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THE JOURNAL
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(ZOOLOGY.)

THE PERCY SLADEN TRUST EXPEDITIONS* TO THE ABROLHOS
ISLANDS (INDIAN OCEAN).

Under the Leadership of Prof. W. J. DAKIN, F.L.S., F.Z.S.

Amphipoda and Isopoda. By W. M. TATTERSALL, D.Sc., Keeper of the
Manchester Museum. (Communicated by Prof. W. J. DAKIN, F.L.S.)

(PLATES 1-3.)

[Read 5th May, 1921.]

I AM indebted to Professor Dakin for the opportunity of examining the small collection of Amphipoda and Isopoda which he made during his expedition to the Abrolhos Islands. Nine species of Amphipoda and three of Isopoda were found in the collection. The number of specimens was very small, and considerable difficulty has been encountered in the endeavour to identify them satisfactorily. I have not been able to satisfy myself that any of the Amphipoda represent undescribed species, but in almost all cases the specimens showed some departure from existing descriptions. The recent work of Chilton has, however, shown that in the Amphipoda we are dealing with a dominant and virile group of Crustacea exhibiting relatively endless variations, and the time has now arrived when it is better to determine the extent of specific variation than to regard each departure from the normal as of specific value. Future work will undoubtedly reduce the number of valid species of Amphipoda.

* Acknowledgement must be made here also of a grant from the Government Grant Committee of the Royal Society, and a grant from the British Association.

The main interest of the collections lies in the bearing which it has on the general question of the origin of the fauna of the Abrolhos Islands. As Professor Dakin has already pointed out, these islands are remarkable as being the most southerly islands in the world with coral reefs fringing their shores, and this fact would suggest that the fauna of the islands should, in the main, bear a strong tropical facies. The Amphipoda in this collection bear out that suggestion. I have in the following table indicated the known geographical distribution of all the species in the collection. It will be seen at once that six of them have a wide distribution in the tropical and sub-tropical waters of the Indian and Western Pacific Oceans, ranging from South and East Africa to the Oceanic Islands of the Pacific. Two other species, *Parharpinia villosa* and *Grubia setosa*, have so far only been met with in the waters round South and East Australia and New Zealand. Only one species, *Parawaldeckia kidderi*, seems to be a migrant from the Southern waters of the Antarctic sub-Polar seas.

Of the Isopoda, two species are described as new, but all three species in this collection belong to the Sphæromidæ, a family of Isopoda characteristic of the warmer waters of the globe.

| | South Africa. | East Africa. Red Sea. | Indian Ocean, Ceylon, Seychelles, Maldives. | Tropical Australia, Torres Straits, etc. | Australia and Tasmania. | Tropical and sub-tropical Isles of Pacific. | New Zealand. | Sub-Antarctic Isles of New Zealand. | Other localities. |
|---|-----------------------------------|---------------------------------|---|--|---|--|----------------------------|-------------------------------------|-------------------|
| <i>Parawaldeckia kidderi</i> | .. | .. | .. | × | × | × | × | × | Kerguelen. |
| <i>Parharpinia villosa</i> | .. | .. | .. | .. | × | .. | × | .. | .. |
| <i>Leucothoë spinicarpa</i> | × | × | × | × | × | .. | .. | .. | .. |
| <i>Ceradocus rubromaculatus</i> | × | × | × | × | × | × | × | .. | .. |
| <i>Mæra tenella</i> | .. | .. | × | .. | .. | × | .. | .. | .. |
| <i>Mæra mastersii</i> | × | × | .. | × | × | × | × | .. | .. |
| <i>Elasmopus subcarinatus</i> | × | .. | × | .. | × | .. | × | .. | .. |
| <i>Eurystheus atlanticus</i> | × | .. | × | .. | × | .. | .. | .. | Cape Verde. |
| <i>Grubia setosa</i> | .. | .. | .. | .. | × | .. | .. | .. | .. |
| | Stebbing, 1908. Barnard, 1916. | Walker, 1909. Barnard, 1916. | Walker, 1904, 1905, 1909. | Miëns, 1884. | Stebbing, 1910. Haswell, 1880. Chilton, 1916. | Chevreux, 1908. Chilton, 1910. Dana, 1852. | Chilton, 1916. Thomson. | Chilton, 1909. | |

AMPHIPODA.

Family LYSIANASSIDÆ.

Genus PARAWALDECKIA, *Stebbing*.

1. PARAWALDECKIA KIDDERI (*S. I. Smith*). (Pl. 1. figs. 1-6.)

Nannonyx kidderi, Chilton, 1909, p. 615.

Parawaldeckia Thomsoni, Stebbing, 1910 (1), p. 571.

Locality. Dredge off Wallaby Group, one male and two females, 6-7 mm.

Distribution. Kerguelen (Smith), Torres Straits (Miers), Tasmania (Thomson), New Zealand (Thomson), Campbell Islands and Auckland Islands (Chilton), Kermadec Islands (Chilton).

Remarks. The difficulties which present themselves to the student of Amphipoda in attempting to identify isolated specimens from remote localities are nowhere more abundantly illustrated than by a reference to the history of this species, as detailed by Chilton in the paper quoted above. It had been referred to three different genera and been described under at least five and probably as many as eight different specific names. Its adventurous career was even then not at an end, for in the next year Stebbing, who had not been able to consult Chilton's paper before his own went to press, proposed a new genus, *Parawaldeckia*, for the reception of *Nannonyx thomsoni*, one of the many synonyms of this species. It seems that at last the species has a permanent abiding place of its own.

I believe my specimens to belong to the species as described by Chilton. They agree closely with his description except in one point. The adult male presents the usual sexual differences in the third uropods exhibited by so many Lysianassidæ, in having the rami of these appendages enlarged and fringed with plumose setæ. Chilton says that in the male the third uropods are the same as in the female. I give a figure of the telson of one of my specimens, showing it to be slightly excavated but not distinctly cleft. Each lobe of the apex is armed with two short spines, and there are two delicate plumose setæ on each lateral margin. In this respect my specimens are in substantial agreement with Chilton's descriptions. The outer plate of the maxilliped is broadly rounded and unarmed, the inner plate truncate and armed with three blunt teeth.

The genus *Parawaldeckia* is characterised by the possession of accessory lobes to the branchial vesicles and by having the last joint of the peduncle of the second antenna of the male dilated and moderately long, the remaining joints being small. It is very closely allied to *Waldeckia*, and differs only in having the telson slightly excavated, whereas in *Waldeckia* it is deeply cleft. My specimens agree with the definition of the genus *Parawaldeckia* in these points. There can be no question as to its relationship to *Waldeckia*, for a

comparison of the figures of some of the appendages given herewith with those published by Chevreux and Walker for *Waldeckia* will show the closest agreement in general form, especially in the first and second gnathopods.

Family PHOXOCEPHALIDÆ.

Genus PARHARPINIA, *Stebbing*.

2. PARHARPINIA VILLOSA (*Haswell*). (Pl. 1. figs. 7-14.)

Phoxus villosus, Haswell, 1880 (1), p. 258, pl. ix. fig. 2.

Parharpinia villosa, Stebbing, 1906, p. 147.

Locality. Sandy Island, Wallaby Group, one female with incubatory lamellæ, 6 mm.

Distribution. Coasts of Australia (*Haswell*) and New Zealand (*Thomson*).

Remarks. In comparing this specimen with *Stebbing's* description, it is found to differ in the following points:—

| | | Stebbing. | Present specimen. |
|----|--|--|--|
| 1. | Antenna 1. Flagellum. Accessory App. | 13 joints. 10 joints. | 10 joints. 7 joints. |
| 2. | Antenna 2. Flagellum. | 17 joints. | 11 joints. |
| 3. | Outer plate of Maxillipeds. | Extend to more than half-way along the long second joint of the palp, and are fringed with a dozen graduated spines serrate on both edges. | Barely extend beyond the first joint of the palp and have only eight serrate spines. |
| 4. | Gnathopod 2. | Fifth joint about as long as the sixth. | Fifth joint much shorter than the sixth. |
| 5. | Peræopods 1 & 2. | Apical spine of the fifth joint nearly as long as the sixth joint. | Apical spine of the fifth joint half as long as the sixth joint. |
| 6. | Peræopod 3. | Fifth joint scarcely longer than the sixth. | Sixth joint longer than the fifth. |
| 7. | Peræopod 5. | Second joint not produced to end of fourth. | Second joint produced to end of fourth. |
| 8. | Uropod 2. | Peduncle fringed with ten outstanding spines. | Peduncle with only eight spines. |

The most important of these differences are numbers 3 and 4. The length of the outer plate of the maxillipeds is one of the characters used by *Stebbing* to separate the genera *Parharpinia* and *Pontharpinia*. In the former it is described as elongate and fringed with serrate spines on the inner margins. In the latter it is simply described as short. In my specimen, the maxillipeds do not appear to differ markedly from those of the genus *Pontharpinia*, except that the spines on the inner margin of the

outer plate are serrate on both margins, a feature not, so far as I aware, described in *Pontharpinia*.

I am quite unable to understand Stebbing's description of the second gnathopod unless, indeed, by some chance the descriptions of gnathopods 1 and 2 have become inadvertently transposed in his diagnosis. As will be seen from the figures of these appendages given here, the fifth joint is decidedly larger in gnathopod 1 than in gnathopod 2, and with this supposition, Stebbing's description of the gnathopods would apply to my specimen.

Stebbing's description is based on specimens from New Zealand recorded by Thomson (1882) as *Phoxus batei*, Haswell. Stebbing identifies Thomson's specimens with *Phoxus villosus*, Haswell, and refers Haswell's *P. batei* to *Pontharpinia rostrata* (Dana). On comparing my specimen with Thomson's description and figures, I find the most complete agreement except that the carpus of the second gnathopods is distinctly shorter than Thomson shows. Thomson does not describe or figure the fourth peræopods.

My specimen differs from Haswell's original description in the larger size of the eyes, in the fewer joints in the accessory appendage of antenna 1, and in the shape of the second joint of the fifth peræopods. In the characters of the eyes and the fifth peræopods it agrees with Haswell's description of *Phoxus batei*, and as the latter is said by Haswell to differ from *P. villosus* in the larger size of the eyes and the form of the fifth peræopods, it looks as if my specimen really belonged to *Phoxus batei*, Haswell = *Pontharpinia rostrata* (Dana). But the long and slender form of the fourth peræopods agrees much more with those figured by Haswell for *P. villosus*.

The genera *Pontharpinia* and *Parharpinia* are distinguished, according to the definitions of these genera given by Stebbing in 'Das Tierreich,' by the following characters:—

- (1) In *Pontharpinia* the third joint of the mandibular palp is shorter than the second. In *Parharpinia* the third joint is longer than the second.
- (2) In *Pontharpinia* the outer plates of the maxillipeds are short. In *Parharpinia* they are elongate and fringed with serrate spines on the inner margins.
- (3) In *Pontharpinia* the fourth and fifth joints of the third and fourth peræopods are expanded. In *Parharpinia* they are not expanded.
- (4) In *Pontharpinia* the expanded second joint of the fifth peræopods is greatly produced, while in *Parharpinia* it is only moderately produced.

These differences appear to me of doubtful value. My specimen is a *Parharpinia* in the characters of the mandibular palp and the form of the third and fourth peræopods, and a *Pontharpinia* in the characters of the maxillipeds and of the fifth peræopod.

On the whole, my specimen agrees most closely with those described by Thomson as *Phoxus batei*. As these specimens formed the basis of Stebbing's description of *P. villosa*, Haswell, and were those upon which Stebbing founded the genus *Parharpinia*, I here record the present specimen as *Parharpinia villosa* (Haswell), with an expression of doubt as to the separate identity of the genera *Parharpinia* and *Pontharpinia*.

My specimen differs from *Pontharpinia uncinata*, Chevreux, in the evenly rounded epimeral plate of the third segment of the pleon, from *P. stimpsonii*, Stebbing, in the shorter and evenly rounded rostrum, and from *P. pinguis* (Haswell) in the less robust peræopods. I should have been quite content to record my specimen as *Pontharpinia rostrata* (Dana) except for the longer and more slender fourth peræopods. In Dana's figure the eyes are larger and more rounded in form and the rostrum shorter than in my specimen, but these differences disappear in the light of Haswell's description of *Phoxus batei*, which Stebbing regards as synonymous with *P. rostrata*.

A redescription of Australian and New Zealand species is a necessity before they can be placed on a sound basis, and it is to be hoped that this will be attempted by some one on the spot who has access to material.

Family LEUCOTHOIDÆ.

Genus LEUCOTHOË, *Leach*.

3. LEUCOTHOË SPINICARPA (*Abildgaard*).

L. spinicarpa, Chilton, 1912 (2), p. 478.

" " Barnard, 1916, p. 148.

Localities. Wooded Island, Easter Group, two specimens. Sandy Island, Wallaby Group, five specimens.

Distribution. Cosmopolitan.

Remarks. The two papers quoted above give the full synonymy of this species and full notes on its known distribution.

Family GAMMARIDÆ.

Genus CERADOCUS, *A. Costa*.

4. CERADOCUS RUBROMACULATUS (*Stimpson*). (Pl. 1. figs. 15, 16.)

C. rubromaculatus, Stebbing, 1906, p. 430 (synonymy).

" " Walker, 1904, p. 272; 1905, p. 927; and 1909, p. 334.

" " Chevreux, 1907, p. 479.

" " Stebbing, 1908 (1), p. 81; 1908 (2), p. 456; 1910 (1), p. 598.

" " Chilton, 1916, p. 369.

Locality. Sandy Island, Wallaby Group, one female, 10 mm., and one male and two females, 6 mm.

Distribution. Ceylon, the Maldives and Laccadives, and the coast of Africa (Walker); South Africa (Stebbing); Australia and Tasmania (Haswell & Stebbing); New Zealand (Chilton); French Oceania (Chevreux).

Remarks. From the published descriptions and figures, this species would appear to be subject to great variation in the antennæ, antennules, first and second gnathopods, fifth peræopods, and in the size and extent of the serrations on the margins of the pleon and its epimeral plates.

These facts have led me to ascribe all the four specimens in this collection to the same species, notwithstanding the differences and the extraordinary dimorphism in the second gnathopods of the only male specimen.

In the large female specimen, 10 mm. in length, the dorsal surface of the pleon is microscopically shagreened. The teeth on the posterior margins of the first three segments are longer and coarser than in the smaller specimens, and there is a seta alternating with every tooth. The epimeral plate of the first pleon segment has two teeth on the lower border and eight on the hinder border, or ten teeth in all. The second pleon segment has five teeth on the margins of the epimeral plate, and the third segment fourteen teeth. It is not easy to decide where the lower and hinder margins meet. The antennal peduncle is equal in length to the antennular. The accessory flagellum of the antennule has seven joints and the main flagellum twenty-five. The flagellum of the antenna has fourteen joints. The hinder lower corner of the second joint of the fourth and fifth peræopods is prolonged into a spine, as figured by Chevreux (1907) for specimens from French Oceania.

In the smaller specimens the teeth on the dorsal border of the first three pleon segments are shorter and finer than in the larger specimen. The epimeral plates of the first two segments of the pleon have one or two teeth on the lower border but none on the hinder. The third segment of the pleon has six teeth on the hinder border and two on the lower border of the epimeral plate. The flagellum of the first antenna has seven joints and the accessory appendage four joints. The flagellum of the second antenna has from 15–21 joints. The hinder lower corner of the second joint of the fourth and fifth peræopods is much less produced than in the large specimen, and is more like the typical form.

The male specimen presents a striking dimorphism in the second gnathopods. The right one is of the normal type, the palm rather oblique and furnished with two flat-topped teeth. It is not so robust as in the specimens figured by Chevreux from French Oceania, and the palm is more oblique and not transverse. But Chilton describes specimens from New Zealand which appear to agree with mine. The second gnathopod on the left side is quite different. The propodus is larger and more robust, the palm very oblique with no prominent tooth marking its edge, but with a very strong obtuse

tooth near the base of the nail. The whole limb recalls to some extent that found among the males of the genus *Elasmopus*, though it is not setose at all. Stebbing, in the 'Challenger' Report and in recording this species from South Africa, notes the dissimilarity between the right and left second gnathopods in some of his specimens; but the dissimilarity usually takes the form of one of the gnathopods being of the female type and the other of the male. No such striking instance as the present one has been noticed before.

With regard to the serrations on the epimeral plates of the first three segments of the pleon, the typical form has one or two serrations on the lower margin in all three segments, but only the third segment is serrated on the hind margin. Chevreux describes serrations on both lower and hinder margins of the epimeral plates of the second and third pleon segments in specimens from French Oceania. Haswell says of Australian specimens "lateral plates (epimera) of the three anterior segments of the pleon serrated posteriorly," while in *Mæra spinosa*, now regarded as a synonym of *C. rubromaculata*, he gives only the third segment with serrations on the posterior margin of the lateral plate. There is thus abundant evidence of variation in this character. I may note that, in all my specimens, the first joint of the mandibular palp has a spiniform process on its inner corner as described by Walker (1904) and Chevreux (1907).

Genus MÆRA, Leach.

5. MÆRA TENELLA (*Dana*).

Gammarus tenellus, Dana, 1852, p. 952, pl. 65. fig. 7.

Mæra tenella, Walker, 1904, p. 272, pl. 5. fig. 31.

M. tenella, Stebbing, 1906, p. 438.

Locality. Wooded Island, Easter Group, one male, 5 mm.

Remarks. The single specimen agrees closely with the description and figures of a specimen from Ceylon referred to Dana's species by Walker. The only noteworthy point of difference is that the dactylus of the second gnathopods in the male has a well-marked tooth about the centre of its inner margin, which fits into a corresponding excavation on the palm. The serrate hind margin of the third segment of the pleon and the slightly different form of the second gnathopods of the male seem to distinguish this species from *M. viridis*, Haswell, to which it is otherwise very closely allied; in fact, this species seems to me to afford an additional argument in support of Chilton's contention that Haswell's species belongs to the genus *Mæra*, and not to *Elasmopus* to which Stebbing would refer it.

Distribution. Fiji (*Dana*); Ceylon (*Walker*).

6. *MÆRA MASTERSII* (*Haswell*).

Megamæra mastersii, Haswell, 1880 (1), p. 265, pl. 11. fig. 1.

M. thompsoni, Miers, 1884, p. 318, pl. 34. fig. B.

Mæra mastersii, Stebbing, 1906, p. 439.

„ „ Chevreux, 1907, p. 481.

„ „ Stebbing, 1910 (1), p. 642.

„ „ Chilton, 1911, p. 564.

„ „ Barnard, 1916, p. 195.

„ „ Chilton, 1913, p. 367.

Locality. Sandy Island, Wallaby Group, one male, 5 mm.

Distribution. Port Jackson, Australia (Haswell); several localities in the Torres Strait (Miers); Gambier Archipelago (Chevreux); Kermadec Islands (Chilton); Mozambique (Barnard); New Zealand (Thomson & Chilton).

Genus *ELASMOPUS*, *A. Costa*.7. *ELASMOPUS SUBCARINATUS* (*Haswell*).

Megamæra subcarinata, Haswell, 1880 (2), p. 335, pl. 21. fig. 4.

Elasmopus subcarinatus, Chilton, 1915, p. 321, figs. 1-6.

Locality. Dredged off Wallaby Group, one male, 6 mm.

Distribution. Shores of New Zealand, Australia, Ceylon, South Africa, and Indian Ocean.

Remarks. Chilton, in the paper quoted above, has given a full account and synonymy of this species and of its geographical distribution. The species is distinguished from its congeners by the two carinæ of the fourth segment of the pleon each ending in a prominent tooth. In this character my specimen agrees with the type, but it differs from typical specimens as described by Chilton in the following characters:—

- (1) In the first antennæ, which are much shorter than usual and have only fifteen joints in the flagellum. The accessory appendage is quite short and only has two joints. Walker recorded specimens from Ceylon in which the accessory appendage of the first antenna was only two-jointed.
- (2) In the hinder margin of the second joint of the last pair of peræopods, which is closely and coarsely pectinate as described for the species *E. pecteniscus*, Sp. Bate. Chilton says of all the peræopods that the “basal joint posterior margin simply serrate,” while Stebbing says that the margins are “strongly serrate.” But the condition in the present specimen agrees with Walker’s description in *E. serrula* (= *E. pecteniscus*): “the greater part of the hind margin elegantly cut into flat-topped

teeth of a peculiar form" (Walker, 1904). Barnard (1916), in describing *E. pecteniscrus*, Bate, from S. Africa, to which species he refers Walker's *E. serrula* as a synonym, figures the second joint of the fourth peræopod, showing a condition exactly similar to the second joint of the fifth peræopod in my specimen. I may note that on one side the hinder margin of the second joint of the fifth peræopod is concave and on the other convex or evenly curved. Barnard suggests that the concave margin is a condition of maturity. The fifth peræopods of my specimen are not so setose as is described by Chilton for New Zealand specimens. Having only one specimen, it is impossible to say whether these differences are constant and of specific value. The two dorsal carinæ of the fourth pleon segment exclude this specimen from all other described species, and in the character of the second gnathopods the specimen is a typical adult male of *E. subcarinata* as figured by Chilton. I prefer, therefore, to regard the specimen as at most an individual variation of this widely distributed species.

Family PHOTIDÆ.

Genus EURYSTHEUS, Bate.

8. EURYSTHEUS ATLANTICUS (*Stebbing*). (Pl. 1. figs. 17-20.)

Gammaropsis atlantica, Stebbing, 1888, p. 1101, pl. 114.

G. zeylanicus, Walker, 1904, p. 282, pl. 6. fig. 41.

G. gardineri, Walker, 1905, p. 929, pl. 88. figs. 11-14, 16-17.

Eurystheus atlanticus, Stebbing, 1906, p. 611.

E. atlanticus, Stebbing, 1908, p. 86 (1), pl. 40 B.

E. zeylanicus, Walker, 1909, p. 339.

E. atlanticus, Walker, 1909, p. 339.

„ „ Stebbing, 1910 (1), p. 614.

Locality. Dredged off Wallaby Group, one female with ova, 6 mm.; one adult male, 6 mm.; two young males, 4 and 4.5 mm.

Distribution. Cape Verde Islands (*Stebbing*), Ceylon, Maldivæ and Laccadive Archipelagoes, Seychelles (*Walker*), S. Africa (*Stebbing*), Australian coasts (*Stebbing*).

Remarks. These four specimens are all imperfect; only one, the larger of the immature males, has any of the antennæ still attached, and that only the peduncle with the accessory appendage on one side only. The accessory appendage is composed of four joints, three large ones and a small terminal one.

Only the two larger specimens have the lageniform eyes characteristic of the species. In the two smaller specimens the neck of the flask, so to speak, is wanting.

I have figured the distal joints of the second gnathopods of all four specimens. The second gnathopods of the female agree very fairly well with those figured for *E. afer* by Stebbing (1888), for *E. zeylanicus* by Walker (1904), and for *E. gardineri* by Walker (1905). Those of the smaller immature male resemble the figures given by Stebbing for the type-specimen (a female) from Cape Verde (1888, pl. 114, gn. 2) of *E. atlanticus*, by Walker for the young male of *E. zeylanicus* (1904, pl. 6, fig. 41, gn. 2, ♂ jr.), and by Walker for the young male of *E. gardineri* (1905, pl. 88, fig. 14).

The second gnathopods of the larger of the immature males agree closely with those figured for the adult male of *E. zeylanicus* by Walker (1904, pl. 6, fig. 41, gn. 2, ♂), and is not unlike the figures given by Stebbing for the adult male of *E. atlanticus* (1908 (1), pl. 40 B). Stebbing's specimen had, however, lageniform eyes.

The second gnathopods of the adult male are not quite like those figured for any of the species of *Eurystheus*, but seem to be the adult condition of the immature males in this collection. I feel convinced that the four specimens here dealt with belong to one species. They were all collected at the same time in the same place, and appear to me to represent the adult female and three stages of growth in the male. From this it follows that the lageniform shape of the eyes is an adult character only, or, alternatively, a character which varies greatly. I feel sure, too, that my specimens belong to the same species as *E. zeylanicus*, Walker, and *E. gardineri*, Walker. Neither of these species has lageniform eyes, but judging from my specimens, most of Walker's specimens were immature. Walker himself in 1909 united these two species, and in a footnote to the same paper expresses the opinion that both are synonymous with *E. atlanticus*, Stebbing. In accepting that verdict, it is necessary to point out that the type of *E. atlanticus* is a female which has the lageniform eyes of the adult and second gnathopods of the form ascribed here to an immature male with oval eyes. Both Chilton 1912 (2) and Barnard (1916) have suggested the possibility of *E. atlanticus* being the same as *E. afer* (Stebbing), and support is given to that idea by the close resemblance of the second gnathopods of the adult female in the present collection to those figured by Stebbing for *E. afer*, female. But the latter species has long oval eyes, not lageniform in shape. Chilton's specimens, identified with doubt as *E. afer*, seem to have gnathopods altogether longer and more slender than in the present specimens.

It will be seen that there has been considerable difficulty in arriving at a conclusion with regard to the identity of these specimens. I can best sum up the evidence yielded by them, by saying that they are certainly the same as *E. zeylanicus* and *E. gardineri* of Walker, and that I accept his opinion that these species are synonymous with *E. atlanticus*, Stebbing, a widely distributed and apparently very variable species.

Family AMPHITHOIDÆ.

Genus GRUBIA, *Czerniavsky*.9. GRUBIA SETOSA (*Haswell*). (Pl. 2. figs. 21-24.)

Amphithoë setosa, Haswell, 1880 (1), p. 270.

Grubia setosa, Stebbing, 1906, p. 644.

Localities. Four males and four females, up to 15 mm. in length, from Sandy Island, Wooded Island, and Pigeon Island. (Shore collecting in each case.)

Distribution. Sidney Harbour and Botany Bay, New South Wales (Haswell & Chilton).

Remarks. Haswell's original description is short and unaccompanied by figures, but the present specimens are in agreement with it. Chilton, who examined specimens from Sydney Harbour which he referred to this species, stated that the first antenna possessed a small accessory appendage. The present specimens, or at least such of them as still retain the first antenna, possess a small two-jointed accessory flagellum on that appendage, barely longer than the first joint of the main flagellum. The species is therefore a true *Grubia*, in which genus Stebbing has already placed it.

The species is mainly distinguished by the form of the first and second gnathopods in both sexes, and especially by those of the male. I figure these appendages herewith. They are similar in the male and female, but in the former they are more massive and are densely fringed with long, delicate, plumose setæ, especially on the second, carpal, and propodal joints. The palmar margin is undefined in the first gnathopod, but in the second it is bounded by a rather prominent tooth, on the inside margin of which is a strong spine. In the second gnathopod of the male the limiting tooth is stronger, and immediately inside it on the palm is a small excavation into which the nail fits. The nail in both gnathopods is provided with a closely-set row of blunt spines on the inside margin. The figures will serve to show the general form of these limbs and the proportions of the joints.

For the rest, the species has no very marked characters. The first antennæ are almost as long as the whole animal, the third joint of the peduncle about $\frac{1}{4}$ – $\frac{1}{3}$ as long as the second, and the flagellum composed of about 50 joints. The second antennæ are $\frac{2}{3}$ as long as the first. The fourth joint of the peduncle reaches to the distal end of the second joint of the peduncle of the first antennæ. The fifth joint equals the fourth in length, and the flagellum has 35 joints. The lower margin of the peduncle is beset with long plumose hairs, particularly in the male. The inner lobe of the first maxilla bears six or seven fine plumose setæ. The third uropods have the peduncle much larger than the rami, with a row of seven short, blunt spines on the dorsal apical margin. The inner ramus bears one spine and a number of setæ

at its apex. The outer ramus bears two recurved hooks of equal size and a short, blunt spine near the proximal end of the dorsal surface. In the light of Chevreux's description of *G. brevidactyla* and of the present species, Stebbing's diagnosis of the genus *Grubia* in 'Das Tierreich' will require emendation in the following points:—antenna 1 has a short accessory flagellum of one or two joints, and maxilla 1 the inner plate with a few small lateral setæ.

The present species is distinguished by the form of the first and second legs and, possibly also, by the structure of the third uropods.

ISOPODA.

Tribe **FLABELLIFERA.**

Family SPHÆROMIDÆ.

Group HEMIBRANCHIATA.

Genus *CILICÆOPSIS*, *Hansen.*

CILICÆOPSIS DAKINI, sp. n. (Pl. 2. figs. 25–29; Pl. 3. fig. 34.)

Locality. Woody Island, Easter Group, one adult male, 13 mm. long, 9 mm. broad.

Description. The single specimen of this new species, a male, measures 13 mm. in length and 9 mm. in breadth, and is thus one and a half times as long as broad. The body is strongly convex in dorsal view and without granulations or tubercles. The posterior margins of all the thoracic somites, the lateral margins of the body, the uropods, and the abdomen are fringed with short, thick hairs, the general appearance of which can be seen from Pl. 3. fig. 34. Similar hairs are scattered over the dorsal surface of the abdomen, especially on the two large bosses. The distinguishing features of the species are to be found in the abdomen and uropods. The abdomen shows three proximal segments separated off from the large terminal telsonic somite; the sutures separating the first two abdominal somites not complete in the mid-dorsal line. The posterior margin of the third abdominal somite is considerably and broadly produced in the mid-dorsal line, but does not form a process of any kind. The terminal abdominal somite bears two relatively enormous mammiform bosses. The posterior margin is evenly rounded, and shows the merest trace of a median process separated by shallow notches from the rest of the margin. The uropods consist of a massive basal joint and a long, narrow, terminal joint. The basal joint, I take it, represents the fused basipodite and endopodite, and the long terminal joint the exopod.

The figures which I give of the epistome, the antennule, antenna, second and eighth thoracic limbs will suffice to show the general features of these

appendages. The epistome is quite truncate anteriorly; the front margin fringed with short, thick hairs similar to those on the rest of the body. The second to the eighth thoracic limbs are bi-unguiculate and characterised by the development of strong spines on the inner margins of the merus, carpus, and propodus.

The pleopods are of the typical hemibranchiate type. The exopod of the third, fourth, and fifth pairs is two-jointed. In the third pair the margins of the endopod and the distal joint of the exopod are fringed with plumose setæ. In the fourth and fifth pairs there are no plumose setæ, but the outer margins of both branches of the fifth pleopods possess a fringe of simple short hairs. The appendix masculina on the second pleopods is longer than the branches, with the terminal portion narrower than the rest and slightly hooked.

This species differs from the definition of the genus *Cilicæopsis* given by Hansen (1905) in possessing a vestige of a mesial lobe on the posterior margin of the last abdominal somite, and from the type-species *C. granulata* (Whitelegge) and its ally, *C. whiteleggei* (Stebbing), in being without a long process from the median portion of the anterior part of the abdomen. In this latter character it agrees, however, with *Cilicæa stylijera*, Whitelegge, and *C. ornata*, Whitelegge, which Hansen refers tentatively to the genus *Cilicæopsis*. It may be noted that both the last-named species show a further resemblance to *C. dakini* in having the posterior margin of the third abdominal somite produced in the mid-dorsal line.

I know of no species of the group Cymodocini with which the present species can be confused in the form and structure of the abdomen, and I have pleasure in associating it with the name of its discoverer.

Genus CYMODOCE, *Leach*.

CYMODOCE MAMMIFERA, *Haswell* (?). (Pl. 3. fig. 35.)

C. mammifera, *Haswell*, 1880 (4), p. 474, pl. 18. fig. 1, 1*v*.

Locality. Off Wallaby Islands, dredging, two specimens, 12 mm.

Remarks. It is with some doubt that I refer these two specimens to *Haswell's* species, but they agree completely with his short description and figures. Of the two specimens, one is apparently an immature male in so far as it has a pair of penial filaments on the sternum of the last thoracic somite, but no appendix masculina on the second pleopods. The other is a female. The species is a typical hemibranchiate spheromid in the structure of the pleopods, and would seem to fall into the genus *Cymodoce* by the well-developed mesial lobe in the abdominal notch, by the absence of a mesial process on the abdomen of the male, and by the well-developed endopod of

the uropods. The body in both sexes is smooth, except for a sparse coating of short fine hairs on the sides of the thorax and on the abdomen and the uropods. There are no granulations or small tubercles. In the male, the abdomen of which I have figured, the posterior margin of the fourth abdominal somite, which is completely separated from the terminal part of the abdomen, is produced into two small tubercles, one on each side of the middle line. The terminal part of the abdomen has two large mammiform bosses on the dorsal surface separated by a shallow depression, each with a small tubercle on the highest part of the boss. The posterior margin of the abdomen is tridentate, a large mesial lobe separated by notches from a small lateral lobe on each side. The large median lobe is very much bigger than the lateral lobes and almost masks them in dorsal view. The uropods are shorter than the median lobe of the abdominal notch, the endopod well-developed and as long as the exopod, with the apex truncate; the apex of the exopod is rather acute. The female differs from the male in being without the tubercles on the posterior margin of the fourth abdominal somite, and in having the bosses on the terminal portion of the abdomen less well-marked than in the male and without the tubercle on their highest parts.

Haswell's types were collected at Port Denison in Queensland, and the species does not appear to have been met with since. The species was omitted from Haswell's 'Catalogue of Australian Crustacea,' and has been lost sight of since the original description appeared in 1880.

CYMODOCE PELSARTI, sp. n. (Pl. 2. figs. 30-33; Pl. 3. fig. 36.)

Localities. Sandy Island, two males, 9-12 mm. Pigeon Island, one male, 8 mm.; one female, 6 mm.; and six juv.

Description of the Male. The sides of the thoracic somites and the whole of the abdomen and uropods are fringed with rather long hairs. Similar but much shorter hairs are sparsely scattered over the dorsal surface of the thorax. The thoracic somites have a double row of small round tubercles extending as a band right across the posterior portion. These tubercles are rather obscure on the anterior somites, but become successively more clearly marked on the posterior ones. They are more clearly defined in the larger specimens. The abdomen has an ornamentation of granules and tubercles, as shown in Pl. 3. fig. 36, which is taken from a male specimen, 9 mm. in length. The whole of the abdomen and dorsal surface of the uropods is finely granulose, and scattered among the small granulations are larger rounded tubercles and a few still larger and pointed tubercles. The posterior margin of the fourth abdominal somite, which is complete right across the dorsal surface, is produced into two prominent pointed tubercles, one on each side of the middle line. Each of these tubercles bears a clump of long hairs immediately in front. The remainder of the anterior portion of the abdomen

is covered with larger and smaller tubercles. The posterior part of the abdomen has, in the main, three large bosses—an anterior pair, one on each side of the middle line, and behind them a single median posterior boss. The anterior pair of bosses are somewhat elliptical in shape, and each bears a large, prominent, almost erect, conical spine with additional spines at its apex. Behind this prominent spine are four or five sharply-pointed tubercles, more prominent than the rest of the tubercles and granulations covering the surface. The posterior median boss is circular in outline, quite smooth and polished, and bearing a single almost erect stout conical spine. The posterior margin of the abdomen is tridentate; the median lobe rather longer than the lateral lobes, with the apex truncate and bearing two spine-like tubercles. The lateral lobes have their apex pointed and bearing a single spine-like tubercle. The uropods extend some way behind the posterior margin of the abdomen; their dorsal surface is covered with fine granulations, with here and there a larger and more prominent tubercle. The inner branch is longer and stouter than the outer; its apex obtusely rounded, with a spine-like tubercle at its tip. The outer branch is more pointed than the inner, and has a similar spiniform tubercle at the apex. The mouth-parts and thoracic appendages present no special features, and the figures which I give of the peduncles of the antennules and antennæ, second and eighth thoracic limbs will serve to show the general structure of these appendages. The second to the eighth thoracic limbs are stout and bi-unguiculate, with an armature of strong spines on the inner margin of the merus, carpus, and propodus.

The pleopods are typically hemibranchiate, with the exopods of the third, fourth, and fifth pairs two-jointed. The appendix masculina on the second pair of the male is nearly twice as long as the branches, narrowing to a finely-pointed apex, the distal portion curved slightly inwards.

The female differs from the male in having the body smooth, without tubercles and granules, and with the hairs on the thorax and abdomen very short and very much less numerous. The anterior part of the abdomen, *i. e.* the combined first four segments, has the general surface raised into two obscure bosses. The terminal portion of the abdomen has likewise two bosses, more clearly defined and separated medianly by a shallow groove. The posterior margin is tridentate; the median lobe somewhat larger than the lateral lobes, with its apex bluntly rounded.

Among all the described species of the genus *Cymodoce*, this species comes nearest to *C. pilosa*, M. Ed., and its allies *C. longistylis*, Miers, *C. bicarinata*, Stebbing, and *C. zanzibarensis*, Stebbing, but differs from all of these species by the large, conical, erect spine which crowns each of the three main bosses of the abdomen. I have associated the name of the discoverer of the Abrolhos group of islands with this pretty little species found there by Professor Dakin.

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EXPLANATION OF THE PLATES.

PLATE 1.

Parawaldeckia kidderi (S. I. Smith).

- Fig. 1. Telson, $\times 680$.
2. Peduncle of antenna of male, $\times 33$.
3. Second thoracic leg, $\times 33$.
4. Third „ „ $\times 33$.
5. Fifth „ „ $\times 33$.
6. Eighth „ „ $\times 33$.

Parharpinia villosa (Haswell).

- Fig. 7. Mandible, $\times 57$.
8. Maxilliped, $\times 57$.
9. Second thoracic leg, $\times 33$.
10. Third „ „ $\times 33$.
11. Fifth „ „ $\times 33$.
12. Sixth „ „ $\times 33$.
13. Seventh „ „ $\times 18$.
14. Eighth „ „ $\times 33$.

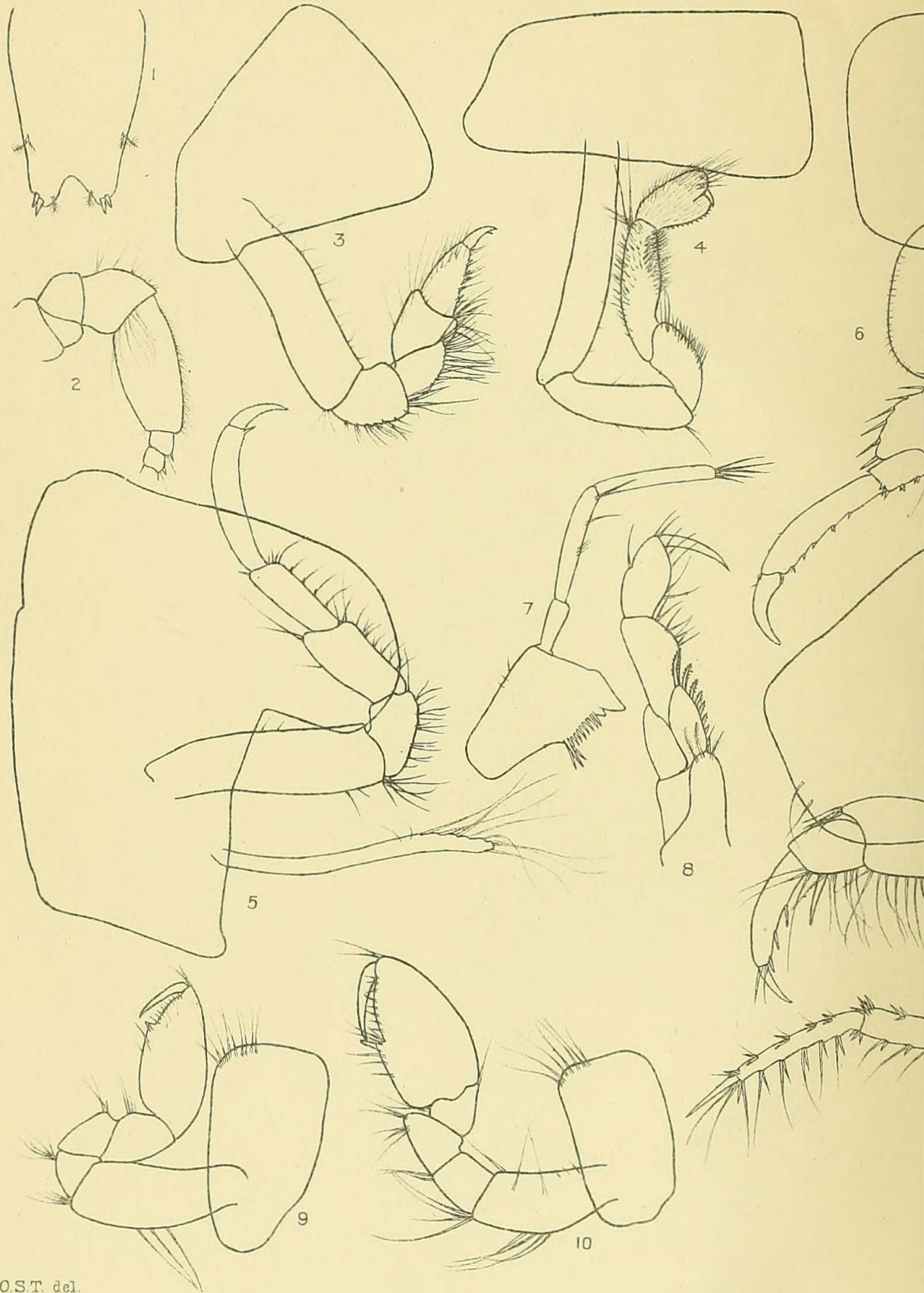
Ceradocus rubromaculatus (Stimpson).

- Fig. 15. Left third thoracic leg of male, 6 mm., $\times 33$.
16. Right „ „ „ same specimen, $\times 33$.

Eurystheus atlanticus (Stebbing).

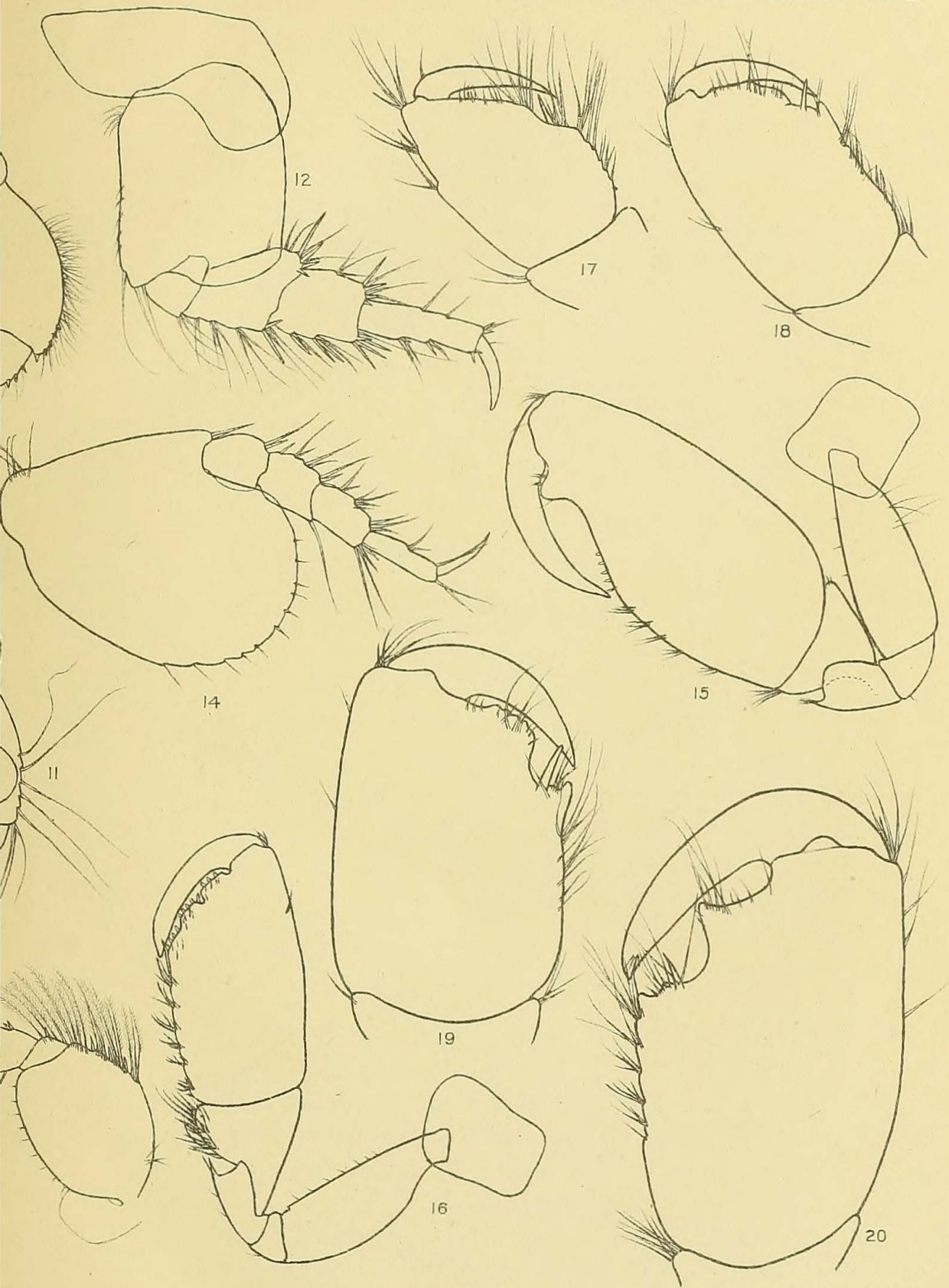
- Fig. 17. Hand of third thoracic limb of female with lageniform eye, $\times 460$.
18. Hand of third thoracic limb of young male with oval eye, $\times 460$.
19. Hand of third thoracic limb of young male with oval eye, $\times 460$.
20. Hand of third thoracic limb of adult male with lageniform eye, $\times 460$.

Tattersall.

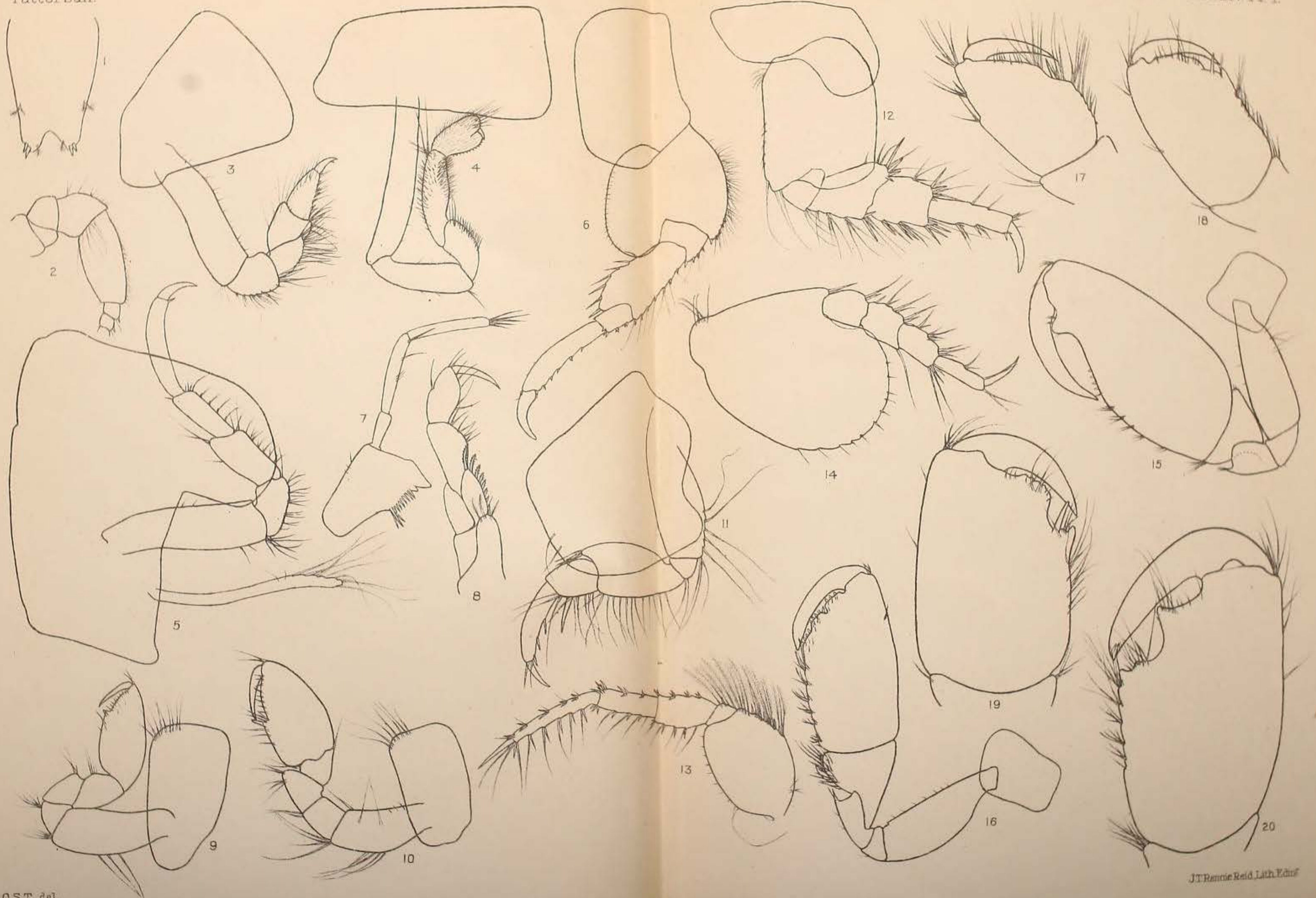


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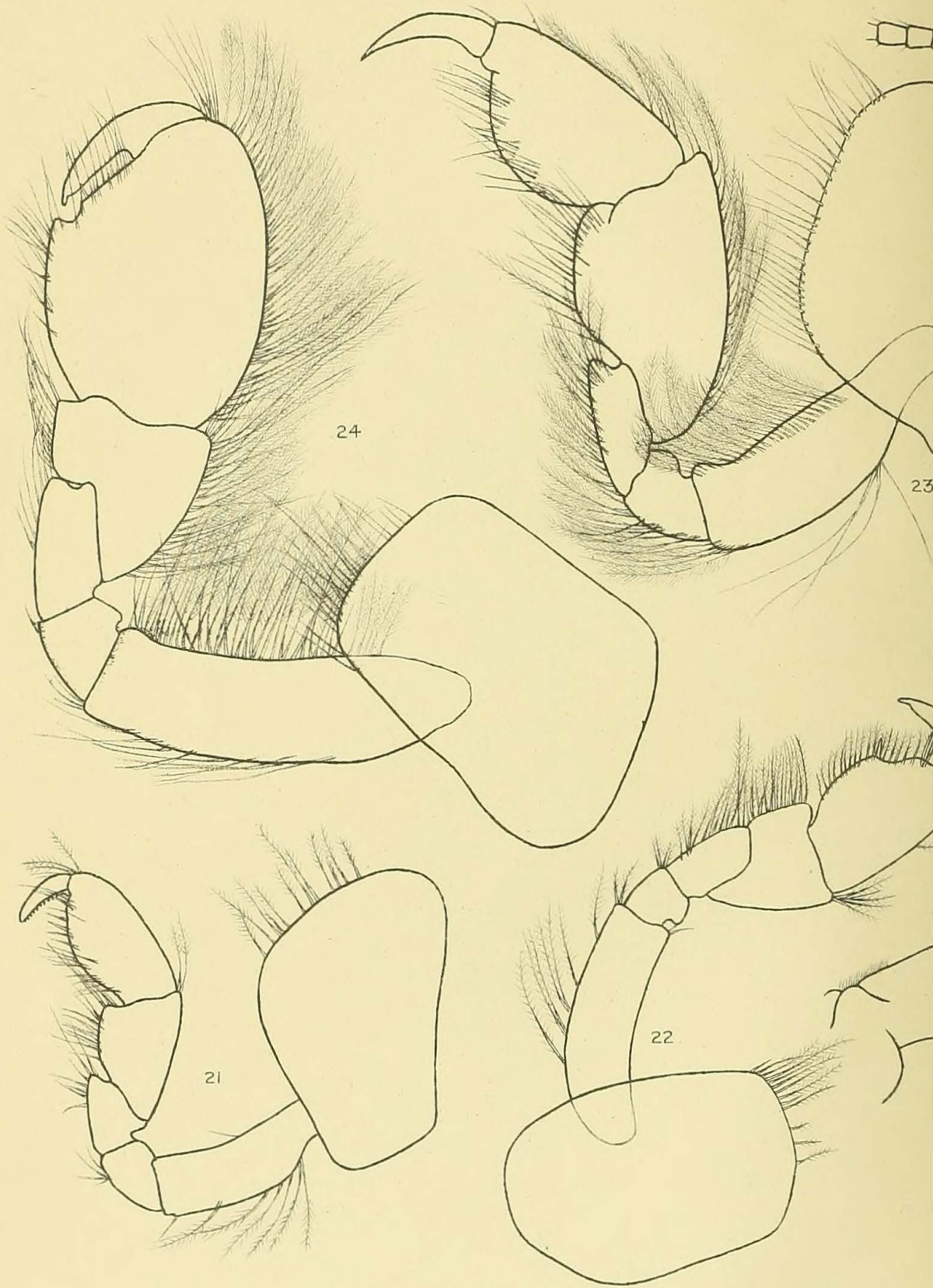


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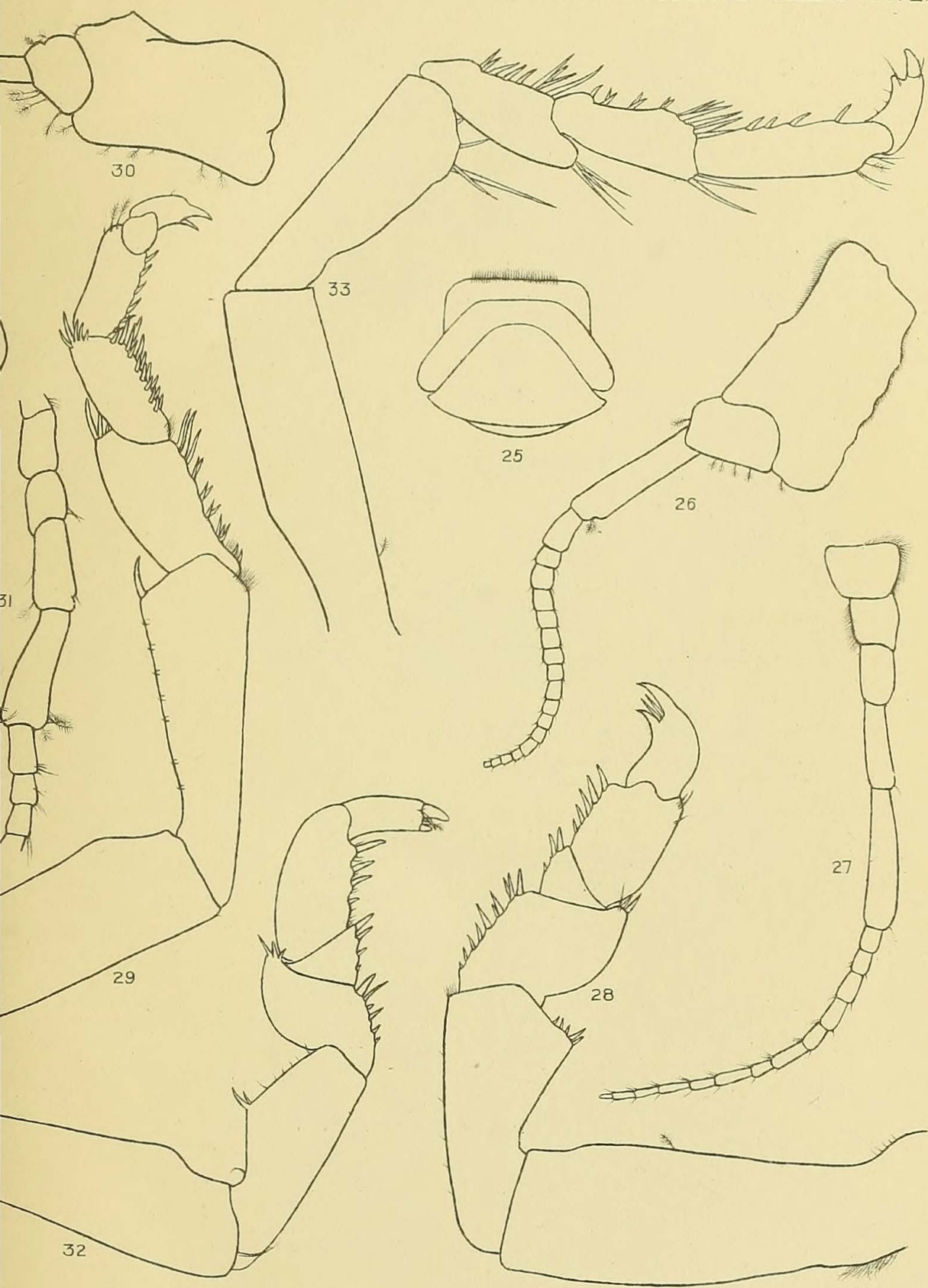
ABROLHOS AMPHIPODA AND ISOPODA.

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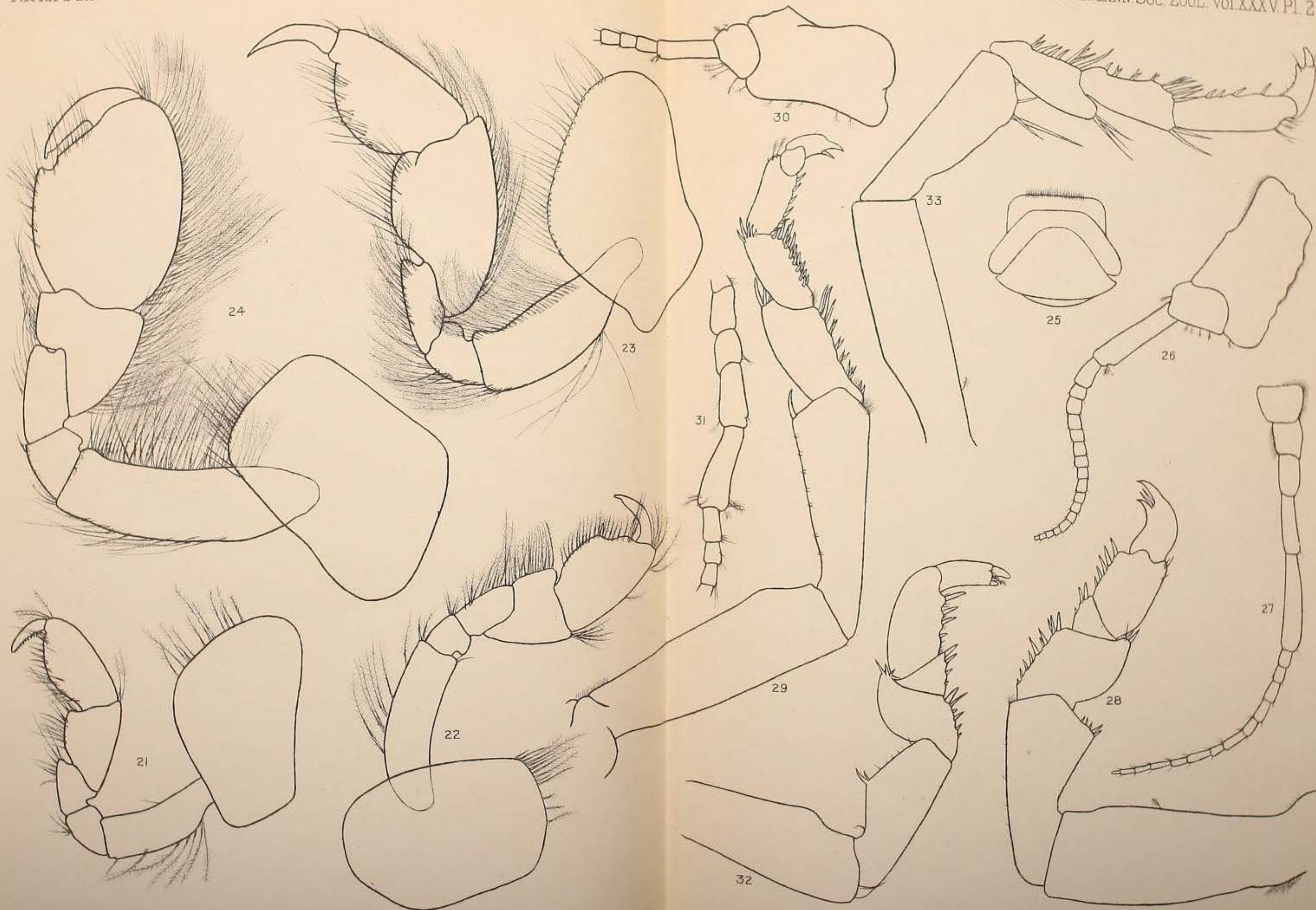
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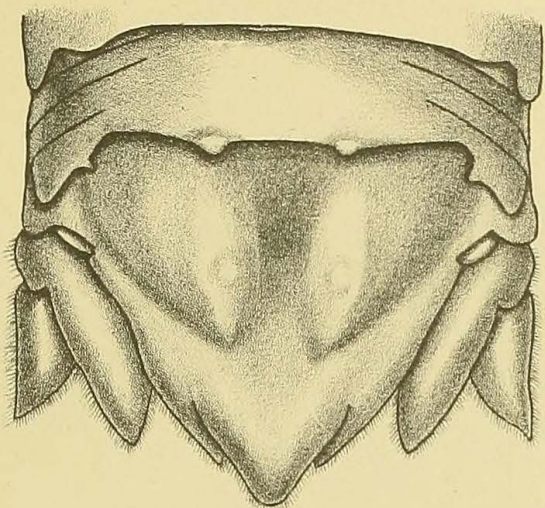
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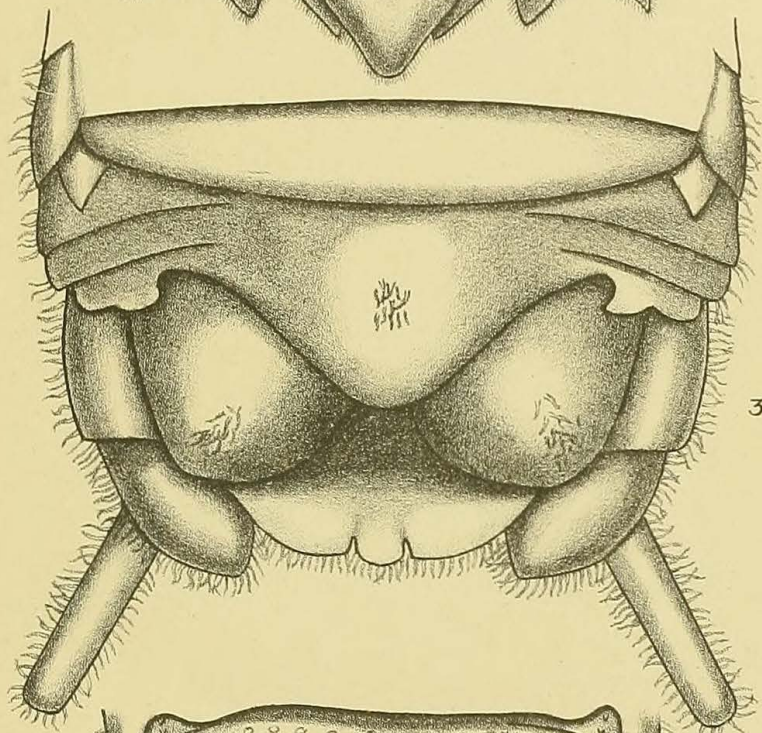
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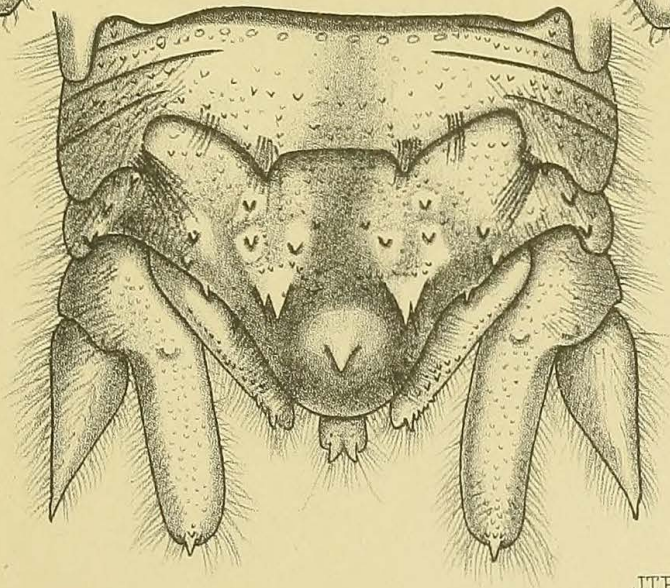
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ABROLHOS AMPHIPODA AND ISOPODA.

PLATE 2.

Grubia setosa (Haswell).

- Fig. 21. Second thoracic limb of female, $\times 22$.
 22. Third " " " $\times 22$.
 23. Second " " male, $\times 22$.
 24. Third " " " $\times 22$.

Cilicæopsis dakini, sp. n.

- Fig. 25. Epistome.
 26. Antennule of male, $\times 22$.
 27. Antenna " " $\times 22$.
 28. Second thoracic limb, $\times 22$.
 29. Eighth " " $\times 22$.

Cymodoce pelsarti, sp. n.

- Fig. 30. Antennule of male, $\times 33$.
 31. Antenna " " $\times 33$.
 32. Third thoracic limb, $\times 33$.
 33. Eighth " " $\times 33$.

PLATE 3.

- Fig. 34. *Cilicæopsis dakini*, sp. n., abdomen of male, $\times 10$.
 35. *Cymodoce mamnifera*, Haswell, abdomen of young male, $\times 11$.
 36. *Cymodoce pelsarti*, sp. n., abdomen of male, $\times 16$.

[I am greatly indebted to my wife for the drawings illustrating
 this report.]