

NOTES ON COPEPODS PARASITIC ON SOUTH INDIAN MARINE
FISHES

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THE present paper contains notes on ten species of copepod parasites not included in the earlier publications by the author (1961, 63a, 63b). All are known species, but most of them are new records for this region and others are not adequately described previously. The paper also contains a discussion on the validity of the genera *Midias* Wilson and *Dentigryps* Wilson.

Family: CALIGIDAE

Caligus undulatus Shen and Li

(Fig. 1)

Material: A single male was obtained from the plankton collected at Mandapam, South India.

Length: 3.5 mm.

Remarks: The single specimen that I have resembles the male described by Shen and Li in all essential characters. But, certain variations were observed and these are discussed below.

C. undulatus possesses very pronounced characters which make its identification easy. The postero-median lobe of the cephalothorax is very large and projects far beyond the lateral lobes. The posterior sinuses are widely gaping so that the apron of the third legs is fully exposed. The membranous flange of the carapace is fairly broad and triangularly produced postero-laterally. The anal laminae carry comparatively long setae. Basal segment of the first antenna is armed with very long feathery setae. The third segment of the second antenna is a flat lobe with dentate distal border, first and second segments are prominently grooved. First maxilla is stouter than the second and the latter has a prominent adhesion pad and a small accessory process. Situated just behind the mouth cone is a pair of prominent adhesion pads. The second segment of the second maxillipeds has a large apically flared lobe and the claw has a large spine and two apical teeth. The limbs of the sternal fork are apically flattened and rounded.

The distal segment of the exopod of the first leg has three claws, a spine-seta and three large setae. The second claw is the shortest and carries a large accessory blade. The spine-seta is very long and curved. The ventral setae have their proximal outer border hairy, rest of the outer border being apparently without hairs. First exopod segment of second leg has a large claw; second segment has

a very small claw; third segment has a small winged claw, the first seta is flanged on one side and setose on the other. The basal spine of the exopod of the third

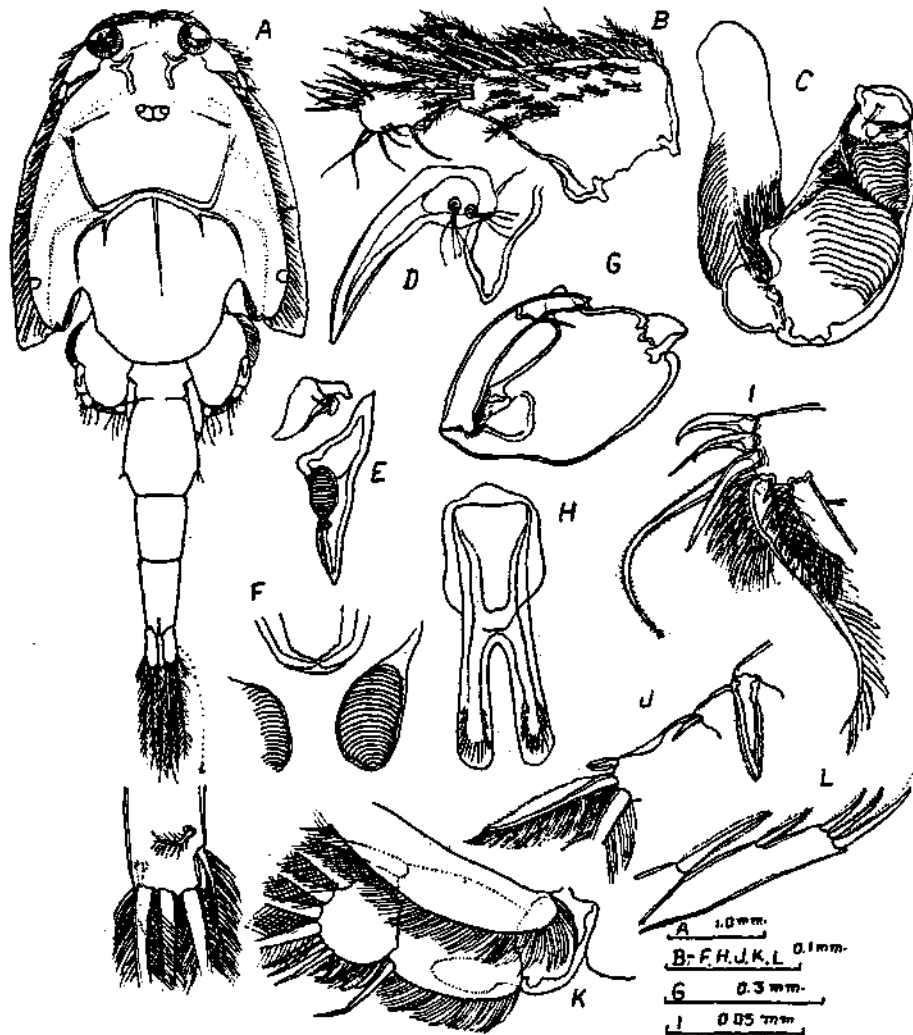


FIG. 1. *Caligus undulatus* Shen and Li. Male. A. entire animal, dorsal view. B. first antenna. C. second antenna. D. first maxilla. E. second maxilla. F. mouth cone and adhesion pads. G. second maxilliped. H. sternal fork. I. first leg. J. second leg, tip of exopod. K. third leg, exopod. L. tip of fourth leg.

leg is flattened and apically rounded, the spines on the segments are long and jointed. Fourth leg is three-segmented, with five winged claws.

The present record considerably extends the distribution of this species.

Caligus longicervicis Gnanamuthu

(Fig. 2)

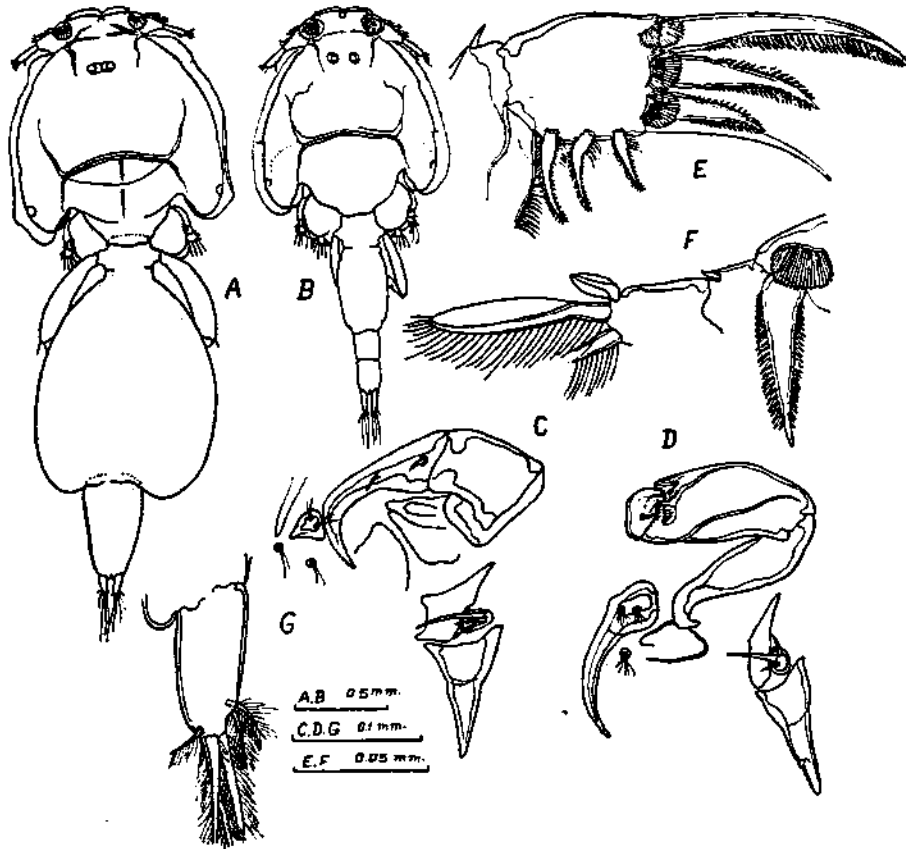
Caligus longicervicis Gnanamuthu, 1950, p. 115, figs. 31-46.*Caligus cunicephalus* Pillai, 1963, p. 77, fig. 7 (nec Gnanamuthu 1950).*Material*: Four females and two males were collected from the buccal cavity of *Trichiurus savala* Cuvier, examined at Trivandrum.

FIG. 2. *Caligus longicervicis* Gnanamuthu. A. female, dorsal view. B. male, dorsal view. C. second antenna and maxillae, female. D. same, male. E. first leg. F. second leg, exopod. G. anal lamina.

Remarks: On a previous occasion, I identified a collection of *Caligus* from *Trichiurus savala* as *C. cunicephalus*. At that time I failed to notice that those specimens had no sternal fork whereas *C. cunicephalus* has. A detailed study of the present specimens has shown that what I described as *C. cunicephalus* is really *C. longicervicis*.

In the original description of this species there are a few minor defects. The thin membraneous lobe seen external to the lunules is present in other species of

Caligus and is hence not of any specific value. The fourth thoracic segment is described as very long but in my specimens it is much shorter than what is illustrated by Gnanamuthu. The armature of the basal segment of the first antenna includes no spines. According to Gnanamuthu the first maxilla is a long pointed process carrying two long setae. In my specimens the first maxilla is comparatively small and carries two bunches of fine hairs as usual in *Caligus*. The palp of the second maxilla has three setae and not one as stated by Gnanamuthu. According to Gnanamuthu the first maxilliped terminates in three claws, but I could find only two. However, in this species the outer thin flange is shifted forwards and probably this was mistaken for a third claw. The sternal fork described by Gnanamuthu is of a very unusual type. In spite of very careful examination I could find no sternal fork. But a pair of chitinised ridges, remotely resembling what Gnanamuthu has illustrated, is present between the second maxillipeds. This is not the sternal fork ; this species lacks sternal fork.

The small seta shown by Gnanamuthu on the protopod of the first leg is not the endopod ; the endopod is a short process. Gnanamuthu has described the claws on the exopod of the second leg as serrated, but the first claw is large and serrated, the second is very small and naked, and the third is flanged. The vestigial fifth and sixth legs are present. Gnanamuthu observed that the appendages of the male are similar to those of the female but in the present specimens the second antenna and first maxilla are different from those of the female, the second maxilla has even a subsidiary process.

C. longicervicis shows very close resemblance to *C. cunicephalus* but in the latter there is a sternal fork and the basal segment of the second maxilliped has a double boss, both are absent in *C. longicervicis*. *C. longicervicis* shows surprisingly close resemblance to *C. uruguayensis* Thomsen, 1949, (vide Yamaguti, 1963, pl. 75, fig. 1) and might be same. But as I have no access to Thomsen's paper I am unable to make a decision.

Caligus annularis Yamaguti

(Fig. 3)

Caligus annularis Yamaguti, 1954, p. 385, figs. 33-34.

Material : A single female from the gills of *Otolithus maculatus* (Cuvier) examined at Trivandrum.

Female : Carapace is nearly circular with projecting frontal plates, lunules are large and circular. Postero-median lobe of the carapace is much broader than the lateral lobes and projects well beyond the latter and overlaps the fourth segment. Genital segment is pyriform with a short anterior neck and well rounded postero-lateral parts. Abdomen is shorter than the genital segment, with the proximal part slightly bulged. Anal laminae are longer than broad and each carries three long and three short setae.

Basal segment of first antenna is nearly as long as broad. Basal segment of second antenna has a very large spine-like process, distal segment is short and carries two setae, one proximal and the other median. First maxilla is large and strongly curved ; its base carries two bunches of hairs. Second maxilla is drawn

out into a parallel-sided apically rounded process, its palp has a stout seta and two small setae. The maxillipeds deserve no special comment. The sternal fork has a rather short base and stout bracket-shaped limbs with narrow flange.

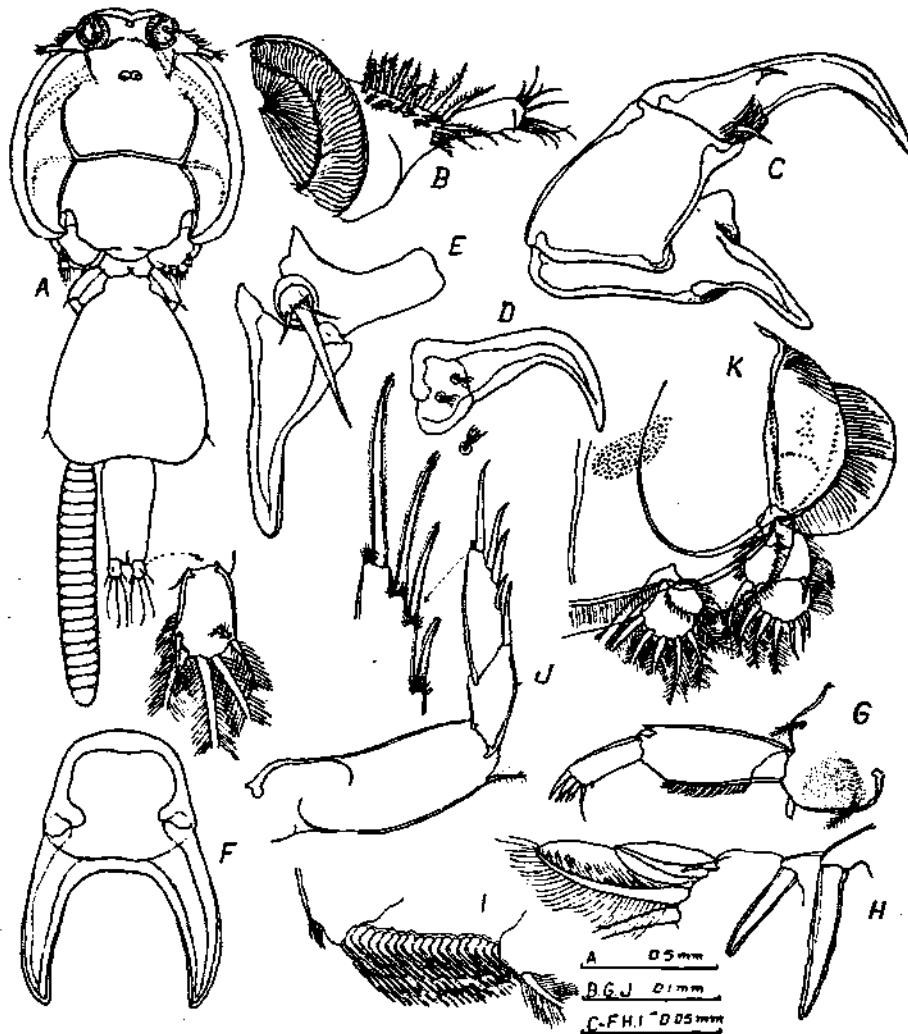


FIG. 3. *Caligus annularis* Yamaguti. A. female, dorsal view. B. first antenna. C. second antenna. D. first maxilla. E. second maxilla. F. sternal fork. G. first leg. H. second leg, exopod. I. same, endopod. J. fourth leg. K. third leg.

First leg is quite characteristic, its protopod has a patch of denticles; distal segment of exopod has only a very small spine on the lower border, its distal border has three claws and a spine seta, two of the claws carry an accessory spine. The first and second segments of the exopod of the second leg carry a stout flanged claw; third segment has a very small naked claw; basal segment of endopod has a cluster of four to five sharp spines; second segment has two to three rows of closely packed strong spines. Apron of the third leg is armed with two longitudinal rows and two

patches of denticles ; its proximal outer part is grooved. Fourth leg is stout and short, three-segmented, with four winged claws. Fifth and sixth legs are vestigial.

Length : 2.3 mm.

Remarks : Though the abdomen, as observed by Yamaguti, is cylindrical, its proximal part is definitely bulged. The anal laminae carry only six setae instead of seven. The second antenna is three-segmented instead of two-segmented as observed by Yamaguti. The palp of the second maxilla carries three setae.

As observed by Yamaguti, *C. annularis* closely resembles *C. paxillifer* Yamaguti in several characters. But in the nature of the second antenna, first maxilla and of the legs *C. annularis* shows very close resemblance to *C. epinepheli* Yamaguti. However, in the latter species the abdomen is two-segmented.

Caligus platurus Kirtisinghe

(Fig. 4)

Caligus platurus Kirtisinghe, 1964, p. 61, figs. 38-48.

Material : A single female was collected along with several specimens of *Caligus brevicaudus* Pillai, from the gills and inner surface of the opercle of *Caranx* sp. at Trivandrum.

Female : The cephalothorax is roughly semicircular, with subtruncate hind border. The frontal plates are low with prominent lunules. The median posterior lobe is only slightly broader than the lateral lobes and hardly projects beyond them ; the latter curve inwards closing the posterior sinuses. Fourth thoracic segment is large. Genital segment is much enlarged and nearly equal in length and width. Abdomen is enlarged and flattened, as long as broad and slightly overlapped by the genital segment. Anal laminae are small, each carries five setae.

Distal segment of the first antenna is slender and long. Second antenna is as described by Kirtisinghe. First maxilla is a blunt slightly curved process. Second maxilla is elongate-triangular and apically flanged, it carries an accessory process, the palp carries three setae. Maxillipeds are of the normal type. The sternal fork has stout parallel rami with prominent outer flange, the base is large but somewhat indistinct.

The vestigial endopod of the first leg is rather long and tipped with two spines, the distal exopod segment has three long slender claws, a long spine-seta and three short ventral setae. The first two claws of the exopod of the second leg are very large and flanged, third claw is small ; second segment of the endopod has a row of closely packed prominent spines. Basal claw of the third leg is strongly curved. Fourth leg is fairly stout and four-segmented, with five large winged claws.

Length : 3.7 mm.

Remarks : *C. platurus* closely resembles *C. spinosus* Yamaguti, *C. cordyla* Pillai and *C. brevicaudus* Pillai. In all these species one finds very little differ-

ence in the structure of the various appendages. Nevertheless, the general shape of the body, particularly of the post-cephalothoracic part, is different. *C. platurus*

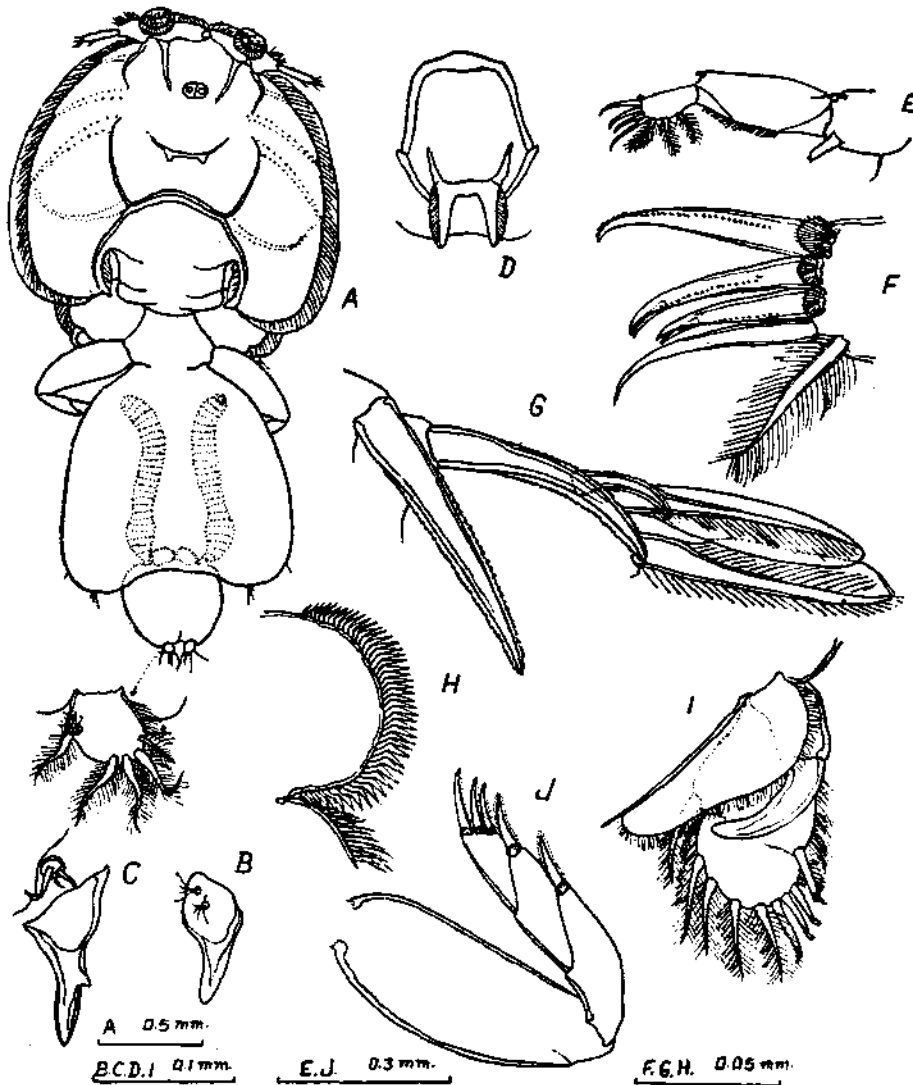


FIG. 4. *Caligus platurus* Kirtisinghe. A. female, dorsal view. B. first maxilla. C. second maxilla. D. sternal fork. E. first leg. F. same, tip enlarged. G. second leg, exopod. H. same, endopod. I. third leg, exopod. J. fourth leg.

is most closely related to *C. brevicaudus* but the shape of the genital segment, abdomen and the first maxilla is different.

Caligus cornutus Heegaard

(Fig. 5)

Caligus cornutus Heegaard, 1962, p. 164, figs. 92-98.*Caligus spinosus* Pillai, 1963, p. 76, fig. 7 (nec. Yamaguti, 1939, Shiino, 1960).

Remarks: Depending on the general likeness, I identified a few specimens collected by me from *Sphyræna obtusata* as *C. spinosus* Yamaguti. However, publications which appeared since then have shown that these specimens might belong to *Midias*.

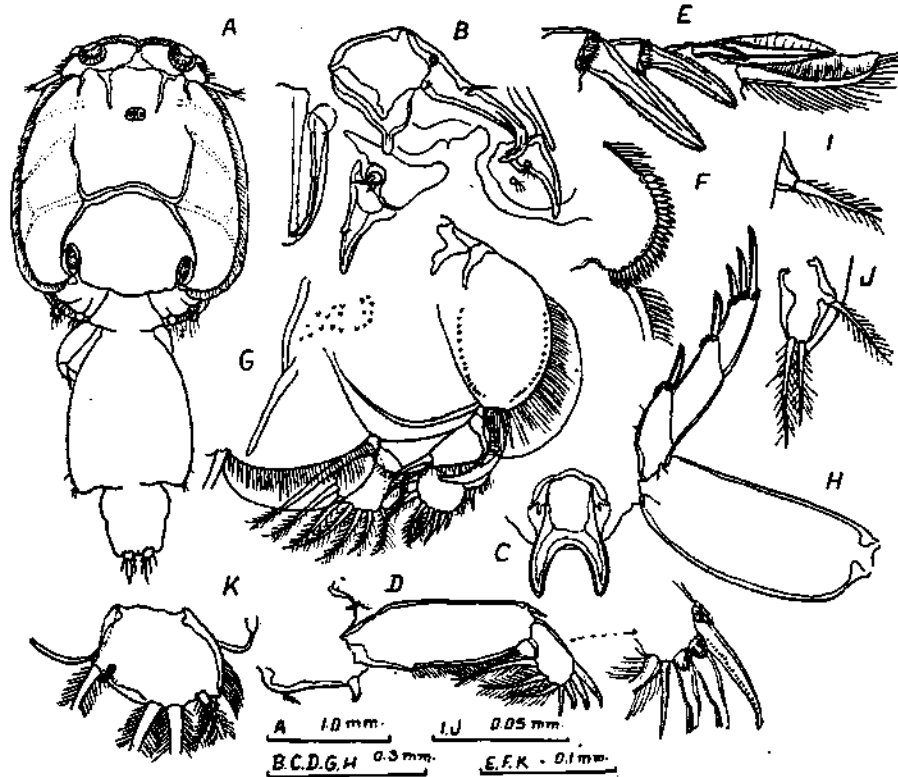


FIG. 5. *Caligus cornutus* Heegaard. A. female, dorsal view. B. second antenna, maxillae and mouth tube. C. sternal fork. D. first leg. E. second leg, exopod. F. same, endopod. G. third leg. H. fourth leg.

Shiino's detailed description of *M. lobodes* was based on specimens collected from *Sphyræna barracuda* in the Indian Ocean. Since then Heegaard collected a few specimens from *Sphyræna jello* in the Australian waters and described them as *Caligus cornutus*. Recently Kirtisinghe described the male of *M. lobodes* collected from *Sphyræna* sp., in Ceylon waters and expressed the opinion that *C. cornutus* Heegaard might be the same as *M. lobodes* Wilson. Undoubtedly the male of *M. lobodes* described by Wilson, Shiino and Kirtisinghe is the same as the male of *C. cornutus*. But the female of *C. cornutus* is different from the female of

M. lobodes. Heegaard's female specimens closely resemble the specimens I described as *C. spinosus*. Heegaard stated that his specimen is a juvenile but judging from the present specimens, which are adults carrying egg strings, I should consider Heegaard's specimen as adult. Apparently *C. cornutus* should be transferred to *Midias*.

In the general appearance of the female and in the structure of the various appendages my specimens very closely resemble *M. lobodes*. In *M. lobodes* the postero-lateral lobes of the cephalothorax curve inwards closing the posterior sinuses; the median lobe is distally transverse and nearly trilobed. The second segment of the first antenna is long and the third segment of the second antenna is long and slender and sharply bent at the tip, it has a stout basal seta and a slender median seta. The second maxilla has an accessory process. The three claws arming the distal border of the second segment of the exopod of the first leg are serrated along the lower border and the upper distal part carries one or two small teeth. The exopod of the second leg has four flanged claws and the proximal segment of the endopod has a row of teeth. The apron of the third leg has a row of spines above the insertion of the exopod and a patch of teeth above the endopod, the basal claw of the exopod has an accessory process. Fourth leg is four-segmented and the basal segment is comparatively broad. In every one of these characters my specimens so closely resemble *M. lobodes* that it could very well form a second species of *Midias* differing from the type species in the shape of the abdomen. I do not have a male but the male described by Heegaard shows no difference from the male of *M. lobodes*. This raises the question whether *Midias* is a valid genus.

Wilson (1911) observed that 'the presence of lunules marks its close affinity with *Caligus* and the preserved material first obtained were referred to that genus. During the past summer, however, there has been an opportunity to study an abundance of living material, and a more careful examination reveals so many characteristics of the Euryphorinae that it must be placed in the latter subfamily. They include among general characters the large size of the copepod, fully twice that of most species of *Caligus*, the possession of rudimentary dorsal plates on the fourth (free) segment, a strongly inflated genital segment, and an abdomen with lateral lobes on the basal segment and posterior lobes on the terminal joint. In addition the first legs have a rudimentary endopod which is two jointed; both rami of the third legs are distinctly three jointed; and the fourth legs have an enlarged basal joint, and three small terminal joints arranged like those in *Gloioptes* and not at all like those of *Caligus*.'

The above discussion regarding the taxonomic position of *Midias* fails to give even a single character which supports the inclusion of *Midias* in Euryphoridae. The one character which helps one to decide whether a particular species is a euryphorid or not is the presence of dorsal plates on the fourth thoracic segment. Except Wilson no one else observed dorsal plates in *Midias* and Shiino placed it in Caligidae. Obviously *Midias* has no dorsal plates and hence is a caligip. *M. lobodes* differs from typical *Caligus* only in the presence of lateral wings on the first abdominal segment and posterior prolongations on the second. These constitute only specific characters since *C. cornutus*, which very closely resembles *M. lobodes* lacks these. I have very little doubt that *Midias* is a synonym of *Caligus*, but I prefer to leave this question open till I get a chance to study *M. lobodes*.

Caligus tylosuri (Rangnekar)

(Fig. 6)

Tuxophorus tylosuri Rangnekar, 1956, p. 52.*Caligus tylosuri* Pillai, 1961, p. 96, fig. 6.

Material: A single female from the surface of the body of *Chorinemus lysan* (Forsk.) along with several specimens of *Lepeophtheirus spinifer* Kirtisinghe and *Tuxophorus wilsoni* Kirtisinghe.

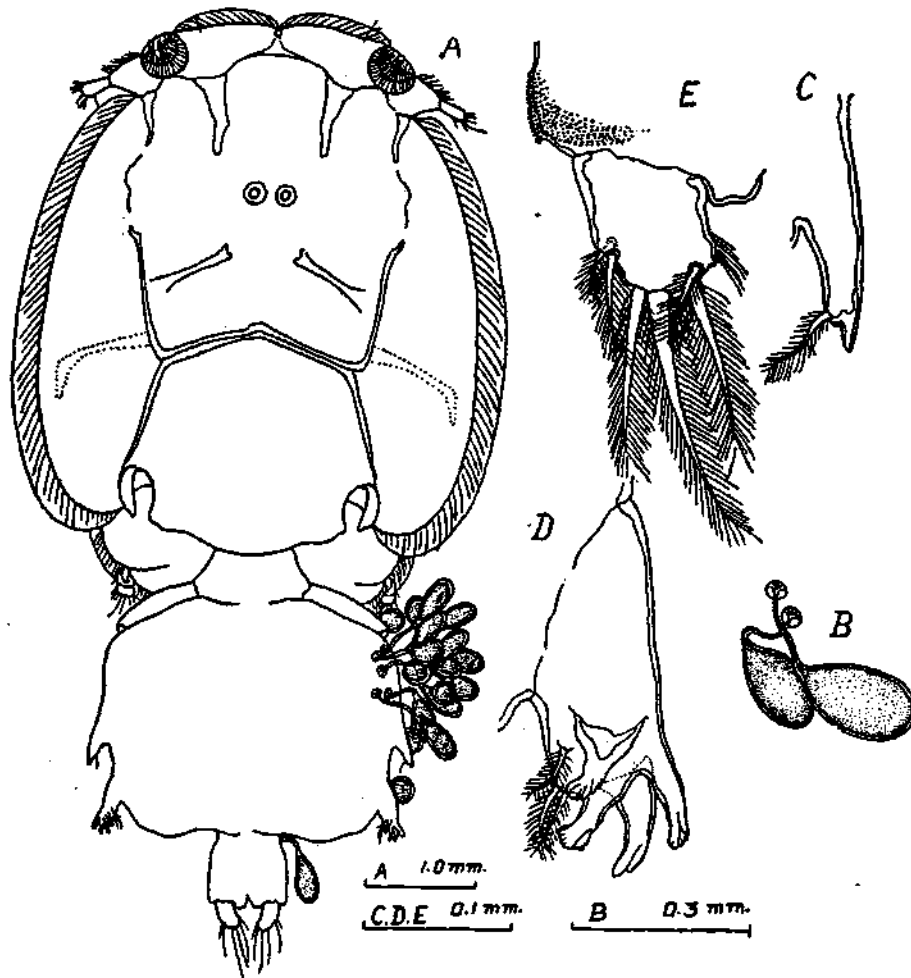


FIG. 6. *Caligus tylosuri* (Rangnekar). A. female, dorsal view. B. two of the attached bodies enlarged. C. fifth leg. D. sixth leg. E. anal lamina.

Remarks: The two previous records of this species were from *Tylosurus crocodilus* (Le Sueur). The present specimen, though from a different host, so

closely resembles the previous records that I have nothing to add to the characters of the species. Nevertheless, the similarity of its cephalothorax with that of *L. spinifer* and *T. wilsoni* is so striking that but for the shape of the genital segment it is hardly distinguishable from the others. I wish to stress here the peculiar development of the fifth and sixth legs. The only other species of *Caligus* which shows a similar development is *C. cordiventris* Shiino (1952). It may perhaps be significant that the host of *C. cordiventris*, *Xesurus scalprum*, is an acanthurid, a scaleless fish like *Chorinemus* the host of *C. tylosuri*. This is further discussed below. The hind part of the body was covered by epizooic growth, part of which is shown in the figure.

Lepeophtheirus spinifer Kirtisinghe

(Fig. 7)

Lepeophtheirus spinifer Kirtisinghe, 1937, p. 441, figs. 41-58; 1964, p. 81, figs. 94-95; Rangnekar, 1959, p. 51, fig. 4; Pillai, 1961, p. 128, fig. 23.

Material: A large number of males and females from the surface of the body of *Chorinemus lysan* (Forsk.) examined at Trivandrum.

Remarks: In a recent publication Lewis (1964) observed that *L. spinifer* closely resembles *Dentigryps ulua* Lewis (1964) and that the former might also belong to the genus *Dentigryps*. *L. spinifer* certainly shows very close similarity to *D. ulua* especially in the shape of the cephalothorax, fourth thoracic segment and genital segment and even in the detailed structure of the appendages. The resemblance is closer in the males. In the males of both species the second maxilla has a poorly chitinised third process and is associated with a prominent adhesion pad. The first and second segments of the second antenna are grooved in an identical manner and the third segment is modified into a bizarre structure with a large lateral process and two distal processes. The basal segment of the second maxilliped has a low bifid process in both species. But *L. spinifer* and *D. ulua* differ in the shape of the abdomen of the female and in the fifth leg processes of the male. It is obvious that these two species should be placed in the same genus.

Commenting on the affinities of *Dentigryps*, Wilson (1913, p. 221) observed that 'it has the carapace and all the appendages of *Lepeophtheirus* except the first maxillae, which here are simple and undivided. But there is no free segment, and the fused fourth, fifth and genital segments are covered with a plate similar to the carapace, the only thorax segment capable of motion being the one between the third and fourth segments where these two dorsal plates come together. A similar condition prevails in the genus *Homoiotetes*. The ventral prongs or processes on the genital segment are one of the typical characters of the genus *Gloiopotes*, but here they lack the spines and setae so commonly found in that genus. The dropping of the abdomen to the ventral surface and its transference forward is typical of the family Pandaridae, while the posterior lobes on either side of the anal laminae are characteristic of such genera as *Alebion*. The present genus is thus a sort of patch work of parts of other genera and may well serve as another connecting link between these genera.'

A careful examination of the above discussion shows that *Dentigryps* is a loosely characterised genus. The discovery of additional species made the definition of

the genus more vague. The recent definition by Lewis (1964) is substantially the same as the original, and both authors agree that *Dentigryps* is a distinct genus closely resembling *Lepeophtheirus*.

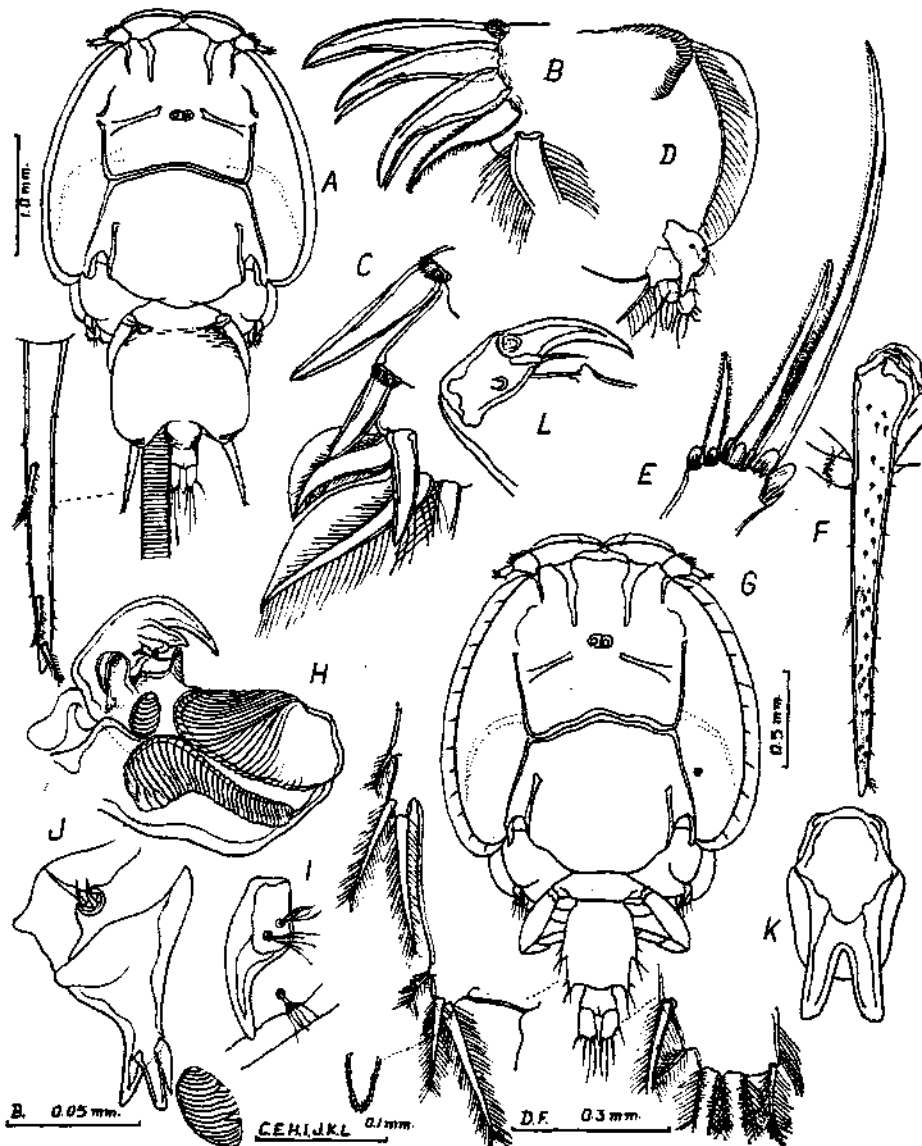


FIG. 7. *Lepeophtheirus spinifer* Kirtisinghe. A. female, dorsal view. B. first leg. C. second leg, exopod. D. third leg. E. fourth leg. F. fifth leg. G. male, dorsal view. H. second antenna. I. first maxilla. J. second maxilla. K. sternal fork. L. second maxilliped.

Wilson observed that as in *Homiototes* the fourth segment is fused with the genital segment and the whole covered by dorsal plates. I could find no such plate

in *L. spinifer* and Lewis makes no mention of such plates in *Dentigryps*. The pandarid affinity seen in the ventral position of the abdomen is far fetched and in *D. ulua* the abdomen is not ventral. In the presence of postero-lateral lobes on the genital segment Wilson found affinity with *Alebion*. But even within the genus *Alebion* there are species without lobes and species of *Dentigryps* show all gradations least developed in *D. curtus* and most in *D. ulua*. In the fifth leg prolongations Wilson found affinity with *Gloiopotes*. But whether the prolongations in the latter genus are the fifth legs is by no means certain. At any rate in the structure as well as the mode of origin of the prolongations these two genera differ much. Both Wilson and Lewis attempted to show that *Dentigryps* has strong euryphorid affinity. Lewis observed that 'the presence of some indication of plate like formations of the dorsal cuticle of the fourth pedigerous segment of *D. ulua* is likewise a character encountered in the euryphorids.' But *Dentigryps* has no dorsal plates. Lewis also observed that 'the members of the family Euryphoridae and members of the genus *Dentigryps* are alike in several characteristics, of which the most noteworthy is the fifth leg projection.' Further below he stated that 'the significance of the fifth leg projection is problematical and in general make up *Dentigryps* is very much a caligid, most closely resembling *Lepeophtheirus*.' In most species of *Caligus* the fifth leg is vestigial, represented by one or two minute setae, but in *C. cordiventris* and *C. tylosuri* it is large. In *Tuxophorus caligodes* the fifth leg is vestigial but in the closely related *T. wilsoni* it is long and well developed. Surely this character can have no more than specific value. Yet Lewis concluded that the strongly projecting fifth legs distinguish *Dentigryps* from *Lepeophtheirus*. As species like *L. spinifer* posed a problem he suggested that they could be transferred to *Dentigryps*. I am afraid it would create problems rather than solve any. I feel that *Dentigryps* can be treated as a synonym of *Lepeophtheirus*.

Family: EURYPHORIDAE

Tuxophorus wilsoni Kirtisinghe

(Fig. 8)

Tuxophorus wilsoni Kirtisinghe, 1937, p. 443, figs. 59-73; Pillai, 1961, p. 122, fig. 20.

Material: A large number of specimens from the surface of the body of *Chorinemus lysan* (Forsk.) examined at Trivandrum.

Remarks: I have nothing to add to the short description published earlier. But the present collection contains specimens of both sexes and hence some notes are added.

Genus *Tuxophorus* includes two species, *T. caligodes* Wilson and *T. wilsoni* Kirtisinghe. In the former the fifth leg is vestigial but there is a long and well developed spine in *T. wilsoni*. In the overall shape of the cephalothorax one finds unusual similarity between *T. wilsoni* and *L. spinifer*, and both have long fifth leg processes. This process in both species originates in an identical manner from the ventral side of the genital segment and carries plumose setae on the dorsal side and fine spinules on the ventral side. The structure of the male is more interesting. Except that the lunules are present the male of *T. wilsoni* is hardly distinguishable from that of *L. spinifer*. In the male of both species the first and second segments

of the second antenna show identical armature and the third segment carries a seta and a lateral process. In both the second maxilla has an accessory process and is associated with an adhesion pad. The similarity we find in the shape of the cephalothorax, second antennae, second maxillae and the fifth legs is apparently the result of adaptation to the same habitat, probably the nature of the body surface of the host, which is a scaleless fish. If this assumption is correct it would follow that the extreme development of the fifth leg has no generic significance and supports the observation made above.

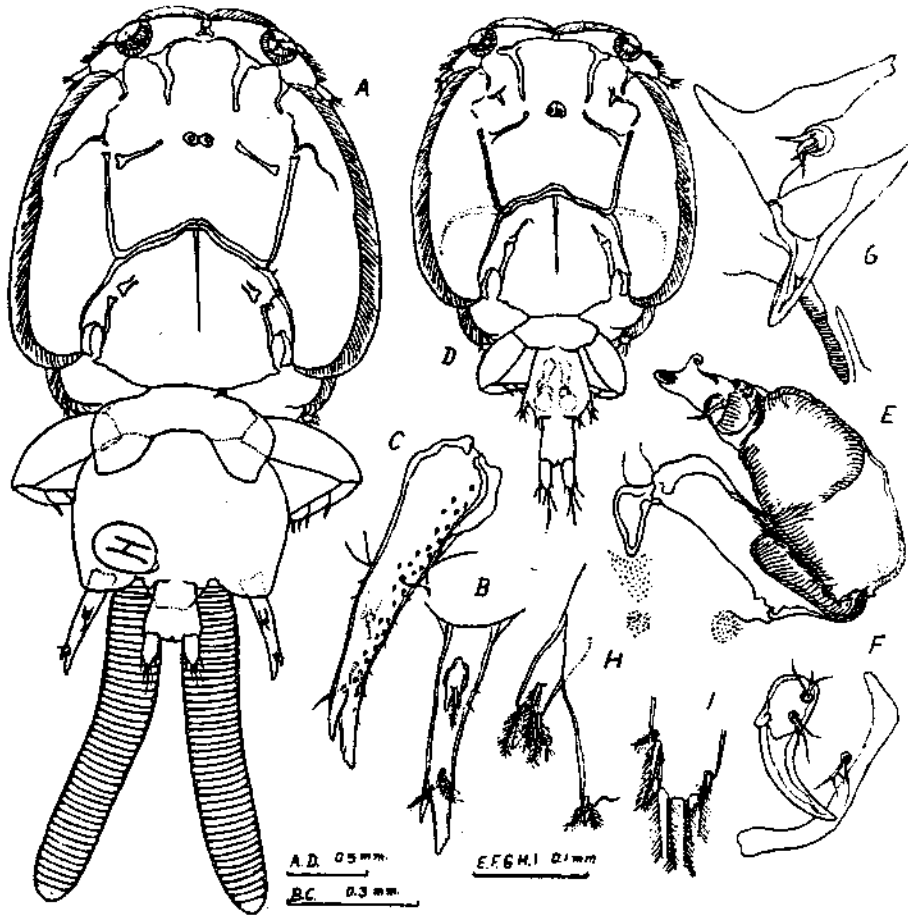


FIG. 8. *Tuxophorus wilsoni* Kirtisinghe. A. female, dorsal view. B. fifth leg, dorsal view. C. same, ventral view. D. male, dorsal view. E. second antenna. F. first maxilla. G. second maxilla. H. fifth and sixth legs. I. anal lamina.

Another example having some bearing on the present discussion may also be cited. From *Pseudarius jatus* I have collected three species of caligid copepods, namely, *Caligus aril* Bassett-Smith (1898), *Lepeophtheirus longipalpus* Bassett-Smith (1898) and *Hermilius longicornis* Bassett-Smith (1898). Though these belong to three different genera, they show certain common characteristics, particularly the development of microscopic spinules on the legs. The structure of the first leg is

most remarkable. The protopodal segment has an unusually long dorsal seta, the endopod is enlarged into an oblong spiny lobe and the distal exopod segment has three claws, each of which has a prominent ventral frilled flange. This similarity is again an adaptation to the same habitat.

Family: ANTHOSOMATIDAE

Lernanthropus cadenati Delamare-Deboutteville and Nunes-Ruivo

(Fig. 9)

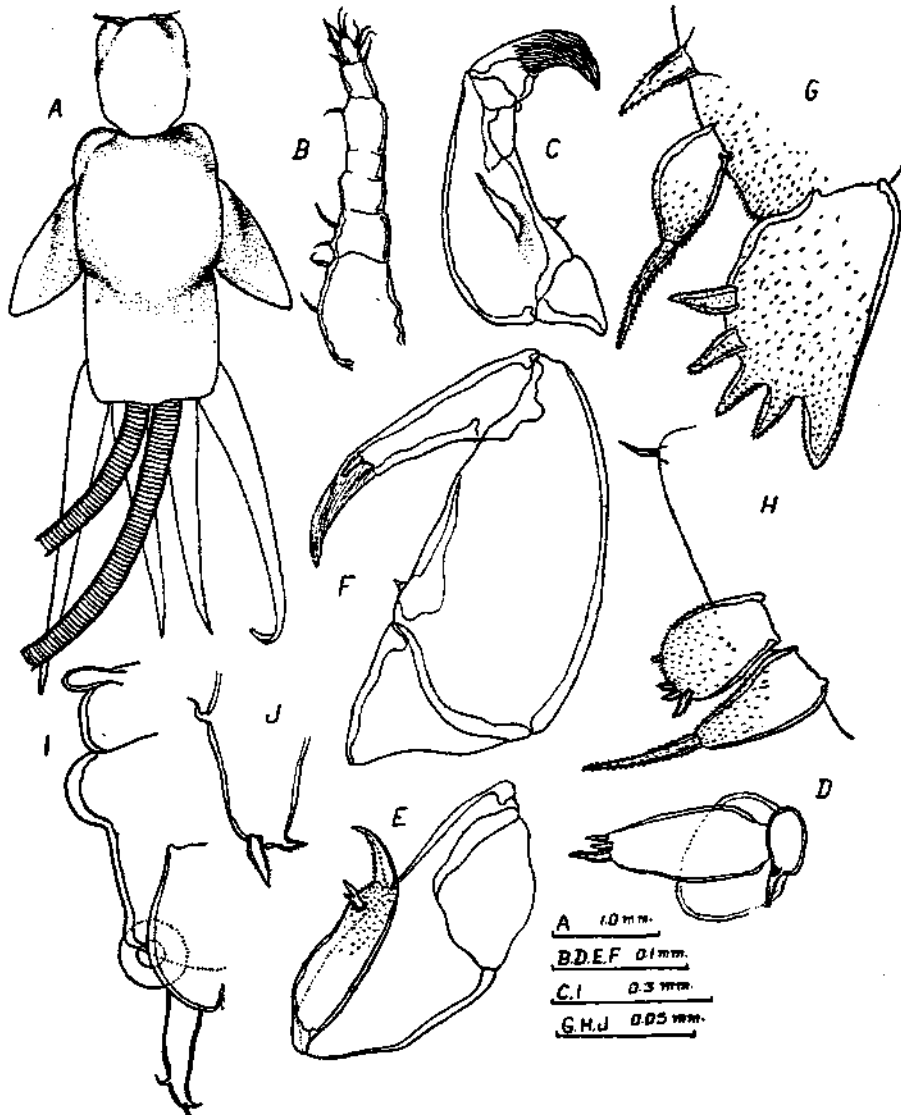


FIG. 9. *Lernanthropus cadenati* Delamare-Deboutteville and Nunes-Ruivo. A. female, dorsal view. B. first antenna. C. second antenna. D. maxilla. E. first maxilliped. F. second maxilliped. G. first leg. H. second leg. I. posterior part of trunk showing fifth leg and anal laminae. J. tip of anal lamina enlarged.

Lernanthropus cadenati Delamare-Deboutteville and Nunes-Ruivo, 1954, p. 145, figs. 2-3.

Material : Seven females from the gills of *Megalops cyprinoides* examined at Trivandrum.

Female : The body is rather stout. The cephalothorax is ovate and longer than broad and the antero-lateral lobes project prominently, the antennal lobe is indistinct. The anterior division of the trunk is swollen and the dorsal plate is roughly rectangular, slightly broader than long and narrower than the anterior division of the trunk, its hind border is irregularly truncate.

The first antenna is seven-segmented and very sparsely setose. Second antenna is strongly uncinata, its claw is finely grooved. Maxilla is bilobed, the smaller lobe carries two spines and the larger three spines. First maxilliped has a stout basal segment, distal part of second segment is spiny and carries a large bifid process, the claw is short and fully spiny. The second maxilliped is stout, the claw has a blunt process at the place where it unites with the unguis, the unguis is grooved and faintly bilobed at the tip.

The first leg has a comparatively short exopod carrying five large teeth, endopod is ovate and carries a single spine which is longer than the ramus. The second leg is much smaller than the first and is somewhat of an unusual type, the endopod and exopod have interchanged their normal position, the exopod carries four teeth. Third leg is biramous and the endopods appear to have partially fused. The fourth leg is biramous and projects far beyond the dorsal plate, the rami are linear and the exopod clearly overreaches the endopod. The fifth leg is reduced to a small oval lobe. The anal laminae are long and each carries three spine-setae, one outer and two distal.

Length : 4.3 mm.

Remarks : The present specimens slightly differ from those described by the original authors in the shape of the cephalothorax and the dorsal plate. In the type the rami of the fourth leg are subequal in length whereas in my specimens the exopod clearly overreaches the endopod. The fifth leg, though small, is present. Nevertheless, the identity of my specimens is certain. The original record was from *Elops* and mine from *Megalops*.

***Lernanthropus lappaceus* C. B. Wilson**

(Fig. 10)

Lernanthropus trifoliatus Pillai, 1963, p. 655, fig. 1Q (in part).

Remarks : Along with a large collection of *L. trifoliatus* Bassett-Smith I got two females of an anthosomatid which I identified as Bassett-Smith's species because of the similarity in the armature of the fourth legs. But a re examination has shown that they belong to *L. lappaceus*. As this species does not appear to have been redescribed I give below a short illustrated description.

Cephalothorax is roughly triangular and narrows forwards. The anterior division of the trunk steadily broadens backwards and terminates in a pair of trian-

gular processes near the base of the third legs. The dorsal plate is large and demarcated into a short narrow anterior part and a broad, nearly circular posterior part. Antero-lateral lobes of the cephalothorax have finely hirsute surface.

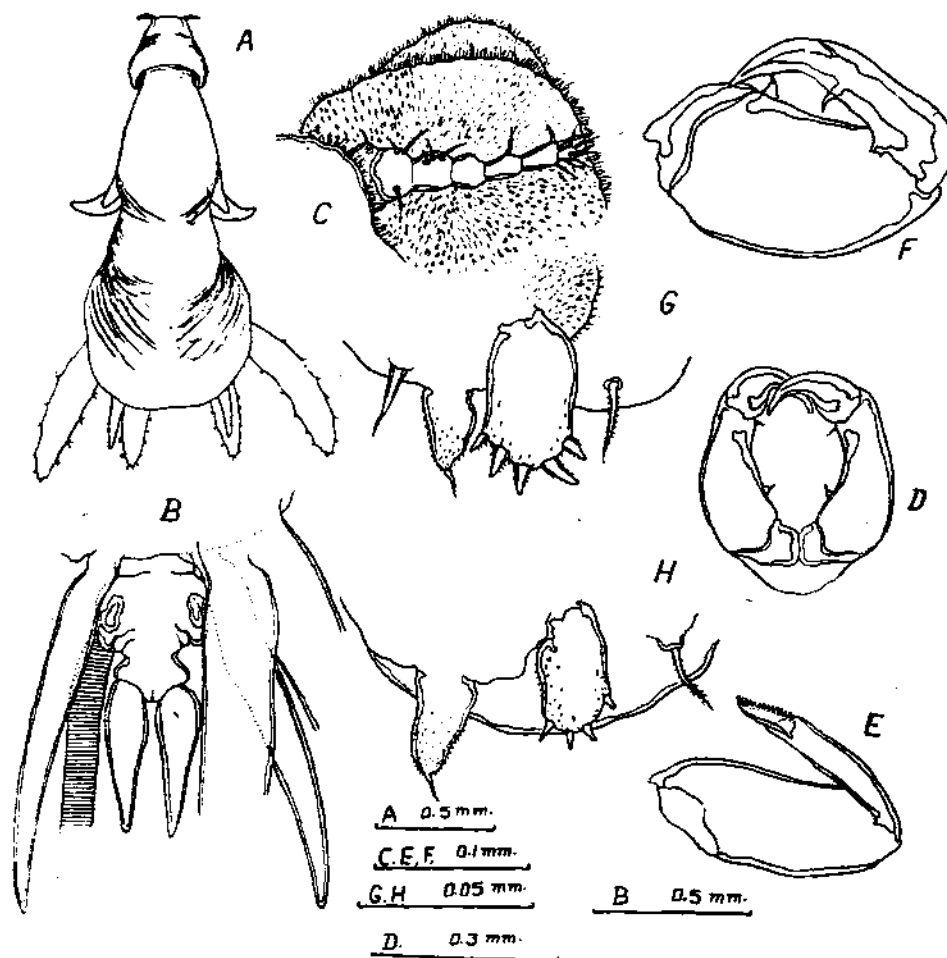


FIG. 10. *Lernanthropus lappaceus* C. B. Wilson. A. female, dorsal view. B. posterior part of body, ventral view. C. first antenna. D. second antenna. E. first maxilliped. F. second maxilliped. G. first leg. H. second leg.

First antenna is seven-segmented and moderately setose. Second antenna is three-segmented, second segment has two processes, base of the third segment is swollen. Second segment of the first maxilliped is distally spiny and produced beyond the base of the claw, the claw is armed with two rows of small teeth. Second segment of the second maxilliped has an inner process and the third segment has a sharp spine.

Basis of first leg carries an outer and an inner spine, exopod is stout and armed with five teeth, endopod has a small spinule. In the second leg the protopod lacks the inner spine and the exopod has only four teeth. Third leg is biramous and com-

paratively small. Fourth leg is biramous and reaches beyond the dorsal plate ; both rami have groups of marginal denticles which make the border irregular ; the exopod is longer than the endopod and is somewhat club-shaped. Fifth leg is uniramous and shorter and narrower than the endopod of the fourth leg ; it carries a few marginal spines. Anal laminae steadily narrow to the apex which carries two small setae.

Length : 4.0 mm.

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