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Isopoda Asellota and *Flabellifera* from Ceylon

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ABSTRACT

Four species of Isopoda from interstitial habitats and springs in Ceylon are reported. *Protojanira lucei* n. sp., a spring-living species, belongs to a genus hitherto only known from South Africa. Of the three species found in marine sandy beaches, *Microcerberus singhalensis* is new, while *M. predatoris* and *Angeliera phreaticola* have been reported from India.

The Isopoda collected by the Lund University Ceylon Expedition in 1962 are for the most part terrestrial and only a few species were found in springs and in littoral interstitial habitats. This last group is dealt with here. Two of the four species found belong to the family Janiridae (Asellota) and two belong to the sub-order Microcerberidea (Flabellifera). Two of the four species are new. The descriptions are given below.

The type material belongs to the Zoological Museum, Lund.

Family *Janiridae*

Protojanira Barnard, 1927

Protojanira lucei n. sp. (Figs. 1–17)

Locus typicus: North Central Province, Ritigala National Reserve, 8 miles NW. Habarana. In a rheocrene between boulders, with sandy bottom. Loc. 56:1. Leg. P. Brinck, H. Andersson and L. Cederholm. Sample from 8.II.1962, with 3 males (holotypus and paratypi) and 6 females (allotypus and paratypi).

Male (Holotypus): Length 4.5 mm. Body elongate, with peraeon segments 1–5 broader than long and peraeon segments 6–7 longer than broad. Head about as long as broad, pleotelson longer than broad. Eyes completely absent. First segment of pleon fused with second but distinguished by a deep suture nearly covered by the distal margin of last peraeon segment. Side-plates undistinguished.

Antennula as long as head with a 7-jointed flagellum.

Report No. 6 from the Lund University Ceylon Expedition in 1962 (P. Brinck, H. Andersson, L. Cederholm).

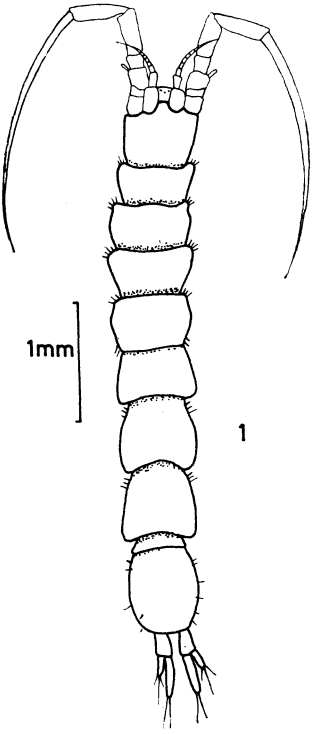


Fig. 1

Figs. 1–17., *Protojanira lucei* n. sp. Fig. *1*: ♂, dorsal view; *2*: peraeopod 1, ♂; *3*: peraeopod 7, ♂; *4*: pleopod 2, ♀; *5*: pleopod 3, ♀; *6*: pleopod 4, ♀; *7*: pleopod 5, ♀; *8*: pleopod 1, ♂; *9*: pleopod 2, ♂; *10*: right uropod, ventral view, ♀; *11*: left mandible, ♀; *12*: right mandible, ♀; *13*: maxilliped, ♂; *14*: maxillula, ♂; *15*: maxilla, ♂; *16*: antenna, ♀; *17*: antennula, ♀. Scale *a*: Figs. 2–10, 16–17; scale *b*: Figs. 11–15.

Antenna 2/3 length of body. Third joint of peduncle with a distinct scale tipped by four setae. Flagellum about 47-jointed.

Labrum with two fields of short hairs on the frontal margin.

Labium suboval with fine hairs at the whole frontal part and two fields of fine setae on proximal and inner margins.

Mandible with a rather weak molar process, tipped with two setae. Cutting edge with three stout teeth and six smaller ones. Right mandible with seven setae, left with four setae and a movable lacinia.

Maxillula with two lobes of normal appearance.

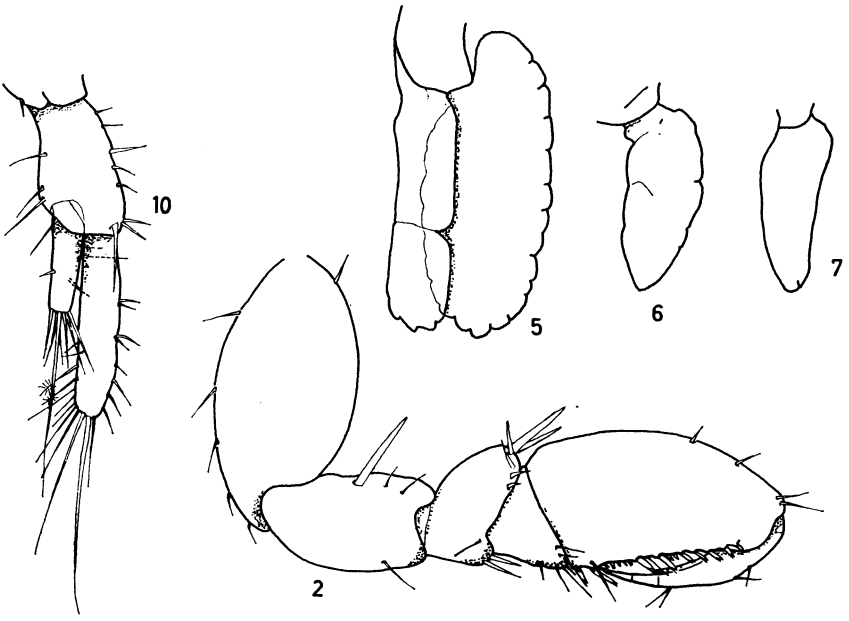
Maxilla with three lobes of normal appearance.

Maxilliped with 2nd and 3rd joints of palp not greatly expanded but broader than epipod. Five coupling-hooks.

Peraeopod 1 subchelate. Finger ending in a stout spine, not serrate on inner margin.

Peraeopods 2–7 of normal appearance, rather slender. Triunguiculate.

Pleopod 1 consisting of a basal piece (undivided) with two foliaceous rami, which only partly cover 2nd pleopod. No suture between the rami and the basal piece.



Figs. 2, 5, 6, 7 and 10

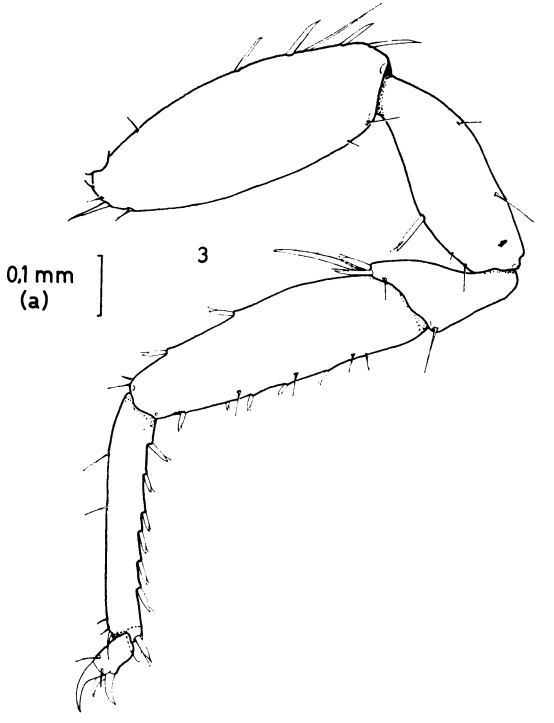


Fig. 3

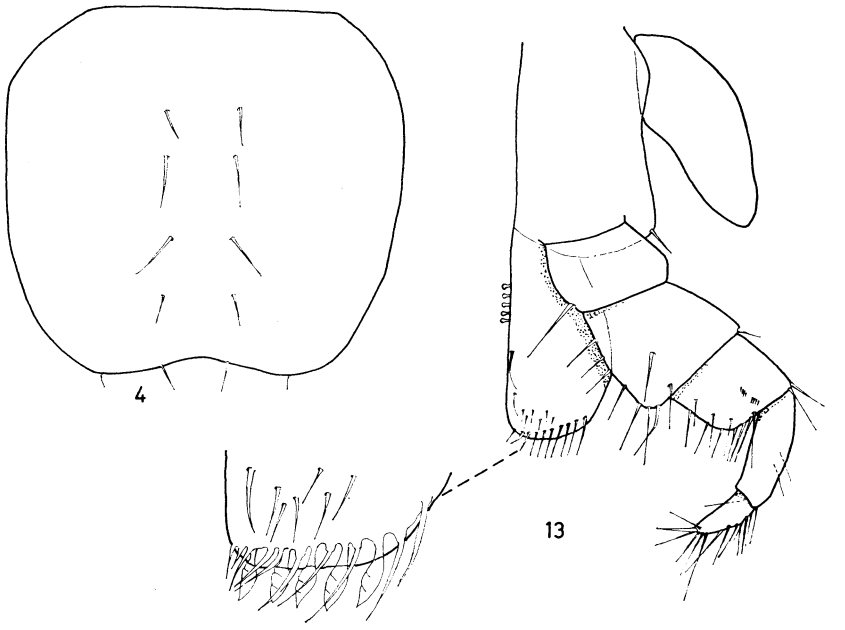
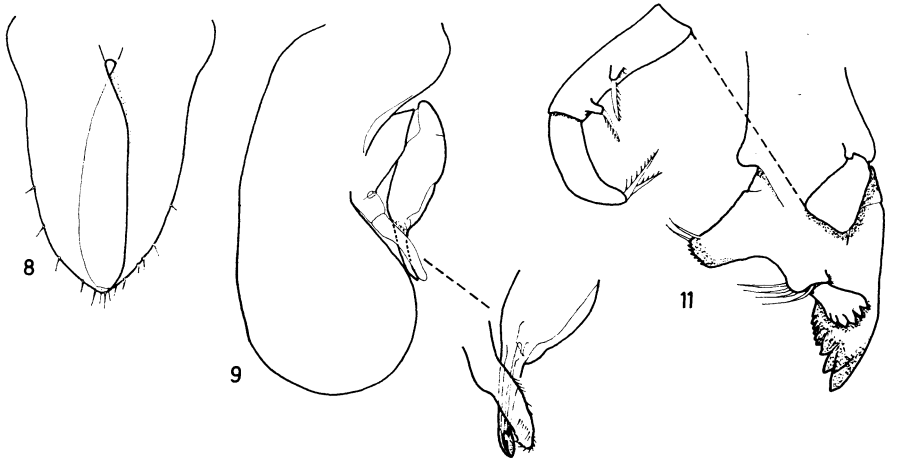


Fig. 4 and 13



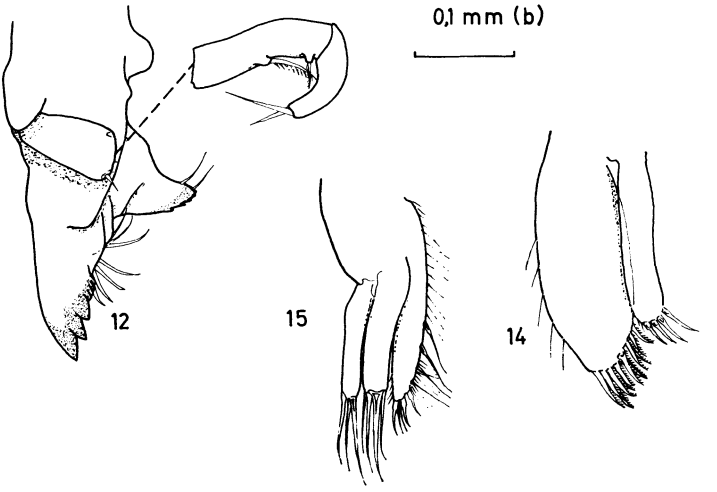
Figs. 8, 9 and 11.

Pleopod 2 bean-shaped. Inner ramus strong, proximally broadened and ending in a small point. Outer ramus two-jointed with the tip covered by small hairs.

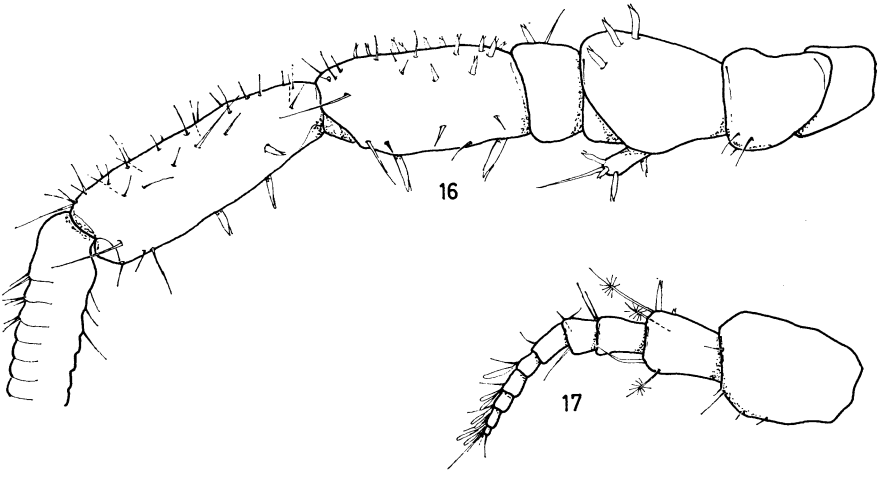
Pleopod 3 normal, biramous.

Pleopods 4 and 5 uniramous.

Uropods nearly as long as pleon with a short peduncle, inner ramus longer than outer.



Figs. 12, 14 and 15.



Figs. 16 and 17.

Female (Allotypus): Length 4.4 mm. Apart from the pleopods, there are only minute differences between the sexes. Thus the antenna has a 43-jointed flagellum, and the maxilliped has four coupling-hooks. No differences in the peraeopods. Pleopod 1 absent. Pleopod 2 forms the operculum, which is subquadrangular with a shallow median incision and two median rows of five spines each. 3rd–5th pleopods as in male.

This species belongs to a genus hitherto known only from South Africa and represented by three species, *P. prenticei* Barnard, 1927, *P. perbrincki* Barnard, 1955 and *P. leleupi* Grindley, 1963. *P. lucei* is clearly distinguishable from these three. The differences are tabulated below.

	P. prenticei	*P. perbrincki*	*P. leleupi*	*P. lucei*
Size	2.5 mm	4 mm	2.5–2.8 mm	4.4–4.5 mm
Antennula	Flagellum 6-jointed	Flagellum 12-jointed	Flagellum 6-jointed	Flagellum 7-jointed
Antenna	Flagellum 28-jointed, longer than peduncle	Flagellum 18–24-jointed, shorter than peduncle	Flagellum 22-jointed, longer than peduncle	Flagellum 43–47-jointed, longer than peduncle
Mandible	Many setae, lacinia absent?	Few setae, lacinia absent?	Many setae, lacinia absent?	Many setae, lacinia present
Maxilliped	4–5 coupling-hooks, epipod with many setae	3–4 coupling-hooks, epipod slender, few setae	Epipod slender, few setae	4–5 coupling-hooks, epipod broad, many setae
Peraeopod 1	Not subchelate	Subchelate, finger serrate on inner margin	Not subchelate	Subchelate, finger not serrate on inner margin
Peraeopods 2–7	Biunguiculate	Triunguiculate	Biunguiculate	Triunguiculate
Plepod 1 ♂	Apically subtruncate, peduncle with median suture	Apically subtruncate, peduncle lacking median suture	Apically subtruncate, peduncle with median suture	Apically not subtruncate, peduncle lacking median suture
Pleopod 2 ♂	Pear-shaped, outer ramus apparently two-jointed	Pear-shaped, outer ramus apparently two-jointed	Bean-shaped outer ramus clearly two-jointed	Bean-shaped, outer ramus clearly two-jointed
Pleopod 2 ♀	Operculum without spines or lobes	Operculum with lobes, distal margin undulate	Operculum without lobes, distal margin undulate	Operculum with spine-rows, distal margin not undulate
Pleopod 4	Biramous	Biramous	Uniramous	Uniramous
Uropod	Endopod half as long as exopod	Endopod longer, exopod with setae on inner margin	Endopod longer, exopod with setae on inner margin	Endopod longer, exopod without setae on inner margin
Habitat	In moss, upper part of streamlet	Swift river, stony bed and under stones in wet ravine	Pool in cave, sandy bottom	Rheocrene between boulders, sandy bottom

Barnard's description of the genus *Protojanira* does not quite agree with *P. perbrincki*, *P. leleupi* and *P. lucei*. Thus all peraeopods are not alike, the first being subchelate in *P. perbrincki* and *P. lucei*. The first pleopods in the male of *P. lucei* do not cover the other pleopods, being much smaller than the second pair. Pleopod 3 of *P. lucei* is distinctly larger than pleopod 1. Pleopod 4 is uniramous in *P. leleupi* and *P. lucei*.

The exopod of the uropod is longer than the endopod only in *P. prenticei*. There is, however, no doubt about *P. perbrincki, P. leleupi* amd *P. lucei* belonging to the same genus, since the characteristic first pleopod in the male should be considered a much more important feature than the above-mentioned small differences.

Angeliera Chappuis and Delamare Debouttéville, 1952

Angeliera phreaticola Ch. et Del.

Syn.: *Brevipleonida gracilis* Gnanamuthu, 1954.

Locality: West Province, Kalutara, 25 miles SSE. Colombo. Marine beach. 50 metres from the shore, in a depression between sand dunes. Ground-water table at a depth of 0.7 m. Loc. 19. Leg. P. Brinck,H. Andersson and L. Cederholm. Sample from 26.1.1962 with a single ovigerous female.

Although this specimen was badly damaged, there is no doubt about its identity. The characteristic form of the mandible (lack of molar process) and maxilliped shows that it cannot belong to any other species.

Angeliera phreaticola was first found by Chappuis and Delamare Debouttéville (1952) in France. Since then the species has been found in many localities, including one in India (Gnanamuthu, 1954).

Sub-order *Microcerberidea* Lang, 1961

Microcerberus Karaman, 1933

Syn.: *Robustura* Gnanamuthu, 1954.

Microcerberus predatoris (Gnanamuthu, 1954)

Locality: West Province, Kalutara, 25 miles SSE. Colombo. Marine beach. 50 metres from the shore, in a depression between sand dunes. Ground-water table at a depth of 0.7 m. Loc. 19. Leg. P. Brinck, H. Andersson and L. Cederholm. Sample from 25.1.1962 with two males.

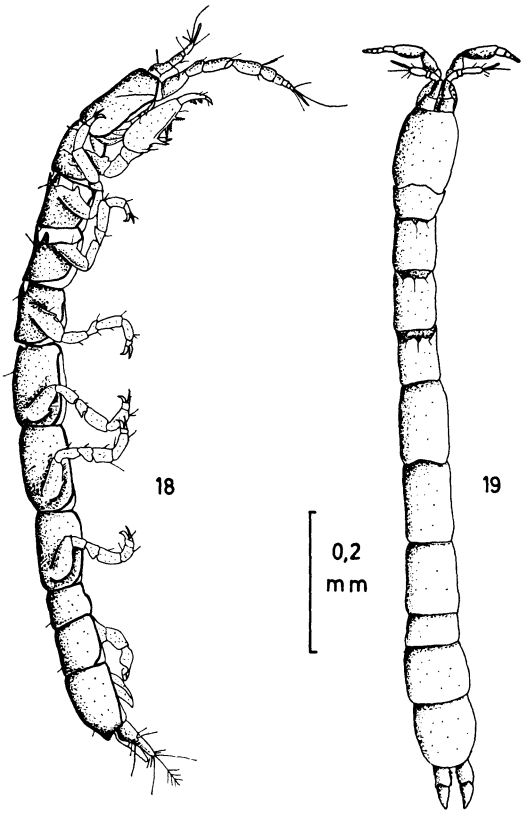
This species has previously been collected on the east coast of India (Gnanamuthu, 1954). It is distinguished by the typical form of the second pleopod in the male. There are, however, some doubts about these specimens being adult (vide Lang, 1961). How many females there are in the sample (if any) is not possible to determine, since there are no clearly defined differences between the females of this species and those of *M. singhalensis* n. sp. (see below), which were found in the same locality. The females of *M. predatoris* are, however, longer than those of *M. singhalensis*.

Microcerberus singhalensis n. sp. (Figs. 18–35)

Locus typicus: West Province, Kalutara, 25 miles SSE. Colombo. Marine beach. 50 metres from the shore, in a depression between sand dunes. Ground-water table at a depth of 0.7 m. Loc. 19. Leg. P. Brinck, H. Andersson and L. Cederholm. Sample from 25.1.1962 with 14 males (holotypus and paratypi) and 19 females (allotypus and paratypi).

Male (Holotypus): Length 0.97 mm. Body elongate, of the normal appearance of the genus.

Peraeon segments 1–4 with well-defined frontal margins on the tergites. First



Figs. 18 and 19.

Figs. 18–35: *Microcerberus singhalensis*, n. sp. Fig. *18*: lateral view, ♂; *19*: dorsal view, ♂; *20*: mandible (I = pars incisiva, L = lacinia mobilis, S = setae, P = palpus, M = processus molaris); *21*: maxillula; *22*: maxilla; *23*: frontal margin of 2nd tergite, ♂; *24*: frontal margin of 3rd tergite, ♂; *25*: frontal margin of 4th tergite, ♂; *26*: peraeopod 1, ♂; *27*: antenna, ♀; *28*: antennula, ♀; *29*: peraeopod 3, ♂; *30*: peraeopod 6, ♂; *31*: ventral view of uropods, ♀; *32*: anal segment and pleopods, ♂; *33*: anal segment and pleopods, ♀; *34*: ventral view of 2nd pleopod, ♂; *35*: lateral view of 2nd pleopod, ♂.

peraeon and pleon segments shorter than the others. Body broadest at the head and at the anal segment.

Antennula 5-segmented, with a short sensory filament on the 5th segment.

Antenna with 5-segmented peduncle and 5-jointed flagellum.

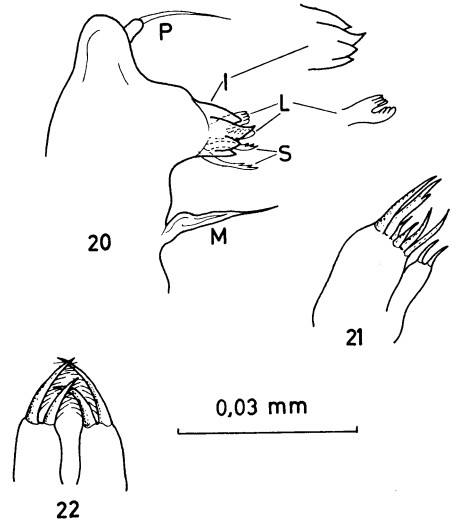
Mandible with one-jointed unisetose papilla. Processus molaris long, slender, not ciliate. Pars incisiva four-dentate. Left mandible with lacinia mobilis and two ciliated setae, right mandible with (probably) three setae.

Maxillula with two endites, the inner one being the smallest.

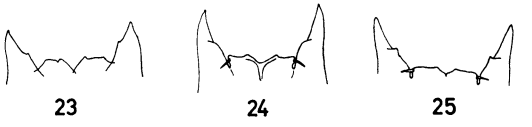
Maxilla with two unisetose endites.

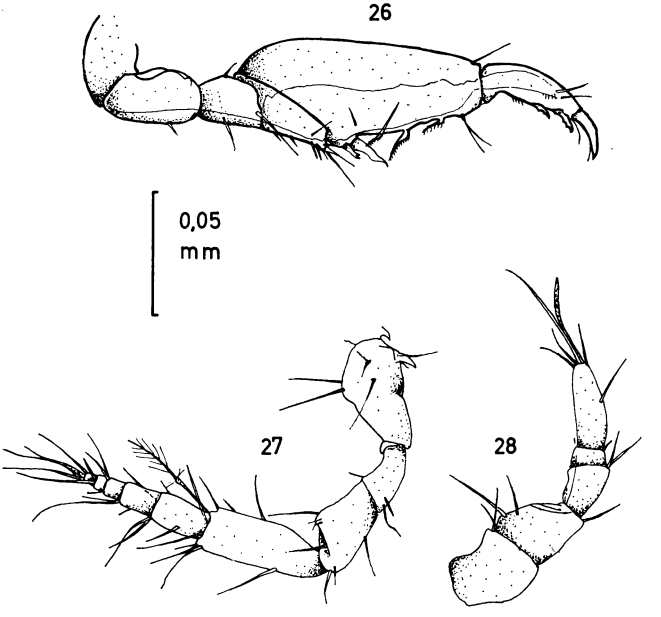
Peraeopod 1 subchelate and not typical of the species.

Peraeopods 2–7 of normal walking-leg appearance and biunguiculate.

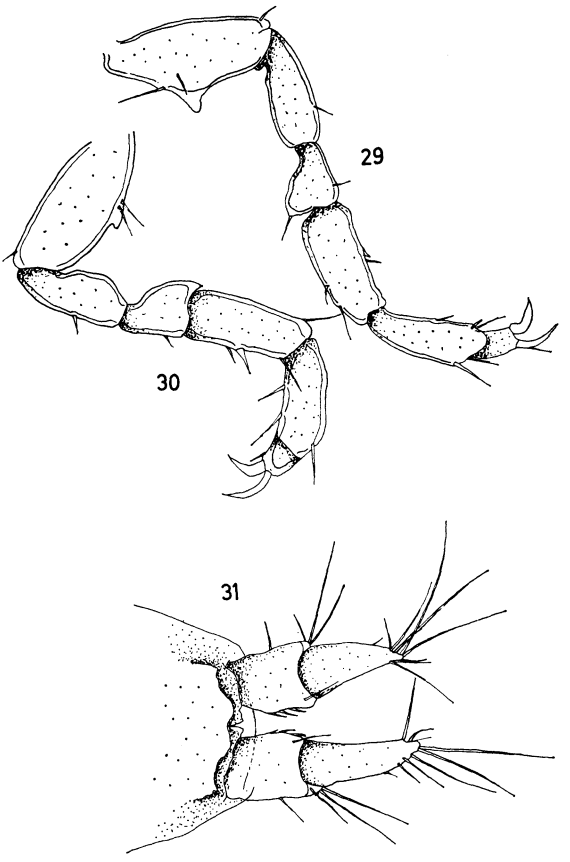


Figs. 20–22.





Figs. 23–28.



Figs. 29–31.

Pleopod 1 absent.

Pleopod 2 with quadrangular fused coxae, quadrangular basis. Small unisetose exopod. Endopod proximally cylindrical, tapering distally towards a small claviform tip. Appendix masculina curving outwards in two acute tips.

Pleopod 3 partly covered by a chitinous lamella, uniramous.

Pleopod 4 biramous.

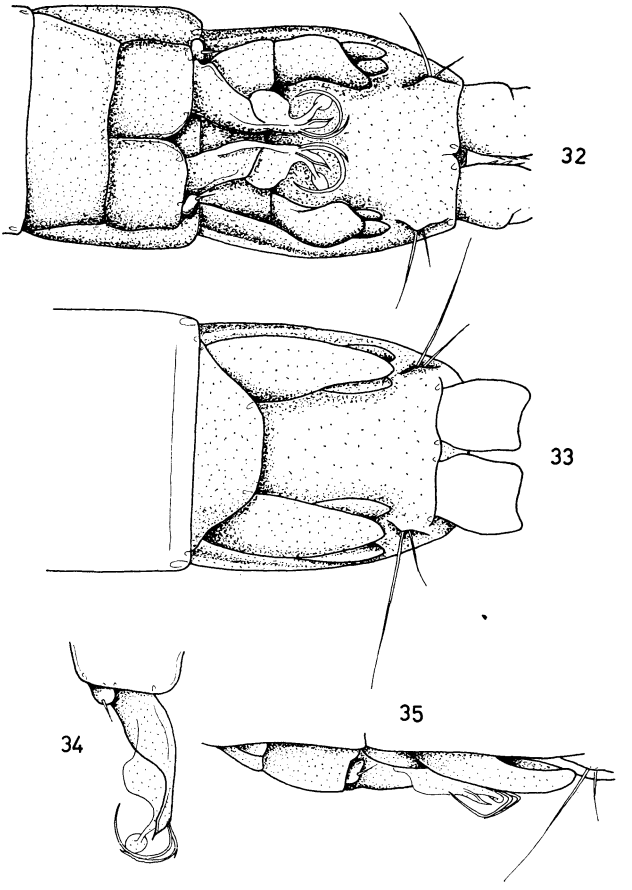
Uropods lacking exopods (there is a faint suture, perhaps indicating the exopod, but it is very indistinct) and shorter than the anal segment.

The frontal margins of tergites 2–4 do not differ very much from those of other species, except in the existence of a small notch in the outer lobes.

Females (Allotypus): Length 0.99 mm. The differences between the sexes lie exclusively in the absence of pleopod 2 in the female. It is not possible to distinguish between the females of *M. predatoris* and *M. singhalensis*.

Microcerberus sp. (Figs. 36–44)

Locality: South Province, Hambantota. Exposed marine beach. Loc. 171. Leg.: P. Brinck, H. Andersson and L. Cederholm. Sample from 23.III.1962 with two males, three females and two juv.



Figs. 32–35.

Male: Length 1.04 mm. Body elongate, of normal form. Tergites of peraeon segments 2–4 with well-defined structure on the frontal margin. Body narrowest in the middle.

Antennula 5-segmented, with a sensory filament on the 5th segment.

Antenna with 5-segmented peduncle and 5-jointed flagellum.

Mouthparts small and compact and similar to those of *M. singhalensis*.

Peraeopod 1 subchelate, peraeopods 2–7 of normal walking-leg appearance.

Pleopod 1 absent.

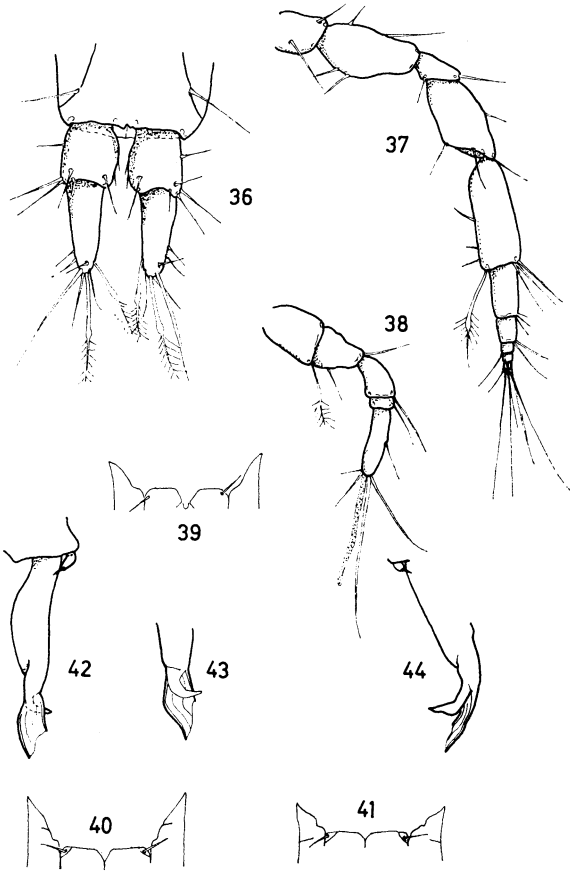
Pleopod 2 with fused coxae and square basis. Small unisetose exopod. Endopod slender, ending in a hyaline membrane. Appendix masculina with a hook-shaped tip.

Pleopods 3 and 4 as in *M. singhalensis*.

Uropods lacking exopod.

Female: Length 0.98 mm. Does not differ from either *M. predatoris* or *M. singhalensis* (except in size, since *M. predatoris* is about 1.4 mm long).

The small material of this species and the fact that the males—except for the diffe-



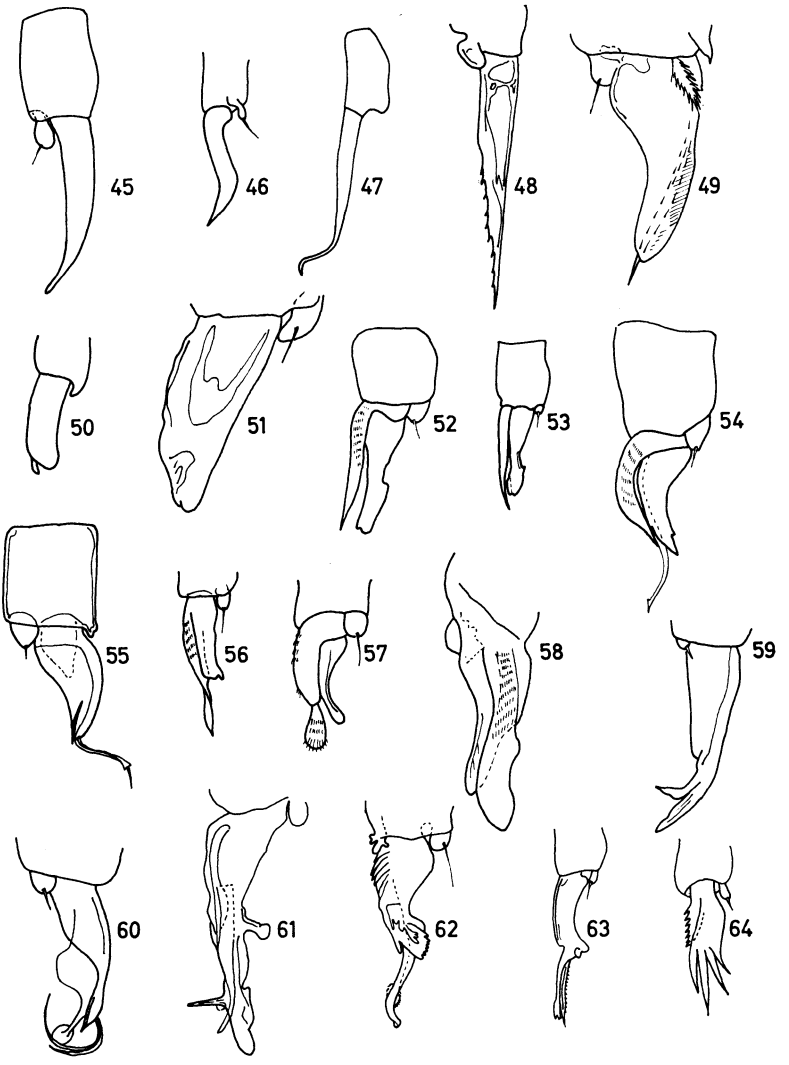
Figs. 36–44.

Figs. 36–44: *Microcerberus* sp. Fig. *36*: ventral view of uropods, ♂; *37*: antenna, ♂; *38*: antennula, ♂; *39*: frontal margin of 2nd tergite, ♂; *40*: frontal margin of 3rd tergite, ♂; *41*: frontal margin of 4th tergite, ♂: *42*: ventral view of 2nd pleopod, ♂; *43*: dorsal view of distal part of 2nd pleopod, ♂; *44*: lateral view (slightly oblique) of 2nd pleopod, ♂. Scale 0.05 mm—figures 23 to 44.

rences of the 2nd pleopod—are very much like those of *M. singhalensis* make it doubtful to establish a new species on this material only. It may be that it constitutes a slightly aberrant form of *M. singhalensis*, but this cannot at present be concluded with any certainty.

Up to this date eighteen species of *Microcerberus* have been described, in the papers of Chappuis (1953, 1954), Chappuis and Delamare Deboutteville (1952, 1955, 1956 and 1958), Chappuis, Delamare Deboutteville and Paulian (1956), Delamare Deboutteville and Chappuis (1957), Gnanamuthu (1954), Karaman (1933), Lang (1961), Pennak (1958) and Remane and Siewing (1953).

A key to eight of these species was published by Chappuis and Delamare Deboutteville (1956: in Delamare Deboutteville, 1960). This was founded upon the 2nd pleopod of the male. In another paper (1956) Delamare Deboutteville and Chappuis discussed



Figs. 45–64. 2nd pleopod of male of the following species of *Microcerberus*: *45*: *plesai*; *46*: *stygius*; *47*: *remyi*; *48*: *monodi*; *49*: *renaudi*; *50*: *predatoris*; *51*: *littoralis*; *52*: *adriaticus*; *53*: *remanei*; *54*: *pauliani*; *55*; *abbotti*; *56*: *ruffoi*; *57*: *arenicola*; *58*: *interstitialis*; *59*: sp. (Ceylon); *60*: *singhalensis*; *61*: *mirabilis*; *62*: *machadoi*; *63*: *mexicanus*; *64*: *delamarei*.

the possibility of using the structure of the frontal margins of tergites 2–4 for systematic purposes and they concluded that these structures are probably specific. However, the differences between the species in this respect are often negligible and the feature as such can hardly be used for this purpose. Moreover, it seems as if not all species possess such structures (Pennak, 1958). The two (? three) species from Ceylon hardly differ at all in this respect, and intraspecific variation seems to account for the

greatest differences. It is often difficult therefore to distinguish between females of different species, but this is not unusual among crustaceans (e.g. in the family *Parastenocarididae* among the copepods).

A revised key, comprising fifteen species, was later published by the same authors (Chappuis and Delamare Deboutteville, 1958). Unfortunately, in this some species were included, which were probably described from immature specimens (vide Lang, 1961). Thus *M. stygius, littoralis, plesai, renaudi, monodi* and *predatoris* seem to be juvenile (perhaps including *remyi*). If this is the case, it seems a little premature to erect a key to the genus. That the 2nd pleopods of the different species in many cases give an impression of immaturity is seen in Figs. 45–64.

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