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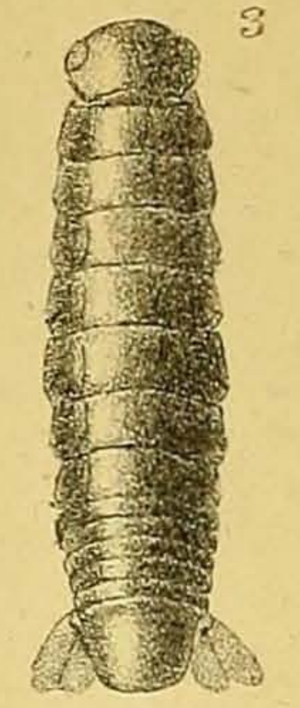

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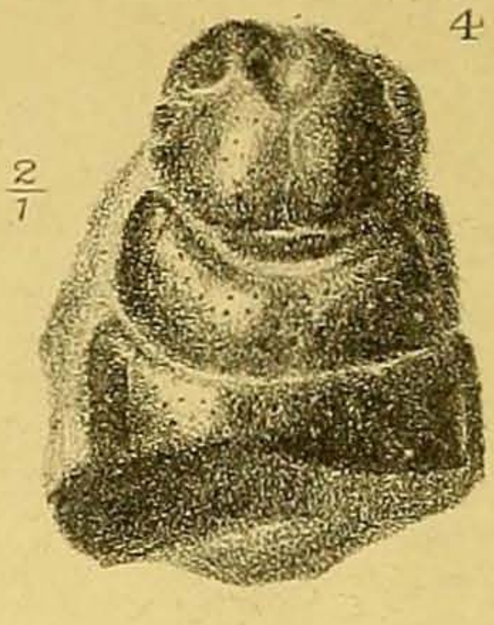

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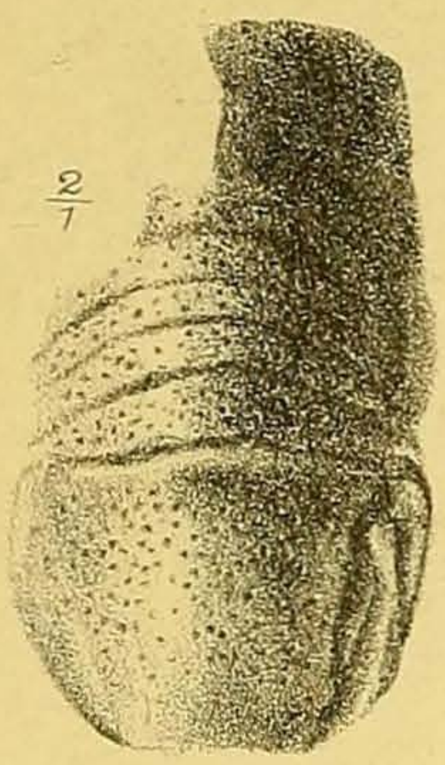

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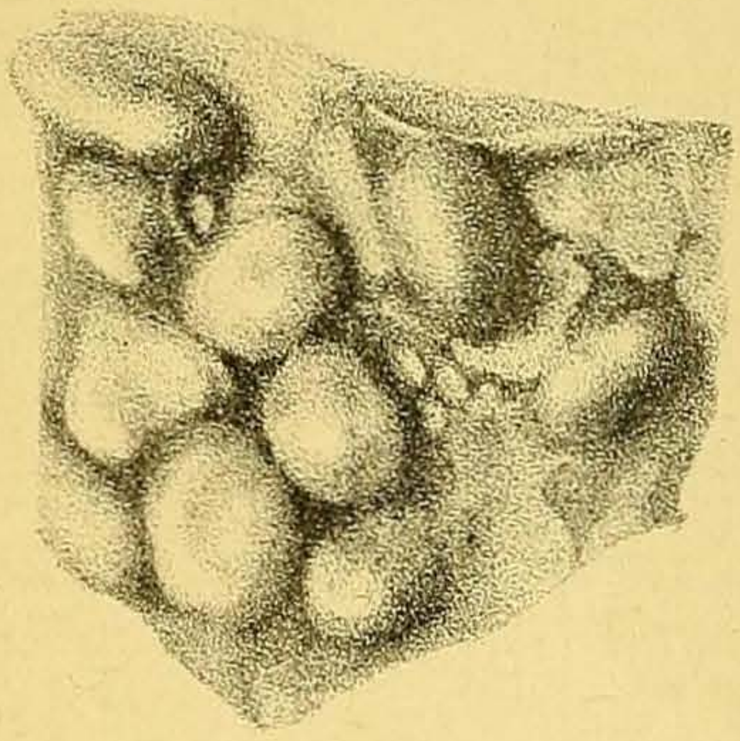

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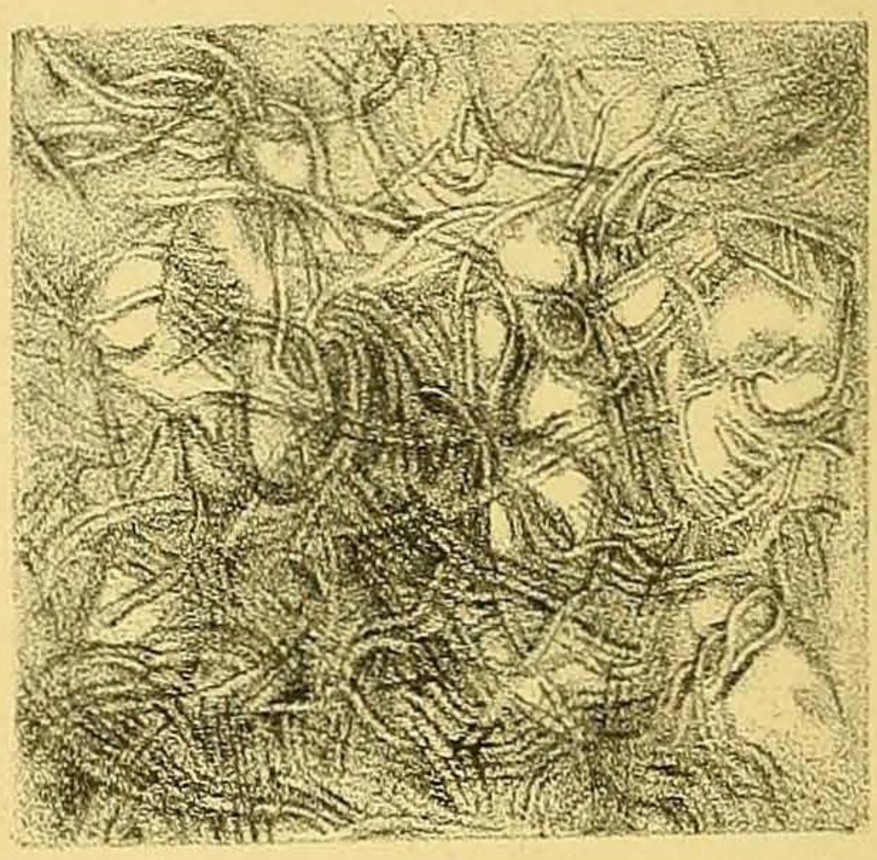
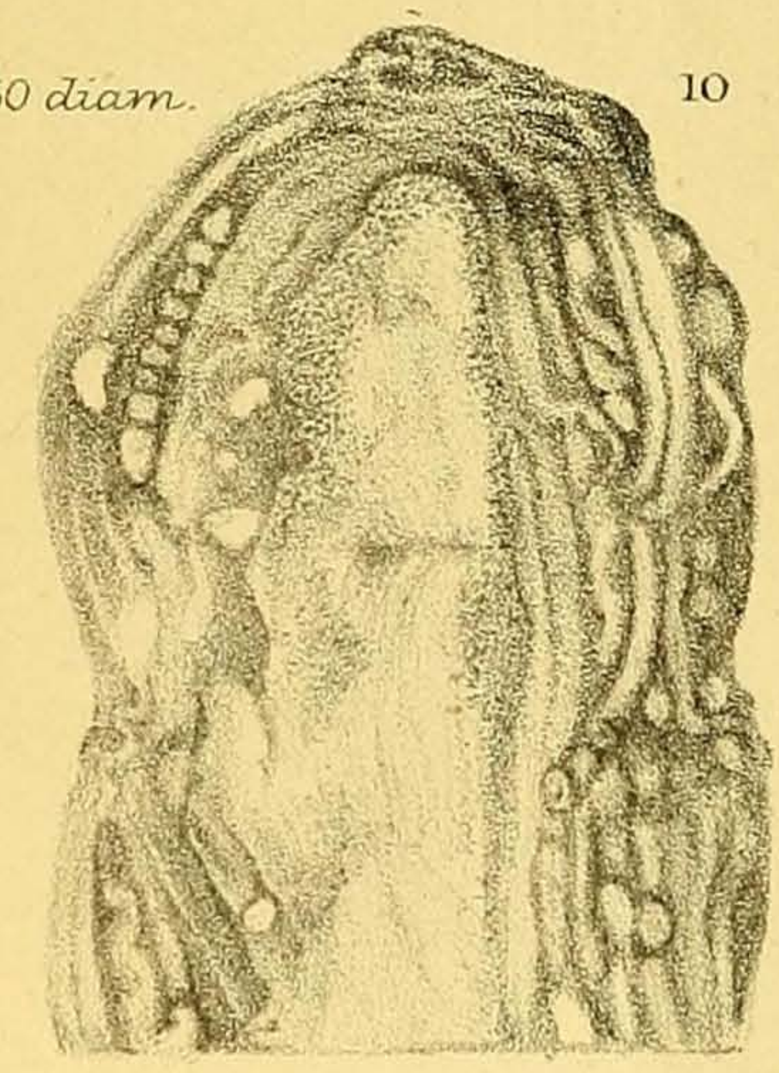


× 68 diam.

× 50 diam.

10



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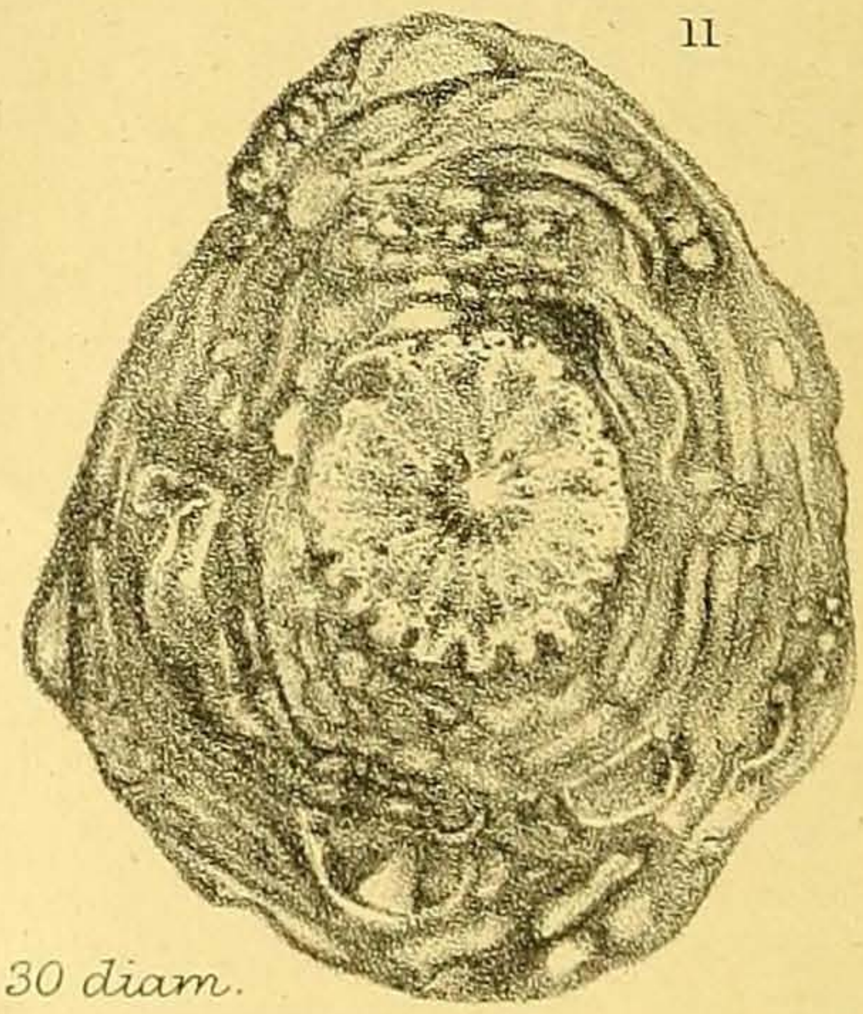

× 30 diam.

E. C. Woodward lith. ad nat. West, Newman & Co. imp.

Figs. 1 to 7. To illustrate Mr. Carter's paper.
Figs. 8 to 11. To illustrate Mr. Wethered's paper.

THE
GEOLOGICAL MAGAZINE.
NEW SERIES. DECADE III. VOL. VI.

No. V.—MAY, 1889.

ORIGINAL ARTICLES.

I.—On Fossil Isopods, with a Description of a New Species.

By James Carter, F.G.S.

(PLATE VI. Figs. 1—7.)

THE recent discovery in the Woodwardian Museum of an undescribed species of Isopod from the Upper Greensand of Cambridge affords an opportunity for the revision of the entire list of that class of fossils. The total number of species which have hitherto been described as occurring in a fossil state is inconsiderable,—probably scarcely thirty—including both foreign and British. To what extent this small number expresses the variety of specific form of this tribe of Crustaceans, which actually existed during the period of deposition of the several rocks in which their remains occur, it is impossible to determine, as doubtless by far the greater proportion of the individuals perished by reason of the delicacy of their tissues—the larger and thick-shelled species only having been preserved—the small, thin-shelled kinds not admitting of recognizable "fossilization." Specimens of Jurassic and Cretaceous Isopods are very rare both as to variety and individual number, and it may be inferred that this rarity of occurrence results from the more or less turbulent conditions under which these marine deposits were formed. The Tertiary estuarine and freshwater species, buried under more tranquil conditions, are much better preserved, and occur in some localities in innumerable abundance—*Sphæroma*, *Archæoniscus*, etc.

The succession and geological distribution of Isopods, so far as has yet been ascertained, is indicated by the following list :—

	One species has been obtained form	the Old Red Sandstone.
?	One ,, ,,	the Triassic rocks.
	Five ,, ,,	the Jurassic ,,
	Three ,, ,,	the Cretaceous ,,
	Eighteen ,,	the Tertiary ,,

About three-fourths of the forms enumerated are foreign, and seven species have been recorded by Dr. Woodward as occurring in this country :—

Præarcturus gigas, H. Woodw.	Old Red Sandstone, Hereford.
Archæoniscus Brodiei, Milne Edwards	Purbeck Beds, Vale of Wardour.
,, *Edwardsii*, H. Woodw.	,, ,,
Palæga Carteri, H. Woodw.	Grey Chalk, Dover.
Bopyrus sp. (parasitic)	Greensand, Cambridge.
Eosphæroma fluviatile, H. Woodw....	U. Eocene, Isle of Wight.
,, *Smithii*, H. Woodw.	,, ,,

To this list may be added *Palæga McCoyi*, the new Cretaceous form described in this paper, thus making a total of eight species as representing the fossil Isopods in Britain. In Phillips's Geology of Oxford and Valley of the Thames, p. 122 (1871 ed.), the genus *Ægya* is mentioned in a list of Liassic fossils, but no specific name, figure or description is given.

In investigating a tribe of genera it is obviously desirable not only to consider each genus separately and distinctly, isolated from its allies, but also to consider it with reference to other forms, so as to determine its relationship and phylogeny, and the precise zoological position which it occupies. To do this at all completely is as difficult as it is interesting, even with reference to living organisms; but with regard to those which occur only in a fossil, and consequently in a more or less imperfect, condition, the difficulty is increased; and in the case of the Isopods—as indeed in that of the innumerable host of perishable organisms which doubtless existed in geological periods—it is well-nigh hopeless to attempt such an enquiry, inasmuch as the supply of material in the shape of specimens is so extremely limited. It may, however, be useful to give collectively a brief epitome of the publications of the few palæontologists who have written upon the subject up to the present date.

In 1879 Dr. H. Woodward, who is well known to have long given special attention to, and to have contributed so largely towards a knowledge of, fossil carcinology generally, made a valuable communication to the Geological Society (Q.J.G.S. vol. xxxv.), in which he has given a list of described species of Isopoda, including the seven already alluded to as being British, and seven foreign; and has added copious notes and observations.

Dr. Ludwig von Ammon, of Munich, has published an able and exhaustive paper—"Ein Beitrag zur Kenntniss der fossilen Asseln" (Sitzungsber. d. Math.-Phys. Classe der k. k. Akad. d. Wissensch. 1882, Heft iv.), in which he has described a new species of *Palæga* (*P. scrobiculata*), and critically reviewed, with abundant bibliographical references, the contributions of various authors who have written upon Isopods. He has also compiled a table, systematically and stratigraphically arranged, of all the species which he regards as true Isopods, including those which Dr. Woodward had previously enumerated, and adding the ten following:—

Isopodites triassicus, Picard, Trias. (A doubtful form.)
Urda rostrata, Münst. Solenhofen.
,, *punctata*, ,, ,,
Ægites Kunthi, v. Ammon ,,
Palæga scrobiculata, v. Ammon, Tertiary.
From the "Unter oligocaen," Tyrol; a large species very nearly allied to *Palæga Carteri*, Woodw.
Oniscus convexus, Koch und Berendt, Tertiary (in Amber).
Trichoniscus asper, Menge, ,,
Porcellio notatus, Koch und Berendt, ,,
,, *granulatus*, Menge, ,,
,, *cyclophorus*, Menge, ,,

The five last mentioned are terrestrial Oniscidæ, of small size, and nearly allied to recent forms. A new Mexican species of

Sphæroma (*S. Burkartii*, Barc.), is described by M. Barcena (Geological Record, 1875, p. 297). The GEOLOGICAL MAGAZINE for April, 1887 (Vol. IV. p. 189), contains a notice of a paper "On New Neogene Isopoda," by N. Andrussow, in which mention is made of the following:—

Cymodocea Sarmatica, Andr. A marine genus of the Sphæromidæ.
Palæga Anconitana, Andr.
Sphæroma Catullii, Zigno.
,, *exsors*, Eichw. Bull. de Moscou, 1863.
Cymatoga Jazykowii, Eichw. Cretaceous, Bull. de Moscou, 1863.

Lastly, let me add that Prof. K. A. von Zittel (Handbuch der Palæontologie, 1885, pp. 666—670) gives, besides the foregoing:—

Arthropleura ornata, Jordan, Coal-M. Saarbrücken.
Archæosphæroma Frici, Novak, U. Miocene, Bohemia.
Sphæroma faveolatum, Costa, Post-Tertiary, Calabria.
Armadillo molassicus, H. v. Meyer, U. Miocene, Oeningen in Baden.

On *Palæga McCoyi*, sp. nov. Plate VI. Figs. 1—7.

The species about to be described is represented by three specimens from the Cambridge Upper Greensand, one of which exhibits the cephalon and first two segments of the pereion, another is tolerably complete except the telson, the third consists of portions of the pereion, the pleon, and the telson, with traces of the caudal appendages. As is the case with so many of the fossils from the same prolific bed, the specimens occur as phosphatic casts only, no portion of the test having been preserved: these casts are, however, so sharp as to afford characters with quite sufficient distinctness to be available for specific description. As specimens of Isopods occur so rarely, and are usually so imperfect, the distinction of a new species by means of mutilated examples seems justifiable.

Description.—General form slender, moderately convex transversely; lateral margins of pereion approximately parallel; cephalon about three-fourths as wide as the first segment of the pereion, rather wider than long, rounded in front, posterior border with a median condyloid prominence. Eyes large, reniform, widely separated, directed obliquely outwards and forwards; extending backwards beyond the transverse mid-line of the cephalon. The three anterior segments of the pereion rather shorter than the succeeding four; a sharp sulcus marks off a large epimeron on each segment. The pleon is about half the length of the pereion, and rather narrower; it consists of five equal, short segments, the last of which is lodged in the sinus of the fourth. The telson constitutes the posterior half of the pleon, and is as wide anteriorly as the segment which supports it: it narrows posteriorly and has apparently no carina. The surface of all the segments may be seen under the lens to be pitted by large, widely separated, puncta (see Pl. VI. Figs. 4 & 5). The matrix in which the specimen is embedded shows a sharp cast of the uropodite, the basal joint of which has the inner distal angle prolonged into a spine more than half as long as the endopodite—a character which occurs in many *Ægidæ*: the endo- and exo-podite are broken; they were probably of moderate and of equal size.

Total length from 30 to 35 millimetres; width from 8 to 9 mm. Upper Greensand, Cambridge; Woodwardian Museum.

To one of the specimens (Figs. 5 and 7) Prof. Seeley attached as a MS. label *Squilla McCoyi*, and this name is quoted by Mr. Jukes Browne in the list of fossils contained in his paper 'On the Cambridge Gault and Upper Greensand' (Q. J. G. S. May, 1875). The subsequent occurrence of two other specimens has enabled me to determine that the fossil so named is the pleon of the Isopod now described.

Palæga McCoyi is quite distinct from all other described fossil Isopods, although it bears considerable resemblance to several recent forms. I have provisionally referred it to the genus *Palæga*, established by Dr. H. Woodward (Geol. Mag. 1870, p. 495). Some characters suggest a reference to the recent genus *Cirolana*, but the tribe to which it really belongs cannot be determined until the details of the cephalic and abdominal appendages are known; in the absence of this knowledge it is not possible to decide whether it should be referred to the Ægidæ proper, or to the Cymothoidæ.

With reference to these tribes, as regards living species, a most valuable and exhaustive series of articles, illustrated by numerous plates, have been published in Naturhistorisk Tidsskrift (Copenhag.), Bd. xii. xiii. xiv. 1879–84, 'Symbolæ ad Monographiam Cymothoarum,' by J. C. Schiœdte and Fr. Meinert. These authors also publish a paper in the same series, 'De Cirolanis Ægas simulantibus commentatio brevis,' Bd. xii. 1879–80.

DESCRIPTION OF PLATE VI. Figs. 1—7.

Fig.	2.	*Palæga McCoyi*, Carter.			Showing the cephalon (crushed), the pereion, and the anterior segments of the pleon. nat. size.
,,	1.	,,	,,	,,	Cephalon, first, and portion of second segment of pereion. nat. size.
,,	4.	,,	,,	,,	The same specimen as Fig. 1, but enlarged.
,,	7.	,,	,,	,,	Posterior portion of pereion, the pleon and the telson, with impression in the matrix of uropodite. nat. size.
,,	5.	,,	,,	,,	The same specimen as Fig. 7, but enlarged.
,,	6.	,,	,,	,,	Uropodite. enlarged.
,,	3.	,,	,,	,,	Restoration of entire form.

II.—On the Microscopic Structure of the Jurassic Pisolite.

By E. Wethered, F.G.S., F.C.S., F.R.M.S.

(PLATE VI. Figs. 8—11.)

THE specimens of pisolite which I have examined were obtained from two horizons, namely, the Coralline Oolite and base of the Inferior Oolite near Cheltenham. The pisolites are well known and have frequently been referred to by authors as fine types of oolitic granules, and in proof of this I may quote from Mr. H. B. Woodward's last edition of his Geology of England and Wales. Speaking of oolite granules the author says (p. 281), "When these