

STUDIES ON THE FAUNA OF CURAÇAO AND OTHER
CARIBBEAN ISLANDS: No. 66.

COPEPODA ASSOCIATED WITH WEST INDIAN
INVERTEBRATES - II

Cancerillidae, Micropontiidae (Siphonostoma)

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Family **CANCERILLIDAE** Giesbrecht, 1897

This family is represented in our collections by adults of a single species only, from Curaçao. Since, in our opinion, this species constitutes a new genus which extends the anagenetic trend characterizing the Cancerillidae, it seems of particular interest. One copepodid stage, possibly of a different species, was also found. No other cancerillids are known from the West Indies.

Ophiopsyllus n.g.

Diagnosis. ♀. Cancerillid copepods in which the expanded cephalosome occupies about $\frac{3}{4}$ of the total length. Three metasomal segments discernible but all very much reduced. Urosome consisting

mainly of genital and anal segments. Genital segment incorporating somite of leg 5. Two ovisacs, each with 2–3 large eggs. — First antenna 6-segmented. Second antenna biramous, the exopod represented by a small knob with one seta; the appendage 4-segmented, with a strong terminal claw. Mandible a unimerous stylet. First maxilla a single lobe. Second maxilla consisting of a large basal segment and a strong claw. Maxilliped resembling second maxilla but both segments armed. Three pairs of legs. Leg 1 biramous, with unimerous rami. Legs 2 and 5 consisting each of a single segment bearing setae. Legs 3 and 4 absent.

♂. Very similar to the female, but slightly smaller. The main differences in the genital segment.

Both sexes associated with ophiuroids.

Type and only species: *Ophiopsyllus reductus* n.sp.

The names are derived: *Ophiopsyllus* originally from the Greek *ὄφις*, a serpent (hence "ophio-", a common prefix for the names of serpent-stars) and *ψύλλα*, a flea; thus, "associate of ophiuroids"; *reductus* (Latin, = reduced), referring to the reduction of segments and appendages. Gender of the genus: masculine.

***Ophiopsyllus reductus* n.sp.**

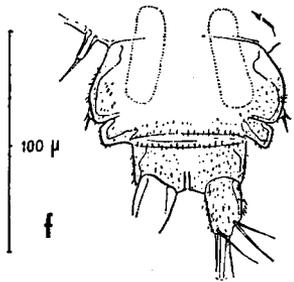
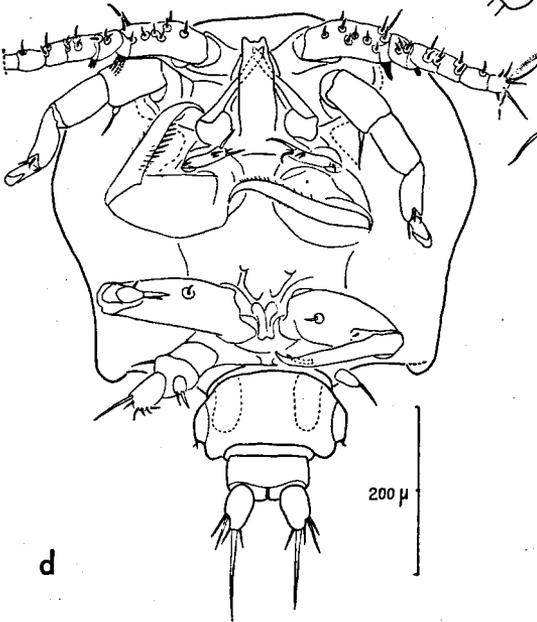
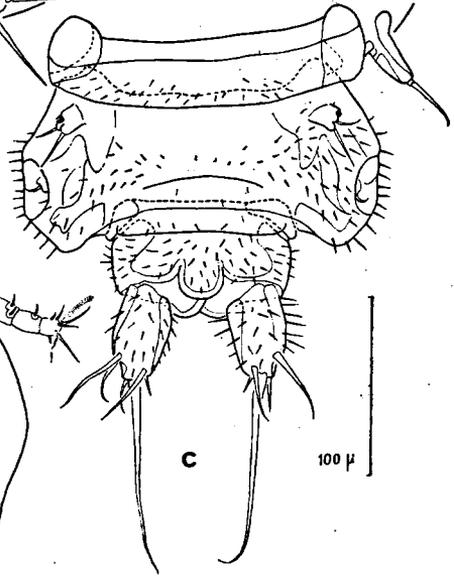
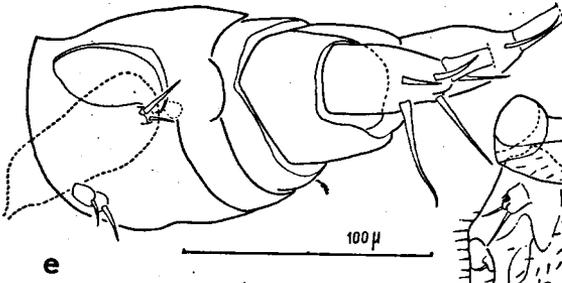
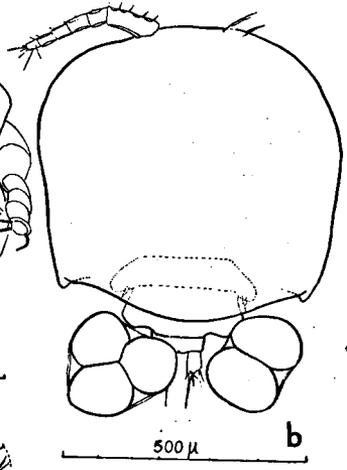
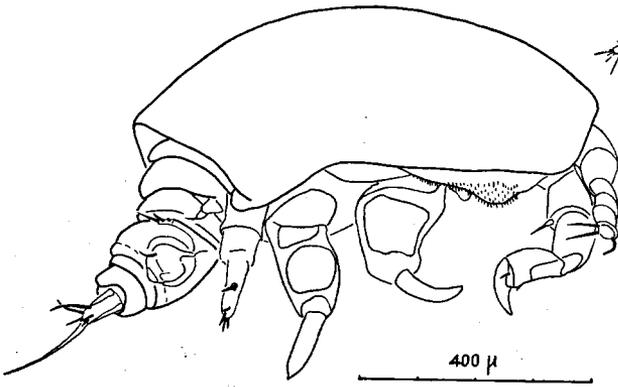
(Figs. 1–3)

Type material. — CURAÇAO: 23 females and 14 males from the arms of the brittle-star *Ophiocoma echinata* (Lamarck), Piscadera Bay; collected by J. H. Stock, September 29, 1958, in about 1 meter of water. — Holotype female, allotype male and 28 paratypes are deposited in the Zoölogisch Museum, Amsterdam (cat.nr. Co.100.693); the remaining paratypes in the United States National Museum, Washington.

Female. — The body (fig. 1a) is curved, with the concave side ventral. The average length of 10 specimens was 0.68 mm (measured with the animal on its side; range, 0.61–0.78 mm); width 0.60 mm (0.51–0.66 mm). In life, the body is colorless and opaque, with wine-red spots; eye red; eggs orange-brown.

The cephalosome, which includes somites through that of the maxillipeds, is by far the largest tagma. It is very slightly shorter

Fig. 1. *Ophiopsyllus reductus* n.g., n.sp. — a (top left), habitus, lateral (♀); b, habitus, dorsal (♀); c, urosome and parts of last 2 metasomal segments, dorsal (♀); d, habitus, ventral (♂) — left leg 1 and right leg 2 omitted, also spinules on body and, for the most part, on appendages; e, urosome (♂), viewed *in situ* from the right side and somewhat posteriorly; f, urosome (♂), ventral.



than wide and, although expanded (fig. 1b), is not greatly inflated (fig. 1a). In dorsal view, the tergal complex usually conceals all the head appendages except the first antennae, and, because of the body's curvature, may obscure the segments as far as the genital. The posterolateral corners of the cephalosomal tergum are slightly produced posteriad. The heavy sclerotization is penetrated by numerous fine canals and, in addition, many spinules are scattered over the dorsal surface.

A pair of highly refractile internal structures show up very clearly in lactic acid mounts, just lateral to the insertion of the second antennae. Each is an irregularly bulbous body joined to the ventral surface by a thick stalk. These structures appear to be endophragmal in nature but no muscles could be seen to insert on them.

A lateral view (fig. 1a) is particularly instructive in determining the segmentation of the body. Behind the cephalosome occur what we interpret as 3 metasomal segments, the 2 most anterior each bearing a pair of legs. The tergum of the second metasomal segment is clearly defined. The genital segment, which apparently incorporates the somite of leg 5 in addition to the complex of 2 somites usual in cyclopoids, follows the third metasomal segment. The second of the 2 "true" genital somites is clearly visible in dorsal or lateral views. Between the genital and anal segments there is also a small segment. Many of these reduced segments cannot easily be made out in ventral view and dorsally their relationships are not always clear.

The ventral surface of the urosome is covered with long spinules; dorsally these are less numerous, as shown in fig. 1c. The exoskeleton is thick.

The genital segment is about half the width of the cephalosome. It is produced laterally and somewhat posteriorly on either side. The genital areas, where the egg sacs originate, lie at the tips of these extensions. In each genital area there is a single backwardly-directed seta (fig. 3g).

The egg sacs may contain 2 eggs (arranged transversely in a cylindrical sac) or 3 (in a triangular sac). The membrane of the egg sac is unusually thick.

The anal segment is half as wide as the genital. The terminal anus furrows it posteriorly for about half the length of the segment, and

there is a small smooth anal plate dorsally. The caudal rami insert somewhat dorsally at either side of the distal end.

The position of the appendages is shown in fig. 1d (male).

The rostral area is largely obscured in ventral view by the forwardly-directed oral cone. It is defined by thickenings in, rather than differentiated from, the ventral exoskeleton of the head.

The first antenna (fig. 2a) is 6-segmented. The second segment is larger than the others. The numerous long spinules over the whole appendage make determination of the true armature difficult, but the disposition of setae appears to be: 10, 2, 4, 2, 1, and 9. Comparative studies have been a strong factor in our interpretation of the groups of structures on the distal posterior (dorsal) corner of the first and, to a lesser extent, second segments as spinules rather than setae, since siphonostomes in general and cancerillids in particular do not have true elements on this surface. There is a single aesthete distally on the anterior (ventral) surface of the last segment (fig. 2b).

The second antenna (fig. 2c) is 4-segmented and densely covered with short spinules. A seta, which presumably represents a remnant of the exopod, arises from a small knob on the distal posterior edge of the second segment; a smaller seta is present on the distal anterior corner of segment 4; and one on either side of the apical claw. The claw itself is strong and hook-like (fig. 2e).

The oral cone extends anteriorly, its tip reaching just to the edge of the head. Its outlines are indistinct. Within it, the tips of the mandibles, which reach to the end, can be seen to cross.

The mandible (fig. 2f) consists of a unimerous stylet, somewhat curved in the middle, articulating on a basal portion (not shown in the figure). The end of the stylet is somewhat flattened, enlarged, and longitudinally striated; its inner edge bears 7-8 serrations.

At the level of the mandibles there is a spinulose buttress-like extension of the cephalosomal border inwards on either side. This separates the insertions of second antenna and first maxilla. The latter (fig. 2g) is represented mainly by a unimerous lobe with 5 smooth apical setae and a few hairs. This lobe articulates on a basal portion and, close to the line of articulation, a small seta occurs. While it is relatively easy to homologize this seta with the outer lobe in the *Parartotrogus* appendage (compare G. O. Sars, 1915, pl. 79, fig. m), articulation of the inner lobe (which is usually

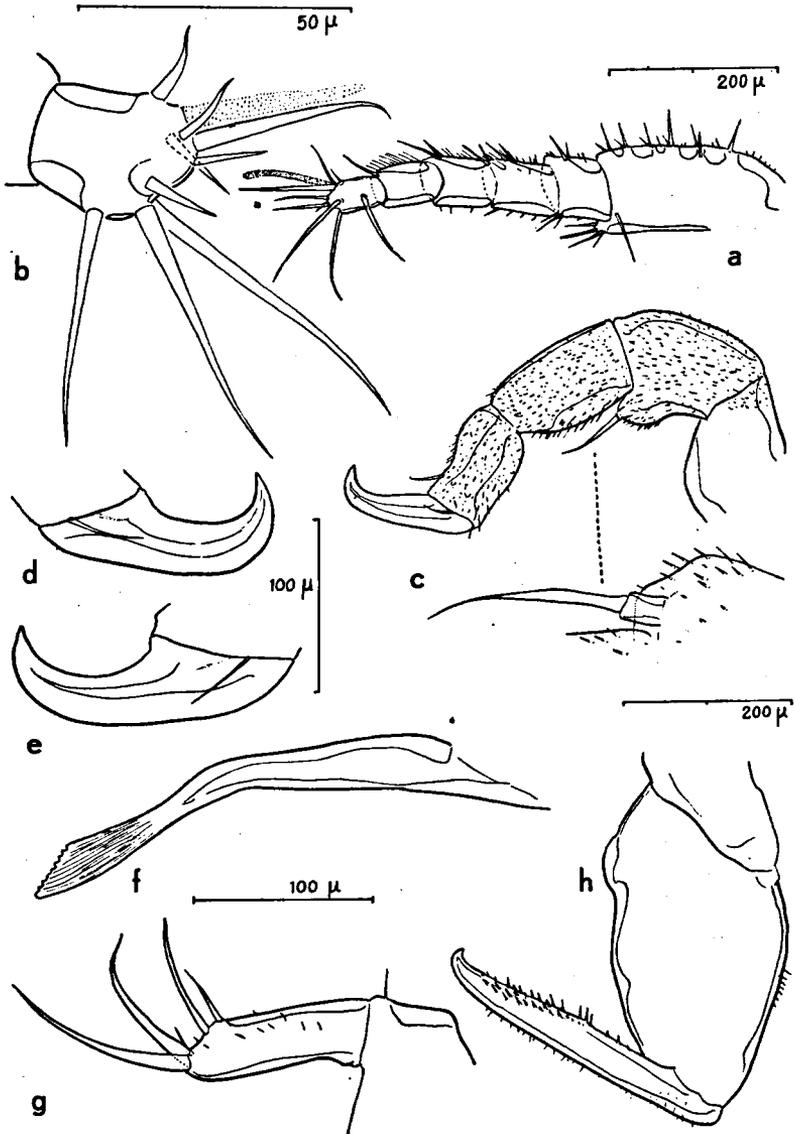


Fig. 2. *Ophiopsyllus reductus* n.g., n.sp. — a, first antenna (♀); b, last segment of right first antenna, dorsal (♀); c, second antenna (♀) and its endopod, more strongly magnified; d, detail of terminal claw on second antenna (♂); e, same (♀); f, blade of mandible (♀); g, first maxilla (♀); h, second maxilla (♀).

considered a gnathobase in siphonostomes) may perhaps best be considered a secondary development in this species.

The second maxilla (fig. 2h) has a stout basal segment and a narrower distal segment. The latter is nearly straight for most of its length but curves terminally into a strong hook (presumably representing an element now confluent with the distal segment). There are no setae but the distal segment bears numerous spinules on the anterior and medial surfaces.

The maxilliped (fig. 3a) is very similar to the second maxilla but the strong basal segment is armed on its ventral side with 2 small setae. This armature suggests that the basal segment represents the first 2 segments in the *Cancerilla* appendage. There are fewer spinules on the distal segment than in the maxilla. Also, breaks in the sclerotization (fig. 3b) indicate more definitely that the terminal curved portion represents an original hook-like element. Posterior to this there is a smaller auxiliary hook.

There is no trace of a postoral protuberance.

Only 2 pairs of metasomal legs are present. Leg 1 (fig. 3c) consists of a 2-segmented protopod and 2 unimerous rami. The limit of the coxa is indicated on its inner side by a sclerotization and there is a medial extension from the base of the leg which almost meets the corresponding process from the other side, being joined to it by a sclerotized ridge; the 2 processes and the ridge represent the only remnant of the intercoxal plate. The basis bears a lateral seta. The exopod is twice the size of the endopod and bears 7 setae arranged as shown in the figure. The endopod bears only 2 setae, both almost terminal. Minute spinules cover most of the leg. Leg 2 (fig. 3d) is borne far laterally on the metasomal segment. There is no trace of an intercoxal plate. On the finger-shaped segment which forms the main mass of the leg is a minute terminal knob carrying a single smooth seta nearly as long as the leg.

Laterodorsally on the genital segment, just behind its insertion on the third metasomal segment (fig. 1c), lies a pair of appendages. Because of their position, structure and separation from leg 2 by a naked segment, as well as by comparison with other cancerillids, we interpret these as leg 5 (fig. 3e) rather than as leg 3 (or leg 4). Each is unimerous, carrying a terminal seta, one on the outer side, and 2, small spine-like elements nearer the base.

Leg 6 may be represented by the single seta in the genital area (fig. 3g).

The caudal ramus (fig. 1c) is about as long as the anal segment, 1.75–2 times as long as wide. It is armed with 2 lateral setae inserted a short distance from the tip of the ramus, 3 terminal setae, the middle one being the longest (longer than the anal segment and caudal ramus combined), and one subapical seta dorsally on the inner side. All the caudal setae are smooth.

Male. – Very similar to the female in the shape of the body (fig. 1d) and appendages. The average length is 0.64 mm (range, 0.62–

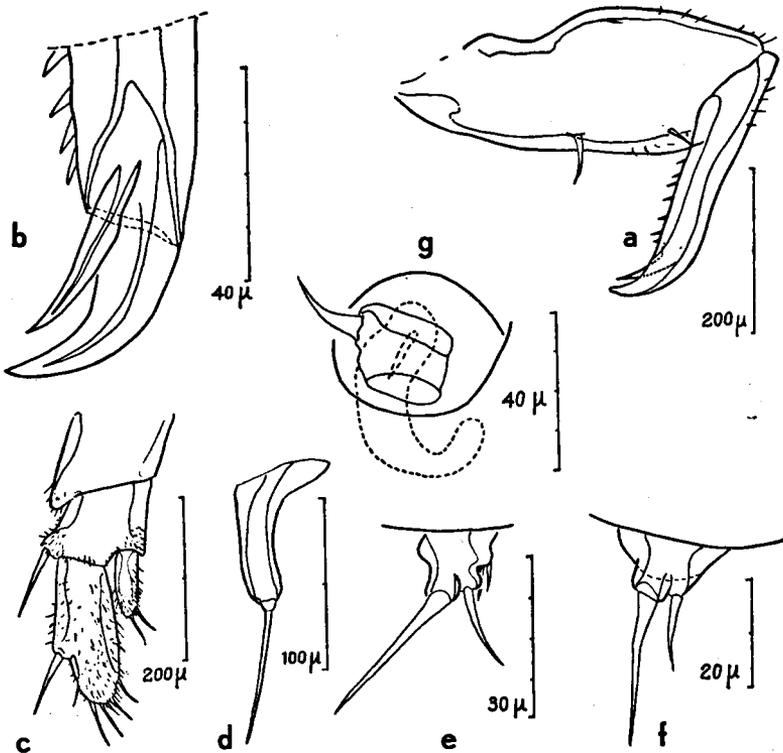


Fig. 3. *Ophiopsyllus reductus* n.g., n.sp. – a, maxilliped (♀); b, distal end of right maxilliped, posterior (♀); c, leg 1 (♀); d, leg 2 (♀); e, right leg 5 (♀), dorsal *in situ* on an isolated urosome (upper line indicates posterior edge of third metasomal segment); f, right leg 5 (♂), dorsal *in situ*, from an undissected animal; g, right genital area (♀), lateral.

0.67 mm), the width 0.51 mm (0.49–0.53 mm), based on 7 specimens. The male is thus slightly smaller. The spinulation on the body is somewhat heavier.

The segment corresponding to the second genital somite of the female (fig. 1e–f) is, as usual, more distinct but, although it is differentiated dorsally and laterally, there is no line of articulation ventrally. There is a pair of setae, each borne on a small knob at each postero lateral corner of the genital segment; these probably represent leg 6.

Spermatophores (which serve to establish our specimens as adult males) could be seen within the body (fig. 1e). They are cylindrical.

Leg 5 (fig. 3f) differs from that of the female in lacking the outermost spine-like elements but the other appendages, the rostral area and the oral cone are virtually identical. Fig. 2d shows the claw on the second antenna for comparison with that of the female.

Discussion. – Besides *Ophiopsyllus*, the Cancerillidae comprises with certainty three genera: *Cancerilla* Dalyell, 1851, *Parartotrogus* T. & A. Scott, 1893, and *Cancerillopsis* Stephensen, 1933. The first two formed GIESBRECHT's asterocherid subfamily, the Cancerillinae, which G. O. SARS raised to familial rank in 1915; *Cancerillopsis* was added by STEPHENSEN (1933).

Like *Cancerillopsis*, *Ophiopsyllus* appears to be close to *Cancerilla*. The female habitus is very similar in all three genera; the rostrum, oral cone, mandible, first maxilla, second maxilla, and caudal ramus are virtually identical; and there are only slight differences in the antennae and maxilliped. The females of all the species are closely associated with ophiuroids. The main characters on which we have based the generic separation of *Ophiopsyllus* are: the extreme reduction of segments between the cephalosome and genital segment and between the latter and the anal segment, the retention of 4 segments and a remnant of the exopod in the second antenna, the reduction of the maxilliped to 2 segments, the number and structure of the legs, the lack of extreme sexual dimorphism in structure or habits, and the small number of eggs. Two species of *Cancerilla* (*neozelanica* Stephensen, 1927, and *durbanensis* Stephensen, 1933) approach most closely to this new generic concept. In

both there are only 2 pairs of legs (although the second is biramous) and *C. neozelanica* has a maxillipedal claw like that of *O. reductus*.

It is unfortunate that the male sex is known only in *Parartotrogus* and in one species of *Cancerilla*, since the significance of the condition in *Ophiopsyllus* is thus less certain. In *Parartotrogus richardi* T. & A. Scott, 1893 (according to its authors), there is little sexual difference externally except in the genital segment and first antenna. Both sexes occurred free of a host. The adult male of *Cancerilla tubulata* Dalyell, 1851, however, is so unlike the female in the shape and segmentation of the body, the structure of legs 1, 2, and 5, and its behavior that the species furnishes one of the classic cases among copepods of the two sexes being described originally as representatives of genera which were not thought closely related. Since only females have been discovered in the other species of *Cancerilla* (*neozelanica*, *durbanensis*, *ampla* Heegaard, 1951, and *alata* Heegaard, 1951) and in the monotypic genus *Cancerillopsis*, evidence that these possess similarly dimorphic adults can only be inferential. It does seem possible, however, that the males of *Cancerilla* and *Cancerillopsis* will not prove to be closely associated with ophiuroid hosts, since, if they were, specimens should occur together with the females. The occurrence of male *Ophiopsyllus reductus* on the same host as the female, and the lack of pronounced differences between the sexes, are thus of some interest.

Although *Parartotrogus* is somewhat separate from *Cancerilla*, *Cancerillopsis* and *Ophiopsyllus*, the four genera form a very coherent taxonomic unit. Addition of *Ophiopsyllus* makes possible the following redefinition of the family Cancerillidae:

Siphonostome copepods in which there is a trend toward enlargement of the cephalosome, simplification of its appendages, and reduction of segments behind the head except the genital and anal. This trend is possibly correlated with increasing dependence on a host. Only in adult female *Cancerilla* and *Cancerillopsis* and adults of *Ophiopsyllus* is there a secondary division of the somite of leg 1 from the head.

Rostrum present only in outline. First antenna 9- (*Pararto-*

trogus) to 6-segmented in female ¹⁾); an aesthete present on last segment. Male first antenna geniculate (*Parartotrogus*) or not; 10-segmented in male *Cancerilla* ¹⁾ but as in the female for *Parartotrogus* and *Ophiopsyllus*; with or without aesthetes additional to that of the female. Second antenna 4- or 3-segmented; always bearing a powerful terminal claw; exopod, when present, very rudimentary. Siphon reduced and pointing anteriorly, or absent. Outer lobe of first maxilla present only in *Parartotrogus*, represented by a seta in *Ophiopsyllus*; inner lobe short and strong with at least 3 setae. Second maxilla the usual bimerous prehensile structure, the original articulation of the terminal claw defined only in *Parartotrogus*. Maxilliped with 2-4 segments; 2 terminal claws persistent. Legs 1-4 showing varying stages of reduction, usually of generic significance. Even when best developed, however (*Parartotrogus* and male *Cancerilla*), leg 1 is more reduced than leg 2. Leg 5 usually present but rudimentary. Caudal rami normal.

Associated (except male *Cancerilla* and possibly *Parartotrogus*) with ophiuroids.

The genera can at present be separated most easily by the structure of leg 3: with 2 trimerous rami in *Parartotrogus*; a 2-segmented rudiment in *Cancerillopsis*; with one free segment in *Cancerilla*; and absent in *Ophiopsyllus*. Other characters support this indication of an anagenetic trend remarkably well. However, the second antenna and leg 5 of *Ophiopsyllus* lie morphologically between those of *Parartotrogus* and *Cancerillopsis*.

Other genera have tentatively been associated with the Cancerillidae. T. SCOTT (1901) compared *Cancerina* T. Scott, 1901, with *Cancerilla* as did NORMAN & BRADY (1909) their *Microcancerilla*, although neither genus was formally attributed to the family. Indeed, the first was made a synonym of the poecilostome copepod genus *Seliodes* Levinsen, 1878, by T. SCOTT (1902). *M. coeruleo-*

¹⁾ As GIESBRECHT suggests (compare 1899, Taf. 9 Fig. 45 with Taf. 10 Fig. 10), the antenna of female *Cancerilla* (which is similar to that of *Cancerillopsis* and *Ophiopsyllus*) is probably derived by fusion of segment 1 with 2, and 3 plus 4 with 5 in the *Parartotrogus* pattern. The appendage in the *Cancerilla* male can similarly be homologized with that of *Parartotrogus* by assuming fusion of the *Parartotrogus* segment 1 with 2, and division of segments 6 and 9 each into 2 segments.

cruciata N. & B., however, does exhibit some cancerillid features, but it is not clear whether the anomalies are of taxonomic significance, due to the immaturity of the single specimen, or the result of other causes. Until a more complete description is available, no certain disposition can be made of *Microcancerilla*. T. SCOTT (1902, p. 481) has made *Cancerina confusa* T. Scott, 1901, the only species in this genus, a synonym of the poecilostome copepod *Selioides bolbroei* Levinsen, 1878.

The position of *Stephopontius* Thompson & A. Scott, 1903, which was doubtfully attributed to the Cancerillidae by SEWELL (1949, p. 167), has recently been discussed by HUMES & CRESSEY (1959).

Allantogynus Changeux, 1958, was originally placed by its author "auprès des Cancerillidae Sars", but later (1961) transferred to a new family, the Allantogynidae. We are indebted to Dr. J. BRESCIANI (Charlottenlund) for drawing our attention (*in litt.* to A. G. H., March 23, 1961) to the similarity between *Allantogynus* and *Nanaspis* Humes & Cressey, 1959, and suggesting inclusion of the former in the Nanaspidae H. & C. In our opinion, the resemblance is sufficiently close to warrant considering the name Allantogynidae a junior synonym of Nanaspidae.

A possible relationship between the Cancerillidae, the Nanaspidae, the Stellicomitidae Humes & Cressey, 1958, the Micropontiidae Gooding, 1957, and *Stephopontius* has already been mentioned (HUMES & CRESSEY, 1958, 1959). The association of each of the families with a different group of echinoderms is noteworthy: the Cancerillidae with ophiuroids, the Nanaspidae with holothurians, the Stellicomitidae with asteroids, and the Micropontiidae with echinoids. *Stephopontius typicus* Thompson & Scott, the only species in this genus, occurred "in the general washings from dredged Invertebrates". It is possible, however, that the Micropontiidae are not closely related to the others, since they exhibit differences in the structure of the first antenna and leg 1.

Cancerillid Development

(Fig. 4)

Among the adult *Ophiopsyllus reductus* there occurred a single copepodid (perhaps a Copepodid I stage). CHANGEUX (1957) has described two cancerillid copepodid stages (which were not referred definitely to any species, although *Cancerilla tubulata* Dalyell was mentioned as a possibility) from the ophiuroid *Ophiopsila*

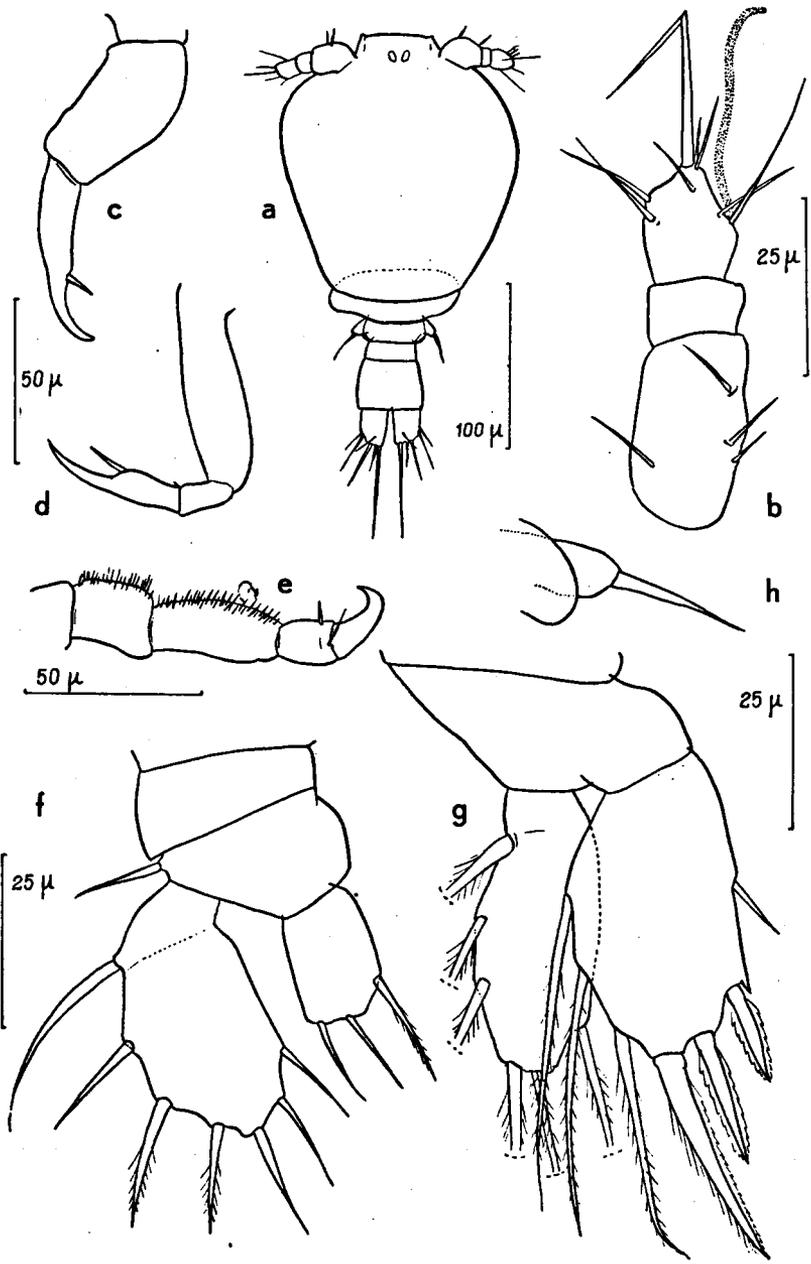


Fig. 4. *Cancerillid development stage*. - a, habitus, dorsal; b, first antenna; c, second maxilla; d, maxilliped; e, second antenna; f, leg 1; g, leg 2; h, leg 3.

aranaea Forbes in the Mediterranean and discussed what is known about development in this family. Since it seems likely that our copepodid represents a stage previous to his earlier instar ("exemplaire no. 2"), although it is most probably referable to a different species, and since it exhibits some interesting features, the form is described here by comparison with adults of *O. reductus*.

The body (fig. 4a) is 0.23 mm long and comprises 5 segments. The segment bearing leg 1 is not differentiated from the head.

The first antenna (fig. 4b) is 3-segmented. There is an aesthete on the terminal segment. The second antenna (fig. 4e) resembles that of *O. reductus* but lacks any trace of an exopod. The second maxilla (fig. 4c) bears an additional strong spine on the inner margin of the claw. The maxilliped (fig. 4d) is 3-segmented, there being 2 segments representing the single distal one in *O. reductus*. The accessory claw is present.

There are 3 pairs of legs, the 2 anterior ones biramous, the third (fig. 4h) consisting of a single knob armed with a seta. It seems probable that this third pair of legs represents leg 3 rather than the leg 5 of *O. reductus*. Leg 1 (fig. 4f) bears 1 seta on the basis, 3 on the endopod and 7 on the exopod; 3 of these setae are ciliated as shown in the figure. Leg 2 (fig. 4g) bears 6 ciliated setae on the endopod; 3 ciliated setae, 3 spines and a rudimentary outer element on the exopod.

The caudal rami are armed as in *O. reductus*.

Characters which suggest that this copepodid represents an earlier stage than either of CHANGEUX' are the 5-segmented body and the 3-segmented first antenna. However, it is difficult to evaluate many of the differences: the smaller size of ours, the less numerous setae on the first antenna, the "more primitive" second maxilla and legs 1-2, and the less well-developed leg 3 (labeled "P5" on CHANGEUX' fig. 23 but referred to in the text as the third pair of legs) may be generic, specific or even sexual characters, rather than true indications of differences between successive instars.

We hesitate to identify this copepodid as *O. reductus*, in the absence of a series of stages linking it to the adult, since the second antenna lacks any trace of what we interpret as an exopod. In an effort to obtain more developmental material, a further collection was made in the type locality; it contained 2 presumed Copepodid V stages which were definitely referable to *O. reductus*. These resemble the adult closely in most features, but the exopod of the second antenna is even more strongly developed. We suggest, then, that a second cancerillid may occur in the West Indian fauna. However, we should also like to stress the significance of the alternative: that, if this Copepodid I represents *O. reductus*, in the development of this species' second antenna the basic exopod is either lost, a secondary structure developing in the late instars, or it never develops until the late instars. This is a point to which especial attention might well be paid by any one working on cancerillid development in the future.

Family MICROPONTIIDAE Gooding, 1957

The Micropontiidae is at present monotypic. The genus *Micropontius* was established for a single species, *M. ovoides* Gooding, 1957, found in the washings of spatangoid sea-urchins at Plymouth, England, and off Concarneau, France. *M. ovoides* has since been reported from the Mediterranean (Stock, 1960) and off the west

coast of Sweden (BRESCIANI & LÜTZEN, 1962). In our collections from Jamaica there occurred what we consider to be a new species of *Micropontius*.

***Micropontius glaber* n.sp.**

(Figs. 5-7)

Type material. — JAMAICA: 117 females and 29 males from alcohol washings of a single cake-urchin, *Meoma ventricosa* (Lamarck), north side of Lime Cay, off Kingston; in sand at about 5 meters depth of water; August 30, 1959. — Holotype female, allotype male, and 36 paratypes have been deposited in the United States National Museum, Washington; 36 paratypes in the Zoölogisch Museum, Amsterdam; 36 paratypes in the British Museum (Natural History), London; and the remainder in the collection of A. G. Humes.

The drawings, except fig. 5f, have been made from a single female and a male.

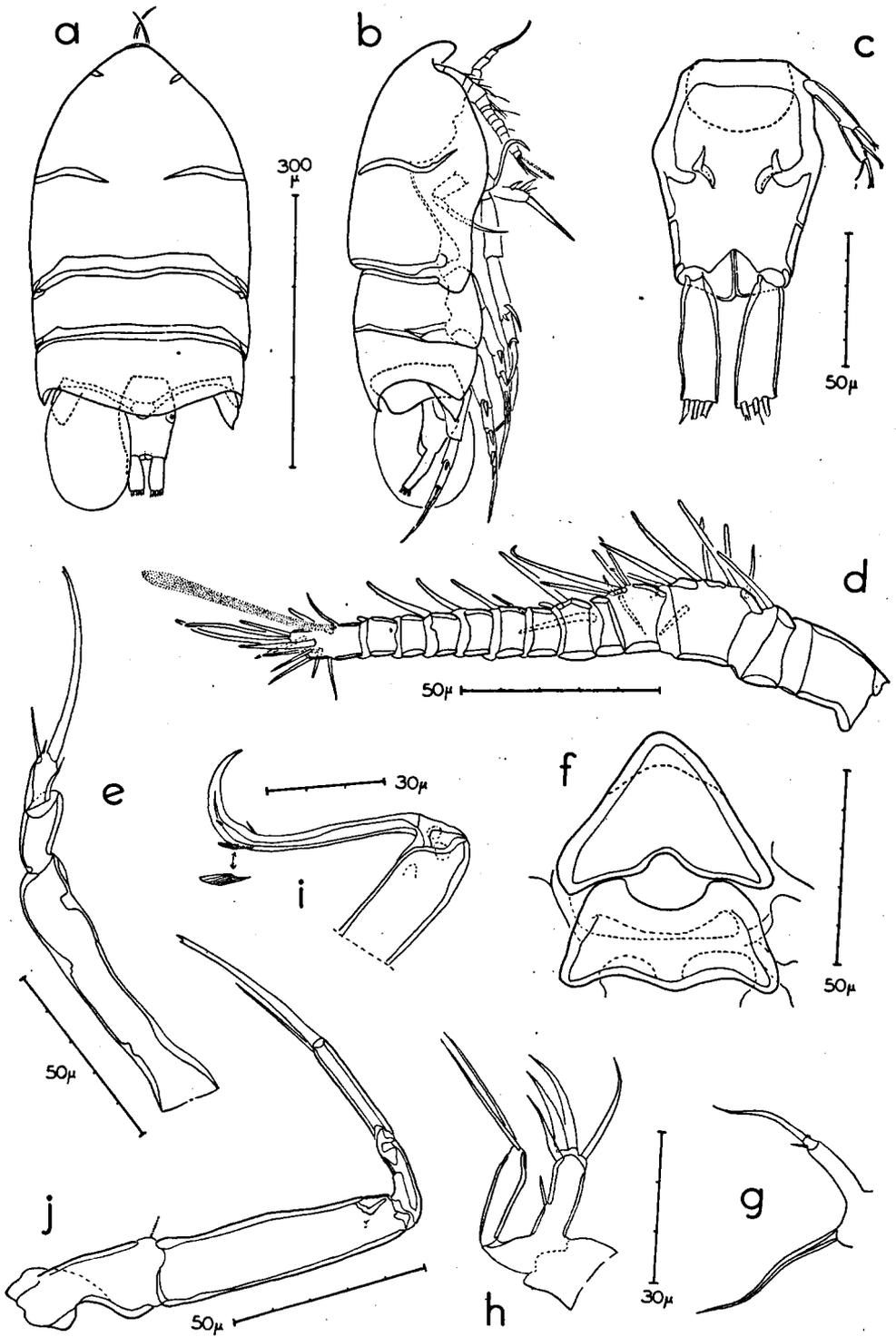
The specific name (Latin, *glaber* = smooth) refers to the absence of the body setae which characterize *M. ovoides*.

Other specimens (all from *Meoma ventricosa*). — JAMAICA: 10 females and 6 males from 3 hosts, 9 females and 17 males from 5 hosts, west side of Rackham's Cay, off Kingston; from sand in 1-2 meters of water; August 31, 1959.

Female. — The form of the body and appendages is similar to *M. ovoides*; the arrangement of the appendages is identical. The length of the body (figs. 5a-5b) is 460 μ (average of 10 specimens; range, 450-471 μ); the greatest width, at the level of leg 1, 229 μ (226-234 μ). This species is thus slightly larger than *M. ovoides*. The posterior margin of the third segment (the "apron") is rather inconspicuous in dorsal view so that the prosome appears to terminate in the rather more heavily thickened and sinuous edge of the fourth segment (indicated by two dashed lines in fig. 5a), although this is almost completely covered by the "apron".

The long setae on the ventrolateral edges of the prosome which are so notable a feature in *M. ovoides* do not occur in *M. glaber*. Sometimes, however, hair-like elements similar to those on the dorsal surface may be found in the same positions.

More than half the urosome (fig. 5c) is exposed in dorsal view. Although this tagma (excluding the caudal rami) has approximately the same length: width ratio as that of *M. ovoides*, the dorsal or ventral outline is spindle-shaped rather than subquadrate. The genital areas are dorsolateral and free of armature. Complex sclerotizations extend ventrally at this level. It is probable that the



somite of leg 5, a genital segment complex (of 2 somites), a post-genital and an anal somite are all represented in the urosome, but none of these is differentiated. The anus is terminal.

A single egg is borne on either side by ovigerous females. In a few cases, one or both of the eggs were dumbbell-shaped, but these were probably abnormal.

The rostrum is like that of *M. ovoides*.

The first antenna (fig. 5d) has 13 segments (a single segment without articulation or line of fusion represents the 2 terminal ones in *M. ovoides*). The armature is (proximal to distal segments): 0, 1, 9, 6, 1, 1, 1, 1, 1, 0, 0, 12 setae and one aesthete.

A small finger-shaped projection of unknown significance occurs on the ventral side of the sixth and twelfth segments. Many of the setae have truncate tips which can be seen under oil-immersion objectives to vary from the rounded form shown in the figure through a single acuminate process of uncertain size to a minute bifurcation (compare the caudal setae: fig. 5c).

If the terminal claw is interpreted as an element rather than a segment, the second antenna (fig. 5e) has 3 segments; however, there is some indication of a fourth segment near the insertion of the appendage. No trace of an exopod could be seen. The terminal segment bears a long slender claw with a notched tip and a small seta.

The oral cone (fig. 5f, and cf. fig. 7e) and the mandible (fig. 5g) are as in *M. ovoides*. The smaller of the elements on the mandibular palp is here minute.

There are 5 setae on the inner branch of the first maxilla (fig. 5h), decreasing in length outwards. The outer ramus seems articulated with the basis.

Fig. 5. *Micropontius glaber* n.sp., female. — a, habitus, dorsal; b, habitus, lateral; c, urosome, ventral (right leg 5 omitted); d, right first antenna, ventral (= posterior); e, right second antenna, dorsal; f, oral cone, ventral *in situ* (from a different female); g, left mandible, posterior; h, right first maxilla, posterior; i, right second maxilla, ventral (= outer); j, right maxilliped, outer (= anterior).

The second maxilla (fig. 5i) is 2-segmented. The second segment extends into a slender hook, on which there is a rather well-marked flange (rather than the spinule in *M. ovoides*) on the outer side of the region of greatest curvature.

There is a narrow space which extends quite far dorsally (fig. 5b) on either side of the body between the insertions of the second maxillae and of leg 1. Each space is bounded on the outer side by the ventrolateral extensions of the cephalothoracic tergum and inwardly by the central raised area on which the appendages insert. In these spaces lie the maxillipeds.

Each maxilliped (fig. 5j) is 4-segmented (the claw, as in the case of the second antenna, being interpreted as armature). The small seta shown on the basal segment may sometimes be lacking. The tip of the claw is notched like that of the second antenna.

In ventral view, the postoral protuberance appears as in fig. 6a; laterally it forms a prominent keel (cf. fig. 7b).

Legs 1-5 (figs. 6 b-g) differ from those of *M. ovoides* mainly in the relative lengths of segments and armature. The ventral process on the second endopod segment of leg 1 is continued as a well-defined boss the whole length of the segment (fig. 6c); leg 2 bears a similar boss. In some specimens, the second endopod segment of leg 1 is ciliated as in *M. ovoides*. The 2 outer spines on this endopod are also spinulose although this does not show in the view from which the figure was made. Between the 2 terminal spines on the exopod of leg 1 there occurs a setule-like structure whose thin cuticularization often masks its basal articulation. On the posterior legs this structure is replaced by a spinous process like that often found here in other copepods.

The caudal ramus (fig. 6h) is about $3\frac{1}{2}$ times as long as wide ($2\frac{1}{2}$ in *M. ovoides*), being rather wider distally than near its insertion. There are 4 truncate setae, one placed more dorsally, and a dorsal hair on the end.

Male. - The body of the male is even more perfectly oval in dorsal (fig. 7a) or ventral views than in *M. ovoides*, since the posterior extensions of the fourth segment sheath the sides of the urosome (fig. 7c) closely for about half the latter's length. Laterally (fig. 7b) the body is not quite so deep and the postoral protuberance

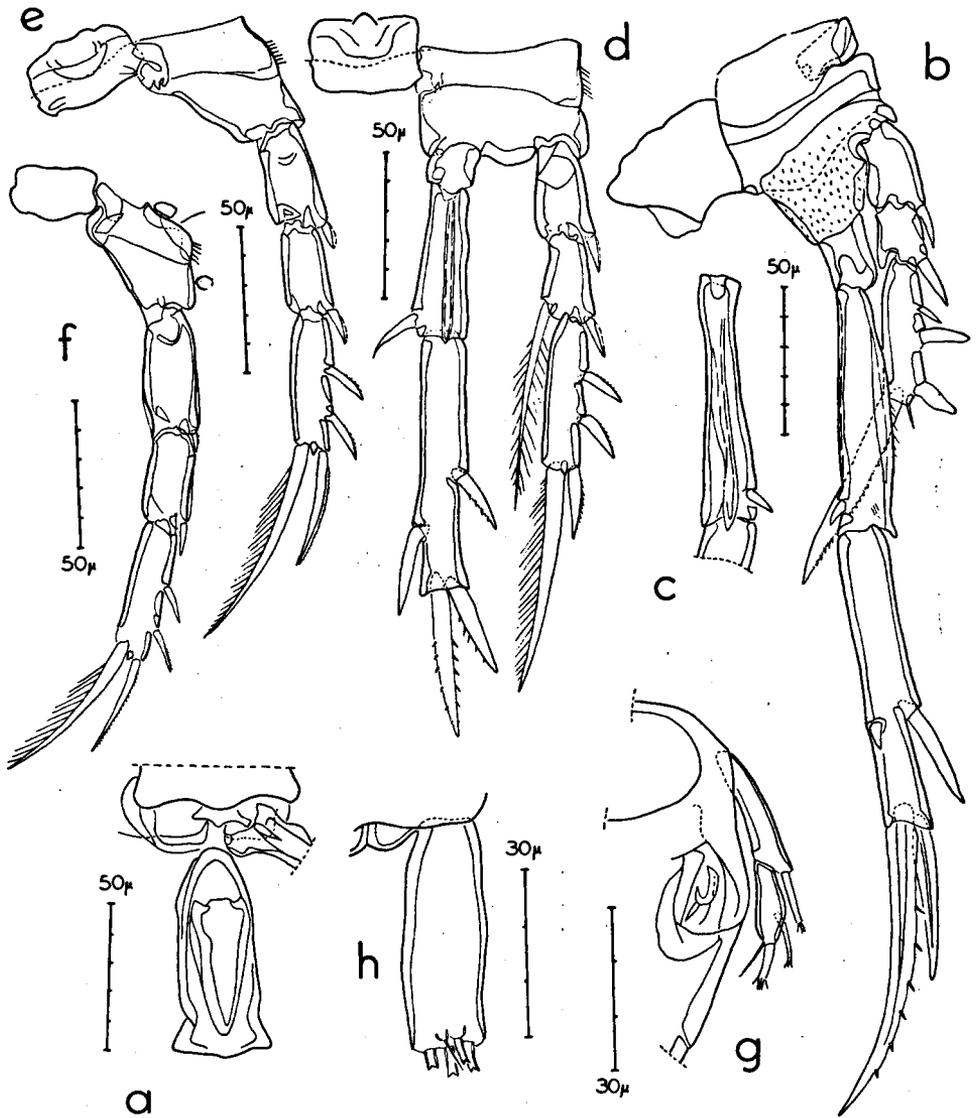


Fig. 6. *Micropontius glaber* n.sp., female. — a, postoral protuberance (with posterior edge of oral cone and base of left maxilliped), ventral and slightly from the right; b, left leg 1 and intercoxal plate, ventral (endopod somewhat medial); c, right endopod segment 2, ventral; d, left leg 2 and intercoxal plate, ventral; e, left leg 3 and intercoxal plate, ventral; f, left leg 4 and intercoxal plate, ventral; g, right side of genital region and leg 5, dorsal; h, right caudal ramus and part of anal area, dorsal.

is more prominent. The length is 425 μ (based on 10 specimens; range, 411–434 μ); width, 205 μ (200–211 μ).

Spermatophores, seen within the body, are ovoid bodies, about 65 \times 40 μ .

The rostrum, second antenna, oral cone (fig. 7e), mandible, first maxilla, second maxilla, maxilliped, postoral protuberance and legs 1–5 are identical with those of the female.

The first antenna (fig. 7d) is 11-segmented, with an armature of: 0, 1, 9, 6, 1, 1, 2, 1, 1, 0, 12 setae and one aesthete. It seems probable from this arrangement of elements that segment 7 of the female pattern has fused with 8, and 11 with 12, to form the male structure. As in *M. ovoides*, the appendage is weakly prehensile and possesses a larger aesthete than in the female.

Leg 6 is represented by a flap covering each genital opening. As in *M. ovoides*, the genital openings are large and surrounded by a heavy exoskeletal framework (fig. 7c). The free end of the leg flap faces diagonally inward and posteriorly. A single inconspicuous setule is borne at the posterior corner.

The caudal rami, like those of the *M. ovoides* male, are very small in comparison with those of the female, and are set more ventrally (fig. 7c). They are armed as in the female.

Discussion. – *M. glaber* appears to be very similar to *M. ovoides*. The main differences between the two have been mentioned in the description. Those which we consider significant in diagnosing the new species are: the lack of setae on the sides of the body segments, the arrangement of the posterior part of the body, the shape of the urosome in the female, the proportions of the segments and elements of legs 1–4, and the longer, flatter caudal rami. Of these, the second is perhaps the easiest to distinguish, *viz.*:

“Apron” of fourth segment in female covering urosome dorsally to base of caudal rami; posterior projections of this segment in male extending beyond urosome and separate from it *ovoides*

“Apron” of fourth segment in female covering urosome in dorsal view only to genital areas; posterior projections of this segment in male less than half length of urosome and sheathing it closely *glaber*

This similarity between the two species would make any account of the genus *Micropontius* repetitive of the specific descriptions. Furthermore, in the absence of closely related forms, it is not clear which characters should be considered of generic rank and which pertain to the family. Additional information is thus necessary to clarify the generic concept.

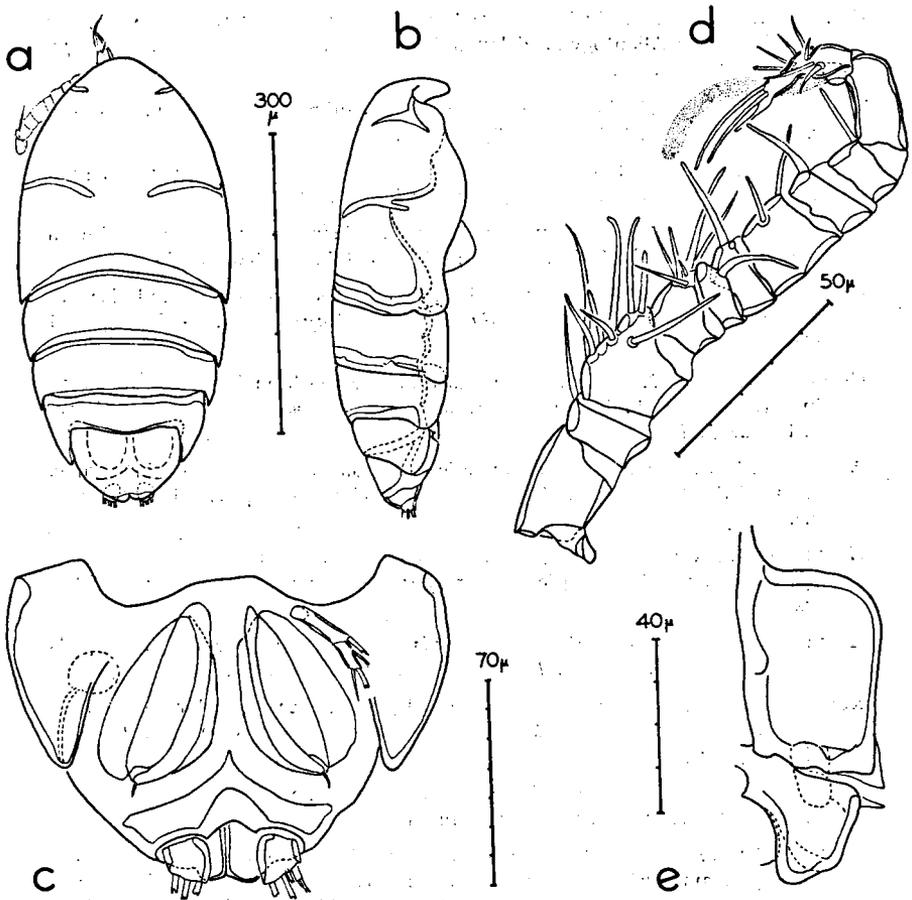


Fig. 7. *Micropontius glaber* n.sp., male. - a, habitus, dorsal; b, habitus, lateral; c, urosome and posterior extensions of fourth segment (right leg 5 omitted); d, right first antenna, dorsal (= anterior); e, oral cone from the right side.

REFERENCES

- BRESCIANI, J. & LÜTZEN, J., 1962. Parasitic copepods from the west coast of Sweden including some new or little known species. *Vid. Medd. Dansk naturh. Foren.* 124, p. 367-408, 9 figs.
- CHANGEUX, J.-P., 1957. Description de deux stades larvaires d'un Copépode Cancerrillidae, parasite sur *Ophiopsila aranea* Forb. *Vie et Milieu* 8, p. 297-311, 25 figs.
- CHANGEUX, J.-P., 1958. Quelques caractères biologiques d'un Copépode parasite d'Holothuries: *Allantogynus delamarei* n.g., n.sp. *C. R. Acad. Sci. Paris* 247, p. 961-964, 1 fig.
- CHANGEUX, J.-P., 1960. Contribution à l'étude des animaux associés aux Holothuries. *Actualités sci. techn.*, no. 1284, 124 pp.
- DALYELL, Sir JOHN, 1851. *The powers of the Creator displayed in Creation*, etc. John van Voorst, London. 2 vols. (Copepoda: vol. 1, p. 223-268).
- GIESBRECHT, W., 1897. System der Ascomyzontiden, einer semiparasitischen Copepoden-Familie. *Zool. Anz.* 20, no. 521, p. 9-14, no. 522, p. 17-24.
- GIESBRECHT, W., 1899. Die Asterocheriden des Golfes von Neapel und des angrenzenden Meeres-Abschnitte. *Fauna Flora Neapel* 25, vi + 218 pp., 11 pls.
- GOODING, R. U., 1957. On some Copepoda from Plymouth, mainly associated with invertebrates, including three new species. *Jour. mar. biol. Ass. U.K.* 36, p. 195-221, 6 figs.
- HEEGAARD, P. E., 1951. Antarctic parasitic copepods and an ascothoracid cirriped from brittle-stars. *Vid. Medd. Dansk naturh. Foren.* 113, p. 171-190, 7 figs., 2 pls.
- HUMES, A. G. & CRESSEY, R. F., 1958. A new family containing two new genera of cyclopoid copepods parasitic on starfishes. *Jour. Parasitol.* 44, p. 395-408, 8 pls.
- HUMES, A. G. & CRESSEY, R. F., 1959. A new family and genus of cyclopoid copepods parasitic on a holothurian. *Jour. Parasitol.* 45, p. 209-216, 3 pls.
- NORMAN, A. M. & BRADY, G. S., 1909. The Crustacea of Northumberland and Durham. *Trans. nat. Hist. Soc. Northumberland*, N.S., 3, p. 252-417, 3 pls.
- SARS, G. O., 1915. *An account of the Crustacea of Norway*, etc., vol. 6, pts. 9 and 10, p. 105-140, pls. LXV-LXXX. Bergen Museum.
- SCOTT, T., 1901. Notes on gatherings of Crustacea collected for the most part by the Fishery Steamer "Garland" and the Steam Trawler "St. Andrews" of Aberdeen and examined during the year 1900. *Rep. Fish. Bd. Scotland* 19, pt. 3, p. 235-281, pls. xvii-xviii.
- SCOTT, T., 1902. Notes on gatherings of Crustacea collected by the Fishery Steamer "Garland" and the Steam Trawlers "Star of Peace" and "Star of Hope", of

- Aberdeen, during the year 1901. *Rep. Fish. Bd. Scotland* 30, pt. 3, p. 447-485, pls. xxiii-xxv.
- SCOTT, T. & SCOTT, A., 1893. On some new or rare Crustacea from Scotland. *Ann. Mag. nat. Hist.* (6) 12, p. 237-246, pls. xi-xiii.
- SEWELL, R. B. S., 1949. The littoral and semi-parasitic Cyclopoida, the Monstrilloida and Notodelphyoida. *Sci. Repts. John Murray Exped.* 9, no. 2, 199 pp., 41 figs., 1 map.
- STEPHENSEN, K., 1927. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16. XL. Crustacea from Auckland and Campbell Island. *Vid. Medd. Dansk naturh. Foren.* 83, p. 289-390, 33 figs.
- STEPHENSEN, K., 1933. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16. LXIV. Some new copepods, parasites of ophiurids and echinoids. *Vid. Medd. Dansk naturh. Foren.* 93, p. 197-213, 7 figs.
- STOCK, J., 1960. Sur quelques Copépodes associés aux Invertébrés des côtes du Roussillon. *Crustaceana* 1, p. 218-257, 20 figs.
- THOMPSON, I. C. & SCOTT, A., 1903. Report on the Copepoda collected by Professor Herdman at Ceylon in 1902. *Rep. Pearl Oyster Fish. Manaar*, pt. 1, Suppl. Rep. no. 7 p. 227-307, 20 pls.