

THE
GEOLOGICAL MAGAZINE:

LIBRARY
MUSEUM OF COMPARATIVE ZOOLOGY,
OR,
CAMBRIDGE, MASS.
Monthly Journal of Geology:

WITH WHICH IS INCORPORATED

“THE GEOLOGIST.”

NOS. CCXXXV. TO CCXLVI.

EDITED BY

HENRY WOODWARD, LL.D., F.R.S., F.G.S., F.Z.S., F.R.M.S.,

OF THE BRITISH MUSEUM OF NATURAL HISTORY;

VICE-PRESIDENT OF THE PALÆONTOGRAPHICAL SOCIETY,

MEMBER OF THE LYCEUM OF NATURAL HISTORY, NEW YORK; AND OF THE AMERICAN PHILOSOPHICAL SOCIETY, PHILADELPHIA; HONORARY MEMBER OF THE YORKSHIRE PHILOSOPHICAL SOCIETY; OF THE GEOLOGISTS' ASSOCIATION, LONDON; OF THE GEOLOGICAL SOCIETIES OF EDINBURGH, GLASGOW, AND NORWICH; CORRESPONDING MEMBER OF THE GEOLOGICAL SOCIETY OF BELGIUM; OF THE IMPERIAL SOCIETY OF NATURAL HISTORY OF MOSCOW; OF THE NATURAL HISTORY SOCIETY OF MONTREAL; AND OF THE MALACOLOGICAL SOCIETY OF BELGIUM.

ASSISTED BY

PROFESSOR JOHN MORRIS, M.A., F.G.S., &c., &c.,

AND

ROBERT ETHERIDGE, F.R.S. L. & E., V.P.G.S., &c.

OF THE BRITISH MUSEUM OF NATURAL HISTORY.

NEW SERIES. DECADE III. VOL. I.

JANUARY—DECEMBER, 1884.

LONDON:

TRÜBNER & Co., 57 AND 59, LUDGATE HILL.

F. SAVY, 77, BOULEVART ST.-GERMAIN, PARIS.

c 1884.

THE
GEOLOGICAL MAGAZINE.

NEW SERIES. DECADE III. VOL. I.

No. VII.—JULY, 1884.

ORIGINAL ARTICLES.

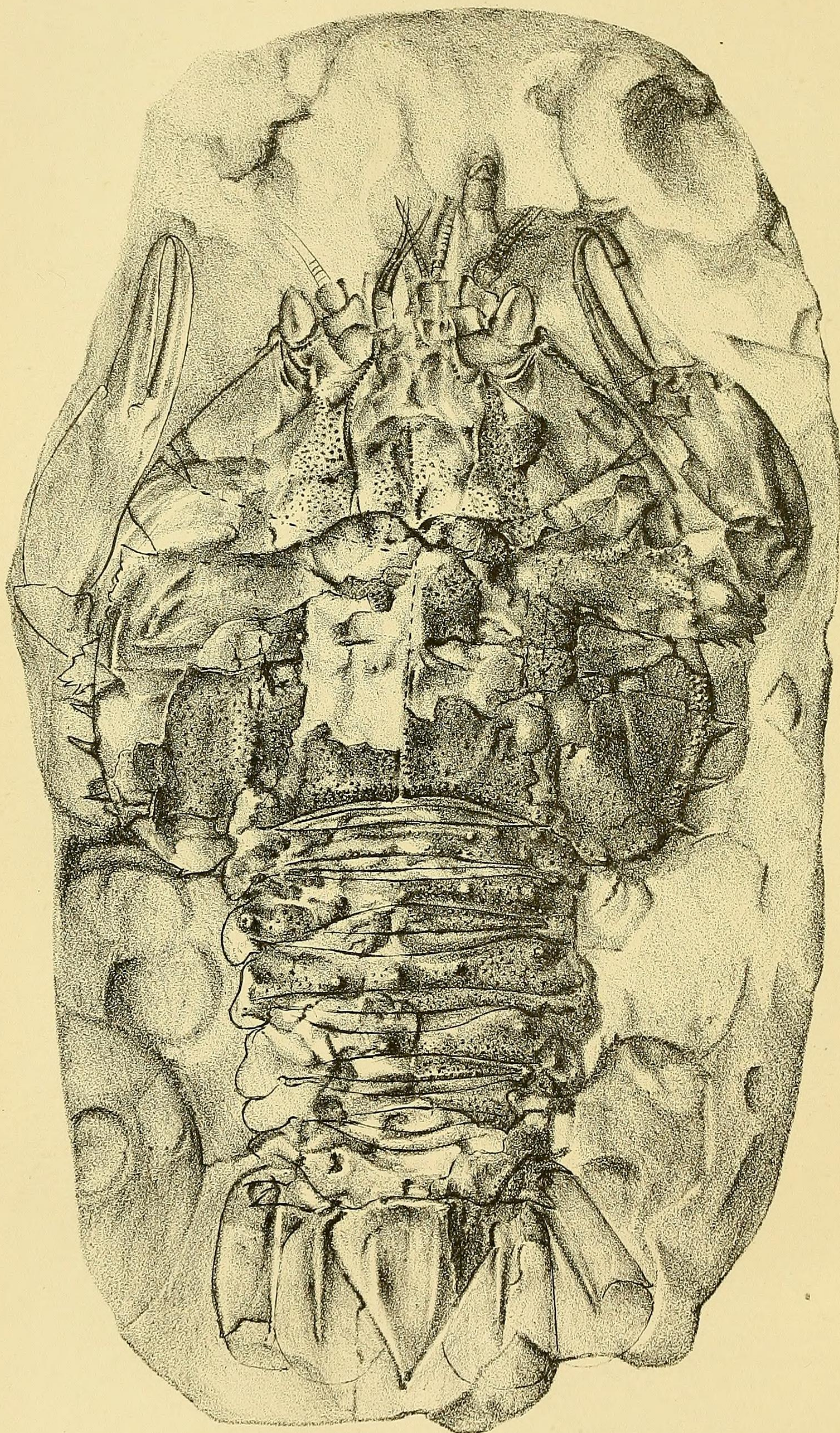
I.—NOTES ON THE GEOLOGY OF THE NILE VALLEY.

By Professor J. W. DAWSON, C.M.G., LL.D., F.R.S., F.G.S., etc.
Principal of McGill College, Montreal.

1. *Raised Sea Margins.*

SHORTLY after my arrival in Cairo, Dr. Schweinfurth, of that city, was so kind as to conduct me to a remarkable sea-terrace at the foot of the Mokattam hill, behind the tombs of the Caliphs, and stated, on the authority of Col. Ardagh, R.E., to be at an elevation of about 200 feet above the level of the sea, and which, I believe, was first described by Oscar Fraas. At this place a cliff of hard Eocene limestone, about 30 feet in height, has been perforated by *Lithodomi*, whose burrows are now filled with a grey calcareous deposit, and valves of a small species of oyster are also attached to the surface of the rock. The burrows resemble those of an ordinary Mediterranean species of *Lithodomus*, but I did not see the shells. The oyster has been described by Fuchs as a new species, under the name *O. pseudo-cucullata*; but, according to Dr. Schweinfurth, it does not seem distinguishable, except as a variety, from *O. cucullata*, Born. (= *O. Forskali*, Chemn.), of the Red Sea. Since the locality was observed by Fraas, Dr. Schweinfurth has discovered other shells in the crevices of the rock, more especially a *Pecten*, a *Terebratula*, and a *Balanus*, all modern species. The recent character of these shells and their mode of occurrence and state of preservation, oblige us, I think, to assign them to the Pleistocene, or at farthest the later Pliocene period, though I am aware that they have been regarded as Miocene.

Shortly after visiting this place, I was so fortunate as to discover on the opposite side of the Nile a similar exposure, associated with an old sea beach, which I subsequently examined more carefully in company with Dr. Schweinfurth. It occurs at the summit of a rocky knoll, called by the Arabs Het-el-Orab, or the Crow's Nest, a short distance to the south-west of the Pyramids of Gizeh, and separated from the plateaux of the Pyramids by the depression which contains the Sphinx, and which is partly natural, but in great part produced by excavation, of which evidences exist not only in the remaining chips of stone, but also in the Sphinx itself, and in the tomb crowning an isolated mass of rock farther to the west.



E.C. Woodward del. et lith.

West, Newman & Co. imp.

Archæastacus Willemoesii, Spence Bate. 1883.
(= ? *Eryon crassichelis*, H. Woodw. 1866.)
L. Lias,
Lyme Regis, Dorset.

CLEVELAND SHALE	<i>Ctenacanthus formosus</i> , Newb.
		„ <i>furcicarinatus</i> , Newb.
		<i>Cladodus Patersoni</i> , Newb.
		<i>Orodus variabilis</i> , Newb.
		<i>Polyrhizodus modestus</i> , Newb.
		<i>Palæoniscus</i> , 2 sp.
ERIE SHALE	<i>Leiorhynchus mesocostale</i> , Hall.
		<i>Spirifera disjuncta</i> , Sby.

In regard to the fish quoted above from the Cleveland shale, Dr Newberry remarks (Pal. of Ohio, vol. ii. p. 94) :—

“To the palæontologist it is scarcely necessary to say that such a group of fossils as that enumerated above could only come from Carboniferous rocks, most of the genera here represented being exclusively confined to that formation. The only exception is *Ctenacanthus*, of which one or two doubtful species have been described from the Devonian rocks of the Old World, and we have obtained one well-marked and beautiful species from the Huron shale (Portage) (*Ct. vetustus*, Newb.).”

Writing of the fossils of the Berea Grit, the same author says (p. 90) :—

“The most interesting fossil found in this formation is a plant that covers some of the surfaces of the layers at Bedford, and which I have been unable to distinguish from *Annularia longifolia* of the Coal-measures.”

In regard to the Brachiopods in the list given above, *Orthis Michelinii* was described from the Lower Carboniferous rocks of France; *Streptorhynchus crenistriatum* from those of Yorkshire; *Chonetes Logani* from the Burlington group of Iowa; *Rhynchonella Sagerana* from the Marshall Group of Michigan, and of *Spiriferina solidirostris* and *Syringothyris typus* Dr. Newberry writes (p. 92) :—
“They are characteristic of the Lower Carboniferous rocks of other States.”

The evidence of the age of the Cuyahoga Shale, and therefore of the Trilobite above described, could scarcely be more complete.

IV.—*ARCHÆASTACUS* (*ERYON*) *WILLEMÆSII*, A NEW GENUS AND SPECIES OF *ERYONIDÆ*.¹

By C. SPENCE BATE, F.R.S.

(PLATE X.)²

THE several species of *Eryon*, described by various authors, appear to be distinguishable as separate genera, which are as definable from one another as from the recent forms of *Polycheles* and *Willemæsia*; but the variability appears not to be greater than in those that are separated in time through geological æons, than in those that are contemporaneous in geographical space.

¹ Read before Section C., British Association, at Southport, 1883.

² Mr. Spence Bate had most obligingly sent up to the Editor a pencil drawing, being a restoration of Mr. Lee's fossil, for the Artist to copy; but as Mr. Lee subsequently kindly allowed the original specimen to be drawn, it was deemed advisable to reproduce the actual fossil without additions from recent specimens.—EDIT.

While studying the fossil forms of the *Eryonidæ*, for comparison with those recently brought to our knowledge through the deep-sea explorations, I have found in the collection of Mr. J. E. Lee, F.G.S., of Torquay, a specimen from the Lower Lias at Lyme Regis, that appears to connect the ancient forms with the recent more intimately than has been illustrated in the comparison of any previously known fossil specimen.

The specimen is in a fragile and imperfect condition, but one-half of the dorsal surface is tolerably well preserved, while the other half exhibits the impress of the form only. The two conditions are shown in the accompanying figure by a different depth of shading, the more dark by that where the external texture is preserved; the less where the impression of form alone is retained; while the outline exhibits the restoration of structure in conformation with known parts.

Archæastacus, the generic name by which I propose to call the present genus, has the dorsal surface of the carapace almost circular, the anterior margin being nearly straight between the orbital notches, while beyond them the anterior lateral angles are produced anteriorly beyond the frontal margin. The anterior two-thirds of the lateral margin are smooth, whereas the posterior third is armed with five prominent teeth. The median dorsal line is longitudinally armed with three or four strong teeth, one not being distinct, on the frontal margin a second almost hypothetically present over the gastric region, a third and fourth over the post-gastric and cardiac regions, and evidence exists of a double row of small tubercles traversing the dorsal median line from the posterior to probably the frontal margin. The inner line of the branchial region is posteriorly defined by a small ridge that is furnished with three or four small tubercles or teeth. From the post-gastric region to the lateral walls a strong ridge traverses the line of the cervical fossa in recent crustacea, a circumstance that I believe to be due to the compression of fossilization, the weaker parts yielding, while the stronger and more rigid resist. Thus the fossa, which is due to a reflexion or folding of the dermal tissue, resists more decidedly the compression of fossilization, and thus remains rigid while the surrounding tissue has yielded to pressure. The cervical fossa, or as it may in this specimen be called ridge, bifurcates at half its length, forming an anterior and posterior branch, which incloses what I have in recent species called the *Siagnitic* region, or that part to which the *Siagnos* or mandible is attached. The posterior portion of the animal, the pleon (or abdomen), is broad and evenly tuberculated; each somite generally carrying (or supposed to carry) one large tubercle on the posterior margin in the median line, a similar one near the margin, centrally situated above the coxal plate, and another between this and that on the median line, but of smaller dimensions, and standing on the posterior margin.

The animal appears to have no ophthalmopod, or eye-stalk, although a semicircular notch appears to exist. This may arise, as I believe it does, from the organ having, from its softer condition, perished

during fossilization, or it may be from the organ being hid or reduced to a minimum value, as observed in the recent forms of *Willemoesia*, or from its entire absence, as in *Eryoniscus*; but the presence of an orbital concavity determines that this ancient form has retrograded from a species in which the organ was an important feature.

The first pair of antennæ has three short joints to the peduncle, and the remains of a pair of multiarticulate flagella to each.

The second pair of antennæ has very little of it preserved in the specimen, but evidently carries an ovate scaphocerite; that on the right side is half lost, that on the left has the impression only; the rest of the organ is wanting on each side, except what I took to be the impression of the distal joint of the peduncle, and the first of the flagellum on the right side.¹

On the right side the first large chelate pereiopod is well defined, although part of it exists only as an impression. That on the left has been restored in outline from the right side, only a part being preserved.

All the other appendages are absent or hid beneath the body of the animal, except those that go to form the *Rhipidura* or tail fan.

The outer plates are only determinable by the impression left in the rock. They are broad, leaf-like, and rounded at the extremity, without any sign of a *diæresis* or division in the outer plate, or a tooth on the outer margin of the latter;² the telson is broad, double-ridged, and abruptly tapering.

This species bears a generic resemblance with *Polycheles crucifera* in the form of the carapace and *P. Mülleri* and *baccata* in that of the pleon, but differs from both in having no great dorsal ridge or prominent teeth traversing the median line of the pleon, which in this aspect more resembles that of some recent forms of *Astacus*.

The fossil also differs from the recent *Eryonidæ* in having a broad open orbital notch, instead of a narrow cleft, in the dorsal surface of the carapace, that is filled up with the upper surface of the base of the rigidly attached ophthalmopod.

The first pair of antennæ, as far as I am able to interpret the evidence at my disposal, has not the inner margin of the first joint of the peduncle produced to an elevated ridge on the inner margin; this circumstance I think is largely due to the distance at which these appendages are laterally separated from each other.

The second or outer pair of antennæ, if I have understood the parts represented in the specimen correctly, approximates that in the recent, and differs from that of *Eryon* in carrying a distinct scaphocerite at the base. It is true that Desmarest states that it is provided with a large scale; but he does not show it in his figure of the animal, and although it has been so accepted by authors, I am not

¹ The Artist has since succeeded in making out distinctly the three short basal joints of the second pair of antennæ.—EDIT.

² The Artist has indicated a division in the broad outer plate on the right side, probably not clearly seen when the above description was penned by the author.—EDIT.

aware of a figure or specimen in which it has been shown to be present.¹

Taken as a whole the specimen that I have named *Archæastacus Willemœsii* resembles the form of the recent *Polycheles* as nearly as it does that of the ancient *Eryon*, and in the breadth of the pleon and the absence of its dorsal carina, it exhibits conditions that demonstrate a no very distant departure from the modern genus *Astacus*, which would be more appreciated, if, instead of being dorsally depressed, it had a stronger lateral compression, more especially as relates to the carapace.

It therefore appears to clearly demonstrate that the genus *Eryon* has departed from an unknown ancestor of *Astacus*, and that the recent *Polycheles* is in direct descent from *Archæastacus* of the European Lias.²

V.—METALLIFEROUS DEPOSITS.

By CARL OCHSENIUS, Phil. Dr. Sc. Geolog. and Geogr.,
of the University of Marburg.

THE origin of metalliferous deposits has long been a subject of discussion. Professor Joseph Le Conte, however, seems to have arrived at a very decided opinion on this question, for in a contribution to the "American Journal of Science" (3rd series, xxvi. p. 1—19, July, 1883), after referring to Sulphur Banks and Steamboat Springs in California, he says: "Thus then subterranean waters of any kind, but especially alkaline, at any temperature, but mostly hot, circulating in any direction, but mainly upcoming, and in any kind of waterway, but mainly in open fissures, by deposit, form metalliferous veins."

At the meeting of the German Geological Society in the month of August, 1881, the formation of metalliferous veins was treated by me as being one of those phenomena which must be attributed to the action of mother liquor salts; the following are translated extracts from the journal of that Society.³

"As a consequence of my investigations concerning rock salt beds

¹ The scale at the base of the outer antenna in *Eryon Barrovensis*, M'Coy, is figured by Dr. H. Woodward (see Quart. Journ. Geol. Soc. 1866, vol. xxii. pl. xxv. fig. 1) from specimens in the British Museum and the collection of the Rev. P. B. Brodie, F.G.S. Dr. Woodward writes:—"Each of the outer antennæ has a large oval scale attached to its broad basal joint" (*op. cit.* p. 496).—EDIT.

² Whatever decision may ultimately be arrived at, as to the advisability, or otherwise, of abolishing the genus *Eryon*, and adopting Mr. C. Spence-Bate's proposed genus *Archæastacus*, for these Liassic Crustaceans, there is little doubt that the specimen here described as *A. Willemœsii* is the same as *Eryon crassichelis*, H. Woodw., 1866, Quart. Journ. Geol. Soc. vol. xxii. p. 497, a reduced figure of which only was given on pl. xxv. fig. 2 (*op. cit.*), in which the characters are not well shown. Capt. Hussey's specimen figured as *E. crassichelis* is moreover preserved with the *underside* exposed, whereas Mr. J. E. Lee's specimen exhibits the *dorsal* aspect. The detached carapace of *E. crassichelis*, from Mr. Day's Collection (see *op. cit.*), now in the British Museum, appears, however, identical with Mr. Lee's specimen. In Mr. Day's specimen the eye can also be detected.—EDIT.

³ Zeitschrift der Deutschen geologischen Gesellschaft, 1881, 507—511; 1882, 288—372.