

former existence of horizontal strata of—1. (lowermost) loam with flints,—2. greenish sands with ironstone nodules,—3. yellow and reddish sands,—superposed on the bare chalk, after the eocene beds were for the most part denuded, and before the sandpipes were formed, into which these overlying beds were here and there let down and thereby preserved when further denuding agencies removed the later tertiary beds.

Regarding then the outliers of ferruginous sands and sandstones above referred to as of the age of the Lower Crag, Mr. Prestwich pointed out the relative position of beds of similar structure on the Downs between Calais and Boulogne, and on the top of Cassel Hill near Dunkirk; and of others at Louvain, and at Diest in Belgium, mentioned by M. Dumont and Sir C. Lyell. This extensive range of Crag-beds to the south of the typical Suffolk area, and their considerable elevation above the sea, are of course matters of great interest, not only as pointing out the relative age of some of the drifts, but especially as giving us a still nearer date to limit the denudation of the Weald, and indicating marginal sea-beds now stretching far inland and ranging once probably over the Wealden area,—possibly connected too with the Carentan beds of Normandy.

With regard to the denudation of the Weald, Mr. Prestwich suggests that, the anticlinal axis of the Weald having been somewhat raised during the cretaceous period, and the lower tertiaries partly constructed from its *débris* and gradually distributed over its area, it was again denuded to a further extent in the later tertiary period, some island or islands of the lower cretaceous rocks remaining in its area from which for the most part these sandy ferruginous Crag-beds were derived. The great or final elevation and denudation of the Wealden area was necessarily subsequent to the deposition of these pliocene beds, for their outliers, resting on an old flint-drift, occur on the very edge of the upraised chalk-escarpments of the Weald. This elevation being also subsequent in time to the first or Lower Crag period, Mr. Prestwich suggests, that we have here evidence of the physical cause of the distinction of the two Crag periods. The first Crag sea was open to the south, and of considerable extent; but the last Wealden elevation, cutting off the southern portion, so altered the hydrographical conditions of the period, that a sea open only to the north remained, in which the Red or Upper Crag, with its partially boreal fauna, was then deposited.

2. *On some PERMIAN FOSSILS from DURHAM.*

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[Communicated by T. Davidson, Esq., F.G.S.]

[PLATE VII.]

THIS communication comprises a notice of the occurrence of a malacostracous Crustacean and of a new species of *Chiton* in the

Magnesian Limestone of Durham, together with remarks on some other Permian fossils.

1. *PROSONISCUS PROBLEMATICUS*, Schlotheim, sp.

Pl. VII. figs. 1-7.

Trilobites problematicus, Schlotheim, Petrefact. 1820, p. 41.

Palæocrangon problematica, Schauroth, Zeitschr. deut. geol. Gesell. 1854, vol. vi. p. 560. pl. 22. figs. 2 a-e.

In the summer of 1853 I found two imperfect specimens of one of the higher (malacostracan) Crustaceans in the limestone at Humbleton Quarry. At the time I thought that the species belonged to the *Macrura*; but I now find this was an error. A short notice of this interesting discovery appeared in the Address of the President of the Tyneside Naturalists' Field Club, March 15, 1854*.

At that time I believed that none but the lower forms of Crustaceans had been previously found in the Permian rocks. I have since learned, however, that in Schlotheim's 'Petrefactenkunde,' 1820, p. 41, mention is made of the discovery (in the Zechstein-dolomite of Glücksbrunn) of a peculiar fossil, named by Schlotheim *Trilobites problematicus*, which is probably the same species as mine.

In 1854 Baron Schauroth† authenticated Schlotheim's discovery, and figured and described a specimen of this species as belonging to one of the higher groups of *Crustacea*, naming it *Palæocrangon problematica*. On comparing my specimens with the figures given by Schauroth, I have a little hesitation in regarding them as belonging to the same species; but as "Palæocrangon" does not express the affinities of the fossil animal, I propose, as a more correct generic term, the name *Prosoniscus* ‡, as suggested by a palæontological friend.

Though my original specimens are in no respect inferior to those of Schauroth's, I did not venture to name and describe them when they were first noticed, but postponed doing so in the expectation of procuring more examples, and obtaining a more definite knowledge of the affinities of the species. It was not, however, until the summer of the present year that any further traces of it were found, when one or two other fragments from a different locality were met with. In all, six specimens have been obtained: two from Humbleton Quarry, three from Field House, Ryhope, and one from Tunstall Hill.

Drawings of the most perfect of these have been submitted to Mr. C. S. Bates, and I am indebted to that gentleman for the following interesting remarks:—

"There is but one Order among recent *Crustacea* with which figs. 1 and 2 can be identified, and that is the *Isopoda*. But the relation of the fossil to the recent species is peculiar. In all recent forms (as far as I know) where the eyes project upon the surface of

* Transactions of the Tyneside Nat. Field Club, vol. ii. p. 333.

† Zeitschrift der deutsch. geolog. Gesell. vol. vi. p. 560. pl. 22. fig. 2.

‡ From *πρόσωπον*, a face or mask, and *ὄνισκος*, oniscus.

the integument the cephalic region is small, being less than the next succeeding segment; but this fact, which is very constant in the adult animals, is not permanent in the larval condition of the same; the head or cephalic segment being more important in relation to the succeeding rings. But from all the larval or adult forms of prominent-eyed *Isopods* this fossil specimen differs in the anterior position of the eye. This may be a specific distinction only.

“The fact that this *Isopod*, found in so early a geological period, assumes rather the larval than the adult form of the recent type, is consonant with all we know of the relation which animals generally of so early a date hold to existing species.”

We must therefore, it appears, look upon our fossil Crustacean as belonging to the family *Isopoda*, though somewhat of an abnormal character in reference to the recent forms.

Baron Schaueroth's specimen from the Zechstein-dolomite of Pössneck appears to consist of four body-rings and the two posterior segments*. I have been fortunate, however, in procuring one specimen showing the cephalic segment or carapace, with two body-segments attached (Pl. VII. figs. 1, 2, 3).

The carapace is about as long as four of the succeeding body-rings, somewhat less in depth, and slightly compressed laterally; it is carinated along the back and wedge-shaped in front; the eyes are large, round, and prominent, and are placed far forward; from the lower part of each eye runs an indented line, at a short distance from the margin, up to the dorsal region, where it curves forward.

The other five specimens consist of body-rings (2 to 6 in number) and the two great posterior or caudal segments†; and are very similar to the figures given by Schaueroth. In one of the Durham specimens (fig. 7) there are six body-rings, and two posterior segments; the others (figs. 4, 5, 6) have likewise the two latter segments, but not so many of the former. The body-segments are narrow, almost uniform in size, but varying a little in depth, the central ones appearing to be the most produced; they overlap each other and the penultimate segment posteriorly; they are slightly compressed, and have traces of a median dorsal ridge; those in front have their extremities turned a little forward, while the posterior ones are bent in the contrary direction. The large penultimate segment is greatly developed laterally; it is strongly carinated dorsally; its ventral margins are slightly convex, as is also the posterior border, which has a deep notch not far from the dorsal ridge; the ridge or keel of this segment is very prominent except anteriorly, where at each side of the dorsal line is a transverse swelling; it is compressed also posteriorly. The next segment, which is the hindermost known, is more compressed than the preceding one, and considerably smaller.

None of the English specimens show the true external surface, nor have any traces of feet or of antennæ been found.

* The latter are regarded as the cephalic and thoracic segments by this author.

† It is probable that we have all the hinder segments in these specimens; but there may possibly be a small terminal one besides.

The specimen with the carapace (figs. 1–3) is one-eighth of an inch long. The largest of those with the body-segments only (fig. 4) is nearly half an inch in length.

2. *CHEMNITZIA ROESSLERI*, Geinitz, sp. Pl. VII. fig. 8.

Loxonema Roessleri, Geinitz, Jahresbericht Wetterauisch. Gesell. 1850–51; Schauroth, Zeitschr. deutsch. geol. Gesell. 1854, vol. vi. p. 538. pl. 21. fig. 9.

In 1853 I obtained a very fine specimen of a ribbed *Chemnitzia* at Humbleton Quarry, which agrees very well with the *Loxonema Roessleri*, Geinitz, as figured by Baron Schauroth in the 'Zeitschrift d. deutsch. geol. Ges.' 1854, vol. vi. p. 538. pl. 21. fig. 9. A notice of the occurrence of this interesting fossil was given, together with that of the above-described Crustacean, in the Transactions of the Tyneside Naturalists' Field Club, vol. ii. p. 333.

The first account of a ribbed *Chemnitzia* from the Permian rocks is found in Mr. Howse's 'Catalogue of Permian Fossils *.' This is probably the same as the one now before us; and is undoubtedly distinct from *Loxonema Swedenborgiana*, King (Monograph Perm. Foss. p. 210), though Baron Schauroth is disposed to consider the two identical. The size, however, is sufficient to distinguish them.

I have given a figure of this specimen (fig. 8), as Schauroth's figure is from a very imperfect individual. My specimen is perfect with the exception of two or three of the apical whorls; the six whorls that remain give a very good idea of the species. This shell is long and slender, tapering gently to an apparently very fine point; the whorls (which, when entire, probably numbered eight or nine) are somewhat convex, rather tumid behind, with the suture deep; they are covered with thick, close-set, transverse ribs, giving to the shell a fluted appearance; the large whorls have about eighteen ribs each, and are finely striated on the under surface. The pillar-lip, as far as can be observed, is straight, but the greater portion of the aperture is hidden in the matrix.

There is little doubt that this is a true *Chemnitzia*: the form of the shell, the character of the whorls with their ribs, the deep suture, and straight columella, pronounce it to belong to this genus. The whole habit of the shell, too, is very similar to that of *Chemnitzia*.

3. *CHITON HOWSEANUS*, sp. nov. Pl. VII. figs. 9–13.

Three plates of a *Chiton* have occurred at Tunstall Hill, which, on a careful examination, appear to be distinct from *Chiton Loftusianus*, King (Monog. Perm. Foss. p. 202. pl. 16. figs. 9–14), of which I have a full series.

Of the new species two of the plates are intermediate (figs. 10, 11, 12), and one anterior (fig. 13). The former plates are not much compressed; they are wide and obtusely angulated, not much pointed

* Transact. Tyneside Nat. Field Club, vol. i. p. 241.

posteriorly, and they have a surface finely granulated; the lateral areas, which are rather wide, are not strongly marked, and the lines of growth are indistinct; one or two wide grooved lines, commencing at the posterior margin, run parallel to the lower margin, and are continued faintly to the anterior dorsal region. The anterior plate (fig. 13) is marked in a similar manner. The processes for insertion are more prominent, narrower, and not so regularly arched as the apophyses of *C. Loftusianus* (fig. 9).

C. Howseanus may be readily distinguished from the last-named species, which is the only other *Chiton* found in the Permian rocks, by the flatness and greater width of the plates, by the obscurity of the lateral areas, and smoothness (want of strong lines of growth) of the plates. The one or two grooved lines which follow the margin are also characteristic.

I have great pleasure in dedicating this species to Mr. R. Howse, the author of an excellent 'Catalogue of the Fossils of the Permian System of the counties of Northumberland and Durham,' and 'Notes on the Permian System of Durham,' &c.

4. LIMA PERMIANA.

Lima Permiana, King, Monogr. Perm. Foss. p. 154. pl. 13. fig. 4.

It may be interesting to mention that this species, which Professor King founded upon the knowledge of a single valve from Humbleton Quarry, is not of rare occurrence at Tunstall Hill, and at Field House, Ryhope; from which localities I have obtained a very fine series of specimens, completely illustrating and establishing the species*.

This species, in common with all *Limæ*, is characterized by a hinge-area, by its being devoid of a notch under the front ear of the right valve, and by the obliquity of its valves; also by its hinge-area being narrow, its ears small, and its valves smooth, which latter slope gradually and shut close.

5. HIPPOTHOA VOIGTIANA, King, sp. Pl. VII. figs. 14, 15.

Aulopora Voigtiana, King, Monog. Perm. Foss. p. 31. pl. 3. fig. 13.

Prof. King, in his 'Monograph of Permian Fossils,' gives a short account of this fossil under the generic appellation of *Aulopora*. His description and figures were from casts, no testiferous specimens having been procured at that period, and were necessarily incomplete. As I have been so fortunate as to find a perfect example of this fossil, I have deemed it desirable to give a new figure, and to describe the species afresh.

The cells are oval, widest in front, produced or slender behind; they are placed rather near to each other, the connecting threads being short and thicker than usual; the aperture, which is situated at the distal extremity of the cell, is rather large, circular, and protected by a smooth raised lip.

* In the paper already referred to, Baron Schaueroth describes and figures a variety (*subradiata*) of this species.

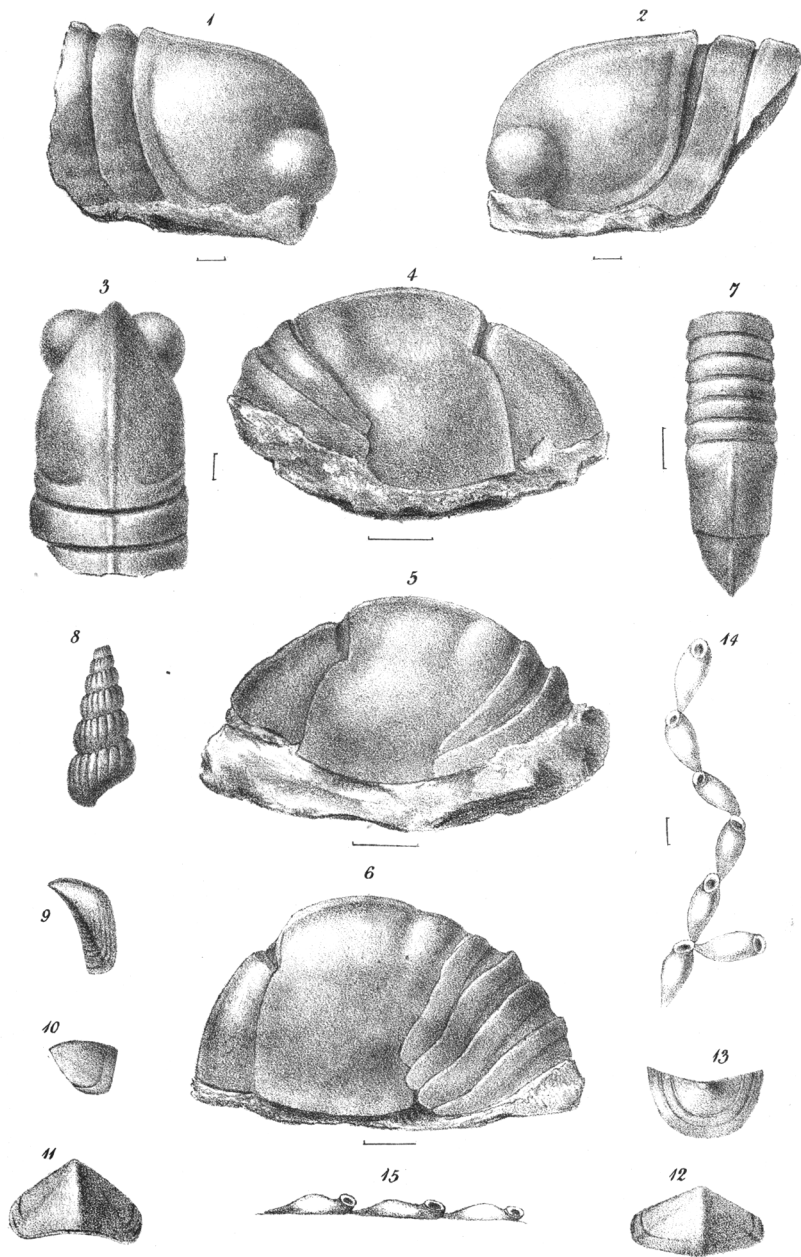
My specimen is not much branched; and the branches always arise from the anterior portion of the cell at an obtuse angle.

This fossil is undoubtedly a *Bryozoon*; and, as the genus *Aulopora* is stated by MM. Edwards and J. Haime to be only the young stoloniferous base of a *Syringopora*, I have, after an attentive examination of its affinities to existing genera, placed it in the species *Hippothoa*, to which it bears a strong resemblance and an evidently close relation.

The specimen figured is from Tunstall Hill, and is attached to the external surface of a *Terebratula elongata*.

EXPLANATION OF PLATE VII.

- Figs. 1, 2. *Prosozoniscus problematicus*, Schloth. sp. }
Lateral views of anterior portion. From Humbleton Hill. } Magnified ten times.
Fig. 3. The same. Dorsal view. }
Figs. 4, 5. The same. Lateral views of posterior portion. From Humbleton Quarry. } Magnified six times.
Fig. 6. The same. Lateral view of posterior portion. } From Field House, Ryhope.
Fig. 7. The same. Dorsal view of posterior portion. } Magnified seven times.
Fig. 8. *Chemnitzia Roessleri*, Geinitz, sp. From Humbleton Hill. Magnified four times.
Fig. 9. *Chiton Loftusianus*, King. Lateral view of an intermediate plate; enlarged. (For comparison with fig. 10.) }
Fig. 10. *Chiton Houseanus*, Kirkby. Lateral view of an intermediate plate. (Enlarged.) } From Tunstall Hill.
Figs. 11, 12. The same. Intermediate plate. (Enlarged.) }
Fig. 13. The same. Anterior plate. (Enlarged.) }
Fig. 14. *Hippothoa Voigtiana*, King, sp. } Magnified sixteen times.
Fig. 15. The same. Side-view. }



W. Kirkby del.

G. West lith.

W. West imp.

PERMIAN FOSSILS
from Durham.