THE

GEOLOGICAL MAGAZINE.

NEW SERIES. DECADE II. VOL. VIII.

No. XII.—DECEMBER, 1881.

ORIGINAL ARTICLES.

I.—Contributions to the Study of Fossil Crustacea.

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(PLATE XIV.)

HAVING received an invitation from Mr. W. Stoddart to examine the collection of his late father, Mr. W. W. Stoddart, F.G.S., at Sneyd Park, Clifton, Bristol, I availed myself of the opportunity to do so in April last, and was interested in finding, among many other good British fossils, a new and undescribed Crustacean belonging to the genus *Eryon*, from the Stonesfield Slate of Stonesfield, Oxfordshire.

Unfortunately only the intaglio is preserved, the relievo side having probably escaped detection or been broken up. This is, however, sufficiently clear to enable one readily to compare it with the other known forms of this well-marked genus.

Ten species of *Eryon* have been described from the Lithographic Stone of Solenhofen, which may be considered as probably near the horizon of our Kimmeridge Clay. They are :—

Eryon propinquus, Schlot.	*Eryon bilobatus*, Münst.
,, *spinimanus*, Germ.	,, *longipes*, Fraas.
,, *orbiculatus*, Münst.	,, *Schuberti*, Meyer.
,, *elongatus*, Münst.	,, *Redenbacheri*, Münst.
,, *arctiformis*, Schlot.	,, *Oppeli*, H. Woodw.

To these must be added one species from the Oxford Clay of the Haute-Saône, France, viz :—

Eryon Perroni, Etallon.

Next in descending order will come Mr. Stoddart's *Eryon* from the Stonesfield Slate.

1.—*Eryon Stoddarti*, H. Woodw., sp. nov. Plate XIV. Fig. 2.

Description.—Carapace one-third broader than long, cervical groove moderately deep and well defined ; dorsal ridge strongly marked and extending from the posterior border to the cervical groove ; two equidistant branchio-cardiac ridges extend from the same groove to the posterior border on either side, terminating just where the margin of the first abdominal segment joins the carapace ; the cervical groove is marked by a deep notch on the border of the carapace, and the posterior edge of the notch is sharply toothed ; the branchial border is evenly rounded, and bears several small denticles upon it ; the hepatic region has two strongly-marked rounded notches, and the border is also finely dentated ; the anterior border is not clearly defined. Greatest breadth of carapace, 5 centimètres ; length, 3½

centimètres. Length of abdomen, including telson, 4½ centimètres; greatest breadth, 2½ centimètres.

The first abdominal somite is narrow, and has a straight groove running across it; the mesial line is marked by a single tubercle. The three following somites are also transversely grooved and have two tubercles on the mesial line, one on either side of the groove; the epimeral pieces are small and somewhat acuminate; the border of each somite is marked by a rounded tubercle at its union with the succeeding somite. The last two somites have only one central tubercle, but are transversely grooved like the preceding. The seventh somite or "telson" is nearly triangular in form, and is marked by two converging ridges, and ends in a terminal spine. The broad lateral swimming-plates are not preserved.

This new species of *Eryon* serves as a link between the Lithographic and Oxfordian *Eryons* above mentioned and those from the Lias below, namely:—

From the Upper Lias.

Eryon Hartmanni, Meyer, U. Lias, Würtemberg.
,, *Edwardsii*, Morière, U. Lias, Calvados.
,, *Moorei*, H. Woodw., U. Lias, Ilminster.

And from the Lower Lias.

Eryon Escheri, Oppel, L. Lias, Baden.
,, *antiquus*, Brodp., L. Lias, Lyme Regis.
,, *Barroviensis*, M'Coy, L. Lias, Barrow-on-Soar, etc.
,, *Wilmcotensis*, H. Woodw., L. Lias, Wilmcote.
,, *Brodiei*, H. Woodw., L. Lias, Lyme Regis.
,, *crassichelis*, H. Woodw., L. Lias, Lyme Regis.

It will be seen at a glance that the 20 species we have enumerated are nearly equally divided between the Upper Oolite (Kimmeridgian) and the Lias; only one form, *Eryon Perroni*, Etallon, being found in the Oxford Clay of Calmoutiers, Haute-Saône.

Eryon Stoddarti most nearly approaches the Liassic species, in which the cervical groove is always strongly marked, and also the dorsal and branchio-cardiac ridges, characters not so strongly defined and often absent in the species from Solenhofen.

2.—*Eryon Neocomiensis*, Hohenegger (MS.). Pl. XIV. Fig. 1.

That distinguished palæontologist, the late Dr. Albert Oppel, in his well-known "Palæontologische Mittheilungen" (Stuttgart, 1862), p. 9, observes on the geological distribution of the genus *Eryon*, "that one finds this genus in the various strata from the Lowest Lias to the Upper Jurassic beds; we may therefore conclude that it enjoyed an unbroken existence through the whole Jurassic period. And further, the Jurassic species of *Eryon* were preceded by the still earlier *Eryon* (*Bolina*) *Raiblanus*, Bronn, sp., from the Trias of Raibl, Bohemia; and the *Eryon* (*Tropifer*) *lævis*, Gould, sp., from the Rhætic Bone-bed of Aust-passage, a doubtful species at best. This genus then may be said to have its beginning in the Trias, and to have continued through the entire Jurassic period, and as far upwards as the Chalk, where it becomes extinct."

Dr. Oppel cites as his authority for the occurrence of *Eryon* in

the Chalk, "The Geology of the South-east of England," by G. A. Mantell, p. 373,[1] (1833), 8vo.

On referring to Mantell's work, we find a list of fossils given and the genus *Eryon* quoted; with a foot-note stating that the specimen was "too imperfect for the species to be ascertained." As no figure is given, nor does any Cretaceous *Eryon* exist among the Mantellian Collection preserved in our National Museum, we may, I think, justly conclude that the reference made by Dr. Mantell to *Eryon* as occurring in the Chalk was erroneous.

Although the specimen cited by the late Dr. Oppel failed to establish the existence of the genus *Eryon* in the English Chalk, I have been fortunate in fixing the presence of this genus in the Neocomian of Silesia.

When visiting the magnificent palæontological collections preserved in the Royal Bavarian Museum in Münich, in 1876, under the direction of Dr. Oppel's eminent successor, Professor Dr. Karl Zittel, I observed a most interesting and perfect example of *Eryon* from the Lowest Cretaceous (Neocomian) of the North Carpathians of Silesia, which by the kindness of Dr. Zittel I was permitted to study and describe.

The fossil, which is preserved as an impression and counterpart in two small blocks of hard black bituminous-looking limestone, exhibits an entire Crustacean measuring nearly 35 millimètres in length, and 22 millimètres in breadth, having the carapace, all the segments of the body, with the "telson," or tail-spine, the broad natatory caudal appendages, and the great chelate fore-limbs united together as in life.

This specimen was obtained in Feb., 1863, by Dr. L. Hohenegger, the late Director of the Arch-Ducal Iron-works in Silesia, Galicia and Hungary, from the Neocomian of Niederlishna, Silesia, and named by him in MS. *Eryon Neocomiensis.*

In describing the Lower Neocomian of this district [see Geognostic Sketch of the North Carpathians of Silesia and the adjacent district, brought up to the present state of our knowledge, by L. Hohenegger (Jahrbuch der k. k. Geologischen Reichsanstalt, Band 3, 1852, Wien, Royal 8vo. pp. 135–148, Taf. I.)], Dr. Hohenegger writes:—

"The identity of the small but numerous patches of 'Coral Limestone' in this district, with the Limestone of Stramberg, near Neutitschein, is now established beyond a doubt, by means of the fossils which have been obtained. They may be correlated with the Ignazi and Horki Mountains in Moravia and Tichau, Chlebowitz, etc., in Neutitschein.

"Although the fauna of this place does not everywhere show exactly the same facies, nevertheless it embraces the characteristic bivalves which place its identity beyond all doubt. Besides which, these 'Coral Limestones' all resemble one another both in their mechanical and chemical constitution, although they vary from the purest white to blackish-grey in colour: which latter tint" [as well

[1] The other references given by Dr. Oppel, viz. to Meyer in Nova Acta Leopold. Carol. Acad. p. 283, and to Morris, Cat. Brit. Fos. 1854, p. 108, are but the repetition of the same reference to Mantell.

seen in the matrix of the fossil *Eryon* about to be described] "is caused by its being strongly impregnated with bitumen, and is very prominent in the 'Coral Limestone' of Bobrek."

Eryon Neocomiensis, sp. nov. Pl. XIV. Fig. 1.

Description.—The contour of the carapace is nearly circular, being wider in front than behind: the anterior border is indented near the attachment for the antennæ and the eye-stalks; the hepatic border has a small and straight notch, and the cervical furrow is also marked by a similar rounded indentation in the lateral margins; the posterior border of the carapace is roundly indented; the first abdominal segment exactly occupying the concavity.

The carapace appears to have been extremely thin and delicate in texture; it is divided by a mesial ridge running from the posterior to the anterior margin, and by a branchio-cardiac ridge on either side the mesial one.

The abdominal segments (with the exception of the first) are nearly uniform in size, and each has an elongated ridge down the centre; the lateral portion of each segment being slightly granular, and the border rounded. They decrease from the second to the sixth, from 7 mm. to 5 mm. in breadth. The telson, which is hastate in form, is 6 mm. long or one-fifth the entire length of the whole specimen; the telson and the swimmerets of the tail together are 12 mm. in breadth. The large claws are well preserved; the hand measuring 6 mm., and to the extremity of the pincers 11 mm. The chelæ are long, slender, and recurved, very much resembling species of *Eryon* from Solenhofen. The wrist is only 2 mm. long, the arm may be estimated at 11 mm.

The eyes are, if present, indistinct; but the large rounded scale at the base of the outer antenna can be distinctly seen and the antennæ and antennules can also be made out in a good light with a pocket lens. The three basal joints of the antennæ are stout, the first two are oblong in form, and the third joint has the inner angle produced. The total length, to the end of the flagellum, is about 8 mm. The antennules are slender and bifid, and measure 5 mm. in total length.

Mr. H. N. Moseley, F.R.S., Naturalist on board the "Challenger," mentions that "in dredging off Matuku Island, in 320 fathoms, on a coral bottom, some *Phorus*, *Turritellæ*, and a few other shells were brought up, *as well as numerous specimens of the blind Crustacean Polycheles*, and other animals, showing the fauna to be a true deep-water one, and with these a living specimen of the Pearly Nautilus." The same Crustacean (*Polycheles*), he states, was dredged off the Island of Sombrero in the Danish West Indies, in from 450 to 490 fathoms.

There can be very little doubt that this curious Crustacean (*Polycheles*), like the Pearly Nautilus with which it was dredged up from these great depths, is the modern representative of this ancient genus *Eryon*, and that its range in time was probably nearly coequal with that of the *Nautilus*.

Like its living congener (*Polycheles*) and its fossil predecessor in

the Lithographic Limestone of Solenhofen, this new Cretaceous *Eryon* from Niederlishna has the outer caudal plates of the tail entire, whereas in the older Liassic form of *Eryon* it is divided across by a transverse joint, as is also the case in the outer swimmeret of the tail of *Astacus*, *Homarus*, *Nephrops*, and many other genera. This genus is remarkable for the persistent character of its hastiform telson, observable not only in the living genus *Polycheles*, but also in its Liassic predecessor, *Eryon Barroviensis*. *Eryon Oppeli* is the only species with an ovately rounded telson; and therefore probably indicates it to belong to another genus.

3.—*Palæocaris Burnettii*, H. Woodw., sp. nov. Pl. XIV. Fig. 3*a*, *b*.

The genus *Palæocaris* was proposed by Messrs. Meek and Worthen, in the Proceedings of the Academy of Natural Sciences, Philadelphia, in March, 1865, p. 48, for a remarkable type of Crustacean obtained from near the base of the Coal-measures of Morris, Grundy County, Illinois, U.S.A., having the "inner and outer pairs of antennæ of nearly equal length, the former each bearing a well-developed accessory appendage; the peduncles of both pairs being shorter than the flagella. Head about as long as the first two abdominal segments. Thoracic legs long and slender; anterior pair not chelate. Telson long, tapering and horizontally flattened; 'stylets' with first joint very small, second double, and also flattened horizontally."

Only one species, *Palæocaris typus*, has been defined by Messrs. Meek and Worthen. The authors describe the "thorax" as "*slightly wider* near the middle than the abdomen"; and the "thoracic and abdominal segments of nearly equal length"; the "telson nearly as broad at the base as the penultimate segment, tapering, and as long as two and a half of the abdominal segments. The 'stylets' (or lateral caudal appendages, sometimes called 'swimmerets') with the first joint very minute, second joint with each division as long as the telson, and lanceolinear in form, with pointed extremities and parallel setigerous margins."

Palæocaris typus, Meek & Worthen.

This curious larval-looking genus of Crustaceans and another genus found by these authors in the same locality and formation, which closely resembles it, named by them, *Acanthotelson Stimpsoni* (see our Plate XIV. Fig. 4) have been referred by Prof. J. D. Dana, "to a group probably holding an intermediate position between the typical Isopoda and the Amphipoda for which he proposed the name Anisopoda."

"This intermediate group, as first shown by Prof. Dana, is characterized, like the Amphipoda, by having the three posterior pairs of thoracic legs in one series, and the four anterior pairs in another; while, as in the Isopoda, the branchiæ are abdominal,

and only one pair of abdominal appendages are styliform and five are branchial."

Such characters as the above, however applicable to *recent* forms, "cannot," as Messrs. Meek and Worthen well observe, "be often made available for the investigation of crushed *fossil* species where so many accidents might have occurred," to disarrange the natural order of the appendages.

Having been favoured by Mr. Robert F. Burnett, F.G.S., of Manchester, with the loan of a specimen, obtained by him in May, 1879, from the Middle Coal-Measures, River Section, Irwell Valley, which evidently belongs to the genus *Palæocaris*, I think it sufficiently interesting to bring it under the notice of the readers of the GEOLOGICAL MAGAZINE, being its first occurrence in England.

The specimen from Manchester exhibits the dorsal aspect of an individual about 30 millimètres in length, and 3 mm. in breadth; composed of a head, rounded in front, about 3 mm. in length; the somites, of which there are fourteen, each measuring about 2 mm. in length; the telson or tail-spine which is linear-lanceolate in form, is 5 mm. long, and the swimmerets are of equal length and striated longitudinally. Each somite has from 8 to 10 parallel striæ crossing it from side to side. The last 7 (abdominal) somites have a tendency to diminish slightly in succession from before backwards, and have the angles of the posterior border of each segment slightly produced.

Two small rounded scales (which *may be eyes*, but certainly have not the structure of eyes preserved), one being much more distinctly evident than the other, are attached on either side, near the front of the head.

Save these cephalic appendages (which do not seem to correspond with any appendage on the head of Messrs. Meek and Worthen's figures of *Palæocaris typus*, see woodcut), there are no other organs attached to the body except the telson, and the lateral lobes of the tail-fin.

The well-marked transverse striæ of the body-segments, their nearly uniform breadth anteriorly, and the more marked tendency of the abdominal rings to have their posterior border produced, with their pleuræ slightly prominent, together with the more narrow form of the head, with its rounded scales, or *eyes?* (reminding one casually of the head of *Prosoponiscus problematicus* from the Permian of Durham), sufficiently entitle this form to be treated as specifically distinct, and we therefore have much pleasure in dedicating it to the discoverer, in whose collection the specimen is preserved.

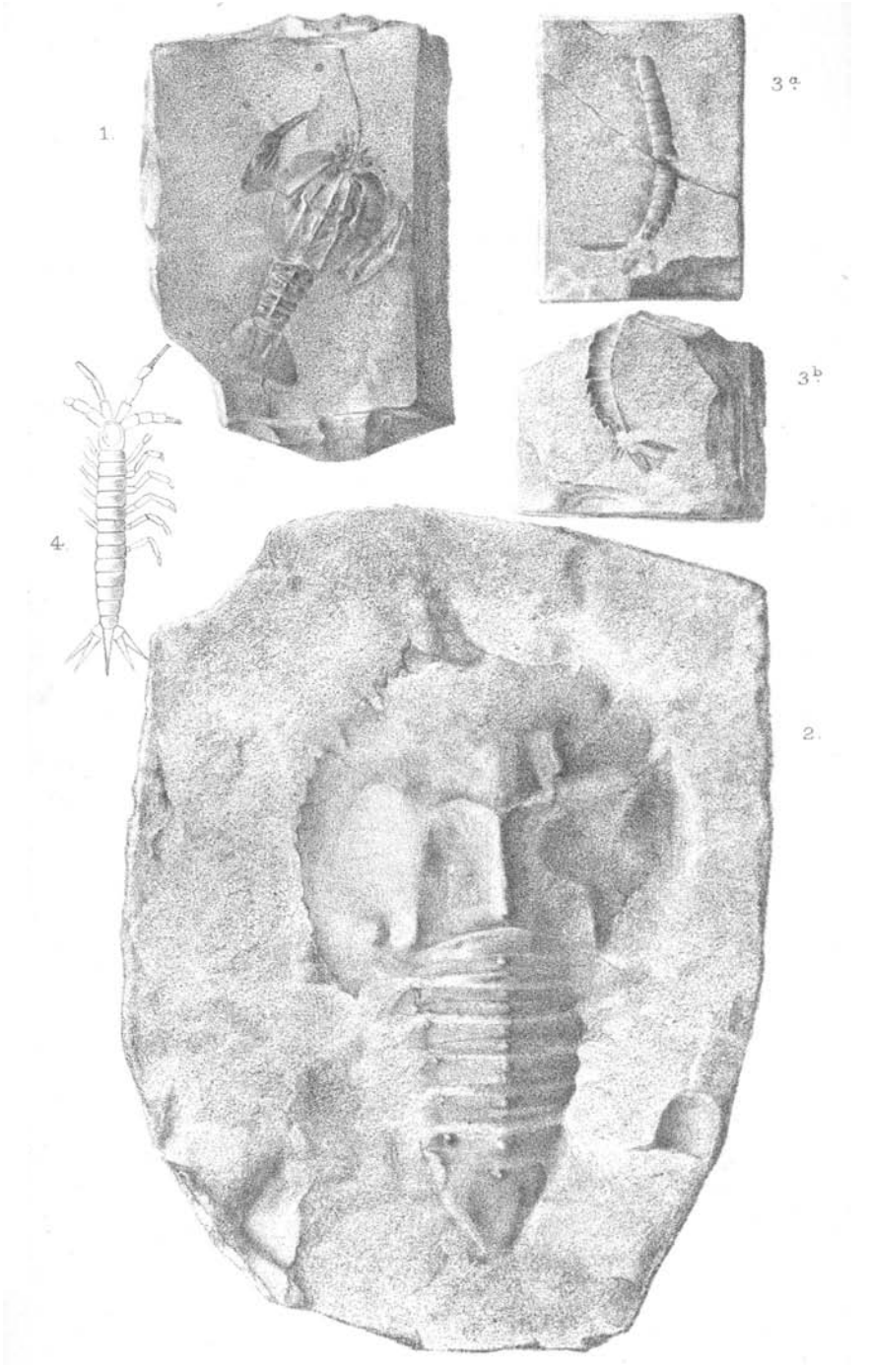
EXPLANATION OF PLATE XIV.

FIG. 1. *Eryon Neocomiensis*, sp. nov. Lowest Cretaceous (Neocomian), Niederlishna, Silesia. Royal Bavarian Museum, Munich.

,, 2. *Eryon Stoddarti*, sp. nov. Stonesfield Slate (Great Oolite), Stonesfield, Oxfordshire. Coll. of the late Mr. W. W. Stoddart, Clifton, Bristol.

,, 3. *Palæocaris Burnetti*, sp. nov. Middle Coal-measures, River Section, Irwell Valley. Collection of R. F. Burnett, Esq., F.G.S., Manchester.

,, 4. *Acanthotelson Stimpsoni*, Meek and Worthen, Coal-measures, Morris, Grundy Co., Illinois.



G. M. Woodward del. et lith. West Newman & Co imp.

New British & Foreign Crustacea.

https://doi.org/10.1017/S0016756800159217 Published online by Cambridge University Press