph of the Permian Fossils of England," Prof. King alludes to these plates: "*Larger valve*, with two long more or less diverging dental plates, and a median sinus. *Small valve*, with two long more or less diverging socket plates."

in different species. In *P. ventricosa* (Fig. 12a) they are narrow, prominent, and inclose a rather wide oblong concave space, obtusely angular anteriorly. In *P. alta* (Pander), Fig. 9, these same plates are very much produced, and converge to an almost acute termination. Again, in *P. æquirostris* (Figs. 4 and 5), their base is very wide and thickened, and they converge laterally, so as to end anteriorly in an acute point. No cardinal projection, or process, is observable, and the muscular impressions seem to occupy (at least in part) the space inclosed by the socket plates. Two contiguous primary vessels (Fig. 12a) run at once direct from the centre of the valve, for some little distance, then divaricate, and finally become reflected, as seen in Fig. 12a.

Such are the principal characters observable in the interior of both valves of this remarkable genus, and which I have been able to study in a great number of specimens. When looking into the interior of the rostral portion of both valves (as may be seen by taking a squeeze in gutta-percha from that portion of the internal cast), we see the hinge and the well-defined depressions or central chambers circumscribed by the dental and socket plates (Figs. 9 and 13). When these plates are much thickened at their base, they produce wide and deep indentures or depressions in the posterior portion of the internal cast, as may be noticed in Figures 3, 3a, b, c.¹ But when sharp and narrow, they leave deep slits in the same portion of the internal cast, as is seen in Figures 11 and 11a.

Porambonites therefore forms a small sub-family among the Brachiopoda, attached, at least during a part of its existence, by means of a pedicle, or its representative. No calcified process is observable for the attachment or support of the oral appendages, which were, no doubt, fleshy and spirally coiled. There are also in the interior of each valve diverging dental and socket plates, which laterally circumscribe the central muscular space.

Porambonites differs materially from *Pentamerus* and other genera by its internal arrangements, nor is there any apparent ground why it should be located in the family *Rhynchonellidae*. The genus is confined to rocks of the Lower Silurian period.

EXPLANATION OF PLATE III.

- FIG. 1, 1a, b, c.—*Porambonites æquirostris*, Pander. Lower Silurian. Pawlowish, near St. Petersburg.
 FIG. 2.————— Specimen seen from the beaks, and showing the position of the septa.
 FIG. 3, 3a, b, c.—*Porambonites æquirostris*, Pander. Internal cast. Poulkova, near St. Petersburg.
 FIG. 4.————— Interior of dorsal valve taken in gutta-percha from the cast of Fig. 3.
 FIG. 5.————— Interior of the dorsal valve from a testiferous specimen. Lower Silurian (1a of Schmidt's classification). Kuckers, Esthonia.
 FIG. 6, 7, 8.————— Interior of ventral valve. Same locality.
 FIG. 9.—*Porambonites alta*, Pander. Interior of rostral portion of both valves to

¹ In pl. iii. figs. 28, 29, 30, of his Beiträge zur Geognosie des Russischen reiches, Pander gives a figure of this same internal cast, but which he erroneously considers to be a *Pentamerus*.

show the hinge and respective position of the dental and socket plates or septa. Reval, Esthonia.

FIG. 10.—*Porambonites gigas*, F. Schmidt. Lower Silurian (2a of Schmidt's classification). Lychholm, Esthonia.

FIG. 11.—*Porambonites (Pentamerus) ventricosa*, Kulorga. Internal cast of ventral valve. 11a. Interior of same valve taken in gutta-percha from the same cast. Lower Silurian. From quarries near the village of Paritz, near Gatschina. This fine internal cast was found and presented to me by Prof. Inostranzew.

FIG. 12.————— Dorsal valve from same internal cast. 12a. interior.

FIG. 13.————— Interior of the rostral portion of the valves, to show hinge and respective position of dental and socket plates in each valve. Taken from the same internal cast.

III.—DESCRIPTIONS OF NEW FOSSILS FROM THE DEVONIAN FORMATION OF CANADA WEST.

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(PLATE IV.)

(Continued from page 16.)

ALVEOLITES (CŒNITES?) DISTANS, Nicholson.

Spec. char.—Corallum ramose, the branches cylindrical, of a diameter of from a line and a half to two lines, dividing dichotomously at intervals of about half an inch, but not anastomosing. Corallites oblique to the surface, with exceedingly thick walls. Calices extremely minute, about one-eighth of a line in their longest diameter, sub-circular, transversely oval, or sub-triangular, level with the surface, and having the lower lip hardly or not at all prominent. Intervals between the calices proportionately very wide—usually about half a line.

FIG. 4.—*Alveolites distans*, Nich. a. Fragment of the natural size. b. A portion of the same enlarged. From the Corniferous Limestone.

At first sight this species has very much the appearance of a *Cœnites* (such as *C. intertextus*), or of the uncertain form *Alveolites (?) seriato-poroides*, Edw. and Haime. It is, however, distinguished from the former by the non-prominent and not markedly triangular calices, and from the latter (which is almost certainly not an *Alveolites*) by the fact that the corallites are disposed obliquely to the surface.

Alveolites distans is readily distinguished from the other ramose species of the genus by the exceedingly small size of the calices and the proportionately great width between them, as well as by the fact that the calices are level with the general surface or nearly so. There is thus produced the fallacious appearance that the corallites are imbedded in an abundant cœnenchyma.

Locality and Formation.—Corniferous Limestone, Port Colborne.

ALVEOLITES CONFERTA, Nicholson. Pl. IV. Fig. 5, c.

Spec. char.—Corallum ramose, composed of cylindrical or elliptical branching stems, which bifurcate, but do not interlace. Diameter of the stems from two to three lines. Corallites minute,

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