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Quod si cui mortalium cordi et curæ sit non tantum inventis hærere, atque iis uti, sed ad ulteriora penetrare; atque non disputando adversarium, sed opere naturam vincere; denique non belle et probabiliter opinari, sed certo et ostensive scire; tales, tanquam veri scientiarum filii, nobis (si videbitur) se adjungant. —*Novum Organum, Præfatio.*

VOLUME THE THIRTY-SECOND.

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SOLD ALSO AT THE APARTMENTS OF THE SOCIETY.

MDCCCLXXVI.

4. *On some* New Macrurous Crustacea *from the* Kimmeridge Clay *of the* Sub-Wealden Boring, Sussex, *and from* Boulogne-sur-mer.

By Henry Woodward, Esq., F.R.S., F.G.S., of the British Museum. (Read November 3, 1875.)

[Plate VI.]

It has always appeared to me to be a point of special interest to geologists to record those forms found in a fossil state which have a considerable vertical range, and yet belong to genera existing at the present day. Among higher groups now living, we find the vertical range exceedingly small; but when we examine the Invertebrata, we meet with such genera as *Lingula*, *Pentacrinus*, and *Limulus* having an extremely high antiquity; but the higher forms of these types follow precisely the same general law, having a much more restricted range in time than the lower and humbler genera.

One of the Crustacea about to be described by me belongs to a very interesting group, the family of the Thalassinidæ.

Most if not all of the members of this family are fossorial in their habits, burrowing in the sand or mud with great rapidity and remaining concealed in their burrows, save their large claws, which have in many instances been caught and devoured by fishes, or have been cut off by the dredge, whilst the animal itself in its burrow escaped.

Of living British representatives we have four genera :—

1. *Callianassa*, Leach (1 species): *C. subterranea*, Leach.
2. *Gebia*, Leach (2 species): *G. stellata*, Leach; *G. deltura*, Leach.
3. *Axius*, Leach (1 species): *A. stirhynchus*, Leach.
4. *Calocaris*, Bell (1 species): *C. Macandreæ*, Bell.

Formerly only one fossil species of this remarkable group of burrowing Crustaceans was known, the *Callianassa* (*Pagurus*) *Faujasii*, from the uppermost Chalk of Maestricht, first noticed in an admirable work by Faujas-Saint-Fond entitled 'Histoire Naturelle de la Montagne de St.-Pierre, Maestricht,' 1799 (p. 179, pl. 32. figs. 5 & 6), and subsequently described by Desmarest in 1822*, and by König in 1823†.

Another species was added in 1845, by Otto‡ from the Greensand§ of Triebitz in Bohemia and Kieslingswalde Glatz, Silesia, and named by him *Callianassa antiqua*.

In 1867 Dr Fritsch of Prague added five new species from the Chalk of Bohemia‖, namely *C. Turtia*, *C. bohemica*, *C. brevis*, *C. elongata*, and *C. gracilis*.

* Brongniart et Desmarest, Hist. Nat. des Crustacés, Paris, 1822, 4to, p. 127, pl. 11, fig. 2.

† König, Icones Foss. Sect. (Lond. 1823) Centuria 1. p. 2, pl. 2. fig. 20.

‡ Otto in H. B. Geinitz's Grundriss der Verstein. p. 211, pl. 8. figs. 12 & 13 (Dresden, 1845).

§ "Greensand" = oberer Quadersandstein = U. Cretaceous.

‖ Ueber die Callianassen der böhmischen Kreideformation (Prag, 1867), tabs. 1 & 2.

In 1868 I called attention to two new species of *Callianassa* at the Norwich Meeting of the British Association*—one, the *Callianassa neocomiensis*, from the Greensand of Colin Glen near Belfast, the other, *C. Batei*, from the Upper Marine series (Eocene), Hempstead, Isle of Wight.

I have now, by the kindness of Mr. Henry Willett, F.G.S., and the Committee of the Sub-Wealden Exploration, been favoured with portions of cores from the boring obtained at a depth of 1057 feet, containing, besides the fore limbs of a small macrurous Crustacean, to be presently described, three or four more or less perfect examples of a new species of *Callianassa*, and the oldest hitherto known of this remarkable type of fossorial Crustaceans (Pl. VI. figs. 1 & 2).

The fossil, which measures about 42 mm. in length, is seen in profile on several sections of cores, and indicates the horizontality of the beds penetrated. The parts of the fossil are all *in situ*, save the carapace, which has been displaced in each case.

The first pair of feet, which are longer than the entire body, have the penultimate joint, or manus, enormously developed (measuring 7 lines in length); the wrist is quadrate, broader than it is long; it decreases greatly in size from its broad articulation with the manus to its narrow proximal end, where it joins the arm (or "meros"), which is short and strongly curved, and is united by two very small and extremely slender joints (the "ischium" and "basos") to the cephalothorax.

The hands of the fore limbs are more equal in size than in the living species of *Callianassa*; but in other genera of Thalassinidæ, as for instance in *Axius*, the inequality is less marked. In the Eocene and Cretaceous species (already referred to) the disparity in the relative size of the hands is also somewhat diminished as compared with existing species. I am therefore not disposed to lay much stress upon this point.

The feet of the second pair are also didactyle; and the extremities of all the four pairs of smaller limbs are somewhat flattened and expanded, to assist in digging.

The carapace and the segments of the abdomen are smooth; the latter are somewhat quadrate in profile, not pointed; and the shelly covering of both is extremely thin, as in all the forms which habitually conceal themselves in foreign bodies—a peculiarity developed in the highest degree in the Paguridæ. The segments of the abdomen contract somewhat at each extremity as in other *Callianassæ*; and the caudal plates are oval.

I propose to designate this new species *Callianassa isochela*.

2. Mecochirus Peytoni, sp. nov. Pl. VI. fig. 3.

Kimmeridge Clay, Boulogne-sur-mer, and Sub-Wealden boring.

I should have hesitated to describe the fossil macruran represented by the two small fore limbs preserved in one of the cores for-

* Brit. Assoc. Report, Norwich, 1868, p. 72, pl. ii. figs. 4 & 5.

warded to me for examination by Mr. Henry Willett, F.G.S., had not my friend, Mr. John E. H. Peyton, F.G.S., of St. Leonards (who has devoted much attention to the question of the true geological horizon of the Sub-Wealden boring) gone over to Boulogne-sur-mer in September 1873, to examine the Kimmeridge Clay of that locality, where he not only obtained several specimens of *Lingula ovalis*, Sow. (new to that locality), but also a small but nearly perfect example of a Crustacean referable to the genus *Mecochirus*.

This genus (like *Callianassa*) early attracted the notice of geological writers. It was first described as a "Locust" by Knorr in 1755, then as an *Astacus* by Bajer in 1757, as a *Macrourites* by Schlotheim in 1820, and as a *Palæmon* by Krüger in 1823 & 1825. It was not, however, correctly defined and separated from other genera until 1827 (by Germar, in Keferstein's Deutschl. Bd. iv. p. 102), since when it has been repeatedly noticed and the species figured by Holl, Bronn, Münster, Mayer, Pearce, Quenstedt, M'Coy, Pictet, Oppel, and others.

The oldest species is the *Mecochirus olifex*, Quenstedt, from the Lower Lias of Dusslingen, near Tübingen, Württemberg*.

Next in ascending order is the *Mecochirus* (*Cancrinium*) *socialis*, of Meyer (1841) from the Kelloway group, Württemberg and Normandy.

To this species (*Mecochirus socialis*, Meyer, sp.) Dr. Albert Oppel has referred the *Mecochirus* (*Ammonicolax*) *Pearcei*, from the Oxford Clay of Christian Malford, near Chippenham, Wilts, which he considers a part of the Kelloway group.

I have not had the good fortune to see a specimen of Meyer's *M. socialis*; but, comparing his figures of that species with specimens of *M. Pearcei* in the British Museum (from the collection of Mr. William Cunnington, F.G.S.), and with other specimens obtained direct from Mr. William Buy (late of Sutton near Chippenham), I am satisfied the specimens from Wiltshire should still be retained as belonging to a distinct species as established by M'Coy in 1849 (Ann. & Mag. Nat. Hist. series 2, vol. iv. p. 172).

The remaining four species of *Mecochirus*, namely *M. longimanus*, Schloth., *M. Bajeri*, Germ., *M. brevimanus*, Münst., and *M. dubius*, Münst., are from the lithographic stone of Solenhofen, Bavaria.

Like other species of this remarkable genus, the fore limbs of *Mecochirus Peytoni* are equal to the length of the entire body. They measure 75 millims. in length, of which the terminal joint (dactylus) measures 18, the propodos 30, the carpus 5, the meros 18, and the ischium and basos 4 millims. The surface of the fore legs is very finely punctate.

The carapace, which is finely granulated, measures 30 millims from the rostrum to the posterior border, and 14 millims. in depth from the mesial dorsal line to the lower margin of the branchial region. The rostrum is somewhat produced.

The antennæ are not well preserved, but are long and slender.

* Württemb. naturw. Jahresh. 1850, Bd. vi. p. 186; Quenstedt, der Jura, 1856, p. 89, tab. 2. fig. 17.

The abdominal segments are 45 millims. in length and about 10 millims in depth (their epimeral borders are falcate); they are about 6 millims. in length each, and the caudal segment about 9 millims.

The smaller feet are not very clearly seen; but they measure about 25 millims. in length.

I believe the two fore limbs (Pl. VI. fig. 4) from the Sub-Wealden boring, though imperfect, may be referred to the same species, *M. Peytoni*; and in examining one of the specimens I was delighted to observe that it was associated (like that from Boulogne) with *Lingula ovalis*, Sow.

In size this species is intermediate between *Mecochirus socialis*, Meyer, sp., and *M. Pearcei*, M'Coy, being about 130 millims., the former being 60 millims. in total length (or less than half the size of *M. Peytoni*), the latter being 175 millims. long, and robust in proportion.

EXPLANATION OF PLATE VI.

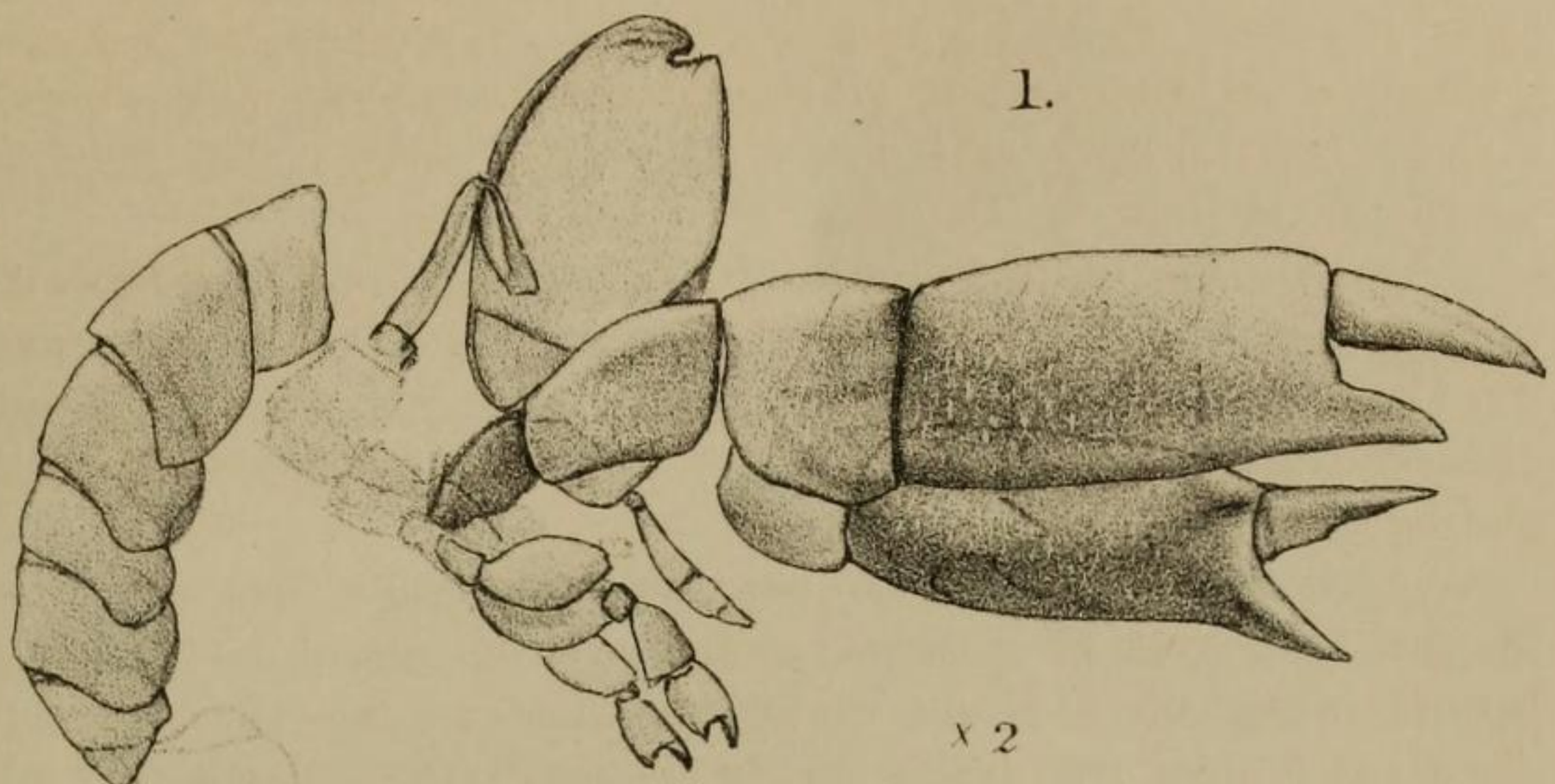
Fig. 1. A nearly entire specimen of *Callianassa isochela*, sp. nov.

2. *Callianassa isochela*, sp. nov. Another specimen, showing the caudal series very well preserved. (Both figures twice nat. size.) From the Kimmeridge Clay of the Sub-Wealden boring, near Battle, Sussex.

3. *Mecochirus Peytoni*, sp. nov. From the Kimmeridge Clay, Boulogne-sur-mer, associated with *Lingula ovalis* in the cliff-section; nat. size.

4. Hands of *M. Peytoni*. From the Kimmeridge Clay, Sub-Wealden boring, near Battle, Sussex; nat. size.

1.



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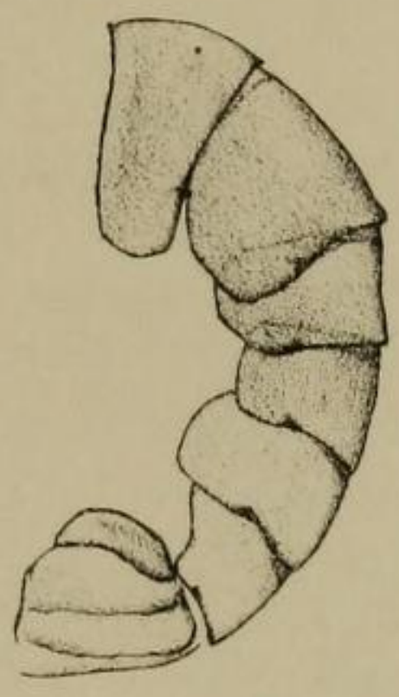

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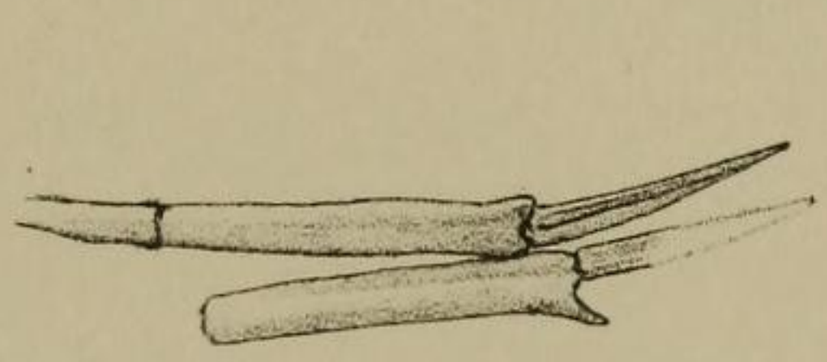

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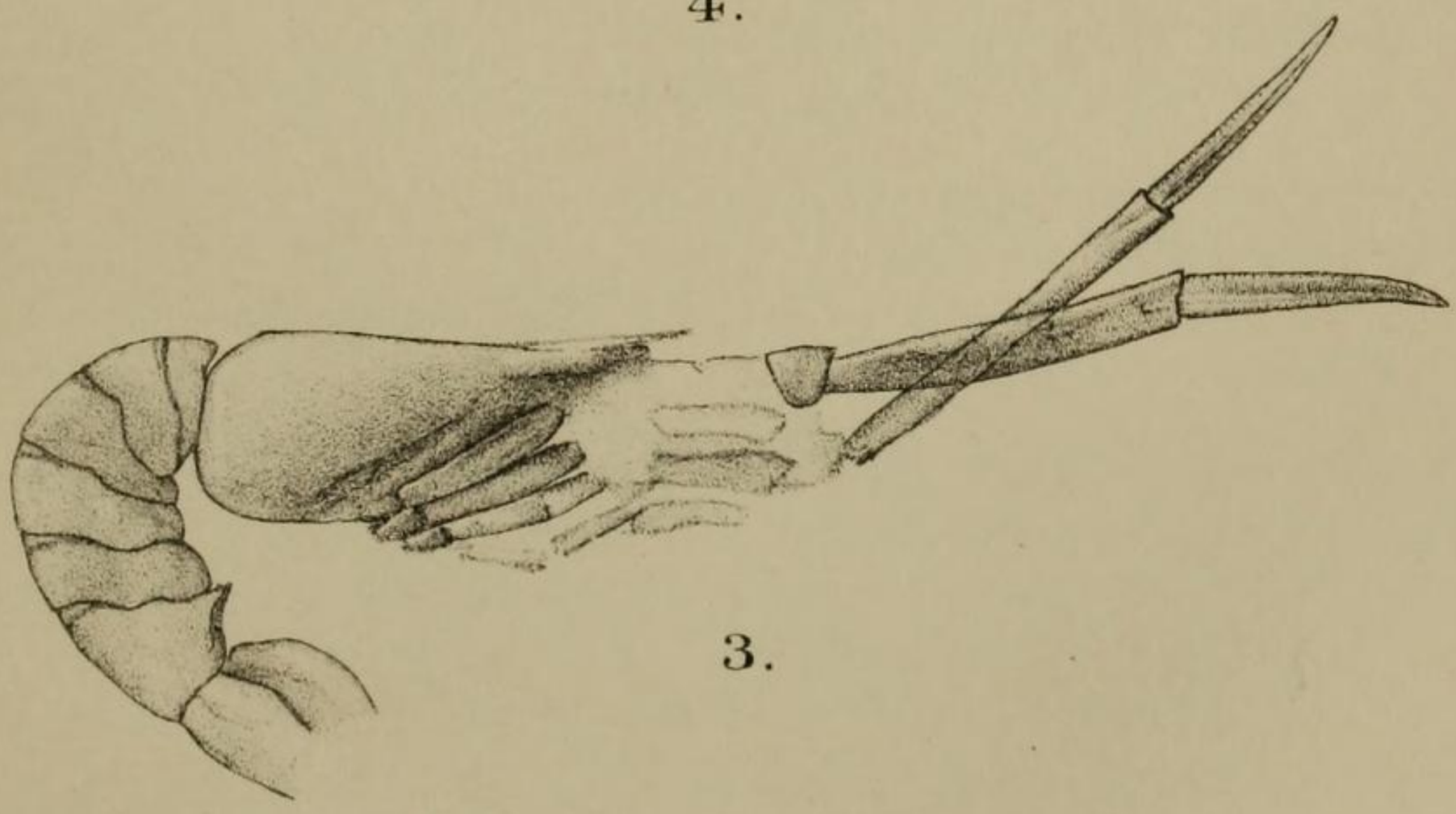

3.

C.L. Griesbach. Mintern Bros. imp.

NEW KIMMERIDGE CLAY CRUSTACEA.