

STUDIES ON INDIAN COPEPODS—16. ON SOME RARE AND INTERESTING COPEPODS FROM SOUTH EAST COAST OF INDIA*

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INTRODUCTION

DURING the period of a three year investigation at the Central Marine Fisheries Research Institute, Mandapam Camp on the copepod fauna of the surrounding Gulf of Mannar and Palk Bay, a total of one hundred and eighty-two species of copepods were gathered and identified. Out of these, twenty-three species were found to be new to science, and they have been described elsewhere (Ummerkutty, 1960, 1960a, 1960b, 1961, 1963, 1966, 1966a, 1966b). In the present communication brief notes are given on some rare and interesting copepods.

It is hardly necessary here to review the systematic accounts of the Indian marine copepods. Much work has been done in this direction and attention may be invited to the monographic treatments that have been published (Sewell, 1929, 1932, 1940, 1947, 1948, 1949, 1956). These publications not only serve more or less as summaries of the works that have so far been done in our waters but also provide extensive bibliographies. It, however, appears that we are far from having a full knowledge of the Indian marine copepods. This is amply proved by the fact that the present investigations have brought to light several species that have not so far been recorded from Indian waters and also many new species as noted earlier.

Copepods included in the present study are based on (a) regular surface tow-net collections made with organdie and bolting silk nets in the Gulf of Mannar in the early hours of the morning ; and (b) washings of weeds and invertebrates which are gathered from inshore waters as well as from dredgings made at 1-2 metre depth. Altogether 150 plankton samples collected from April 1959 to March 1961 were analysed. The shore collections were made chiefly from June 1960 to January 1961 both from the Gulf of Mannar and from Palk Bay. The methods of collection adopted are described in an earlier paper (Ummerkutty, 1961).

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GENERAL NOTES

***Eucalanus elongatus* (Dana)**

Vervoort, 1946, pp. 84-94.

Sewell, 1947, pp. 43-44.

(This is a common species and was obtained in the plankton on several occasions both from the Gulf of Mannar and Palk Bay.)

Vervoot (*loc. cit.*) does not recognise any difference between *E. elongatus* and *E. bunghee* Johnson. 'In my opinion Johnson's species certainly have no specific value. It seems best to distinguish between an Atlantic form with laterally produced thoracic margins, asymmetrical first antenna and slightly spinulated on the dorsal surface, and a Pacific form with smoothly rounded lateral thoracic margins, symmetrical first antenna and without any indication of spinules' (p. 93). This view has been supported by Sewell (1947) who thus remarked on the species he collected during the John Murray Expedition: 'All the specimens belonged to the variety first described by Giesbrecht (1895, p. 246) and later noted by Esterly (1905, p. 132) in which the lateral posterior margin of the fifth thoracic segment is rounded and does not exhibit the small spines of the typical form. Both of these records come from the Pacific Ocean and it would appear possible that this variety is in reality an Indo-Pacific form' (p. 44). The present material belongs to this Indo-Pacific group. Tanaka (1960) has, however, preferred to treat the two forms as distinct species.

***Pseudodiaptomus aurivilli* Cleve**

Cleve, 1901, pp. 48-50, pl. VI, figs. 11-22; pl. VII, figs. 1-2.

Fruchtl, 1924, pp. 51-53.

Sewell, 1932, pp. 122-23.

(This is a common species along the Indian coasts, particularly abundant in the Gulf of Mannar during December-February months).

There is some amount of uncertainty as to the distinction between *P. aurivilli* and *P. mertoni* Fruchtl. According to Fruchtl (*loc. cit.*) the spines guarding the genital apertures of female of *P. aurivilli* are borne on an elevation; these spines are held projecting in postero-ventral direction. In *P. mertoni* they are held almost parallel to the ventral margin of genital segment, and in effect are directed only backwards. The chief difference between the males of these two species, according to Sewell and Fruchtl, consists of the differential orientation of the constituting segments. Sewell (*loc. cit.*) has given the sketches of the male fifth legs of the two species. However, the orientation of constituting elements of these figures differs from that of the figure of male fifth legs of *P. aurivilli* as given by Thompson and Scott (1903). The present example agrees fully with the female of *P. aurivilli* as distinguished by Fruchtl, and the male fifth legs correspond more with the figures given by Thompson and Scott than with those given by Sewell for the two species. Kasturirangan (1963) has expressed the opinion that they are probably one and the same species and that we may have to drop the term *mertoni*, retaining *aurivilli* which is the older name; the present author is inclined to agree with this view.

A note may be added also on the genus *Pseudodiaptomus*. Marsh (1933) removed a number of species of this genus to an older genus *Schmackeria* Poppe and Richard. Johnson (1939) created a subgenus *Pseudodiaptallus* and stated that a subgeneric status will express its 'close relationship to the known *Pseudodiaptomus* species.' Sewell (1956), however, considered all these as three subgenera of Herrick's original genus *Pseudodiaptomus* (*s. lat.*). While *Pseudodiaptallus* Johnson is clearly defined by the segmentation of urosome and by the peculiarities noticed in some appendages, the distinctions between the females of the other two genera (or subgenera) are very ambiguous. According to Marsh (*loc. cit.*) the subgenus *Schmackeria* is characterised by the presence of a vestigial endopod in the form of a process or spine in both right and left legs of male and has the posterior corners of the prosome angular. It is doubtful whether the combination of these two characters could so much be insisted upon, for, there are some species such as *P. hickmani* Sewell, *P. ardjuna* Brehm and *P. nudus* Tanaka which cut right through the above two characters. The last named species is particularly notable in that the male fifth legs are remarkably close to those of *Schmackeria serricaudata* T. Scott, but unlike the latter, the posterior corners of prosome of *P. nudus* is distinctly angular. It is therefore, obvious that these two characters cannot be taken to separate the species of this group into two genera. If we are to depend on the character of the fifth legs, then little distinction can be made between the females of these two groups. Angular or obtuse nature of the posterior end of prosome is too insignificant to be taken as of generic value. Pending further studies, it is suggested that *Pseudodiaptomus* (*s. str.*), *Schmackeria* and *Pseudodiaptallus* may be recognised as three subgenera of the original genus *Pseudodiaptomus* (*s. lat.*).

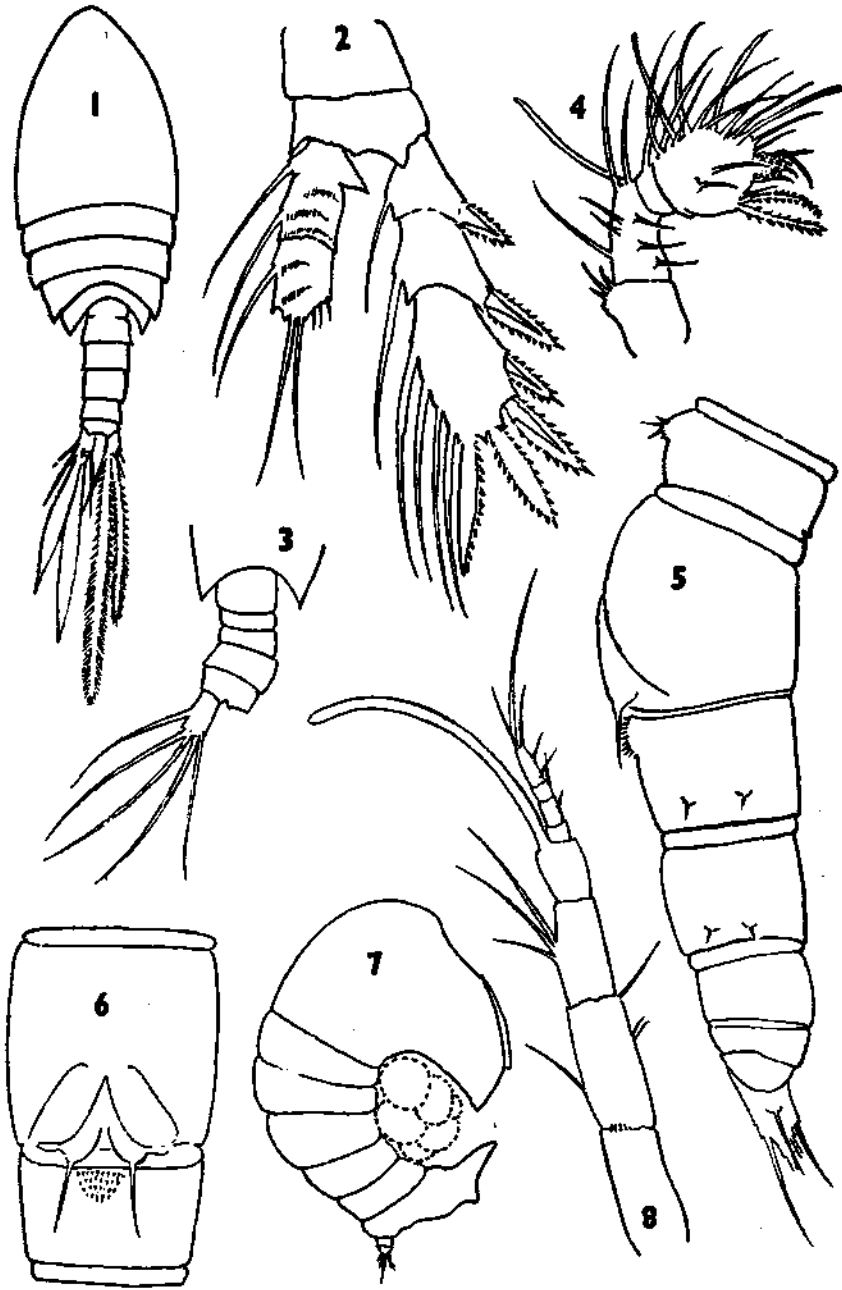
Pseudocyclops obtusus Brady and Robertson

Brady and Robertson, 1873, p. 128, pl. VIII, figs. 4-7.

Sewell, 1932, pp. 330-331, fig. 108.

(A few specimens of this species were obtained from weed washings of the Gulf of Mannar on 14th August, 1960).

Sewell (*loc. cit.*) has added a new variety, var. *latisetosus* besides the typical form of Brady and Robertson which may be termed var. *typica*. These two forms and a new variety are found in the present collections. The differences between these forms are mainly in the structure of the caudal setae. In var. *typica* caudal setae are of normal structure. In var. *latisetosus* second and third caudal setae from the inner side are thickened and flattened, and also the width is suddenly diminished half way along their lengths. Lateral margins of proximal portions of these setae are armed with numerous small spines. In var. *asymmetrica* (Fig. 1) the caudal setae of left and right sides are not similar. On right side they correspond exactly with what is described by Sewell of *latisetosus*. On the left side second and third setae from the inner side are highly flattened, are without spinules or setae on the margins and lack the constriction in the middle. Differences are also noticed in the structure of the fifth legs. The male fifth legs differ from those sketched by Sars for *typica* as well as from those sketched by Sewell for *latisetosus*. Sewell has not figured the female fifth legs for the latter, but has stated; 'The fifth pair of legs shows certain small differences of structure from that of the typical form but in the main character they agree with sufficient closeness to render it undesirable to create a new species for this form.' The fifth leg (Fig. 2) of var. *asymmetrica* differs



FIGS. 1-8.

1. *Pseudocyclops obtusus* var. *asymmetrica*, male dorsal view ; 2. Female, fifth leg ;
 3. *Calanopia thompsoni*, abnormal male urosome ; 4. *Canuella (Canuella) scotti*, male
 antennula ; 5. Male, urosome ; 6. Male, second and third urosomal segments ventral
 view ; 7. *Syngastes* sp., female lateral view ; 8. Female, antennule.

from that of var. *typica* in the following points : (a) in the complete separation of first and second segments of endopod ; (b) in the presence of a lateral projection on outer margin of basal segment ; (c) in having long, distinct setae on endopodal segments and (d) in having biarticulate setae on exopodal segments.

Calanopia thompsoni A. Scott

A. Scott, 1909, p. 178, pl. XLIXX, figs. 1-18.

Sewell, 1932, pp. 342-50, figs. 112-115.

An abnormal male specimen (Fig. 3) was obtained from plankton collected in the Gulf of Mannar on 24th December 1959. All appendages including the right geniculate antennule of this specimen are normally constructed, but urosome is quite abnormal. Here the five segments are clearly traceable, but the orientation and size are curiously distorted. The live animal moved freely without showing any signs of disorder. 'It is not difficult to find representatives of a single species with a short abdomen showing a telescoped condition of the abdominal segments, and more or less normal specimens where the abdominal segments have the position they apparently had in the living state.' (Vervoort, 1946)

Canuella (Canuella) scotti Sewell

Sewell, 1949, p. 136, fig. 2 A-H.

(Forty female and five male specimens of this species were captured from the washings of the callianassid crustacean, *Upogebia darwini*. The latter were collected by breaking large submerged coral stones which harbour them in their numerous holes and which were collected from the Palk Bay on 21st November 1960).

The female has been thoroughly described by A. Scott (*loc. cit.*) and Sewell (*loc. cit.*). However, the following structural peculiarities may be noted : (i) First post-genital segment carries a pair of dorsolateral spines which are set in small pits, symmetrically arranged near the posterior margin of the segments. (ii) Innermost apical caudal seta is much produced in the proximal half. This has been sketched by A. Scott, but not mentioned in his text, as probably he confused his material with the closely related *C. curticauda* Thompson and Scott. In fact A. Scott described this species under the name *C. curticauda* Thompson and Scott but Sewell pointed out that there are differences existing between *C. curticauda* and the species described by A. Scott from the Malay Archipelago and named the latter *C. scotti*. (iv) The copepod is slightly larger than that recorded by earlier workers, the length exclusive of the caudal setae being 1.3 mm.

A. Scott gives the size of the male as 0.94 mm. which is less than that of female. However, he did not describe the male. In the present case, difference in size between the two sexes is very negligible. Sexual dimorphism is expressed both in the antennule and in the urosome. Antennule (Fig. 4) is highly modified and segmentation is scarcely discernible. However, the posterior margin is constricted at five places, thus indicating six segments. The penultimate segment is developed into a highly chitinous, rather rectangular structure with a sharp angular corner at the

anterodistal angle. The distal half of antennule carries profuse number of setae and aesthetascs while proximal half carries only setae. Urosome (Fig. 5) is 6-segmented. First segment carries fifth legs which are very small, each consisting of only four setae borne on four elevated knobs. The genital segment (Fig. 6) carries the genital armature which is represented by a pair of lappets, terminating in strong, long spines. In the space between the lappets numerous smaller spines are present. In lateral view the lappets projecting downwards with a spine are directed backwards. There are four post-genital segments which diminish both in length and width posteriorly. Dorsal lateral spines are present in the case of first two post-genital segments and are comparable to those of female. Caudal rami are only a little longer than the last abdominal segment. Length excluding caudal setae : 1.28 mm.

Parapeltidium serratum (Thompson and Scott)

Thompson and Scott, 1903, p. 274, pl. XIII, figs. 18-22.

(A single specimen is captured from washings of weeds from Palk Bay of Mandapam on 8th July 1960).

This species is recognised by the serrate margins of all body segments except the first. The animal is extremely flat with dorsal median lines of all the proximal segments being slightly elevated to crescent-like structures. The ornamentation of first and last segments is quite complicated while that of the other segments is rather simple. The clear four-angled anterior region is also characteristic. Urosome is not visible in dorsal view, except for the rod-like caudal rami. Antennule, antennae, maxillae, maxilliped and first and fifth legs are figured by Thompson and Scott. Mandible, maxillule and four pairs of swimming legs are typical of the genus. Length excluding caudal setae : female, 1.6 mm.

Thompson and Scott (*loc. cit.*) assigned this species to *Peltidium*. Nicholls (1941) removed it to *Parapeltidium* because of the 1-segmented nature of the fifth legs.

Syngastes sp.

A single female specimen of this species occurred in the weed washings of Palk Bay on 6th June 1960. It is typically tegastid in shape (Fig. 7) with a highly thickened skeleton. In lateral view caudal ramus is lobular, carrying four setae. Antennule (Fig. 8) is 8-segmented, constituting segments having the following relative lengths :

1	2	3	4	5	6	7	8	
23.2	26.7	19.5	12.0	3.8	4.4	3.0	7.4	100

The aesthetasck on the fourth segment is about three-fourths as long as the entire appendage. Third and fourth segments are partly calcified. In antenna (Fig. 9) endopod is 2-segmented, the terminal segment bearing a claw and two setae. Exopod is 1-segmented, carrying three setae. Other oral appendages are typical of the genus. In first leg (Fig. 10) proximal protopod segment is short, less than half the length of second segment which carries a single seta in outer distal angle.

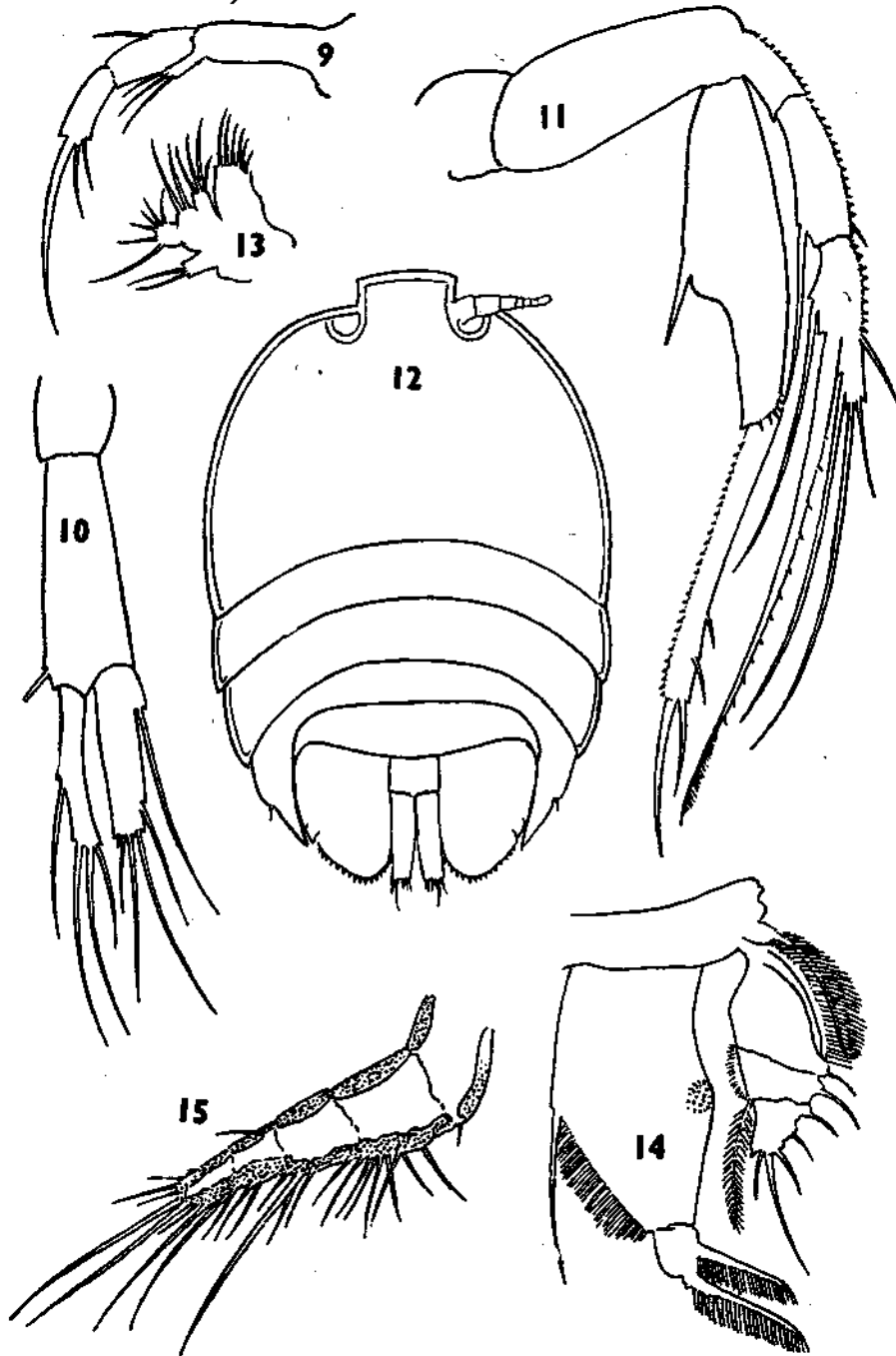
The two rami are subequal, outer ramus carrying four setae and the inner five. Second and third legs are normal, exopod being, 2-segmented and endopod 3-segmented in both cases. In fourth leg (Fig. 11) exopod is 3-segmented and endopod 2-segmented. The former is, however, just as long as the latter. The second seta on the inner margin of terminal exopod segment is modified into a large spine which is longer than the entire ramus. In endopod the two segments are subequal in length, the basal segment carrying one spine and distal segment four spines. Protopods of second, third and fourth legs are similar to those of first leg, but the second segment does not carry any seta. Size : 1.08 mm.

Sewell (*loc. cit.*) stated that the genus *Syngastes* contains eight species, divisible into three groups, depending upon the number of segments in the female antennule. The latter is 5-segmented in *S. macrogathus* Monard and *S. cornalinus* Monard. It is 6-segmented in *S. clausi* (Thompson), *S. imthurni* (Thompson and Scott) and *S. twynami* (Thompson and Scott). A 7-segmented antennule is found in *S. chalmersi* (Thompson and Scott), *S. donnani* (Thompson and Scott) and *S. indicus* Sewell. An unnamed species with 8-segmented antennule is reported by Krishnaswamy (1957) who obtained a single specimen of that species from the present geographical locality. The species dealt with in this paper agrees with his species in possessing an 8-segmented antennule, but is not referred to that species because of the following differences :

Present species	<i>Syngastes</i> sp. Krishnaswamy
Antennule carries the aesthetask on fifth segment.	Antennule carries the aesthetask on fourth segment.
Exopod of antenna 1-segmented.	Exopod of antenna 2-segmented.
Second segment of maxilliped long, bearing a group of long hairs near the proximal end.	Second segment of maxilliped short without hairs.
Rami are subequal in first leg.	Rami of first leg are very unequal.
Exopod is just half of endopod in fourth leg.	Fourth leg not described.
Size : 1.08 mm.	Size : 0.5 mm.

Porcellidium sp.

A single egg-carrying female specimen of this copepod is obtained from the weed washings of Gulf of Mannar on 14th December 1960. It differs from the known species of the genus in several details. The expansions of the genital segment are very large, foliaceous, reaching almost the tip of caudal rami. Posterior margin of the expansion is provided with fine bristles. A little proximal to this area several hairs are arranged in a radiating fashion. Caudal rami are thin and long, with flat posterior margins which bear each three long setae and a number of small setules. On the ventral face each ramus carries a solitary seta in the proximal region. The margins are highly calcified. Fifth legs are almost like those of *P. fimbriatum*, but its length in relation to the expansion of the genital segment is much



FIGS. 9-15.

9. *Syngastes* sp. female antenna ; 10. Female, first leg ; 11. Female, fourth leg ;
 12. *Porcellidium* sp., female antenna ; 13. Female, maxillule ; 14. Female, first leg ;
 15. Female, antennule.

less. The adult animal as well as various appendages are figured (Figs. 12-19). Length excluding caudal setae : 1.0 mm.

The specimen under study is very close to *P. fimbriatum* but chiefly differs in the size, in the structure of the caudal rami and in the shape of the expansions of genital segment. In some respects it also resembles *P. fulvus*, but differs in the proportionate length and breadth of the body.

Xouthous maldiviae Sewell

Sewell, 1940, pp. 198-200, fig. 30.

A single female specimen of this species captured from weed washings of the Gulf of Mannar on 18th December 1960. The general shape of the body agrees closely with that of other members of the genus being highly flattened and quite elongate and ovate with prosomal segments clearly demarcated from each other and without rostrum. Proportionate lengths of prosome and urosome are 65:35. Lateral margins of prosomal segments are smooth and entire from dorsal view. In ventral view, however, the margins carry a number of small spines. A little anterior to the posterior margins of prosomal segments rows of fine spinules are observed in lateral view. Antennule (Fig. 20) is 6-segmented, the segments having the following relative lengths :

1	2	3	4	5	6
22	24	18	16	12	8=100.

There is a fairly long aesthetask on fourth segment. All other appendages are exactly as described by Sewell. In the structure of the fifth leg the present species is much similar to *X. laticaudata* (Thompson and A. Scott) and *X. aemula* Thompson and Scott. Sewell has already pointed out that in both *X. laticaudata* and *X. aemula* the distal segment does not extend beyond distal margin of the proximal segment, but in the present form the margin of proximal segment lies at a level that is less than half the length of distal free segment. In this character it agrees with *X. purpurocinctus*, but in the latter a proximal segment is fringed with six setae and not with broad, flat spines, forming a pallsade, as it is in *X. maldiviae*. Length excluding caudal setae : female 0.6 mm. This is the first record of this species after its original description.

Lourinia armata (Claus)

Claus, 1866, p. 25, pl. 11, figs. 15-24.

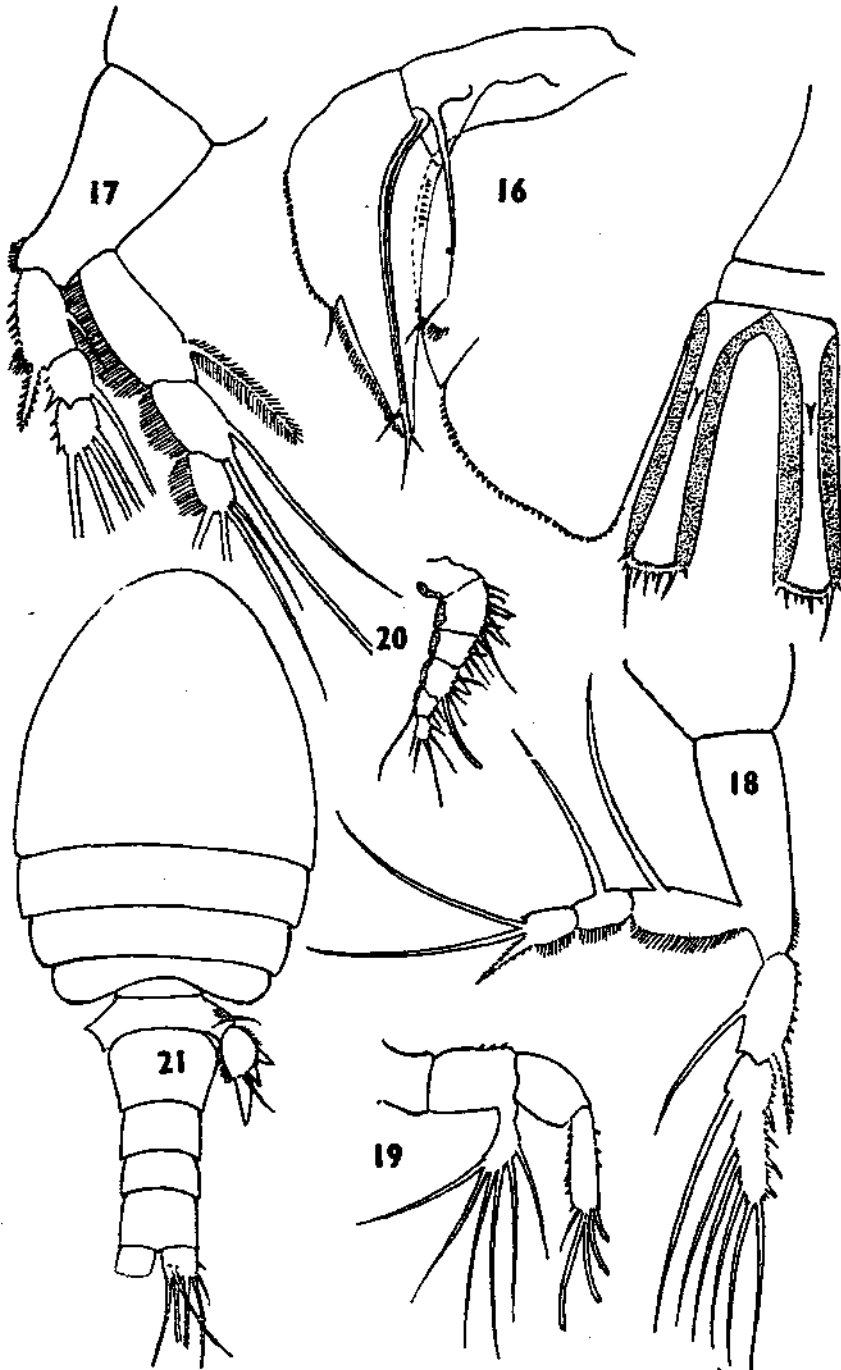
Thompson and Scott, 1903, p. 265, pl. VII, figs. 11-23.

Sewell, 1940, pp. 328-32, figs. 77-78.

Krishnaswamy, 1957, pp. 79-80.

(Several male and female specimens of this copepod were gathered from weed washings of the Gulf of Mannar on 8th June 1960).

This species was originally described by Claus (1866) under the name *Jurinia armata*. Thompson and Scott (1903) apparently unaware of Claus's paper created



FIGS. 16-21.

16. *Porcellidium* sp., female urosome with fifth legs; 17. Female, second leg; 18. Female, third leg; 19. Female, antenna; 20. *Xouthous maldiviae*, female antennule; 21. *Hemicyclops indicus*, female dorsal view.

Ceylonia aculeata for the same species. Wilson (1924) pointed out that both these generic names were preoccupied and proposed *Lourinia* and *Ceyloniella* respectively under the impression that they were different genera. Subsequent workers, however, showed that *Lourinia armata* and *Ceyloniella aculeata* are synonymous and the specific name should be *Ceyloniella armata* (Claus) as this genus has priority. 'Though *Ceyloniella* has distinct page priority over *Lourinia* the proper name, according to prevailing international rules of zoological nomenclature, is that used by the first reviser (i.e. Monard, 1927, p. 173) who used the name *Lourinia armata* (Claus, 1866).' Lang (1948) has distinctly established this, and Nicholls (in personal communication) agrees with this, quoting supports from Vervoort.

***Oithona plumifera* Baird**

Rosendorn, 1917, pp. 10-12, fig. 1 a-d.

Sewell, 1947, pp. 255-56.

(This species occurs in small numbers quite often in the plankton of the Gulf of Mannar.)

This species has been synonymised with *O. spirostris* and *O. atlantica* by Rosendorn (1917). Wilson (1932) and Sewell (1947) admit the synonymy of these two species, but consider *plumifera* as a separate species. Sewell (*loc. cit.*) pointed out that there are only three setae on the endopod of the mandibular palp of *O. plumifera* while four setae arise from that position in *O. spirostris* (= *O. atlantica*).

Farren (1913) pointed out that in some of his examples the plumose setae were not present on the posterior legs. He inferred that they would have been broken off; Sewell (*loc. cit.*) carefully examined several examples he obtained from the John Murray collections and found no sign of their being broken or of any feathering. 'It seems probable that the plumose termination is a variable character and may in some cases be wanting.' (Sewell, 1947, p. 255).

***Paralepeopsyllus mamarensis* Ummerkutty**

Ummerkutty, 1960, pp. 106-111, figs. 1-2.

(One male and two female specimens of this species are caught from sponge washings of the Gulf of Mannar on 18th December 1960).

Josef Eiselt (1959) has revived the family Entomolepidae which was almost buried in literature and has added a new species to this group. He divided the family into two subfamilies, Entomolepinae to include *Lepeopsyllus* Thompson and Scott and *Entomolepis* Brady, and Parmulodinae to include *Parmulodes* Wilson. The latter genus was incorrectly placed by its author under Clausidiidae.

Paralepeopsyllus belongs to the family Entomolepidae but it is difficult to assign it to any of the subfamilies proposed by Eiselt (*loc. cit.*). The present genus almost cuts across the two subfamilies and in some points differs from both, for instance, in such features as the unarticulate mandibular palp and the absence of fourth

and fifth legs. It appears best that we would not divide the family at the present state of our knowledge and would wait until more related forms are known.

Hemicyclops indicus Sewell

Sewell, 1949, pp. 69-72, fig. 16.

(Two female specimens of this copepod were obtained from washings of dredged weeds on 12th Nov. 1960 from the Gulf of Mannar).

This species is easily distinguished (Fig. 21) by the fact that the genital segment is very short with no clear demarcation between proximal and distal halves. Further, it has more compact body and is much smaller than *H. intermedius* and *H. australis*, two other species recorded from the present area. Sewell has given detailed account of both the male and the female. The ornamentation of the swimming legs is added here :

Protopod				Endopod						Exopod							
1		2		1		2		3		1		2		3			
si	se	si	se	si	se	si	se	si	st	se	si	se	si	se	si	st	se
1	0	1	1	1	0	1	0	4	I	I	0	I	1	I	4	I	III
1	0	0	1	1	0	2	0	3	I	I	0	I	1	I	5	I	III
1	0	0	1	1	0	2	0	2	II	II	0	I	1	I	5	I	III
1	0	0	1	1	0	2	0	1	I	III	0	I	1	I	5	I	II

Size : female 1-05 mm. Sewell recorded it from the Nicobar Islands. This is the first record of this species from outside of its type locality.

Hersiliodes latericia Canu

Bocquet and Stock, 1957a, pp. 215-218.

Bocquet *et al.* 1963, pp. 21-31, figs. 1-4.

Saraswathy, 1964, pp. 173-74, figs. 1-4.

A single female specimen was gathered from washings of mud-covered coral stones where polychaetes are found to inhabit. It is captured on 16th July 1960 from the Palk Bay off Mandapam. A single adult specimen of this species and several copepodites were recently collected from the Kerala coast by Saraswathy (*loc. cit.*). The present material corresponds in all details with the descriptions rendered by Bocquet *et al.* (*loc. cit.*). The present record indicates a possible wide distribution of the species along the Indian coasts.

Preherrmannella brevicauda Sewell

Sewell, 1949, pp. 82-85, fig. 19.

Six female specimens of this copepod were obtained from weed washings of the Gulf of Mannar on 12th September 1960. The species is easily identified by the very short caudal rami, the peculiar ornamentation of the swimming legs, the non-prehensibility of antenna and the angular nature of posterior margins of the body segments. The ornamentation of swimming legs is presented below :

Protopod				Endopod					Exopod								
1	2			1	2	3				1	2	3					
si	se	si	se	si	se	si	se	si	st	se	si	se	si	se	si	st	se
1	0	0	1	1	0	1	0	4	I	I	0	I	1	I	4	I	III
1	0	0	1	1	0	2	0	3	I	II	0	I	1	I	5	I	III
1	0	0	1	1	0	2	0	2	I	II	0	I	1	I	5	I	III
1	0	0	1	1	0	1	0	II	I	II	0	I	1	I	5	I	II

In fifth leg the proximal segment is produced into a downward projection which looks like a beak. Size : 0.91 mm. Sewell recorded it from Addu Atoll, Maldiva Archipelago. This is the first report of the species outside its type locality.

Preherrmannella serendibica Thompson and Scott

Thompson and Scott, 1903, pp. 1828-33, pl. XVII, fig. 11.

Two specimens of this copepod occurred in washings of weeds collected from the Gulf of Mannar on 12th September 1960. Only the antennule, the antenna and the dorsal habitat of the species have been sketched by Thompson and Scott. Mandible, maxillule, maxilla and maxilliped are highly reduced and correspond very much with those of the preceding species. It may be noted that unlike in that species antenna is prehensile and that the prehensibility is attained by the development of a strong spine on the penultimate segment of that appendage. The ornamentation of the swimming legs is exactly similar to that of the preceding species. Fifth leg is rectangular with two setae at the apex. Size : 1-20 mm. This is the first record of the species after its discovery. This species was removed to the genus *Preherrmannella* by Sewell (1949).

Pseudanthessius luculentus Humes & Cressey

Humes and Cressey, 1959, pp. 75-81, figs. 31-56.

Ummerkutty, 1961, pp. 443-47.

This species was described by Ummerkutty (*loc. cit.*) under the name *Pseudanthessius agillis*. Subsequently the author came across a paper by Humes and Cressey (*loc. cit.*) who had described it under the name *P. luculentus*. I have no doubt about their synonymy, but by the time I received the above cited paper by

Humes and Cressey, my account had already gone to the press. According to the rule of priority, this species should now be known as *Pseudanthessius luculentus* Humes and Cressey.

Lichomolgus gigas Thompson and Scott

Thompson and Scott, 1903, pp. 280-81, pl. XVI, figs. 21-26.

Five female specimens occurred in starfish washings of the Gulf of Mannar on 12th September 1960.

The oral appendages resemble the figures rendered by Thompson and Scott (*loc. cit.*). The proportionate lengths of the last two segments of antenna, however, are slightly different in the two examples. The length-width ratio of caudal ramus also varies slightly. The ornamentation of swimming legs is as follows :

Protopod				Endopod					Exopod								
1	2			1	2	3				1	2	3					
si	se	si	se	si	se	si	se	si	st	se	si	se	si	se	si	st	se
1	0	0	1	1	0	1	0	4	1	I	0	I	1	I	4	I	III
1	0	0	1	1	0	2	0	3	I	II	0	I	1	I	5	I	III
1	0	0	1	1	0	2	0	2	I	II	0	I	1	I	5	I	III
1	0	0	1	1	0	II	0	I	1	I	5	I	II

Fifth leg is rather slender and narrow with outer margin smooth and inner margin slightly swollen at base. There are two setae on apex of the distal segment ; the proximal segment is represented by a seta. Length excluding caudal setae : 1.5 mm. This is much smaller than the specimens obtained by Thompson and Scott who gave 2.0 mm. as its size. This is the first record of the species after its original description.

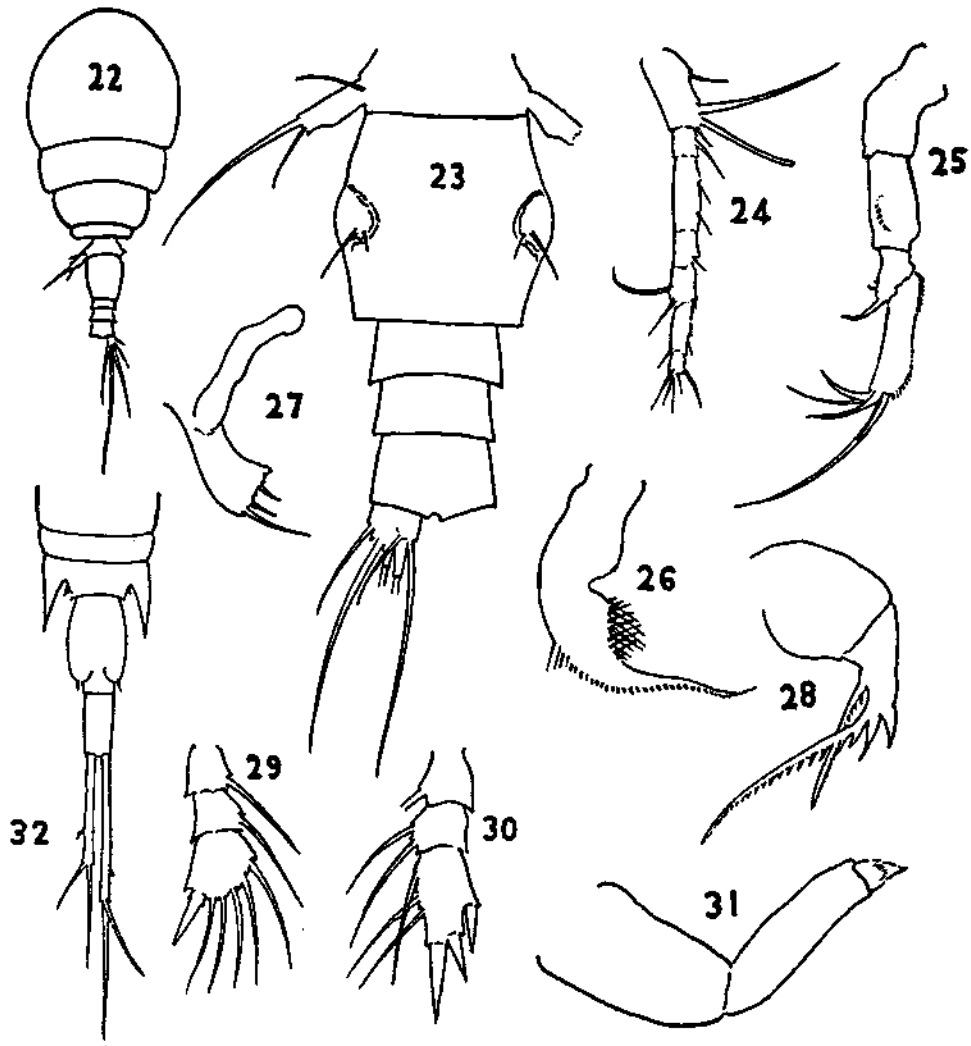
Lichomolgus sp.

A single female specimen of this copepod was obtained from weed washings of *Pentaceros hedemanni* (Lütken) on 12th September 1960, from the Gulf of Mannar. This specimen is distinct (Fig. 22) from all other species of *Lichomolgus* that have been described. Prosome is clearly oval and 4-segmented. In urosome (Fig. 23) there are five segments. The genital segment is quite large and is more or less hexagonal because of lateral bulging of that segment along the mid-transverse area. The genital apertures are present in this area and they are each guarded by a pair of small spines. Each caudal ramus is hardly as long as wide and bears six setae.

Antennule (Fig. 24) is 7-segmented, having the following relative lengths for their segments :

1	2	3	4	5	6	7
23.3	9.0	21.9	12.3	10.3	15.0	8.2=100

The very short second segment may particularly be noted. It is much shorter than half the length of either first or second segment. Antenna (Fig. 25) is 4-segmented, second segment being the largest and the third the shortest. Mandible (Fig. 26) maxillule (Fig. 27), maxilla (Fig. 28) and maxilliped (Fig. 31) are all distinctly deve-



FIGS. 22-32.

22. *Lichomolgus* sp., female, dorsal view; 23. urosome with fifth legs; 24. antennule; 25. antenna; 26. mandible; 27. maxillule; 28. maxilla; 29. first endopod; 30. third endopod; 31. maxilliped; 32. *Corycaeus speciosus*, posterior part of the abdomen of male.

loped. The peculiar basal chitinous ridge of maxillule and very minute terminal spine of maxilliped may be noted. The ornamentation of the swimming legs (Figs. 29-30) is presented below :

Protopod				Endopod						Exopod							
1		2		1		2		3		1		2		3			
si	se	si	se	se	si	se	si	si	st	se	si	se	si	se	si	st	se
1	0	0	1	1	0	1	0	5	I	0	0	I	1	I	4	I	III
1	0	0	1	1	0	2	0	3	I	1	0	I	1	I	5	I	III
1	0	0	1	1	0	2	0	2	I	II	0	I	1	I	5	I	III
1	0	0	1	1	0	1	I	I	II	III	0	I	1	I	5	I	III

The most important feature notable in the ornamentation is the presence of a seta on the inner side of proximal segment of fourth endopod. The rather stout nature of the constituting segments as well as the haired margins of all endopods are also notable. In fifth leg proximal segment is almost fused with the body and is indicated only by a single seta. The distal segment is rectangular with a single bulge on the posterior margin. It carries two terminal setae, one of which is much longer than the other. Size : 0.96 mm.

Remarks : The presence of a seta on inner distal angle of the proximal segment of fourth endopod, the very short second segment of antennule and the distinctness of mouth parts are the most salient features of this species. In the first character, it approaches the condition found in *Lichomolgus astropectinis* Humes and Cressey and related forms which are included by Bocquet and Stock under the subgenus *Stellicola* Kossman. However, the present material profoundly differs from this group in the structure of antennule and antenna, in these respects agreeing with more typical members of the genus. Like the members of the subgenus *Stellicola*, the present species is also found in association with the starfish. However, the availability of a single specimen has limitations on taking a decision regarding its true relationship.

Corycaeus (Corycaeus) speciosus (Dana)

M. Dahl, 1912, p. 13, pl. i, figs. 1-13 ; pl. ii, figs. 1-4.

A single abnormal male specimen of this species was obtained from plankton of the Gulf of Mannar on 30th July 1960. This specimen differs from the typical males in the asymmetry of caudal rami. The left ramus is distinctively shorter, having a 25 : 33 ratio with the right ramus. The specimen is illustrated (Fig. 32). The abnormality of the caudal rami has already been noticed in other species of this genus ; in such cases the left ramus is the longer.

SUMMARY

Brief notes are rendered on twenty rare and interesting copepods obtained from the Gulf of Mannar and Palk Bay around Mandapam. They belong to the

orders Calanoida (four species), Harpacticoida (six species) and Cyclopoida (ten species). Of these species, *Syngastes* sp., *Porcellidium* sp. and *Lichomolgus* sp. are described without assigning specific names to them for want of sufficient material.

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