28. *On the* Occurrence *of* Branchipus (*or* Chirocephalus) *in a* Fossil State, *associated with* Eosphæroma *and with numerous* Insect-remains, *in the* Eocene Freshwater (Bembridge) Limestone *of* Gurnet Bay, Isle of Wight.

By Henry Woodward, LL.D., F.R.S., F.G.S. (Read December 19, 1877.)

[Plate XIV.]

There is hardly a spot in the British Islands so well known to geologists at large as the Isle of Wight.

Exhibiting, as it does, so many fine and varied natural sections in its cliffs, from the Wealden up to the Quaternary, it has attracted the attention of observers from the days of Sir H. Englefield, Bart. (1816), and since that date of Captain L. L. Boscawen Ibbetson (1849), of Dr. Mantell, Prof. Prestwich, Prof. Edward Forbes, Mr. H. W. Bristow, and quite recently of Dr. C. Barrois, of Lille, who has added considerably to the geological literature of the island.

The sections and map of the Isle of Wight published by the Geological Survey of Great Britain, and accompanying Mr. Bristow's valuable memoir, leave apparently little to be desired; but much has yet to be done in order to complete our knowledge of the vast series of fossil remains which are constantly being discovered, especially the large collections yielded by the fluvio-marine series.

The Hempstead and Bembridge* beds have long been known and studied by the late Prof. E. Forbes and others, and have yielded a rich series of fossils to the labours of Henry Keeping, many of which have already been described in Frederick Edwards's monograph and elsewhere. The plant-beds at the base of the Eocene series in Alum Bay, already partially examined by De la Harpe and Salter, are now likely to be thoroughly worked out by the energetic labours of Mr. J. Starkie Gardner, F.G.S., aided in the determination of the plant-remains by Mr. W. Carruthers, F.R.S., F.G.S., and the Baron von Ettingshausen, who have both promised their cooperation.

The fossils of the Eocene marine series have been studied by many able geologists—Lyell, Forbes, Edwards, Owen, Bowerbank, Mantell, and others.

But between the Bagshot beds (Middle Eocene) and the Hempstead and Bembridge beds (Upper Eocene) one meets with the Headon and the Osborne or St. Helen's beds, forming the *lower* part of the fluvio-marine series of the Isle of Wight.

This series consists of an aggregation of beds of freshwater, estuarine, and marine origin, the Headon beds being computed by Mr. Bristow at from 133 to 175 feet in thickness at Headon Hill and Whitecliff Bay, whilst the Osborne series attains a total thickness of 79 feet.

Chara Lyellii, *C. medicaginula*, *C. Wrightii*, and *Carpolithes ovulum* and *C. thalictroides* are the only plants recorded.

* Lyell's earliest papers related to these beds.

Of Crustacea there have been found:—*Candona Forbesii*, *Cytherideis unisulcata* and *C. Colwellensis*, *Cytheridea debilis*, *Müller*i, and *perforata*, *Cythereis cornuta*, *Cytherella Miinsteri*, *Cythere plicata*, *C. angulatopora*, and *C. Wetherelli*; also two Cirripedes, *Balanus unguiformis* and *Pollicipes reflexus*.

These, with about 42 genera of Mollusca (many of which are estuarine and freshwater, and some land species), make up the known fauna of these beds at the time of the Geological Survey Memoir.

To Mr. E. J. A'Court Smith is due the credit of the discovery of a thin but very richly fossiliferous band in this series of deposits at Thorness and Gurnet Bays, near Cowes, which has largely increased the interest of these beds, especially by a very important addition to the known terrestrial forms of life belonging to the Eocene period.

The section is as follows:—

General Section at Thorness and Gurnet Bays.

		Thickness. ft.	in.
	Surface soil.		
I.	*Grey* Clays with occasional bones of *Emys* or *Trionyx*.....	10	0
II.	Lighter (*Yellow*) Clays with broken shells.....	2	0
III.	*Limnæa* Limestone with *Planorbis* and bones of *Emys*, also hard concretions (*Hard limestone* bed)	3	0
IV.	Variegated fossiliferous Clays	8	0
V.	Upper Limestone beds with *Limnæa* and small oblong Oyster (*Ostrea* sp?)	3	0
VI.	Band of loose shells with *Ostreæ* and Sharks' teeth	0	6
VII.	Blue Clays with *Cyrena*	3	0
VIII.	Fossil Plant and Insect-bed	1	0
	Base of cliff.	30	6

"The Limestone at Hempstead Ledge" (5 miles S.W. of Gurnet Bay), writes Mr. Bristow*, "consists of three beds with other softer beds between, and contains numerous *Limnæa longiscata*, *Planorbis*, *Chara*, &c. There, as well as in Gurnet Bay and at West Cowes, it appears to be about 15 or 16 ft. thick. It presents very uniform characters in all these localities, where it is highly fossiliferous, and marked by the presence of occasional *Planorbis*, and *Paludina orbicularis*, together with (as usual) numerous *Gyrogonites* and casts of *Limnæa longiscata*. At the point between Gurnet and Thorney Bays it stretches out at sea towards Hempstead Ledge, in a direction 30° S. of W., with a dip 35° S. of E. On either side of Gurnet Bay it forms a conspicuous curve, and determines the form of the slope on which Cowes is built, although on the surface it is not seen, being concealed by the superincumbent marls and, eventually, by the gravel. On the quay, at West Cowes, it serves for the foundations of some houses built on the northern part of the Parade, opposite to which it forms a ledge dipping 10° S. of E. and skirting the shore as far as Egypt."

* "Memoir on the Geology of the Isle of Wight," by H. W. Bristow. Mem. Geol. Survey Gt. Britain, 1862, 8vo, p. 77.

There can be little doubt that the beds exposed in the cliff-sections at Gurnet and Thorness Bays belong to the Bembridge series, and that the hard band, from which the insect-remains and Crustacea have been obtained, belongs to the lowest part of that series.

The beds dip to the S.W., so that in about half a mile the lower bed of limestone is just on the line of high water; and about 200 yards further west it forms a reef known as "Stuckler's Ledge," which is the eastern point of Thorness Bay.

Within Thorness Bay the beds dip more rapidly to the south, till at 400 yards distance from the ledge the shale with fossils dips down to the beach and forms a small reef.

As no fossils, save those already recorded, had been noticed by Messrs. Forbes and Bristow, great was my delight to find in Mr. A'Court-Smith's collection, the result of 20 years' patient collecting in his leisure hours, abundant remains of insects evidencing the presence of more than twenty genera, representing Coleoptera, Hymenoptera, Lepidoptera, Diptera, Neuroptera, Orthoptera, and Hemiptera, and one representative of the Arachnida.

Mr. A'Court-Smith accounts for the abundance of remains of insects in particular blocks by the theory that they were (after being drowned) left by eddies in pockets, much in the same way as we find organic remains in streams, lakes, and along the coast at the present day.

For the determination of the insect-remains, so far, I am indebted to my experienced friend and colleague, the late Frederick Smith, Esq., Assistant-Keeper of the Zoological Department, British Museum. Possibly some more adventurous palæo-entomologist may make a more rigorous study of them, and give to some at least of the more perfect remains generic and specific determinations.

List of Insect-remains from Gurnet Bay, near Cowes, Isle of Wight, determined by the late Frederick Smith, Esq., Assistant-Keeper, Zoological Department, British Museum.

	Number of specimens.
1. Coleoptera.	
1. Staphylinus	1
2. Dorcus (Lucanidæ)	1
3. Anobium	1
4. Curculio	7
II. Hymenoptera.	
5. Wings of	2
6. Formica	19
7. Myrmica	7
8. Camponotus	7
III. Lepidoptera.	
9. Lithosia	2
IV. Diptera.	
10. Wings of	43
11. Tipulidæ	6
V. Neuroptera.	
12. Phryganea	8
13. Termes?	1
14. Hemerobius	1
15. Perla	2
16. Agrion	2
17. Wings of Libellula	9
VI. Orthoptera.	
18. Gryllotalpa	1
19. Acridiidæ	2
VII. Hemiptera.	
20. Wing of?	1
21. Triecphora sanguinolenta	1
Arachnida.	
1 Spider	1

Mr. A'Court-Smith has likewise been fortunate in discovering numerous fragmentary remains of plants, such as leaves of palm (*Flabellaria*), seeds of water-lily (*Nelumbium*), leaves of rushes and other aquatic plants. With these plant-remains and insects were also found two forms of Crustacea belonging to the Edriophthalmia and the section Isopoda, also abundant remains of a minute Phyllopod Crustacean allied to *Branchipus* or *Artemia*.

Bivalved Entomostraca, as already stated, had been noticed and described by Prof. T. Rupert Jones from these beds to the number of some 14 species and six genera (*Candona*, *Cythere*, *Cythereis*, *Cytherella*, *Cytheridea*, *Cytherideis*); but these, it must be borne in mind, are represented by their calcareous bivalved carapaces, not by the remains of appendages, no limbs (save in a single instance*) having been met with.

Even the Isopoda have a tolerably firm though thin crust; and the paper-like valves of *Estheria* have sufficient chitine in them to give them consistence, and enable them, like the elytra of insects, to be preserved in a fossil state. But that a Crustacean like *Branchipus*, destitute of shelly covering, having a long slender diaphanous many-segmented body and 13 pairs of laminar branchial feet, should undergo the process of fossilization, and leave any trace behind, is truly remarkable.

The preservation of these delicate little Phyllopods is, no doubt, due to the admirable nature of the fine argillaceo-calcareous mud-rock in which they have been entombed in such numbers, the iron having collected around them and stained the outline of the delicate gill-feet and appendages upon the stone, as if painted by some photographic process.

In the first Heft of his 'Fauna Saræpontana Fossilis,' 1873 (Die Fossilen Thiere aus der Steinkohlenformation von Saarbrücken), Dr. Friedrich Goldenberg has described and figured, on Taf. 1. fig. 15 (16), six somewhat doubtful-looking segments which he attributes to *Branchipus*, and names *Branchipusites anthracinus*. Without a careful examination it would be imprudent to pronounce a judgment upon this specimen; I annex a translation of Dr. F. Goldenberg's remarks upon it.

"Of this animal," he says, "eight segments are to be seen in the side view; but of these, the first and last are very imperfect. The middle segments are also very imperfectly preserved, so that one can only find indications of their segmentation. The lateral appendages (side-pieces), of which six are present pretty perfect, in their natural connexion, have much resemblance to the lamellar branchial feet of a *Branchipus*. Their anterior margin is somewhat incurved; the hinder margin, which is parallel to the anterior, bends at about two thirds of its course at an obtuse angle towards the apex of the anterior margin. In the middle of this oblique inferior margin oval thickenings make their appearance, which I regard as remains of vesicular branchiæ, which were seated here at the base of the lobe, unjointed swimming- (or fin-) feet. The substance of these swimming-feet

* *Palæocypris Edwardsii*, from the Coal-measures, Saint-Etienne, France, discovered by M. Ch. Brongniart (see Ann. des Sci. Géolog. 1876, art. no. 3, pl. 7).

seems to have been very thinly membranous and of a blackish-brown colour."

I know of no other recorded example in a fossil state.

It is interesting to mention that both the males with large clasping antennæ, and the females with small antennæ and egg-pouches with large and very distinct disk-like bodies (the compressed eggs), can be made out upon the slabs.

I propose to name this interesting fossil Phyllopod *Branchipodites vectensis* (Pl. XIV. figs. 6–9).

Dimensions:—Length of fossil 6 millims., breadth 2 millims.

The two forms of Isopods discovered by Mr. A'Court-Smith differ considerably both in form and relative size; and as they are, moreover, derived from different horizons in the Bembridge beds, I feel justified in treating them as distinct species.

The smaller species (Pl. XIV. fig. 1) was found in one of the hard blocks met with upon the beach which have yielded the fossil *Branchipus* and the insect-remains; whilst the larger species (Pl. XIV. fig. 2) was obtained from a yellow marly bed charged with the roots of aquatic plants, which occurs somewhat higher up in the series.

The former of these (fig. 1) occupies the surface of a small, grey, and very compact slab, in which about twenty-five specimens may be counted in the space of a few inches.

The largest individuals measure $8\frac{1}{2}$ millims. in length by $4\frac{1}{2}$ or 5 millims. in breadth, the smallest being 7 millims. long by $3\frac{1}{2}$ millims. broad.

The head is small, measuring only half the breadth of the thorax (pereion); the eyes are reniform, marginal, and prominent.

The thorax (pereion) is composed of seven somites; the first of these is greatly produced laterally and deeply emarginated anteriorly, for the insertion of the head, as is the case in several living species of Sphæromidæ and Oniscidæ. The six succeeding somites are well developed, their tergal portion nearly straight and the epimera somewhat strongly recurved.

The abdomen (pleon) is composed of a single caudal shield, nearly circular in outline, and forming one third of the length of the entire animal. Two lamellar caudal appendages or uropoda, which are articulated to the anterior margin of the caudal shield, are seen, one on either side. These, with a trace of antennæ, are the only appendages observed in the fossil.

There can be little doubt of the propriety of referring this species to a position near to, if not actually in, the family of the Sphæromidæ; and it is satisfactory to find that a closely allied fossil form, also from the Eocene, has already been so referred by Prof. H. Milne-Edwards.

I propose to place all these Tertiary forms of Isopoda Normalia in a distinct genus, under the name of *Eosphæroma*, to which I shall refer again subsequently. I designate this small species *Eosphæroma fluviatile*.

The second and larger species (Pl. XIV. fig. 2) occurs on the sur-

face of a fine yellow marl or pipe-clay, full of the rootlets of aquatic plants, and is represented by a group of ten individuals.

The specimen measures $16\frac{1}{2}$ millims. in length and $10\frac{1}{2}$ millims. in breadth. In outline this species is much more oval than fig. 1. The head is less deep, but broader, and the eyes less conspicuous and placed more in front. The head is 4 millims. broad and 2 millims. deep.

The segments of the thorax (pereion), seven in number, are considerably arched, the three median segments being not only broader but deeper than the rest. As in fig. 1, the anterior thoracic somite is developed laterally, so as to enclose the sides of the head. The length of the thorax is 8 millims., breadth 10 millims.

The caudal shield (pleon) is large and nearly semicircular, being 6 millims. long by 8 millims. broad.

Two lamelliform appendages (uropoda), articulated to and arising from the sides of the abdomen, closely encircle the caudal shield. A small ramus is given off from the second (third?) articulation of the uropodite, as in recent Sphæromidæ. Traces of antennæ can also be detected on the slab, but no other appendages are preserved.

I have designated this form *Eosphæroma Smithii*, after its discoverer, Mr. E. J. A'Court-Smith.

It must not be supposed that these remains occur throughout the bed described. The bed itself is at most 12 inches thick, but more often only 2 inches. Thousands of blocks of this fine hard-grained limestone have been broken up, in the course of the last twenty years, by Mr. A'Court-Smith to obtain specimens.

I subjoin a short description of the French Eocene form described by Prof. H. Milne-Edwards*, which I propose to refer to the same genus with those from the Isle of Wight (see Pl. XIV. fig. 3):—

"This Isopod was found in the neighbourhood of Paris, in digging the fortifications at the hill of Chaumont; it was met with in a bed of marl, immediately below the green marl containing *Cythere*†. It is so abundant that sometimes in the space of a square foot one can count the impressions of more than a hundred individuals.

"The form of these little Crustaceans is pretty regularly oval; the largest individuals measure only about 12 centims. [*sic*]‡ long by 7 or 8 broad.

"The body appears to have been depressed, as in *Ancinus*, for the impressions left do not exceed half a centimetre [*sic*] [*read* "millimetre"] in thickness, and present no appearance of deformation.

"The head is of medium size, and gives insertion to the antennæ by a slight frontal flattening; the eyes are small and placed laterally.

"The thorax (pereion) is composed of seven rings, and presents

* See 'Annales des Sciences Naturelles,' 2e série, 1843, tome xx. Zoologie, p. 329.

† [Lower Tertiary.]

‡ [For "centimetres" read "millimetres." This is evidently an uncorrected printer's error, as the specimens, with Prof. Milne-Edwards's label, are now before me, and do not exceed about 12 millims.]

on each side a border formed by the epimeral pieces, which overlap one another and are of a quadrilateral form.

"The abdomen is composed of two segments, the first of which resembles the thoracic rings and presents traces of a transverse suture; the second is scutiform and semioval. Lastly, on each side of this terminal plate, one detects lamellar subfalciform natatory appendages, placed as in *Sphæroma*.

"From these peculiarities of structure, I am induced to believe that this fossil ought to be placed in the family of Sphæromidæ; but it does not sufficiently closely resemble any of the existing species in this group, and in the Museum I have classed it between *Sphæroma* and *Ancinus*, and I have named it *Palæoniscus Brongniartii*."

If to this we add *Palæoniscus obtusus*, Meyer*, from the Miocene of Bonn, which is, no doubt, closely related to the foregoing species, we have all the Tertiary forms hitherto described.

The name *Palæoniscus*, unfortunately, cannot stand, having been preoccupied by Blainville for a genus of Fishes since 1818 (*Palæoniscum*), and by Agassiz since 1833 (*Palæoniscus*). I would have suggested the substitution of *Archæoniscus*, Milne-Edw., the name given to a fossil Isopod from the Purbeck of the Vale of Wardour; but a reference to the figure (Pl. XIV. fig. 4), and to the subjoined description, will show at once that the relations of the four forms above enumerated are with the Sphæromidæ, whereas the presence of several free and movable abdominal somites in *Archæoniscus* connects it with the Ægidæ and other errant Cymothoidæ.

I would venture therefore to propose for these Tertiary forms the generic appellation of *Eosphæroma*.

The known list of Isopod fossils will be then as follows:—

Armadillo molassicus, *Heer*, '*Primæval World of Switzerland*,' vol. ii. p. 5, fig. 210. Miocene, Œningen.
Eosphæroma (Palæoniscus) obtusum, *Meyer*. Miocene, Bonn.
—— (——) Brongniartii, *Milne-Edwards*. Lower Eocene, near Paris.
—— fluviatile, *H. Woodw.* Upper Eocene, Gurnet Bay, Isle of Wight.
—— Smithii, *H. Woodw.* ,, ,, ,,
Palæga Gastaldi, *Sismonda*. Miocene, Turin.
—— Carteri, *H. Woodw.* Grey Chalk, Dover.
—— sp. (*Ferd. Roemer*). White Chalk, with flints, Aalborg, Jutland, Denmark.
Bopyrus (under carapace of *Palæocorystes*). Greensand, Cambridge.
Archæoniscus Brodiei, *Milne-Edwards*. Lower Purbeck, Vale of Wardour, Wiltshire.
—— Edwardsii †, *Westwood*. Lower Purbeck, Durdlestone Bay, Dorset.
Præarcturus gigas, *H. Woodw.* Old Red Sandstone, Rowlestone, Herefordshire.

Among the Sphæromidæ common to our coast at the present day, and also to that of France and Ireland, is *Sphæroma serratum*, Fabr., sp. (see Pl. XIV. fig. 5).

* Palæontographica, Dunker und Meyer, 1858, Band v. pp. 111–113, t. 23. f. 3, 7, 8.

† See Quart. Journ. Geol. Soc. 1854, vol. x. p. 393. I regret to say I had overlooked the fact that Prof. J. O. Westwood had given a specific name to the specimen of *Archæoniscus* figured by him on pl. 14. fig. 12.

This form resembles our fossil in the small size of the cephalon and the broadly-expanded recurved character of the margin of the anterior segment, in the form of the eyes, the antennæ, and the posterior pair of limbs; but the abdominal shield is larger in the fossil.

Dr. Kinahan obtained *Sph. serratum* in the River Logan, Belfast, and in the River Dodder, Dublin *; so that the fossil species occurring in this fluvio-marine bed is quite in accord with the habits of its modern congener.

I subjoin a brief notice of *Archæoniscus Brodiei* by Prof. Milne-Edwards, who writes†:—

"The specimens which I have received from Mr. Brodie (discovered in the Wealden [*sic*] [Purbeck] formation, in the Vale of Wardour, Wiltshire) are 12 centimetres ‡ in length and 9 in breadth; but this geologist has found some whose dimensions are much greater." [I subjoin the measurements of several specimens presented by the Rev. P. B. Brodie to the British Museum—

Length.		Breadth.	
12 millims.	.....	8 millims.	
14 „	.....	9 „	
19 „	.....	11 „	
20 „	.....	13 „	.]

"The body is very smooth, and composed of a series of rings terminated posteriorly by a rounded shield. Unfortunately the head is not well preserved in those specimens which I have examined. I have not been able to discover any traces of the legs; but Mr. Brodie has detected them in some of his specimens. I have been able to make out traces of the antennæ. The fossil is evidently an Isopod, and from its general form should be arranged in the family of Cymothoidæ, but it cannot be referred to any known genus. It appears to be intermediate between *Serolis* and the errant Cymothoidæ. It resembles the former in the greater development of its body-segments, especially of the epimeral portion of the segments as compared with the tergal portion, and also in the expansion of the epimera and the position of the terminal shield of the body.

"It differs from *Serolis* by the greater development and mobility of the anterior rings of the abdomen—characters which ally it to *Ægа* and other errant Cymothoidæ. The several rings between the head and the caudal shield scarcely differ from one another, so that there is no visible limit between the thorax and the abdomen; but one can count as many as twelve; and as the number of thoracic rings never exceeds seven in the Edriophthalmia, we must conclude that the remaining five most posterior ones belong to the abdomen, which would consequently be composed of six movable segments, as

* Bate and Westwood, Hist. Brit. Sess.-eyed Crustacea, 1868, vol. ii pp. 405–407.

† 'Annales des Sciences Naturelles,' 2e série, 1843, tome xx. Zoologie, p. 327.

‡ [For "centimetres" read "millimetres." This error occurs throughout Milne-Edwards's paper. I have the specimens of both *Archæoniscus Brodiei* and *Palæoniscus Brongniartii* before me; it is evidently a clerical error.]

in *Ægа*, *Nelocira*, &c. The sixth abdominal ring, which constitutes the terminal shield, is nearly semicircular, and presents on its median and anterior portion a tubercular swelling nearly analogous to that observed in the caudal shield of several Sphæromidæ. Lastly, the structure of the head appears to be intermediate between that of these last-named Crustacea and that of which *Serolis* offers us an example; for the cephalic ring is enlarged, as in the Sphæromidæ, while the eyes approach the median line, as in *Serolis*.

"From these facts one sees that this fossil Crustacean is perfectly distinct from all living Isopods, and ought therefore to be placed in a separate genus. I would propose to designate it *Archæoniscus Brodiei*."

I have given an outline figure of this old Isopod in my plate (Pl. XIV. fig. 4).

EXPLANATION OF PLATE XIV.

Fig. 1. *Eosphæroma fluviatile*, H. Woodw., 3 times nat. size. Upper Eocene, Bembridge series, Gurnet Bay, I. of Wight. *u*, uropoda.
Fig. 2. *Eosphæroma Smithii*, H. Woodw., twice nat. size. Ditto. *u*, uropoda.
Fig. 3. *Eosphæroma* (*Palæoniscus*) *Brongniartii*, H. Milne-Edw. sp., "Couche de Marne à *Cytherées*, sous les Marnes vertes." U. Eocene, Butte de Chaumont, près Paris. 3 times nat. size. *u*, uropoda.
Fig. 4. *Archæoniscus Brodiei*, Milne-Edw. Lower Purbeck beds, Vale of Wardour, Wilts. 3 times nat. size. (The mesial line dividing the posterior somites in this figure appears to be due to the decortication of these segments, which has laid bare the cast of the straight alimentary canal.)
Fig. 5. *Sphæroma serratum*, Fabr., sp. Recent British Marine and Estuarine.
Fig. 6. Part of a slab of Bembridge stone, drawn of the natural size, covered with impressions of *Branchipodites vectensis*, H. Woodw.
Figs. 7, 8, & 9. Portions of individual specimens, drawn with the camera and 1-inch objective, showing—*br*, *br*, branchial feet; *e*, *e*, the eyes; *o*, *o*, the ovaries, with contained ova; *c*, *c*, the caudal somites.
Fig. 10. *Branchipus* (*Chirocephalus*) *diaphanus*, Prevost. Recent freshwater, British.

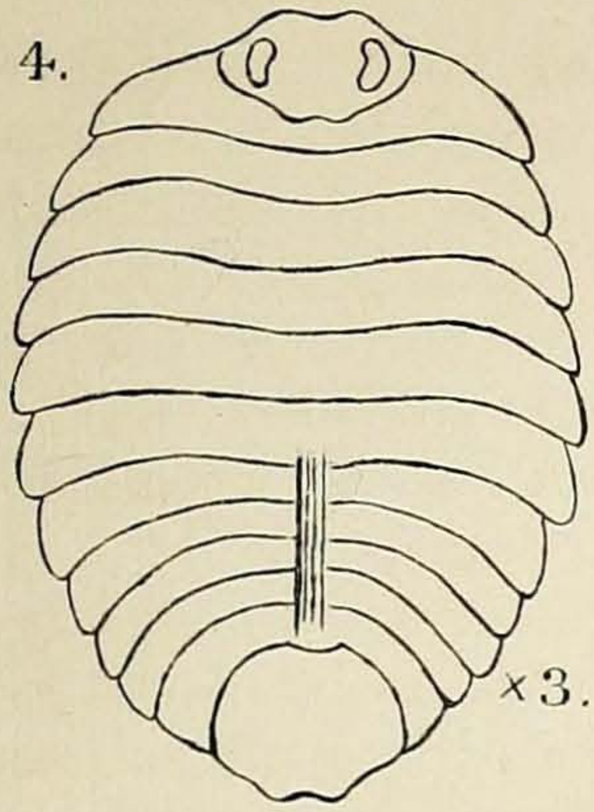
(Figs. 1–4 and Fig. 6 drawn from specimens in the Geological Collection of the British Museum.)

Discussion.

Prof. Wood-Mason stated that he was acquainted with three or four genera of Isopoda, members of which can live indifferently in salt and fresh water, one of them being the parasitic *Bopyrus*—facts that seemed to indicate the process by which, in the course of ages, our fresh waters and, eventually, the land had gradually become stocked with mollusks and crustaceans, littoral and estuarine representatives of these two classes of animals, which were ametabolous, having sufficient plasticity of their organism to enable them to withstand a gradual change from salt- to freshwater conditions.

Mr. J. S. Gardner said that the beds belonged to the Bembridge formation, and that he had diligently examined the corresponding beds in the eastern corner of Whitecliff Bay, but had found them quite barren. No insects had been found in Alum Bay, and comparatively few at Studland and Bournemouth. The Eocene insects found in England everywhere indicate a temperate climate.

4.



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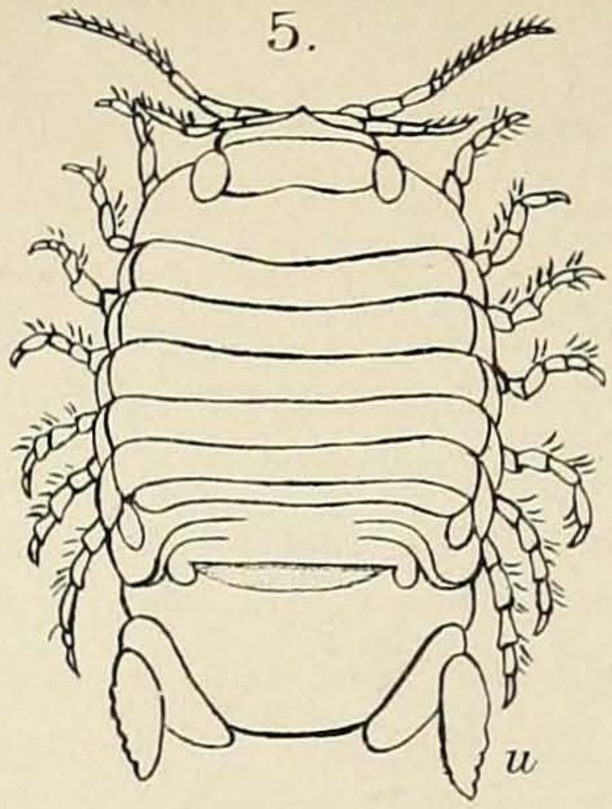

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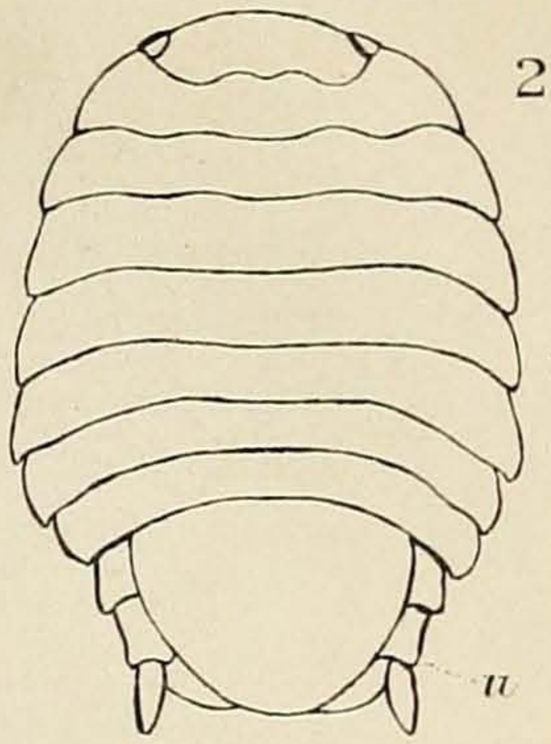

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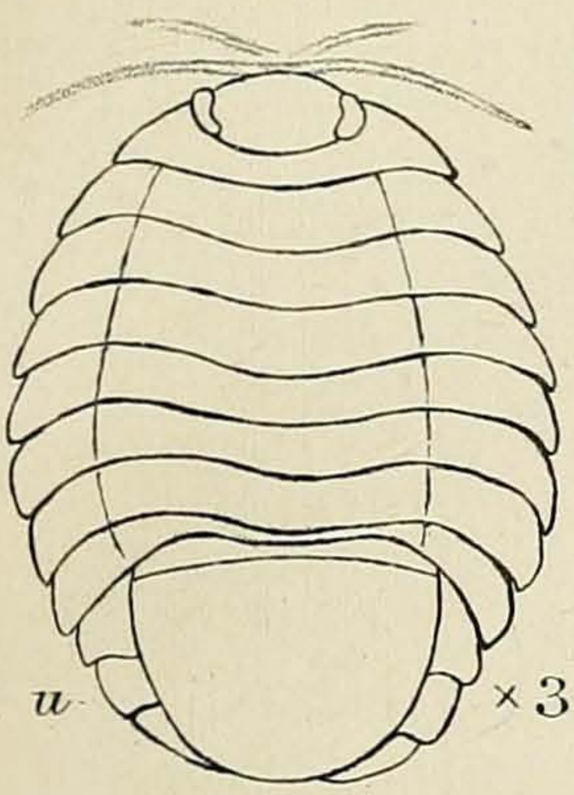

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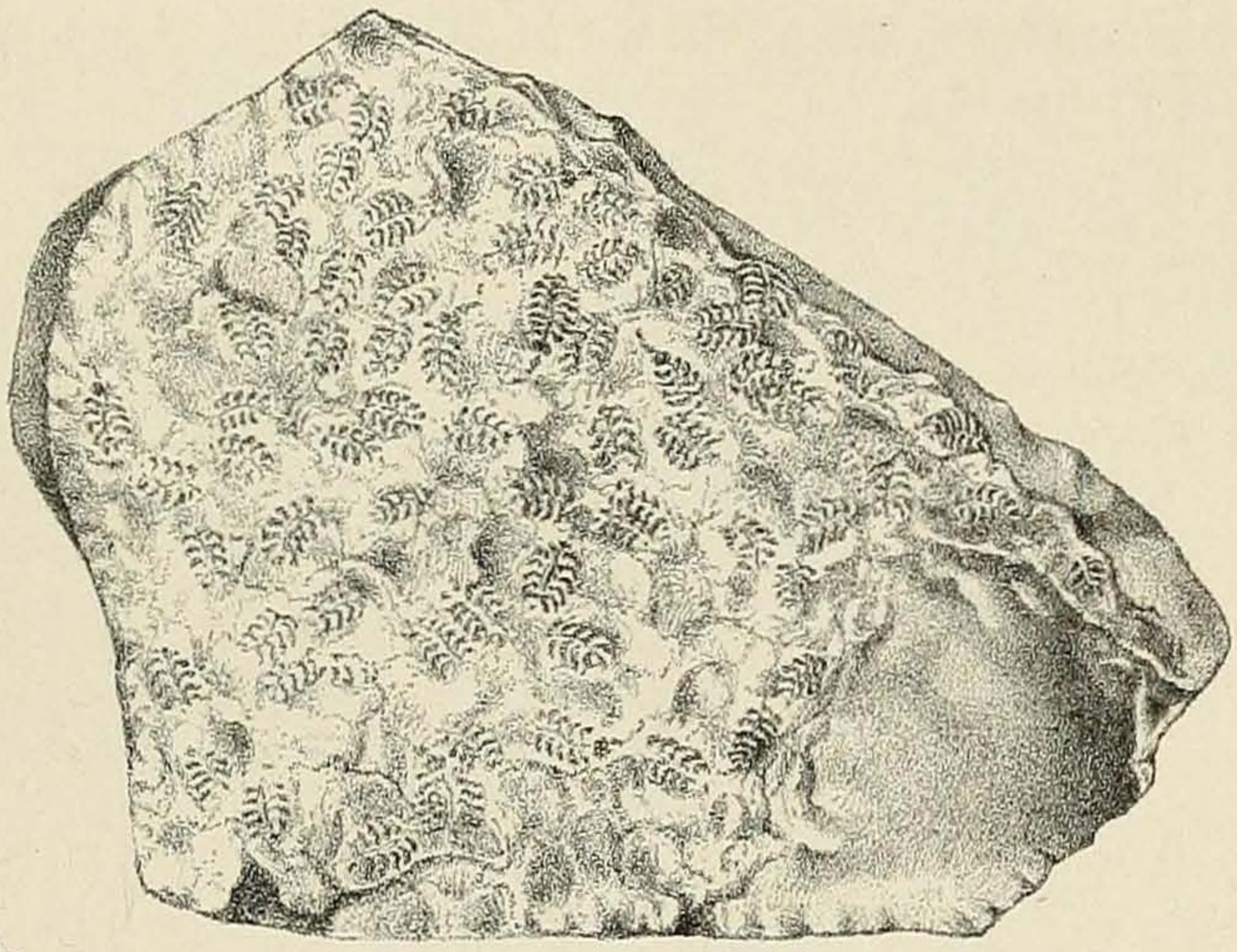

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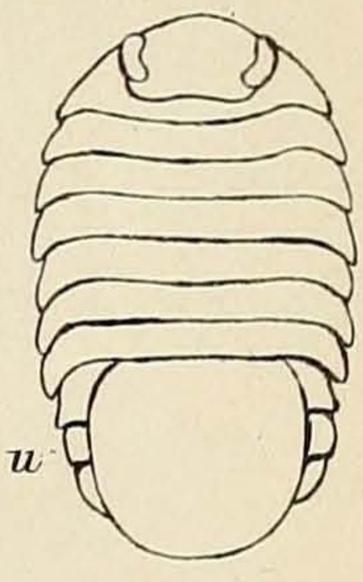

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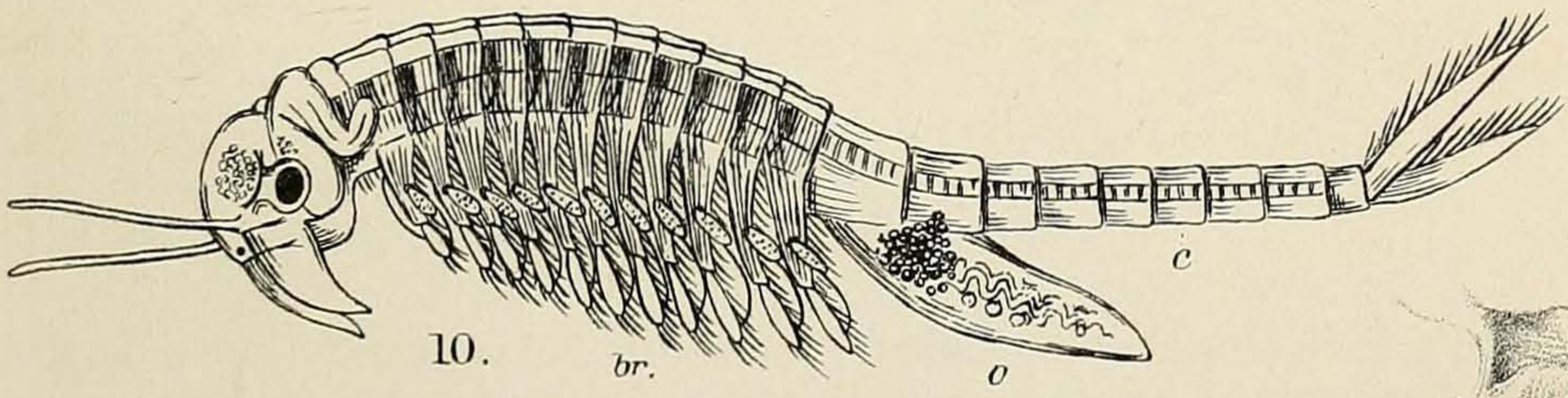
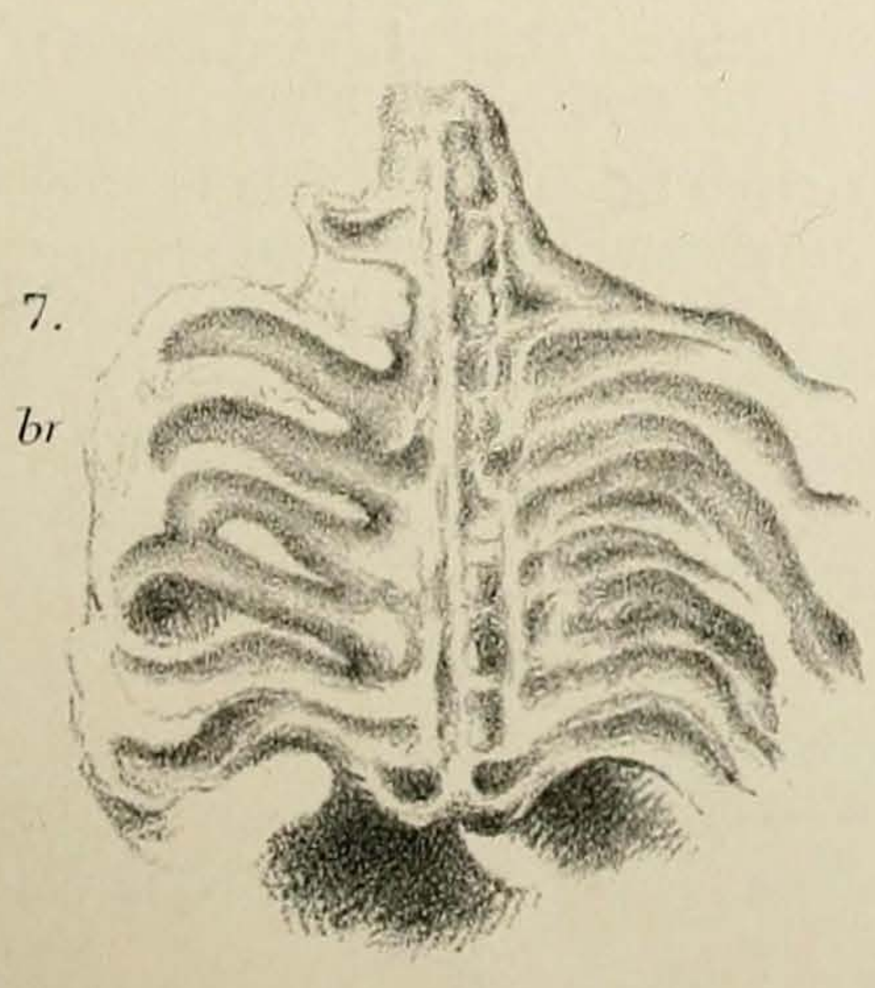


10. *br.* *c* *o*



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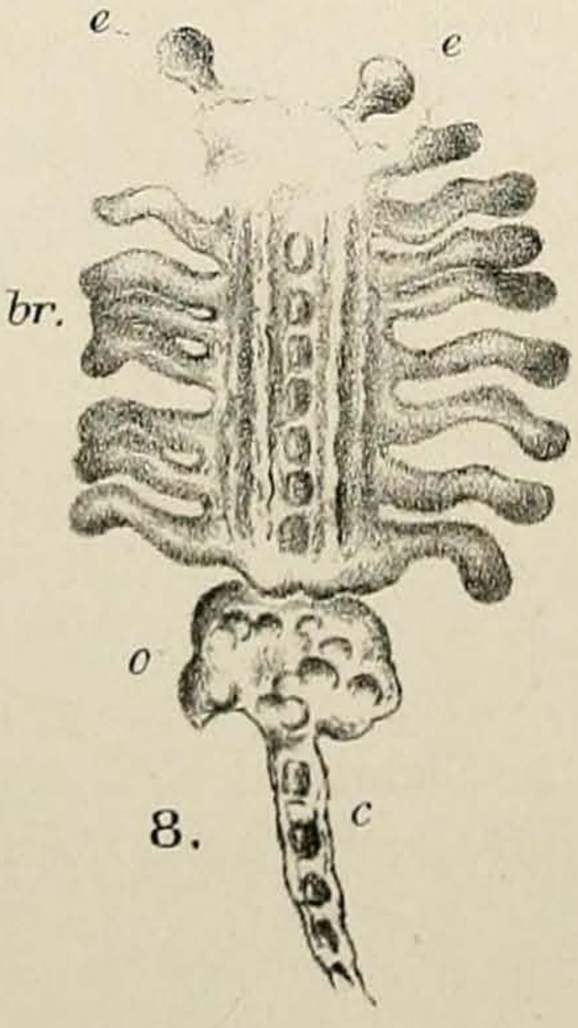
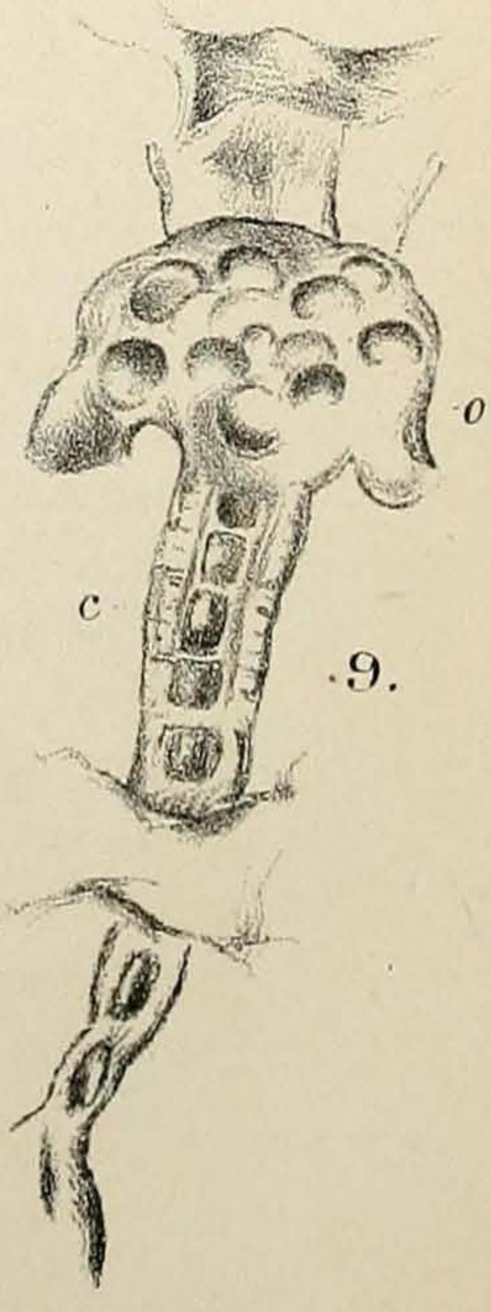


e *e* *br.* *o*

8. *c*



o *br.* *c*

9.

A. S. Foord del. Mintern Bros imp.

EOCENE CRUSTACEA FROM THE ISLE OF WIGHT ETC.