

# A NEW SEMI-PARASITIC COPEPOD FROM AN ESTUARINE ACTINIARIAN OF MARDAS.

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Reporting on the structure, bionomics and systematic position of two halocamptid actiniarians found in the brackish waters of Adayar, Madras, Panikkar (1936) had noted the presence of a large number of copepods living in the gastral cavity of *Phytocoetopsis ramunni*. The present author is indebted to Mr. S. Krishnaswamy, M.Sc., of this department for finding a large number of these in the specimens stored in the laboratory. Later more were obtained by the author and the present paper is based on a study of nearly 32 males, 20 females and 10 immature forms of this lichomolgid cyclopoid. Since this was found to differ from the species described before, it is treated as a new species *Lichomolgus panikkari*, sp. nov. and a full description is given here.

## **Lichomolgus panikkari**, sp. nov.

### THE FEMALE.

*Size.*—Mature adults including egg-bearing forms varied from 2.7 mm. to 3.1 mm. with an average length of 2.9 mm., exclusive of caudal rami. Of the 12 species of this genus, this is probably the largest.

*Body.*—The form is typically cyclopoid with the first thoracic segment faintly demarcated from the cephalon. The cephalothorax is as broad, *if not slightly broader*, as long. The dorsal surface is convex with the edges curving ventrally and free of surface markings. The four free segments are of decreasing length and breadth. The genital segment which follows is far longer but resembles a truncated funnel in shape and is posteriorly half as wide as it is in front. The egg sacs were unequal in size in the five females which bore them. The eggs were few compared to the size of the sac and were found lumped together inside. The walls of the sacs were very thin and in some females the sac had evidently been torn away leaving the egg-mass clinging to the spines of the vestigial V or VI pairs of legs. The abdomen is of three segments of decreasing width and length. The caudal rami were longer than the last two abdominal segments put together but narrow, their width being less than a fifth of the length. Each ramus bears a long spine on the external margin, half way down the length and four spines on the apex.

*The appendages.*—The first antenna is of seven segments. If its total length is of 241 units, the different joints are of 40, 51, 26, 32, 42, 26, 24 units, the second joint being the longest. The spines borne were long and alike. The *second antenna* is four-articled. If the entire appendage is 155 units long, the joints are 60, 35, 20 and 40 units in length, the first being the longest. The first two joints bear a spine

each, the third bears two spines and the last bears six spines of which "one is stout and straight and another is stout and curved like a claw". The *labrum* is deeply cleft and covers the mandibles and the maxillae. The *mandible* is two-articled, the foliaceous distal joint having a long acuminate tip and margins fringed with spinules. It appears capable of being folded with the margins lying one over the other. The *first maxilla* also is two jointed. The distal ventrally directed joint bears two long spines while the proximal carries a long stout tapering lappet fringed with spines. The *second maxilla* is three jointed. The proximal segment is broad, while the terminal of the two tapering joints, ends in a long stout spine and a long lash on which the spines diminish in size towards the free tip. The *maxillipede* is of three stout tapering joints. The middle joint bears two branched spines, while the distal sharp-tipped joint carries two short tooth-like spines.

The first three pairs of swimming legs are similar and biramus, the rami being three-articled. The fourth swimming leg has a three jointed exopod and a two segmented endopod. On these four legs, typical plumose natatory setae are borne as follows:—

I Exopod-0, 1, 4; Endopod-1, 1, 4; II-0, 1, 5; 1, 2, 3. III-0, 1, 5; 1, 2, 2. IV-0, 0.5; 1, 3. The legs bear spines on the joints of their rami as follows:—I Exopod-1, 1, 4, Endopod 1, 1, 5. II-1, 0, 3; 1, 1, 5. III-1; 0, 2; 1, 1, 5. IV-1, 0, 2; 0, 4. These spines are either chitinous emergences or are stout long articulated spines which show traces of their setal character. The latter kind are of three different types, (a) sharp pointed spines with reduced hairs, (b) blunt, smooth spurs, (c) serrately-toothed spines. Three of the last type are found on the exopod of the first leg. The fifth leg is reduced to a single joint and is more lateral in its articulation to the fifth thoracic segment. At its base a small swelling bears a long spine while at the slightly tapered apex, there are two long spines. The proportion of the width to the length of the single joint forming the fifth leg measured in about eight specimens selected at random ranged from : 2.75 to 1 : 4, with an average of 1 : 3. There appears to be a certain amount of individual variation. The sixth leg is more vestigial than the fifth and is more easily seen on the sides of the genital segment of females which do not bear egg-sacs. It consists of two spines one far longer than the other springing from separate swollen bases.

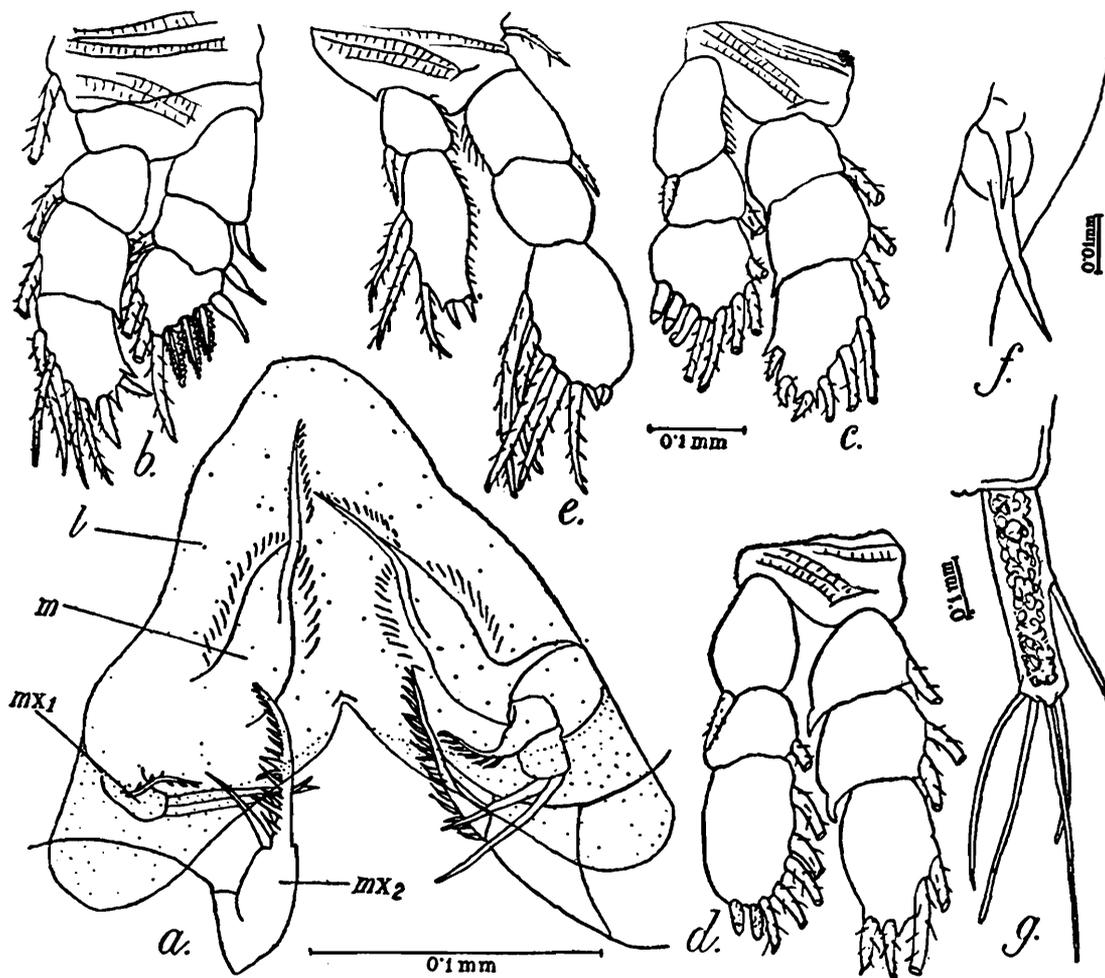
#### THE MALE.

*Size.*—Mature adults vary from 2.4 mm. to 2.8 mm. with an average length of 2.7 mm. exclusive of caudal rami.

*Body.*—The body appears more slender because of the cephalothorax, though slightly longer than in the female, is proportionately far narrower. In a male measuring 190 units long, the cephalothorax is 65 units long and 60 units broad while in a female 200 units long, it is 72 units long and 80 units broad; the free segments are therefore narrower than in the female. The genital segment however is broader than in the female and its lateral margins being markedly convex distinguishes the male.

The abdomen is of four segments, more or less equal in size. The caudal rami are as in the female.

*Appendages.*—The first and second pairs of antennae, the mandibles and the two pairs of maxillae are as in the female. The *maxillipede* however is characteristic. The distal of the three joints is long and narrow capable of folding against the second like a chela. This hand is grooved and the two edges though devoid of teeth are rough and suited for prehension. The first two joints bear two spines each, the claw bears three spines.



TEXT-FIG. 1. *Lichomolgus panikkuri*, sp. nov.; a, adult female  $\times 80$ ; b, First antenna  $\times 200$ ; c, Second antenna  $\times 200$ ; d, mandible  $\times 600$ ; e, First maxilla  $\times 600$ ; f, maxillipede  $\times 200$ ; g, fifth leg  $\times 400$ ; h, serrate spines of exopod of first leg  $\times 800$

The six pairs of thoracic legs are as in the female, the sixth being more conspicuous since the sides of the genital segment are convex in the male.

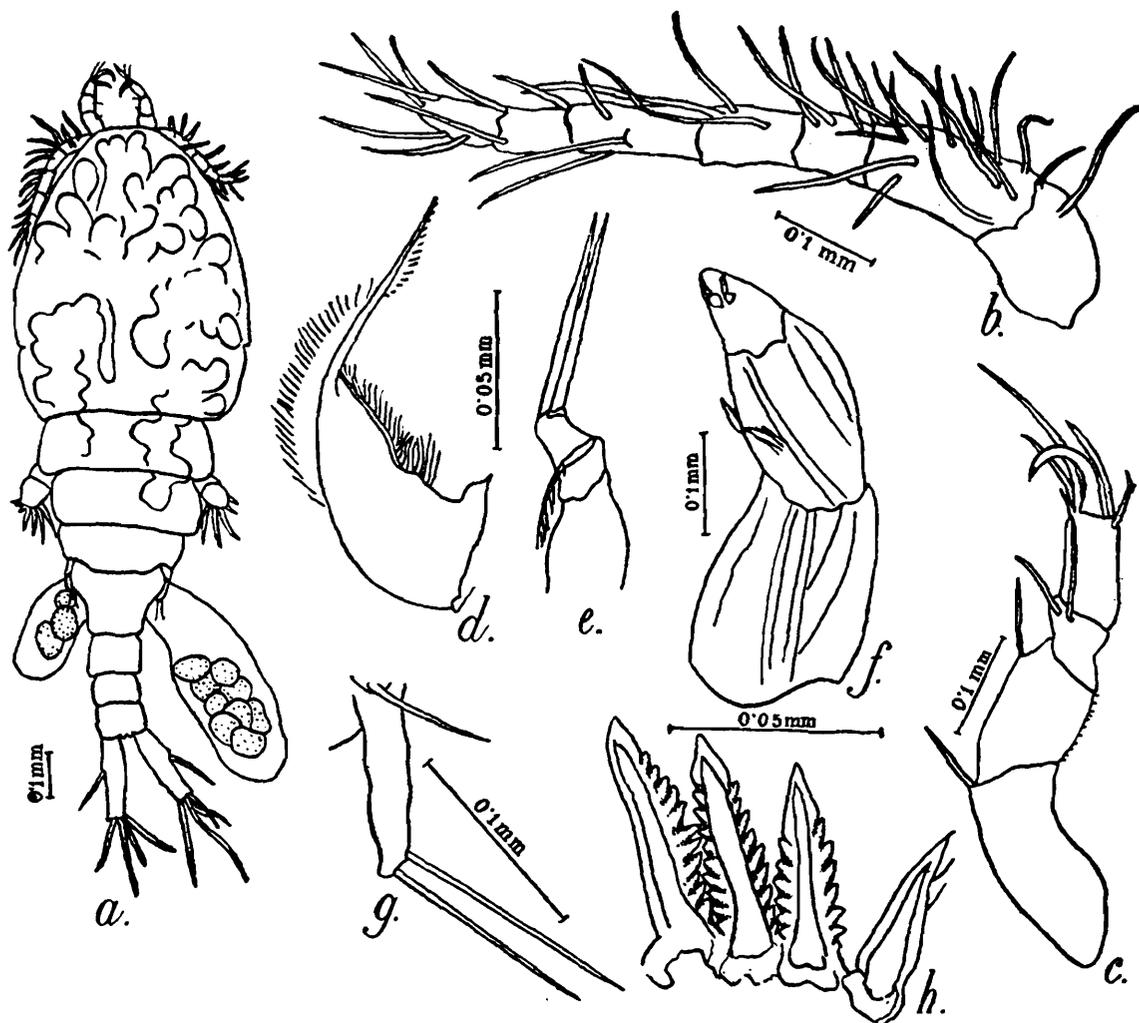
*The Immature forms.*—Of the ten collected, nine belonged to the fifth copepodid stage, four being males and five females, and the tenth belonged to the fourth copepodid stage.

The fifth copepodid ranged from 1.7 mm. to 2.5 mm. in length. The males had only three abdominal segments like all females, mature and immature, but the features of the adult male are already foreshadowed. In a male measuring 1.50 mm. long the cephalothorax is 50 units long but only 47 units broad, while in a female 1.75 mm. long, it is 55 units long and as broad, the female appearing broader than the

malc. The genital segment however appears broader in the male than in the female, as in the adult state. The maxillipede of the male shows a rudimentary claw like spine at its tip, though the form of the appendage and other spines are as in the female.

The fourth copepodid measured 1.5 mm. in length and did not show any indication of sex. There were only two abdominal segments so that there were eight segments in the whole body, including the cephalothorax. These eight segments had the following proportions of length and breadth. Cephalothorax 50, 53; free thoracic segments 10, 42; 12, 30; 8, 21; 6, 15; genital segments 8, 12; abdominal segments 6, 10, 7, 8 units. The caudal rami were proportionately shorter being about only thrice the width. If the lengths of the first antennae of the adult and of the fourth copepodid are adjusted to 100 units, the measurements of the seven joints would compare as follows:—

IV  $\frac{\text{Copepodid}}{\text{Adult.}}$   $\frac{14}{16.5}$ ,  $\frac{20}{21}$ ,  $\frac{7}{11}$ ,  $\frac{12}{13}$ ,  $\frac{20}{17.5}$ ,  $\frac{14.5}{11}$ ,  $\frac{12.5}{10}$ , Fewer setae were borne by the different segments in the larva, than in the adult. With regard to other appendages, which were similar to those of the adult, the absence of serration on all the spines of the exopod of the first leg may be noted.

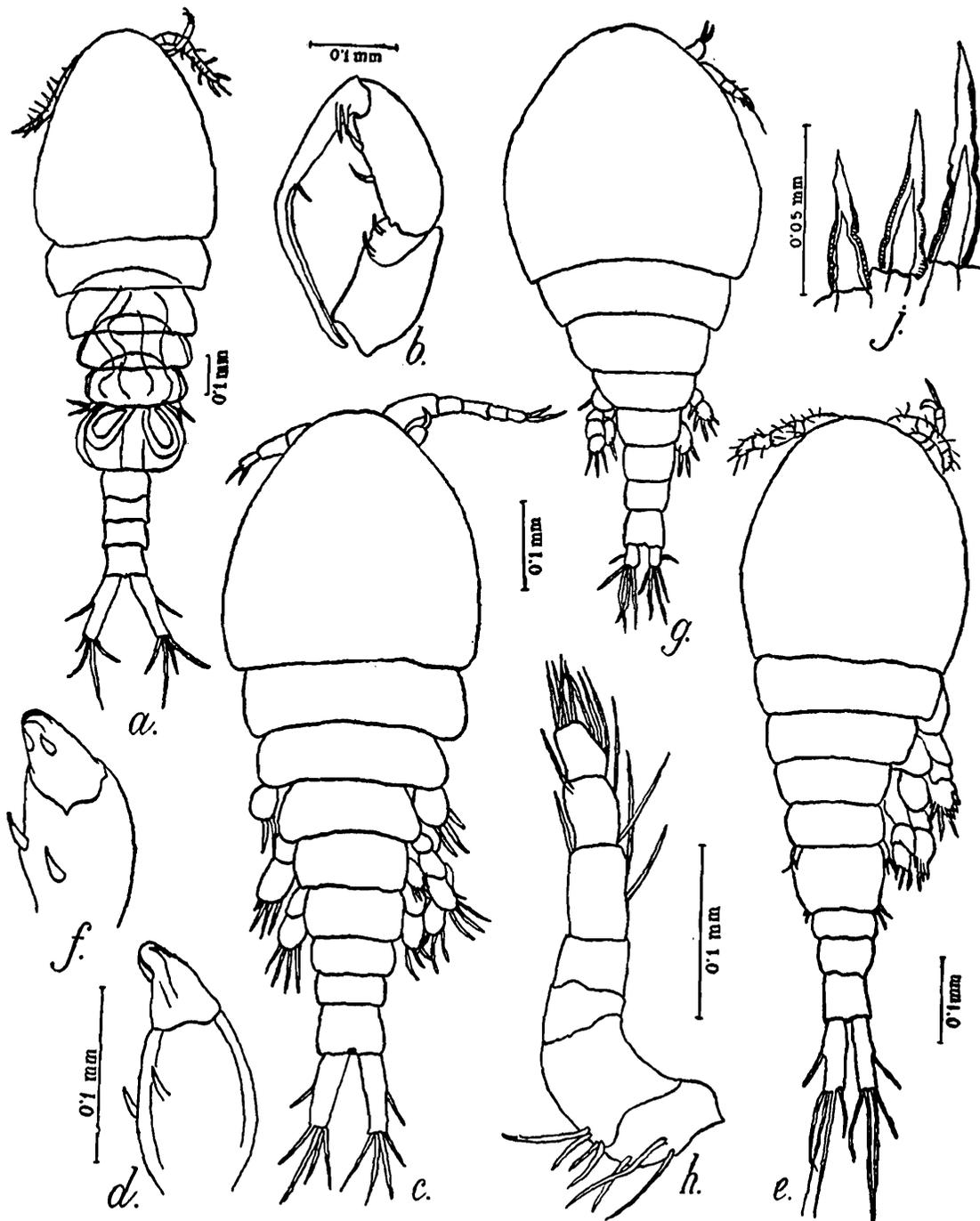


TEXT-FIG. 2. *Lichomolgus panikkari*, sp. nov : a, Labrum and mouth appendages  $\times 600$ ; b, First leg  $\times 200$ ; c, Second leg  $\times 200$ ; d, Third leg  $\times 200$ ; e, Fourth leg  $\times 200$ ; f, Sixth leg  $\times 200$ ; g, Caudal ramus  $\times 120$ ; l, labrum; m, Mandible;  $m \times 1$ , First maxilla;  $m \times 2$ , Second maxilla.

*Taxonomic remarks.*—That this lichomolgid cyclopoid belongs to the genus *Lichomolgus* is clear from the fact that only two genera

*Macrochiron* and *Lichomolgus* are distinguished by a seven-articled first antenna as well as two-jointed endopodites of the IV leg. *Lichomolgus* is distinguished from *Macrochiron* by its relatively shorter and wider Vth leg and by the second maxilla having the lappet long and not dilated at base.

Sewell (1940) in his report on the littoral and semi-parasitic cyclopoidea reviews the position of several species of the genus and accepts seven as valid. These (1) *L. gracilis*, (2) *L. jeversi*, (3) *L. Lankhensis*,



TEXT-FIG. 3. *Lichomolgus panikkari*, sp. nov. ; a, adult male  $\times 80$  ; b, maxillipede  $\times 200$  ; c, Fifth copepodid female  $\times 200$  ; d, maxillipede of female  $\times 400$  ; e, Fifth copepodid male  $\times 200$  ; f, maxillipede of male  $\times 400$  ; g, Fourth copepodid  $\times 200$  ; h, First antenna  $\times 400$  ; j, spines of exopod of first leg  $\times 800$ .

(4) *L. elegans*, (5) *L. gigas*, (6) *L. dentipes* and (7) *L. robustus* had been established by Thomson and Scott (1911) and recorded from the Indian Ocean. Gurney (1927) added (8) *L. aegypticus*, (9) *L. vagans* and (10) *L. faxi*. Two more species (11) *L. spondyli* (1936) and *L. rotundus* (1949)

were added by Yamaguti and Sewell respectively. Detailed comparisons of the present species with these are made difficult because of insufficient data. However, from the available description and figures, it can be seen that they differ from the present form in several respects. The form and size of the present species, especially in relation to the abdominal segments, differ from *L. gracilis*, *L. lankhensis*, *L. elegans*, *L. gigas*, *L. aegypticus*, *L. vagans*, and *L. rotundus*. In the abdominal segments being nearly equal, it is distinct from *L. dentipes* and *L. robustus*. The terminal segment of II antenna has a larger number of apical claws in *L. jeversi*, *L. foxi*, *L. aegypticus* and *L. rotundus*. The proportion of the length to the width of the single joint of the fifth leg has been found to be either twice or six times in most of the species. In the present form it varies from three to four times. The unique feature of the present form in possessing four plumose setae on the endopod of the fourth leg taken together with the facts that it is larger than all other known species in size and that it lives in the gastral cavity of actinarians, mark the present form as belonging to a species not described before. This new species *Lichomolgus panikkari* can be defined as follows:—The first thoracic segment faintly demarcated; posterior to this segment, the body is slightly longer than the anterior half; the second antenna bears one hook, a stout spine, and four other spines terminally; the genital segment is broad in front and narrows behind; it is as long as the last two abdominal segments, the furca is three-fourths the length of the abdomen and bears a lateral spine and four long terminal spines; the exopod of first leg has three serrate spines absent in the fourth copepodid stage of development; the endopod of fourth leg bears four plumose setae; the fifth leg is thrice as long as wide and has two apical spines; and the sixth leg is reduced to two short spines.

*The types*.—Both the holotype (♀) and the allotype (♂) are deposited in the Indian Museum collections of the Zoological Survey of India, Calcutta.

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