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THE present paper describes six species of isopods, two belonging to the family Idoteidae, three to Astacillidae and one to Jaeridae. Three of them namely, *Synidotea fluviatilis*, *Astacilla gibbosa* and *Bagatus longimanus* were briefly described earlier (Pillai, 1954). These are fully described here.

Family Idoteidae

Genus *Synidotea* Harger

Synidotea variegata Collinge

Fig 1, A-G

Synidotea variegata Collinge, 1917, p.2, pl.1 ; Monod, 1934, p.6, pls.1 and 3 ; Barnard, 1936, p. 185 ; 1940, p.428 ; Nierstrasz, 1941,p. 278 ; Pillai, 1954, p.17 ; nec *Synidotea variegata* Chilton, 1924, p.891.

Description. Body elongate oblong, broadest at the fourth peraeon segment and further on conspicuously narrowing backwards. Cephalon transversely rectangular, antero-laterally angular and with an antero-median shallow concavity ; submarginal line semicircular and very prominent. Eyes large and bulging on the sides of the cephalon. First peraeon segment shortest, fourth segment broadest and as long as third, lateral margins of all segments, except the first rounded. First four segments with prominent dorso-median arcuate depressions placed anteriorly. Pleon regularly narrowing backwards, with a pair of proximal lateral grooves, distal border rounded, with a slight postero-median concavity, dorsal side convex, with a dorso-median faint longitudinal elevation.

First peduncular segment of first antenna stout, second segment slightly longer than third, flagellum stout, elongate oblong, with seven to eight groups of setae along the anterior border, each group with two olfactory filaments. Flagellum of second antenna twenty one segmented. Epistome twice as broad as long and broader than the upper lip. Incisor part of mandible bifid, upper lobe with two and lower with three teeth, molar large and serrated, with two short setae on the inferior border

spine row composed of three serrated spines. Outer lobe of first maxilla with eight to nine large spines, majority of them barbed, inner lobe with two long barbed and plumose setae and a small spinule. Inner and middle lobes of second maxilla subsimilar with long comb-like setae, outer lobe considerably elongated with very long sparsely plumose setae.

First pereopod rather stout, dactylus slender and slightly longer than propodus, with distinct unguis and secondary unguis, inferior border of merus, carpus and propodus thickly hairy. Dactylus of posterior pereopods very short, with subsidiary unguis. Uropod as described by Collinge but with three plumose setae instead of a short barbed spine at the base of the ramus.

Length 8.0 mm.

Body greenish with grey mottling, tip of uropods and pleon white, second antenna with alternating dark and white areas.

Material. Several specimens were collected from various localities along the Kerala coast, common along the rocky intertidal reion.

Distribution: India, Ceylon, Suez Canal, Natal, Indochina and South Africa.

Remarks. Depending on the state of maturity the shape of the body shows some variation, fully adult females are long ovate and adult males narrower, juveniles have perfectly parallel sided body. The number of spines arming the outer lobe of the first maxilla also varies.

The extreme elongation of the outer lobe of the second maxilla does not appear to have been observed earlier. Collinge has described a small barbed spine at the distal outer angle of the peduncle of the uropod. In the present specimens there is not even a trace of this spine but instead there is a bunch of three long setae.

Monod while reporting on a collection of isopods from Indochina observed that *S. variegata* Chilton is different from *S. variegata* Collinge. I have in my collection specimens collected from both marine and brackish water localities and a comparative study of this material has clearly shown that the specimens from the latter locality differ from the former in important specific characters. Accordingly specimens collected from brackish water were described as a new species, *S. fluviatilis*.

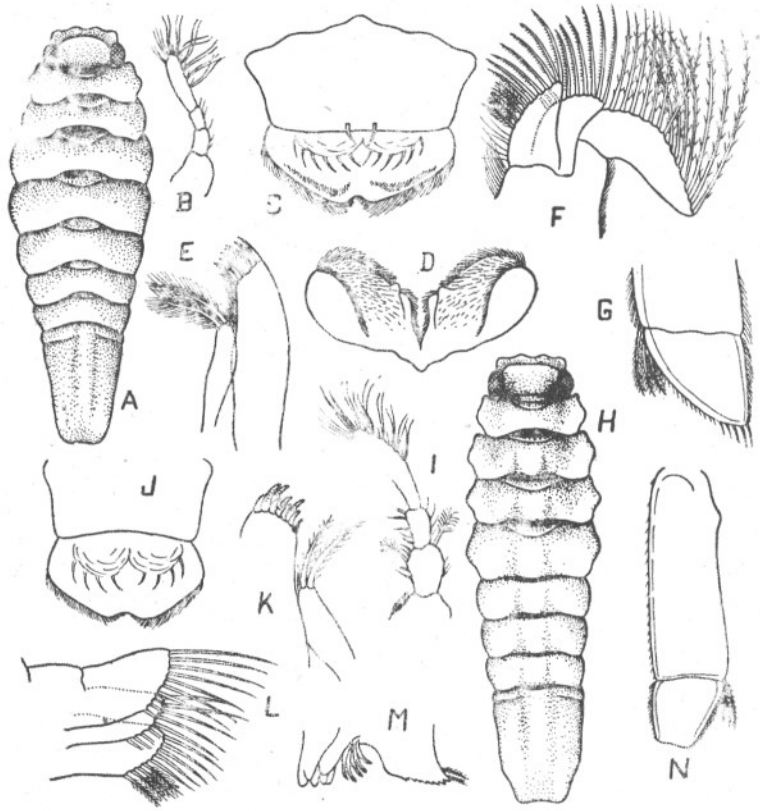


Fig. 1—A-G, *Synidotea variegata* Collinge. A, female, dorsal view; B, antenna 1; C, epistome and upper lip; D, lower lip; E, maxilla 1; F, mixilla 2; G, uropod. H-N, *Synidotea fluviatilis* Pallai. H, female, dorsal view; I, antenna 1; J, epistome and upper lip; K, maxilla 1; L, maxilla 2; M, mandible; N, uropod.

Synidotea fluviatilis Pillai

Fig 1, H-N

Synidotea variegata Chilton, 1924, p. 891, pl.60, f.6 (1), t.f. 10 a-d.

Synidotea fluviatilis Pillai, 1954, p. 18.

Synidotea worliensis Joshi and Bal, 1959, p.64.

Description. Body elongated and parallel sided, with very slight bulging at the fourth thoracic segment. Cephalon rectangular, with the antero-lateral corners more angular than in *S. variegata*; submarginal line transversely oblong and not semicircular as in *S. variegata*. First four pereaeon segments gradually increasing in length, their lateral borders produced outwards in the middle, the arcuate depressions narrower than in *S. variegata* but more prominent. Pleon

comparatively broader, suddenly narrowed at the posterior one third of its length, posterior border subtruncate and very slightly concave, postero-lateral parts angular.

First antenna stout, first peduncular segment large, second with two sensory setae, flagellum with eight bundles of setae in addition to the long apical tuft, each bundle with two olfactory filaments. Upper lip twice as broad as long, prominently bilobed, epistome as broad as upper lip. Mandible as in *S. variegata* but the spine row composed of five spines. Outer lobe of first maxilla with nine comparatively short spines, inner lobe with a small spinule and two sparsely plumose setae devoid of barbs. Second maxilla with subsimilar lobes carrying comparatively short simple setae, first four setae on the inner lobe alone plumose.

Peracopods generally like those of *S. variegata* but stouter, outer distal corner of merus of first leg with a barbed spine, inferior border of merus, carpus and propodus of all the legs with a row of stout plumose setae. Uropods similar to those of *S. variegata* but the ramus is apically truncate.

Length 12.3 mm.

Body grey with dark dorso-median line.

Material. Several specimens were collected from the bar mouths at Quilon and Cochin.

Remarks. In nearly every character *S. fluviatilis* differs from *S. variegata*. The more important differences are the parallel sided body with laterally produced segments, the shape of the pleon, the shape of the outer lobe of the second maxilla and the distally truncated ramus of the uropod.

The description of *S. worliensis* is such that a detailed comparison with the present species is not possible. Nevertheless, it appears to be conspecific with *S. fluviatilis*.

Family Astacillidae
Genus *Astacilla* Cordiner
Astacilla amblyura Stebbing

Fig. 2

Astacilla amblyura Stebbing, 1905, p.46, pl.2, f.B ; Pillai, 1954, p.18.
Neastacilla amblyura Nierstrasz, 1941, p. 256.

Body rough with small tubercles, furrows and ridges. Anterior border of cephalon concave in dorsal view, antero-lateral corners produced into large apically narrowed processes, eyes large and projecting.

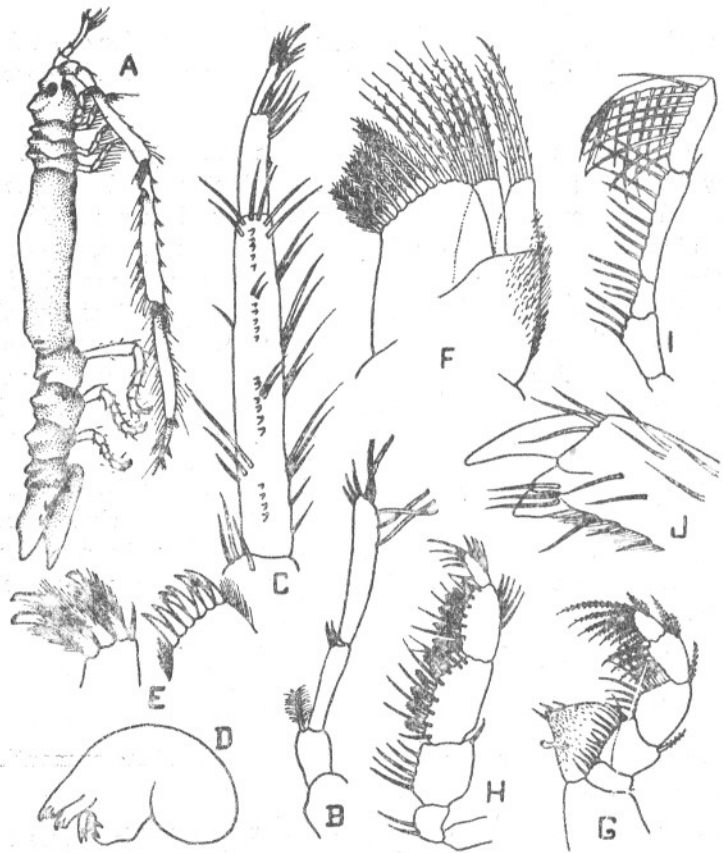


Fig 2. *Astacilla amblyura* Stebbing. A, entire animal, lateral view; B, antenna 1; C, antenna 2; D, mandible; E, maxilla 1; F, maxilla 2; G, maxilliped; H, leg 1; I, leg 2; J, leg 7.

Dorsal surface of cephalon with a pair of large tubercles between the eyes and a similar pair behind, separated from the former by a deep transverse furrow. First pereaeon segment distinct from the cephalon, subequal to second and third, fourth segment very long, nearly twice the length of the body in front of it, with two dorsal projections near the hind border in addition to the prominent dorso-median hump. Pereaeon segments five to seven subequal, their dorso-median part elevated. Pleon completely fused with telson and demarcated by a lateral constriction and dorsal transverse furrow. Telson dorsally convex, with two pairs of lateral tubercles, the area between the tubercles squarish and that beyond the second pair triangular.

First segment of peduncle of first antenna stout and oval, flagellum as long as the last two peduncular segments combined, with five sensory setae. Second antenna as long as body, fourth peduncular seg-

ment with a prominent basal tooth, flagellum three segmented, ending in a long spine, first flagellar segment with a discontinuous row of teeth. Upper lip bilobed and hairy, Incisor part of mandible three lobed, first two lobes tridentate and the third bidentate, molar rounded and smooth, spine row composed of two serrated spines. Outer lobe of first maxilla with ten spines and inner lobe with three large barbed and feathery setae and a small sharp spine. Inner lobe of second maxilla broad, outer lobe comparatively narrow.

Dactylus of first peraeopod with a row of spines on the lower border and ending in a large seta. Peraeopods two to four without the long apical seta observed by Stebbing, the apical seta is just like the previous one but with a slightly swollen base. Peraeopods five to seven stout, thickly hairy, with short stout daetyli produced below the prominent unguis. Ramus of uropod slightly longer than broad, with two apical setae, its margin hairy, concealed ramus twice as long as broad, with two long apical setae. Peduncle of uropod with a row of plumose setae on the outer distal border.

Length 11.0 mm.

Material.

A single adult male was collected from algae in the littoral region at Quilon.

Remarks.

A. amblyura closely resembles *A. sheardi* Hale (1946) in the shape of the body and its tuberculation. Hale distinguished *A. sheardi* by its shorter but stouter second antenna and the absence of a long seta on the dactylus of peraeopods two to four. In the latter character the present specimen resembles *A. sheardi*. However, the long second antenna carrying a conspicuous tooth on the fourth peduncular segment distinguishes *A. amblyura*.

Astacilla gibbosa Pillai

Fig. 3

Astacilla gibbosa Pillai, 1954, p. 18.

Description.

Body short, stout and nearly smooth. Anterior border of cephalon with a small median process, anterolateral angles produced into apically narrowed prolongations. Eyes large and bulging. Dorsal surface of cephalon with a pair of anterior and a second pair of slightly larger submedian bosses, the two pairs separated by a deep transverse furrow, the whole ornamentation like that of *A. amblyura*.

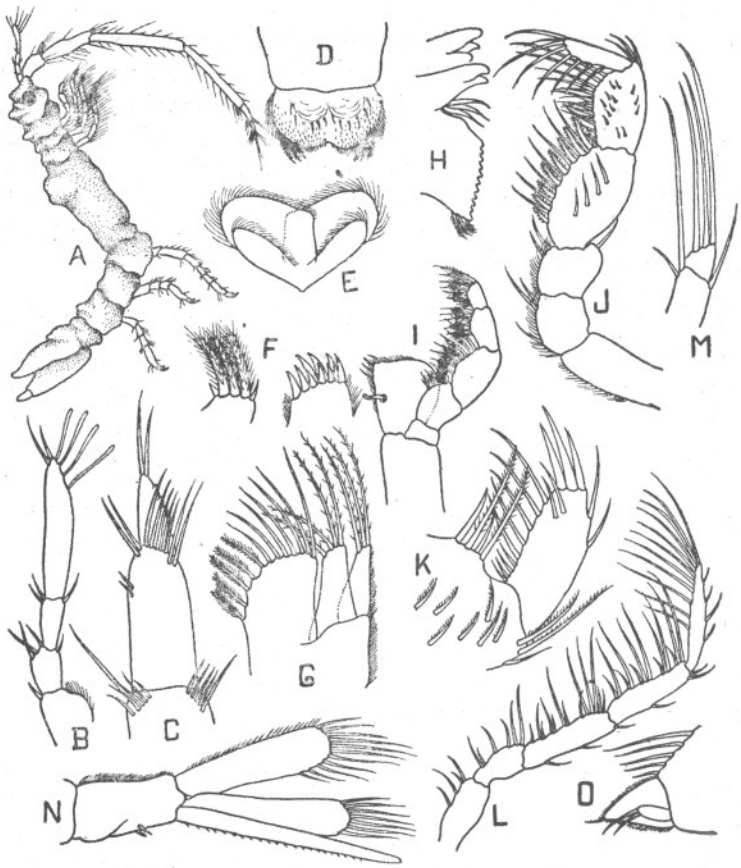


Fig. 3. *Astacilla gibbosa* Pillai. A, male, lateral view; B, antenna 1; C, antenna 2, flagellum; D, epistome and upper lip; E, lower lip; F, maxilla 1; G, maxilla 2; H, mandible; I, maxilliped; J, leg 1; K, same, tip enlarged; L, leg 2; M, same, tip enlarged; N, pleopod 2; O, tip of uropod.

but more prominent. First pereopod segment partially fused with cephalon, its dorsal surface with a median boss, segments two and three smaller than first, each with a postero-median boss on the dorsal side. Fourth segment long, with a large dorsal hump placed in the anterior half. Segments five to seven subsimilar, narrower than fourth. Pleon fused with telson, telson roughly pentagonal, with a very prominent tubercle on the postero-lateral part, the part beyond this tubercle broadly triangular in dorsal view.

First antenna comparatively stout, first segment of peduncle large and rounded, flagellum longer than the combined length of segments two and three. Second antenna reaching the base of pleon when folded backwards, fourth and fifth peduncular segments subequal in length,

flagellum short, three jointed and much narrower than the distal peduncular segment, distal flagellar segment with four equidistant teeth on the inferior border. Incisor part of mandible bifid, upper lobe three and lower two toothed, middle setae three in number, molar well developed and with three inferior setae. Outer lobe of first maxilla strongly curved, with ten large spines in two rows, inner lobe with three strong setae and a small spine. Second maxilla of the usual type, lower lip formed of two diverging setose lobes overlapping in the middle.

First pereopod moderately setose, fifth segment with a row of prominently serrate spines. Dactylus with a stout apical seta and two slightly smaller ones on either side. Second to fourth legs without a pronounced dactylus, legs five to seven with a small secondary unguis. Uropods as long as telson or even slightly longer, basal part narrow, ramus slightly longer than broad, with hairy margin and apical setae, concealed ramus short, with two apical setae. Peduncle of second pleopod of male with two inner spines, endopod longer but narrower than exopod, male stylet stout and longer than endopod, with minute spines on its inner border.

Length 9.6 mm.

Material.

Two specimens were collected from the intertidal region at Quilon.

Remarks.

In the nature of the second antenna and in the sculpturing of the body *A. gibbosa* resembles *A. sheardi* Hale. However, it could be easily distinguished by the large spine like seta on the dactylus of the first pereopod and the absence of a distinct dactylus on the second. The large dorsal hump on the fourth segment of the pereaeon is very characteristic of this species.

Genus *Arcturina* Koehler

Arcturina cylindralis sp. nov.

Fig. 4

Description. Body cylindrical and smooth, strongly bent between the fourth and fifth pereaeon segments. Cephalon large, clearly separated from the first pereaeon segment, anterior border rounded and the anterolateral corners produced. Pereaeon segments one to three partially fused into a large composite segment with its inferior border expanded and produced, fourth pereaeon segment slightly longer than the body in front of it and narrowing towards the hind end, its ventral border with

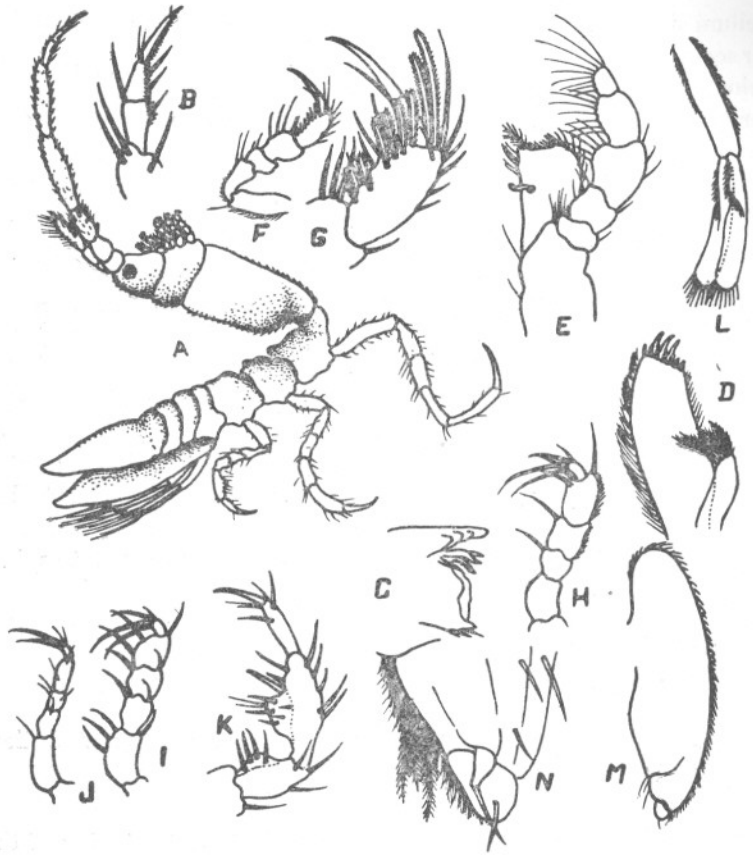


Fig 4. *Arcturina cylindralis* sp. nov. A, female, lateral view; B, antenna 2, flagellum; C, mandible; D, maxilla 1; E, maxilliped; F, leg 1; G, same tip enlarged; H, leg 2; I, leg 3; J, leg 4; K, leg 7; L, pleopod 2; M, uropod; N, same, tip enlarged.

minute hairs, lateral sides with an indistinct longitudinal groove. Peraeon segments five to seven subequal, each with a prominent dorsal ridge. Pleon three segmented, shorter than telson, telson elongate triangular, with a prominent constriction at its base.

First antenna short, reaching the distal border of the third peduncular segment of second antenna, flagellum as long as peduncle, with four groups of sensory setae. Second antenna slightly more than half the length of body, prominently hairy, fourth and fifth peduncular segments of the same length, flagellum three jointed, third segment long ending in a long spine, lower border of flagellum with a row of sharp spines. Incisor part of mandible strong and produced, with three subsidiary teeth, accessory plate bidentate, spine row composed of two spines, molar broad and strong. Inner lobe of first maxilla with three

plumose setae and a strong spine, outer lobe with eleven sharp spines in two rows, its outer border thickly hairy. Inner plate of maxilliped large, with a single strong coupling hook, distal border truncate and slightly concave, with an inner seta and outer tooth, third segment of palp longest, terminal segment large and setose.

Second segment of first peraeopod longest, its inferior border hairy, fourth segment short but dorsally expanded, sixth segment as long as third, seventh well developed, with a long unguis, sixth segment with an inner row of long strongly pectinate setae successively increasing in length distalwards. Peraeopods two and three identical, segments three to six flattened, almost equal in length, seventh segment small, with three long setae. Fourth peraeopod similar to third but more slender. Peraeopods five to seven comparatively very long, fifth longer than sixth and seventh, inner border of segments five and six of seventh peraeopod expanded, the expanded part of sixth segment with a long blunt spine, seventh segment long, with a distinct unguis. Uropods elongate oblong, ramus rounded, outer border densely setose, concealed ramus small, with a single apical seta.

Length 6.0 mm.

Material. A single specimen was collected from the intertidal region at Quilon.

Remarks. *A. cylindrical* sp. nov. differs from *A. rhomboidalis* Koehler (1911) and *A. hexagonalis* Barnard (1925) in the shape of the fourth peraeon segment, which is nearly cylindrical. The first three peraeon segments are partially fused. The seventh peraeopod has a characteristic expansion and the first peraeopod has several prominent pectinate setae. All these characters are very much diagnostic of this species

Suborder Asellota
Family Jaeridae
Genus *Bagatus* Nobili
Bagatus longimanus Pillai

Fig. 5

Bagatus longimanus Pillai, 1954, p. 19 ; Monod, 1961, p.69.

Description. Body elongate and parallel sided. Anterior border of cephalon concave and antero-lateral sinuous. Eyes subdorsal and black, with well developed ocelli. Peraeon segments subequal in length, third segment longest. Coxal plates well developed, one to three triangular and five to seven rounded, fifth linear. Telson elongate ovate, with short, subtruncate posterior border, faintly bilobed.

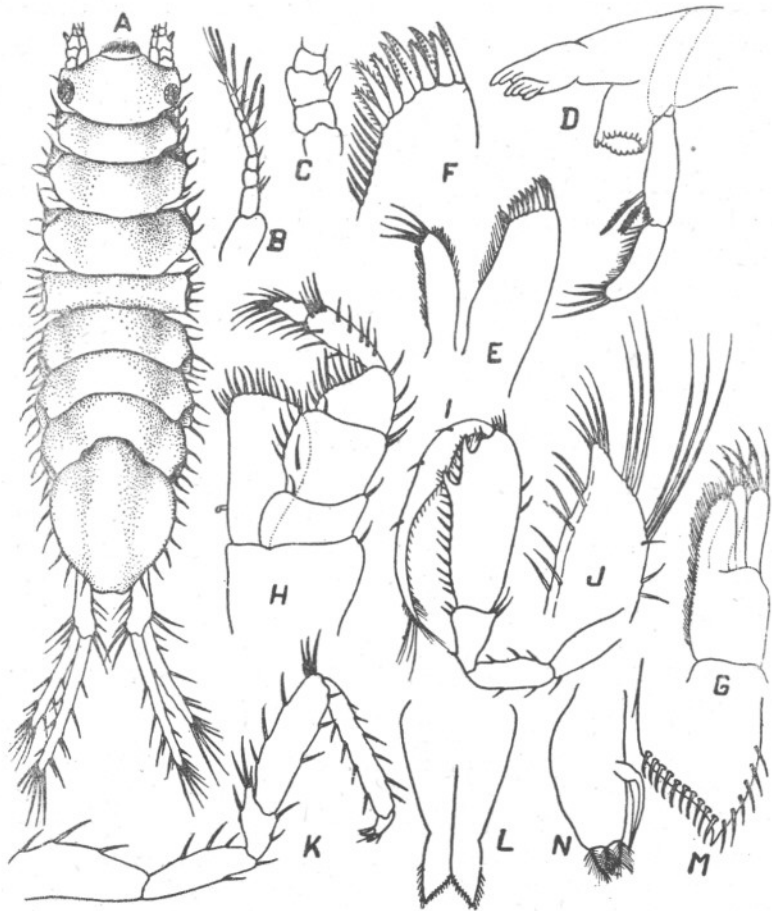


Fig. 5. *Bagatus longimanus* Pillai. A, male, dorsal view; B, antenna 1; C, antenna 2, peduncle; D, mandible; E, maxilla 1; F, same, tip of outer lobe; G, maxilla 2; H, maxilliped; I, leg 1; J, same, tip of dactylus; K, leg 7; L, pleopod 1; M, same, tip of ramus; N, pleopod 2.

First antenna very short, first segment stout, flagellum seven to eight segmented, with long sensory filaments. Second antenna very long, peduncle five segmented, first three segments together equal to fifth in length, third segment with a small scale, twice as long as broad, flagellum about three fourths the length of the body. Upper lip semicircular and hairy. Incisor process of mandible demarcated by a prominent constriction and consists of two quadridentate lobes, spine row composed of six long spine setae, molar produced and toothed, carrying two to four setae on inferior border, palp long and three segmented, segments subequal. Outer lobe of first maxilla with eight to ten large barbed spines, inner lobe with four stout setae. Inner lobe

of second maxilla oblong or elliptical and thickly hairy. Maxilliped, with a single coupling hook, first three segments of palp much expanded. Lower lip clearly bilobed, the lobes slightly overlapping in the middle.

First peraeopod subchelate, carpus short and triangular, propodus very large and broadening distalwards, inner distal border produced into two long slightly curved teeth, dactylus long and slender, almost reaching the base of the fifth segment, with a number of small setae on the lower border and a few long setae near the apex; a little beyond its base the dactylus is slightly swollen and abruptly narrowed near the apex. Peraeopods two to seven subsimilar, carpus produced at the distal part of its dorsal border, dactylus short and biunguiculate. First pleopod of male with the peduncle fused with the rami, the two members of the pair completely fused, rami terminating in a spiniform apex, free distal and outer borders with a row of strong spines. Stylet on second pleopod inserted in the middle of the inner border and slightly overreaching the tip of the ramus, distal border of the pleopod with three plumose setae. Uropods long, overreaching the telson, peduncle short, endopod longer than exopod and three times as long as peduncle.

Length 2.0 mm.

Material. A number of specimens were collected from the intertidal region at Quilon.

Remarks. This species closely resembles *B. longidactylus* Nordenstam (1946) but differs as follows. The front border of the cephalon is not straight. The peraeon is parallel sided and the shape of the pleotelson is different. The antennular flagellum is eight jointed as against eleven jointed in *B. longidactylus*; the second antenna is only three fourths the total length of the animal. The most important difference is the width of the peduncle of the first pleopod of the male. In *B. longimanus* it is much narrower and the rami, unlike as in *B. longidactylus* are completely fused with each other. Because of these differences I find it difficult to agree with Monod (1961) that they are conspecific.

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