

DESCRIPTION OF THE MALE OF *CALIGUS HILSAE* SHEN
(COPEPODA, CALIGIDAE)

BY

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Caligus hilsae Shen, 1957, is unique in the possession of a comparatively very long four-segmented abdomen, long anal laminae which are nearly three times as long as broad and in the absence of the sternal fork.

In a collection of piscicolous copepods made by one of us (L.M.) were eighty one males and one female of a caligid very closely resembling *C. hilsae* Shen. Unfortunately the single female contained in this collection was immature as shown by the persisting remnant of the frontal filament. A comparison of this specimen with the description published by Shen showed that both are identical except that in the present specimen the abdomen is only two-segmented as in the male. Presuming that the condition of the abdomen in Shen's specimen is the same we assign the present specimens to Shen's species. The hitherto unrecorded male of this very interesting species is described in detail and the female is described briefly.

***Caligus hilsae* Shen**

Caligus hilsae Shen, 1957: 372, pl. 7; Yamaguti, 1963: 54, pl. 65 fig. 4.

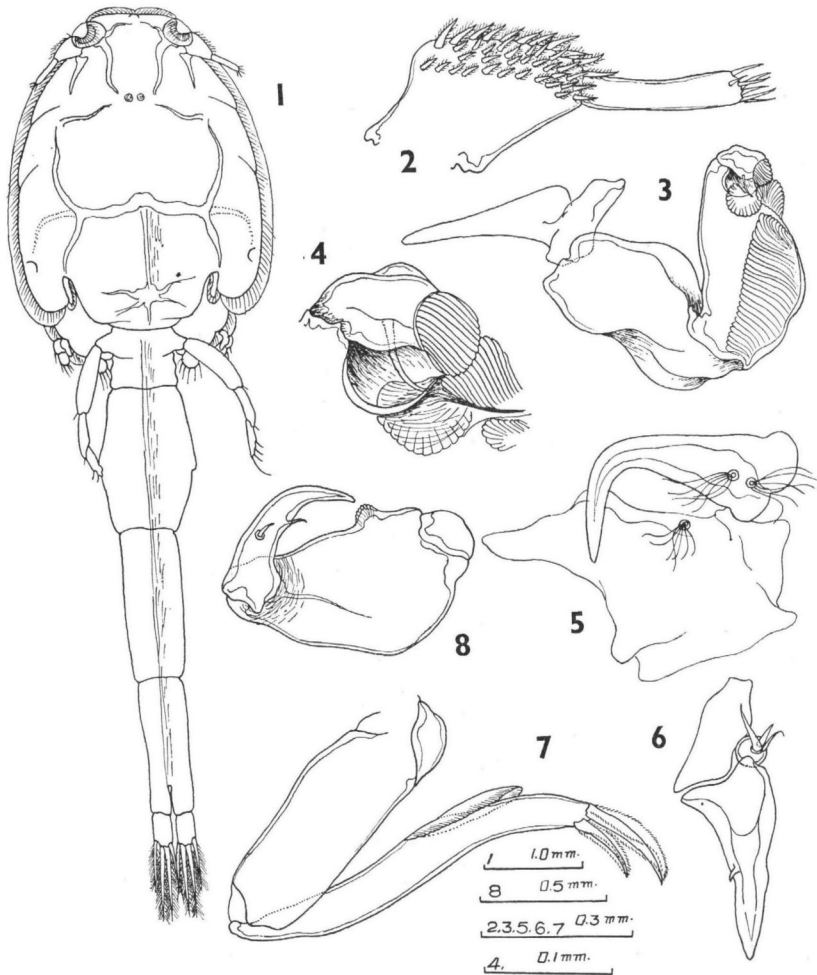
Material examined. — 81 males and 1 female collected by R. S. Lal Mohan from the buccal cavity of *Hilsa toli* (Day) (= *Tenualosa sinensis* (L.)) caught at Navlakhi near Kutch (Arabian Sea). A male will be deposited in the Indian Museum, Calcutta.

Male. — The cephalothorax is longer than broad and visibly narrows anteriorly. The dorsal transverse rib is shifted backwards and the cephalic area is consequently longer than the thoracic. The frontal plates are fairly prominent and projecting, with the lunules of moderate size. The anterior half of the lateral borders of the cephalothorax has two pairs of shallow incisions, the membranous flange is comparatively narrow. The postero-median lobe of the cephalothorax is very broad, nearly three times as broad as the lateral lobes and projecting far beyond the latter, the posterior sinuses are narrow. The fourth thoracic segment, the genital segment and the abdomen together form a long slender hind body which is longer than the cephalothorax. The fourth segment is roughly squarish

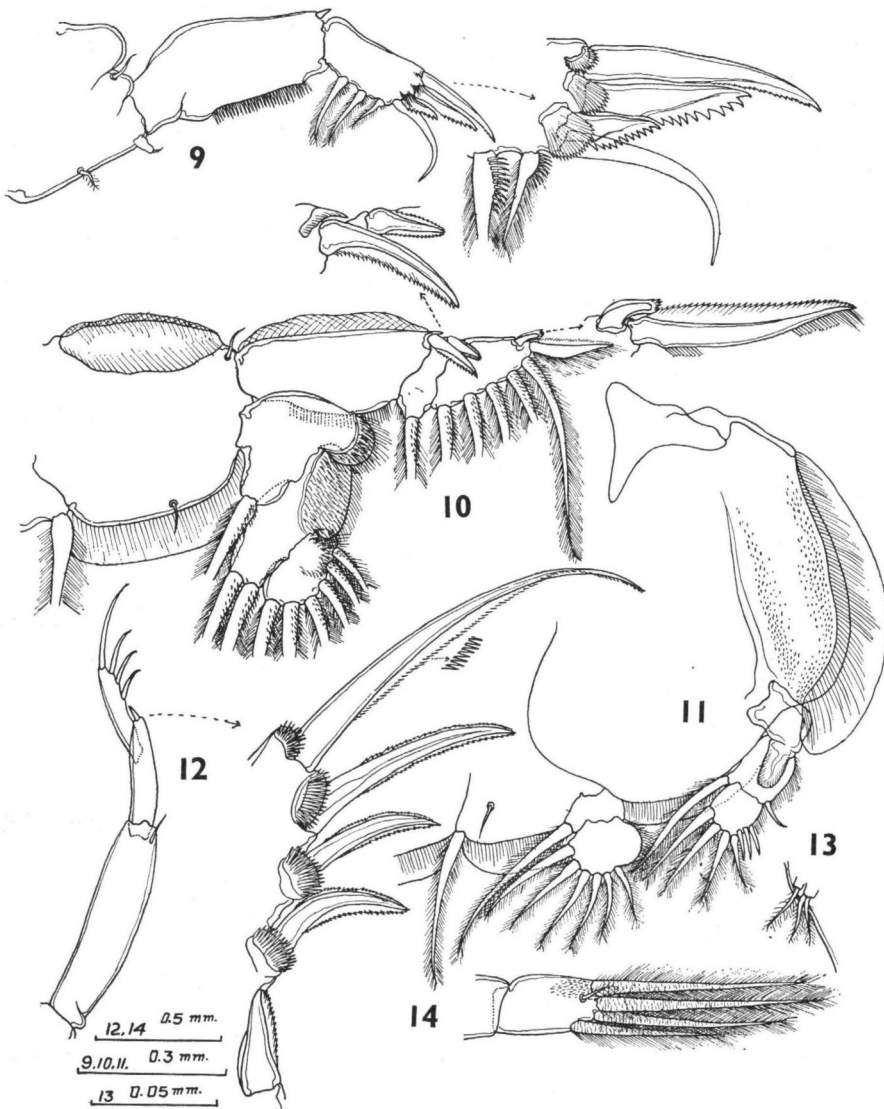
and produced at the place of insertion of the legs. The genital segment is roughly elliptic with a lateral indentation at the place of insertion of the rudimentary legs. The abdomen is two-segmented and as long as the cephalothorax, the first segment is slightly longer than the second. The anal laminae are about one and a half times as long as broad and provided with four stout highly plumose and corrugated setae and a short slender sparsely plumose dorsal seta.

The first antenna has a fairly stout basal segment and a slender distal segment, the former carries several irregular rows of short setae and the latter carries a distal bunch of comparatively short stiff setae.

The second antenna is curiously modified. The basal segment is a large chitinous lamina partially fused with the cephalothorax. The second segment is enlarged



Figs. 1-8. *Calligus bilsae* Shen, male. 1, dorsal view; 2, first antenna; 3, second antenna; 4, same, tip enlarged; 5, first maxilla; 6, second maxilla; 7, first maxilliped; 8, second maxilliped.



Figs. 9-14. *Caligus hilsae* Shen, male. 9, first leg; 10, second leg; 11, third leg; 12, fourth leg; 13, fifth and sixth legs; 14, anal lamina.

and its inner surface is conspicuously roughened by parallel ridges; the inner distal part of its surface carries two conspicuous corrugated pads. The third segment is short but stout and roughly spatulate and carries a long spine-seta, the distal part of the segment is corrugated.

The first maxilla is a stout claw, curved at right angles beyond the middle. Its base carries two bunches of flexible hairs and near the base outside the maxilla is a third bunch of hairs.

The second maxilla is elongate triangular and strongly chitinised, and dark brown in colour; it carries a small accessory spine. The palp carries three spine-setae, one of which is large.

The first maxilliped is rather robust, its basal segment is very stout, its distal segment is about one and a half times as long as the basal and carries the usual outer thin lobe, the distal claws are short and stout and unequal, both claws have a pectinate thin flange.

The second maxilliped is comparatively very stout, its basal segment has a small corrugated elevation at one third the length from the base, the distal segment is a stout claw reaching the projection on the basal segment when folded, it carries two spines.

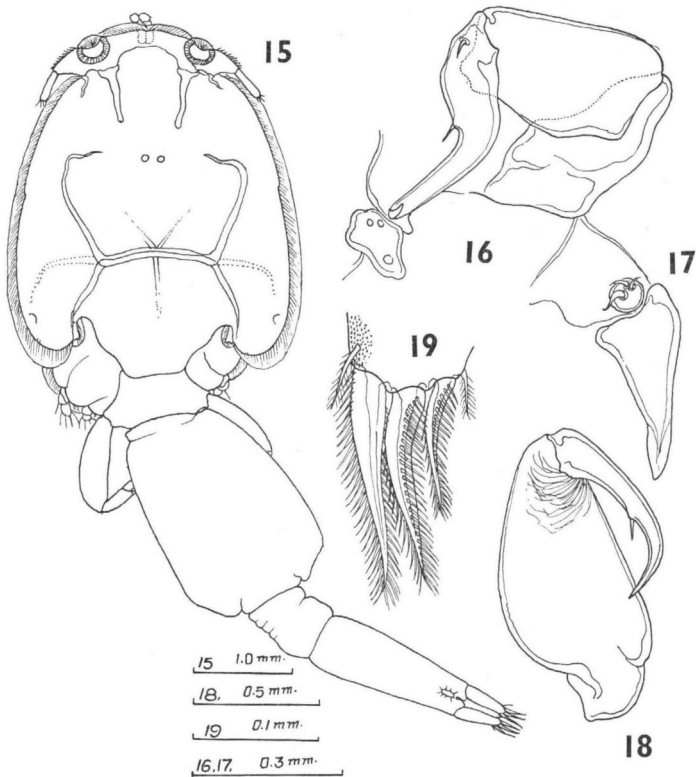
A sternal fork is absent.

The first leg is robust. Its protopod carries an upper and a lower seta, the vestigial endopod is constricted in the middle and carries a spinule. The basal part of the first exopod segment is narrow, its ventral border carries a row of stiff spines and at the outer distal angle there is a short stiff spine. The distal exopod segment is roughly rectangular; the lower border carries three short heavily plumose setae, the proximal part of the outer border of each seta carries a row of spines; the distal border is armed with three strong claws and a stout non-plumose spine-seta. Each of the claws has at its base a spiny lobe. The first claw is finely serrated on the lower border, the second and third claws are somewhat flattened and cut into prominent teeth on the lower side.

The protopod of the second leg is massive. The exopod is three-segmented, the first segment is large and carries a stout tooth flanged on the hind border, the upper distal part of the segment is produced over the base of the spine as a pointed projection; the second segment is very short and carries a claw flanged on both sides and a ventral seta; the third segment is triangular with a peculiarly shaped claw and six setae, the first seta has a flanged upper and heavily plumose lower side, the other setae are heavily plumose and the proximal outer part carries stiff setules. The endopod is three-segmented and comparatively stout, the outer part of the first segment is expanded and the outer part of all the segments carries a cluster of stiff setules giving them a highly pubescent appearance; the first segment carries one seta, the second two setae and the third six setae.

The outer part of the apron of the third leg carries several fine spinules. The rami are well separated and two-segmented. The basal claw of the exopod is short and highly flattened, the first segment carries an outer spine and an inner seta, the second segment has four setae and three spines. The first segment of the endopod has a stout inner seta, the second segment has six setae.

The fourth leg is three-segmented, the first segment is as long as the rest of the limb and carries a lower distal seta, the second and third segments are subequal in length, the former carries a short claw and the latter four claws successively increasing in length. Each claw is flanged by serrate wings and subtended by a row of spines at its base.



Figs. 15-19. *Caligus hilsae* Shen, female. 15, dorsal view; 16, second antenna; 17, second maxilla; 18, second maxilliped; 19, anal lamina.

The fifth and sixth legs are placed close together at the middle of the lateral borders of the genital segment, the former is composed of a single plumose seta and the latter of two similar setae.

The length is 10.4 mm.

Female. — The cephalothorax is comparatively broader than in the male and the frontal border is straighter. The median lobe of the cephalothorax is only twice as broad as the lateral lobes. The fourth segment is comparatively short but broader than in the male. The genital segment is moderately swollen and roughly rectangular. The abdomen is two-segmented and steadily narrows backwards, the second segment is nearly three times as long as the first. The anal laminae are very long, about three to four times as long as broad and tipped with two small and three stout but short setae, the latter are armed with stiff spiniform hairs.

The first antenna is similar to that of the male. The second antenna, as in most of the species of *Caligus*, is normal, the third segment is a long claw with a spine near the base and another in the middle. The first maxilla is absent. The second maxilla is roughly similar to that of the male, but the subsidiary spinule is absent,

the palp carries comparatively short setae. The second maxilliped is roughly similar to that of the male but the prominence on the basal segment is absent and the distal segment is more slender and typically falcate. All the other appendages are similar to those of the male.

The length is 8.2 mm.

Remarks. — The original description of this species was based on a single female which apparently differs from the female in the present collection in certain important characters.

Shen has clearly stated that the lunules are comparatively small and his illustration also shows this. But in our specimen the lunules are much larger. Shen has shown a narrow segment in front of the fourth thoracic segment and another similar segment behind it. These two segments are usually not found in species of *Caligus* and presumably Shen's illustration of the entire animal is not altogether correct in this respect. According to Shen the most important distinguishing character of *C. hilsae* is the four-segmented abdomen. In our specimen the abdomen is only two-segmented and would closely resemble *C. hilsae* as illustrated by Shen if the first two abdominal septa are omitted. Here we suspect that Shen might have mistaken folds on the lateral borders of the first abdominal segment for septa.

In general build as well as in the detailed structure of the various appendages Shen's specimen so closely resembles the present that we hesitate to describe the present specimens as new. If, however, the abdomen in Shen's specimen is really four-segmented, the present specimens will have to be assigned to a new species.

RÉSUMÉ

Description détaillée du mâle jusqu'à présent inconnu de *Caligus hilsae* Shen. Les différences entre la femelle décrite par Shen et la seule femelle de notre collection sont notées.

REFERENCES

- SHEN, C. J., 1957. Parasitic copepods from fishes of China. Part II. Caligoida, Caligidae (1). Acta zool. Sinica, (4) 9: 369-377, pls. 1-11.
- YAMAGUTI, S., 1963. Parasitic Copepoda and Branchiura of fishes: 1-390, pls. 1-333. (Interscience Publishers, New York. London and Sydney).