

## II. ON SOME CRUSTACEAN TEETH FROM THE CARBONIFEROUS AND UPPER LUDLOW ROCKS OF SCOTLAND.

By HENRY WOODWARD, F.G.S., F.Z.S.

[Plate XI.]

I HAVE lately received, from Mr. James Armstrong of Glasgow, some very beautiful examples of the detached teeth of *Dithyrocaris* from Lanarkshire and Renfrewshire, and also specimens of *Ceratiocaris* from Lesmahagow (the latter collected by Mr. J. Slimon); and they seem to possess so much interest, that a description of them will doubtless be welcome.

So long ago as 1843, the late General Portlock (at that time a Captain of Royal Engineers conducting the Geological Branch of the Ordnance Survey of Ireland), in his Report on the Geology of the County of Londonderry, figured the teeth of *Dithyrocaris* in pl. xii. fig. 6, of that work; and at p. 315 he observes, 'Fig. 6 represents bodies which are frequently found on the specimens of this crustacean, and in this instance together, as represented in the figured specimen; they each exhibit a single row of tubercles, and were in all probability connected with the masticatory apparatus, which it is probable, therefore, was highly developed in this large species.' We reproduce the figure in our plate (Pl. XI. fig. 8).

Mr. Salter first noticed the teeth of *Ceratiocaris* in 1860,\* but they have never been properly figured, nor does the figure of the teeth of *Dithyrocaris* from Ireland, given by Portlock (see Pl. XI. fig. 8), correctly represent these organs.

Plate XI. fig. 1, represents a perfect carapace of *Ceratiocaris*, at the anterior end of which (at *a*) the two opposing mandibles may be seen in their proper place, compressed on the surface of the left valve. A detached mandible (fig. 2) from the same locality as fig. 1 (Upper Ludlow Rock, Lesmahagow, Lanarkshire) is represented in the plate of the natural size.† Figs. 3–6 represent the teeth of *Dithyrocaris* collected by Mr. James Armstrong and Mr. J. Bennie from Campsie and East Kilbride, Lanarkshire, and Orchard Quarry, near Thornliebank, Renfrewshire.

Mr. Armstrong (being a practical geologist) was not satisfied with General Portlock's opinion that these detached teeth belonged to *Dithyrocaris*, especially as neither Professor M'Coy, who had figured *Dithyrocaris* (see Plate XI. fig. 9‡), nor Dr. Scouler (the original describer of the genus), had attempted to connect them: he wished to find a specimen with the teeth attached.

At length, after diligent search, Mr. Bennie was so fortunate as to obtain, at Lickprivick Quarry, East Kilbride, Lanarkshire, a portion of a carapace (Pl. XI. fig. 6), upon the under side of which he discovered the long-looked-for teeth *in situ* (fig. 6, *a*, *b*). This

\* See Annals and Mag. Nat. Hist., 3rd series, vol. v. p. 153.

† These specimens are in the British Museum.

‡ Copied from Prof. M'Coy's Carb. Foss. Ireland, pl. xxiii. fig. 2.

discovery is the more acceptable, because the teeth have never yet been met with at Carluke, where the carapaces are found, although the Carboniferous beds have been diligently searched for fossils by Dr. Rankin for at least thirty years, whilst the localities already named as yielding the detached teeth do not furnish remains of the carapace.

The teeth, with one or two exceptions, always occur in ironstone nodules, and the best specimens are those which have been 'weathered' out, as the fossil, being softer than the matrix, cannot readily be developed artificially. If exposed too long, being calcareous, they become soft, and soon crumble away.

It is probable that the soft parts of the animal (which contained the teeth), having been, after death, detached from the carapace whilst undergoing decomposition, became the nucleus for a concretion of phosphatic matter, which was added to, layer by layer, in the same manner as the concretions around organic remains in the London Clay, and the ironstone nodules containing leaves and *Limuli*, in the Coal-measures, appear to have been formed.

Mr. Armstrong informs us that the *Dithyrocaris* tooth from Campsie (Pl. XI. figs. 4 and 4 *a*) occurs in a bed of black shale, overlying the 'Hosie' Limestone of the Lanarkshire Carboniferous series, which is about 670 fathoms below the 'Ell Coal.' This is the horizon usually taken by the Glasgow geologists in giving the position of Carboniferous fossils. No other specimen is recorded from this locality.

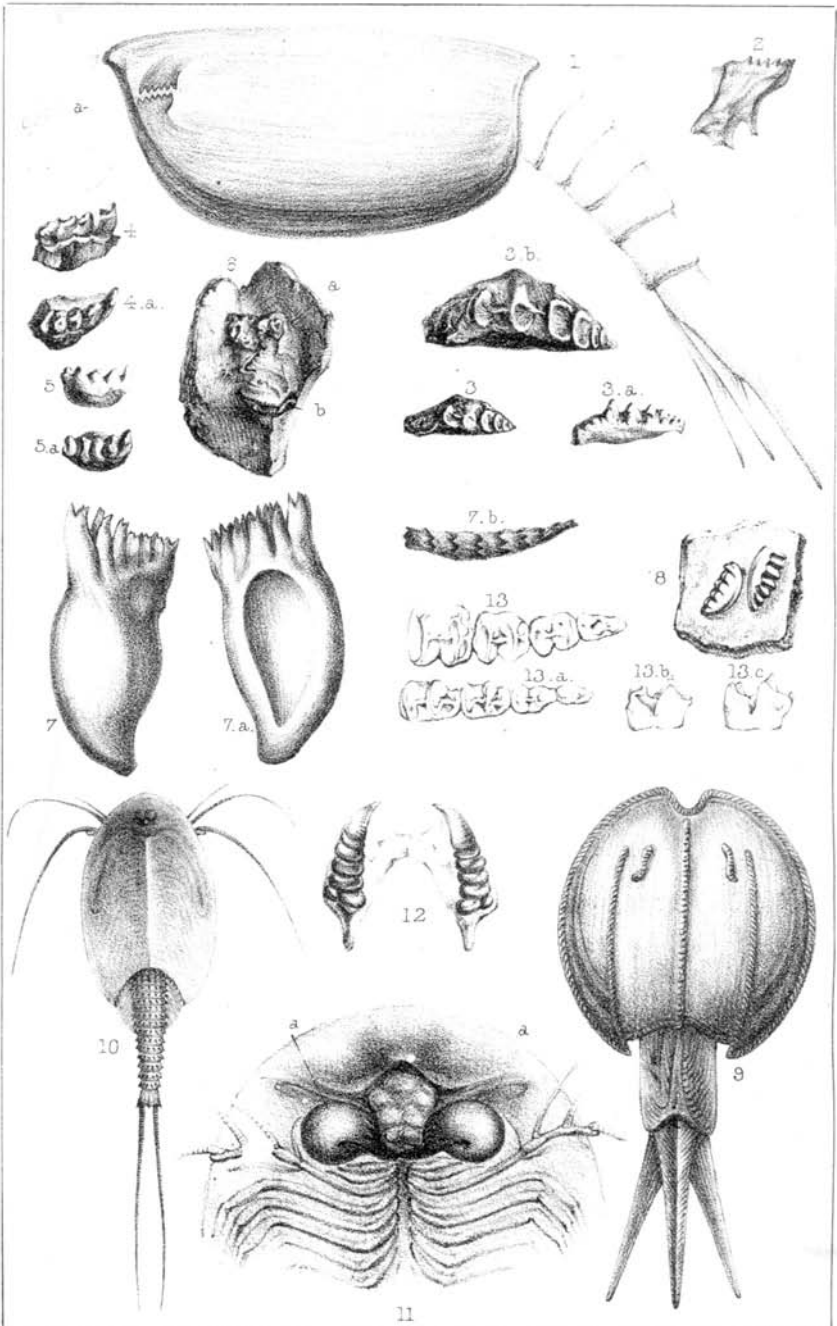
Its associated fossils are *Nucula gibbosa*, *N. lineata*; *Leda longirostris*, *L. attenuata*; *Nautilus subsulcatus*; *Goniatites Gilbertsoni*, *G. vesica*; a profusion of *Spirifera Urüi*, *Orthoceras pygmæum*, and a large *Cythere*?

Those from Orchard Quarry, near Thornliebank, Renfrewshire (Pl. XI. figs. 3, 3 *a*, 3 *b*, and 5, 5 *a*), are from a bed of shale about 300 fathoms below the 'Ell Coal.' The common fossils in this bed are several species of *Cypricardia*, *Leda*, *Orthoceras*, *Productus costatus*, *Bellerophon Urüi*, *B. Leveilleanus*, *Macrocheilus*, *Pleurotomaria monilifera*. No trace of carapace has been discovered at either of these localities.

The specimen with the teeth attached to the portion of carapace, from East Kilbride (Pl. XI. fig. 6), was found in shale associated with *Brachiopoda*, Corals, &c. The teeth are common at Orchard Quarry, but only a single specimen has been met with either at Lickprivick or Campsie.

That these detached fossil remains are the teeth of Crustacea there cannot now be the least doubt; for, in addition to the evidence afforded by the remains of the allied genus *Ceratiocaris* (Pl. XI. fig. 1), and by the fragment of *Dithyrocaris* (Pl. XI. fig. 6), one needs only to compare the gastric teeth of the common Lobster (*Homarus vulgaris*), figured in our plate (fig. 12), with the most perfect tooth of *Dithyrocaris* (figs. 3, 3 *b*), to see the striking similarity between them, both in general form and in minuter details.

They so strongly resemble the molar teeth of the Vertebrata also,



that Dr. Günther at first sight supposed them to be Fish-teeth allied to the *Sphæridæ* or *Labridæ*; whilst Prof. Owen and Mr. Waterhouse, to whom they were submitted for inspection, noticed their great superficial resemblance to the teeth of some small Marsupials, such as the Kangaroo Rat (*Hypsiprymnus*) of Australia.

The important bearing of these 'superficial' resemblances cannot be too strongly impressed upon Palæontologists, and especially on those who work in that Border-land between the Palæozoic and Secondary rocks—the Rhætic and Triassic groups. For it was in the Rhætic Bone-breccia of Württemberg that Prof. Plieninger discovered the teeth of the then oldest known Mammal, the *Microlestes antiquus*; and in a fissure of the Carboniferous Limestone near Frome, Mr. Charles Moore, of Bath, found that wonderful accumulation of minute teeth and other organic remains from a Bone-bed of the same age; and Mr. Boyd Dawkins detected the tooth of the oldest British Mammal (the *Hypsiprymnopsis Rhæticus*) in the Lower Rhætic of Watchet. These teeth, all very minute, often very obscure, require the closest scrutiny, and wherever it is practicable their structure should be microscopically examined.

In the Mammalia the molar teeth are all provided with double roots or fangs; there is also a well-marked division or ridge which surrounds the base of that part of the tooth which is exposed above the gum—a character which distinguishes them from those of Fish and Reptiles. But if the crown only of the tooth of a small fossil Marsupial be compared with a part of one of these gastric teeth of *Dithyrocaris*, these characters will scarcely suffice to distinguish between them, and we must examine their more minute structure.

In the plate I have given figures (13 and 13 *a*, *b*, *c*) of the teeth of a young Kangaroo (*Macropus*) for comparison with the enlarged figure (fig. 3 *b*) of the tooth of *Dithyrocaris*, which will serve to show many superficial points of form which they possess in common.

Fig. 10 is the recent *Apus* (from near Prague in Bohemia), of the natural size, for comparison with *Dithyrocaris* and *Ceratiocaris* (figs. 1 and 9). Fig. 11 is an enlarged view of the same, showing the jaws (*a*, *a*) *in situ*; whilst figs. 7, 7 *a*, and 7 *b*, represent these dissected out, and magnified about seven times. There is a considerable difference between the serrated mandible of *Ceratiocaris* and the more solid and massive teeth of *Dithyrocaris*; and among these, also, there are at least two distinct forms: but we need more materials before we can determine to which species these several forms of teeth belong.

#### EXPLANATION OF PLATE XI.

- Fig. 1. *Ceratiocaris papilio*, Salter. U. Ludlow Rock, Lanark.
2. *C. papilio*, Salter. Detached jaw from same locality
3. Nearly perfect tooth of *Dithyrocaris*, Upper Marine series, Orchard Quarry, Thornliebank, Renfrewshire.
- 3 *a*. Side view of same.
- 3 *b*. Enlarged view of grinding surface of same, showing the fine striæ in the recesses of the C-shaped cusps.

4. Another tooth of *Dithyrocaris*, from the Lower Marine series, Campsie.
- 4 a. Upper view of same.
- 5 & 5 a. Side- and upper view of another specimen, from Orchard Quarry.
6. Fragment of the fore-part of a carapace of *Dithyrocaris*, showing the under-surface, with portions of the two 'molar' teeth (*a*, *b*) seen *in situ*. From Lickprivick Quarry, East Kilbride.
- 7, 7 a, & 7 b. Magnified views of the outer and inner sides and the grinding surface of jaws of *Apus*. Recent from Bohemia.
8. Fac-simile of General Portlock's figure of teeth of *Dithyrocaris*, in the Geol. of Londonderry, pl. xii. fig. 6.
9. *Dithyrocaris Scouleri*, McCoy, Carb. Foss. Ireland, pl. xxiii. fig. 2.
10. *Apus cancriformis*, sp. Recent from Bohemia (nat. size).
11. Ditto. Enlarged view of under-side to show jaws in place (*a a*).
12. Gastric teeth of common Lobster, *Homarus astacus*.
13. Upper molar teeth (right side) of a young Kangaroo, from Australia.
- 13 a. Lower ditto ( " ) ditto.
- 13 b & c. Detached teeth of (*b*) upper and (*c*) lower jaw of same.

### III. REMARKS ON THE GENUS POLYPORITES.

By E. W. BINNEY, F.R.S.

LINDLEY and Hutton, in their 'Fossil Flora' (vol. i. p. 181), give a plate and description of some specimens, termed by them *Polyporites Bowmanni*, which were found by the late Mr. J. E. Bowman, F.L.S., in the Carboniferous strata, near the entrance of the Vale of Llangollen, in the county of Denbigh.

In the notes on the first specimen no doubts are expressed as to the nature of the fossil; but with respect to the second specimen, the authors say, 'It is a matter of great doubt whether this really belongs to the vegetable kingdom. Mr. Bowman remarks that his second specimen might be taken for the scale of a Fish, or of some great Saurian Reptile; and we admit it now without daring to offer any decided opinion about it, chiefly on account of its resemblance, in some respects, to some cellular plants of the present era.'

Some twenty-five years ago, Mr. Bowman showed me both the specimens, and I immediately recognized them to be scales of the genus *Holoptychius*, since changed to *Rhizodus*; and that gentleman was of the same opinion, and stated to me that he always had doubts as to the vegetable nature of the fossils. Probably I should not have taken any notice of these mistaken fossils; but in looking over M. Adolphe Brongniart's excellent work, 'Tableau des Genres de Végétaux fossiles considérés sous le point de vue de leur classification botanique et de leur distribution géologique,' I noticed that, at page 6, in speaking of the 'Famille des Champignons, he says, 'MM. Lindley et Hutton, dans leur *Fossil Flora*, ont désigné sous le nom de *Polyporites Bowmanni* un fossile qu'ils comparent, quoiqu'avec doute, à un *Polyporus*, et qui provient des mines des houilles du pays de Galles. J'ai observé une empreinte analogue dans les échantillons du terrain houiller de Sardaigne, et qui ne paraît pas