

**AMPHIPODS OF THE GENUS *LEMBOS* BATE FROM THE
SOUTH-EAST COAST OF INDIA**

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THE amphipod genus *Lembos* Bate belonging to the family Aoridae has been treated in detail by Barnard, J. L. (1962, 1965, 1970). A total number of 34 species are so far known under the genus (Barnard J. L., 1965, 1969, 1970), but from the seas around India, only three species are reported, viz. *L. podocerooides* Walker (1904, 1905) (Sivaprakasam, 1969), *L. chelatus* Walker (1904) and *L. leptocheirus* Walker (1909) (Sivaprakasam, 1968). The author's (1968) doubtful identification of *L. kergueleni* Stebbing has now been found to be erroneous. In the present paper, two new species, and two new records, recently described from Hawaiian Islands and Micronesia respectively, have been described and figured.

The author is thankful to the Director, Zoological Survey of India, for providing laboratory facilities and is greatly indebted to Dr. J. L. Barnard, U.S. National Museum, for the generous gift of his works on the subject.

Suborder Gammaridea

Family Aoridae

Genus *Lembos* Bate

***Lembos quadrimanus* sp. nov.**

(Fig. 1)

Material : Gulf of Mannar : Several males and females from the washings of sponges, ascidians and seaweeds at Appa island. 4 males and 6 females from sponges at Vaalai island. Several males and females from the washings of sponges, Zoantharia and seaweeds at Kilakkarai. 1 male and 1 female from seaweeds at Pamban. Palk Bay : Several males and females from sponges and seaweeds at Rameswaram. 1 male and 3 females from Mandapam. Length upto 8.0 mm.

Types : Male holotype, female allotype and 5 paratypes (3 males and 2 females) collected from Appa island have been deposited in the Zoological Survey of India, Calcutta.

Description : **Male :** Head with short rostrum. Lateral lobes quadrate-rounded. Eyes oval and dark. Post-antennal lobe pointed. Body smooth with a pair of setae on pleon segments 1-4. Dark bands (in alcohol) with irregular white spaces on head, peraeon segments 2 to 6 and pleon segments 1 to 3 and the rest colourless. Peraeon segments 2 to 4 with ventral (sternal) spines as figured. Epimeral plate 3 with a little tooth at posterolateral corner.

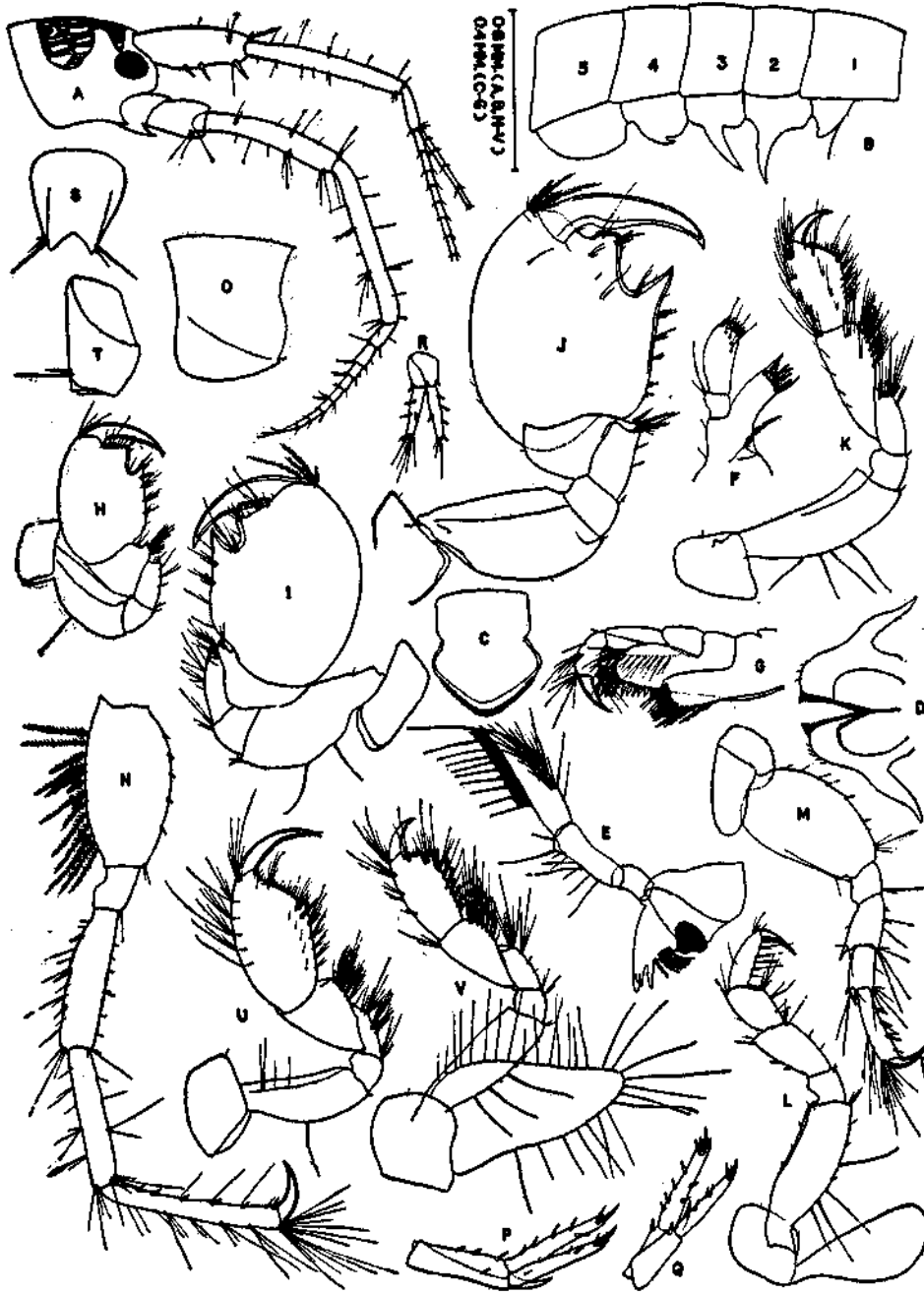


FIG. 1. *Lembos quadrimanus* sp. nov. Male: A, head with antennae; B, Peraeon segments 1-5; C, upper lip; D, lower lip; E, mandible; F, maxilla 1; G, maxilliped; H, I, J, gnathopod 1 of specimens 5.0, 5.8, 6.2 mm. in length; K, gnathopod 2; L, M, N, pereopods 1, 3, 5; O, epimeral plate 3; P, Q, R, uropods 1, 2, 3; S, T, dorsal and lateral views of telson; Female: U, V, gnathopods 1, 2.

Antenna 1 about $\frac{2}{3}$ as long as body. Peduncle shorter than flagellum, 1st joint with 3 spines on lower margin, 2nd joint the longest and 3rd short. Flagellum with about 22 joints. Accessory flagellum long, with 6 joints. Antenna 2 stronger and $\frac{2}{3}$ as long as antenna 1. Last joint of peduncle longer than the preceding and as long as flagellum which has 9-10 joints.

Upper lip conically rounded, with short setules below. Lower lip with inner lobes well-developed. Outer lobes rounded with short setules. Mandibular process slender and produced. Mandible robust. Primary cutting plate 6-dentate and the accessory 3-dentate. Spine row with 7 spines. Molar well-developed. Palp stout, 2nd joint $\frac{2}{3}$ as long as 3rd, fringed with a few setae on inner margin. 3rd joint tapering distally, inner margin with comblike setae interposed with long setae. Maxilla 1, inner plate with a long plumose seta. Outer plate with 9-10 slender spines. 2nd joint of palp with 6 apical spines and 5 setae on lower surface. Maxilla 2 as usual. Maxilliped with inner plate truncate at apex, with plumose setae on its inner and apical margins. Outer plate with long, curved spines on inner margin near apex and the lower ones lanceolate. Palp as usual, 4th joint tipped by a spine.

Gnathopod 1 large, stout and sparsely setose. It undergoes marked changes with age as figured. 5th joint becomes narrow, the central tooth on palm becomes separated from the dactylus, the sinus becomes very wide, the defining spine is shed and a central tooth is developed on dactylus. In the adult, side plate is narrow with anterior corner pointed. 2nd joint is short and stout. 4th joint with a spiniform process distally. 5th joint very short, subtriangular and hind lobe spiniform. 6th joint very large, quadrate. Front margin broadly rounded. Hind margin nearly straight, ending distally in a stout and pointed tooth. Palm transverse, with a granular central tooth separated from hinge of dactylus by a shallow sinus and followed posteriorly by a deep and very wide sinus. Dactylus falcate, overlapping palm and with a central rounded tooth. Gnathopod 2 long and slender. 2nd joint as long as next three combined. 5th joint as wide as and a little longer than 6th. Hind margin densely setose. 6th joint oblong, widening a little distally. Both margins setose. Palm slightly oblique, nearly straight and defined by a spine. Dactylus as long as palm, inner margin serrate.

Peraeopods 1 and 2 identical. Side plate quadrate-rounded. 2nd joint stout. 4th joint widening distally. 5th joint short and wide. 6th joint slender, hind margin setose. Dactylus long and slightly curved. Peraeopod 3 with side plate small and bilobed. 2nd joint oblong with front margin convex. 4th joint ends in a spine on hind margin. 5th joint, hind margin with 3 distal spines. 6th joint with 3 spines on front margin and setose on hind margin. Peraeopod 4 intermediate between 3rd and 5th. 2nd joint, hind margin distally with a plumose seta. Peraeopod 5 very long. 2nd joint oblong, front margin spinous. Hind margin proximally acute-lobed, the whole margin with long plumose setae. 4th joint with 3 spines on hind margin. 5th joint with setae only. 6th joint, front margin with 7 spines and hind margin with long setae. Dactylus stout and curved.

Uropods spinous. Uropods 1 and 2, peduncle with a stout distal spine. Uropod 1, outer ramus shorter than inner and as long as peduncle. Uropod 2, outer ramus shorter than inner and $1\frac{1}{2}$ times as long as peduncle. Uropod 3 with rami subequal and $1\frac{1}{2}$ times as long as peduncle.

Telson longer than broad, excavate distally on dorsal side and with a pair of unequal setae on lateral angles.

Female: Female differs from the male in the absence of sternal spines on pereon and the form of gnathopods. Gnathopod 1 slightly larger than 2nd. 2nd joint not very stout and long. 5th joint $\frac{3}{4}$ as long as 6th and much narrower. Hind margin rounded and densely setose. 6th joint oblong-oval with transverse and oblique palm, twice as long as wide, widening distally. Front margin convex, hind margin straight and both setose. Palm $\frac{3}{4}$ as long as hind margin, with a slight prominence in the middle, with short setæ, palmar angle prominent and defined by a long spine. Dactylus serrate and overlapping palm. Gnathopod 2 similar to that of male, but 5th joint not longer but subequal to 6th in length. Palm transverse. Incubatory lamellae elongate-oval, widest near the base.

Remarks: *L. quadrimanus* derives its specific name from the quadrate form of 6th joint of male gnathopod 1. Among 34 species known under the genus, the new species is closely related to *L. macromanus* (Shoemaker, 1925) (Barnard, J. L., 1962, 1970) in the male gnathopod 1 but in the latter species, this appendage has no spiniform processes on joints 4-5, palmar sinus not very wide and dactylus without rounded process. Gnathopod 2 has joints 5-6 densely setose and palm rounded off with hind margin. Sternal spines are of different shape and number. Female gnathopods are also of different form.

L. quadrimanus also resembles *L. intermedius* Schellenberg (1938) in the female gnathopod 1 but in the latter species 2nd joint of this appendage has slight anterodistal process, 6th joint not very convex in front and palm not very transverse. The males of the two species are very different in the sternal spination and the 1st gnathopod.

The young males of *L. quadrimanus* and *L. podoceroides* Walker (1904) are also similar, but the latter species has no sternal spines (see Barnard, K. H., 1937); the adult gnathopod 1 is very different with a long spurlike process on 6th joint. Female gnathopod 1 is also different in the two species.

The new species is also similar to *L. griseus* described below in several features, but the body pigmentation, form of sternal spines, and the 1st gnathopods of male and female will serve to separate the two species.

The male specimens doubtfully and erroneously assigned by the author (1968) to *L. kergueleni* Stebbing, have now been found to belong to this new species.

Lembos griseus sp. nov.

(Fig. 2)

Material: Gulf of Mannar: Several males and females from the washings of sponges, zoantharians and seaweeds at Appa island and Kilakkarai. 1 male and 1 female from seaweeds at Pamban. Palk Bay: 1 female from Rameswaram. 2 males and 2 females from sponges at Tondi. Length upto 6.5 mm.

Types: Male holotype, female allotype and 5 paratypes (3 males and 2 females) collected from Kilakkarai, have been deposited in the Zoological Survey of India.

Description: *Male*: Head and body similar to that of *L. quadrimanus* described above with the following differences. Dark bands (in alcohol) on posterior

half of head, pereaeon segments 1-7 and pleon segments 1-3; the band on 3rd pleon segment sometimes restricted to sides only. Pereaeon segments 2 to 4 with sternal spines as figured.

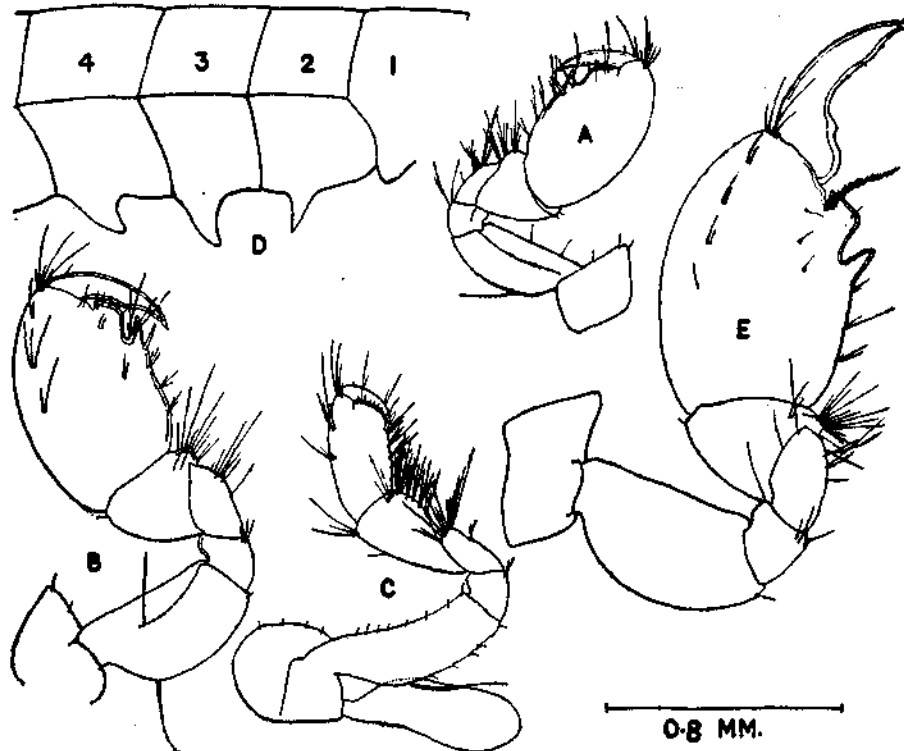


FIG. 2. *Lembos griseus* sp. nov. Male: A. gnathopod 1 of specimen 5.0 mm. in length; B, C. Gnathopods 1, 2 of specimen 6.0 mm. in length; D. pereaeon segments 1-4; E. gnathopod 1 of specimen 6.5 mm. in length.

Antenna 1 about $\frac{2}{3}$ as long as body. Peduncle $\frac{2}{3}$ as long as flagellum which has about 22 joints. Accessory flagellum 7-jointed. Antenna 2 robust and pediform, slightly shorter than antenna 1. 4th joint of peduncle shorter than 5th and as long as flagellum which has 8 joints.

Mouth parts typical of the genus and as in *L. quadrimanus* described above but the mandible is of lesser build.

Gnathopod 1 undergoes little change with age except that the palmar spine is shed, the central tooth on palm becomes separated from hinge of dactylus by a narrow sinus and angular tooth is developed on distal part of dactylus. In the adult, it is large and sparsely setose. Side plate with the anterior corner pointed. 2nd joint short and stout. 4th joint cordate in form. 5th joint triangular, $\frac{1}{2}$ as long as 6th and much narrower. Hind lobe blunt with a few setae. 6th joint large, oblong-oval, $1\frac{1}{2}$ times as long as wide. Palm oblique, half as long as hind margin, with a broad central tooth separated from hinge of dactylus by a small, narrow sinus and from the round-tipped corner tooth by a deep sinus. Front margin convex and hind margin

nearly straight and somewhat serrulate. Dactylus stout, slightly curved and overlapping palm, with a rounded base and an angular prominence near distal end on inner margin. Gnathopod 2 with 2nd joint as long as next three combined. 5th joint subequal in length and width to 6th. 6th joint oblong, twice as long as wide. Hind margin and distal part of front margin setose. Palm transverse and very slightly oblique, defined by a spine. Dactylus slender and reaching palmar spine.

Peraeopods 1 to 5 markedly similar to those of *L. quadrimanus* but of lesser build. Uropods and telson also as in that species.

Female : Female differs from the male in the absence of sternal spines and the form of 1st gnathopod. Gnathopod 1 slightly larger than the next. 2nd joint of medium length and width. 5th joint $\frac{2}{3}$ as long as 6th and narrower, hind margin angular and setose. 6th joint elongate-oval, front and hind margins slightly convex and setose. Palm oblique, shorter than hind margin, with a flat-topped part near hinge of dactylus and a shallow excavation between this and the palmar angle. A strong spine below palmar angle defines the palm. Dactylus slender, serrate and overlapping palm.

Remarks : *L. griseus* derives its specific name from the dark pigmentation of body. It has a striking resemblance to the young male of *L. podocerooides* Walker (1904) but in the latter species there are no sternal spines on peraeon, grey pigmentation is restricted to peraeon segments 6-7 and pleon segments 1-3 and adult male gnathopod 1 has long spurlike process (Walker, 1904; Barnard, K. H., 1937). The female with characteristic palm on gnathopod 1 is identical in the two species, but body pigmentation will serve to distinguish the two species. Perhaps this form of palm is found in several species of the genus, for example in *L. kergueleni* Stebbing (Walker, 1909), *L. longipes* Liljeborg (Kunkel, 1910) and *L. fuegiensis* (Dana) (Barnard, K. H., 1932), and it is often difficult to separate the females in this genus unless collected along with the males.

L. griseus is also similar to *L. intermedius* Schellenberg (1938) in the form of male gnathopods 1-2, but in the latter species male has different sternal spination, gnathopod 1 with anterodistal lobe on 2nd joint, central tooth on palm is not separated from hinge of dactylus and the dactylus slender and without angular prominences.

The new species is, as mentioned under description, similar to *L. quadrimanus* in several features but the body pigmentation, form and number of sternal spines on peraeon, the robust 2nd antenna, male gnathopod 1 without spiniform processes on hind margin of joints 4-5, 6th joint and dactylus of different form and female gnathopod 1 with transverse palm, will serve to separate the two species.

L. fuegiensis (Dana) also has male gnathopod 1 with distinct central palmar process, but it is imperfectly known for comparison with the present new species.

***Lembos leapakahi* J. L. Barnard**

(Fig. 3)

Lembos leapakahi Barnard, J. L., 1970, p. 79, figs. 39-40.

Material : Gulf of Mannar : 1 female from the muddy base of corals at Hare island, Tuticorin. 1 female from algae on corals at Appa island. Length 3.5-4.5 mm.

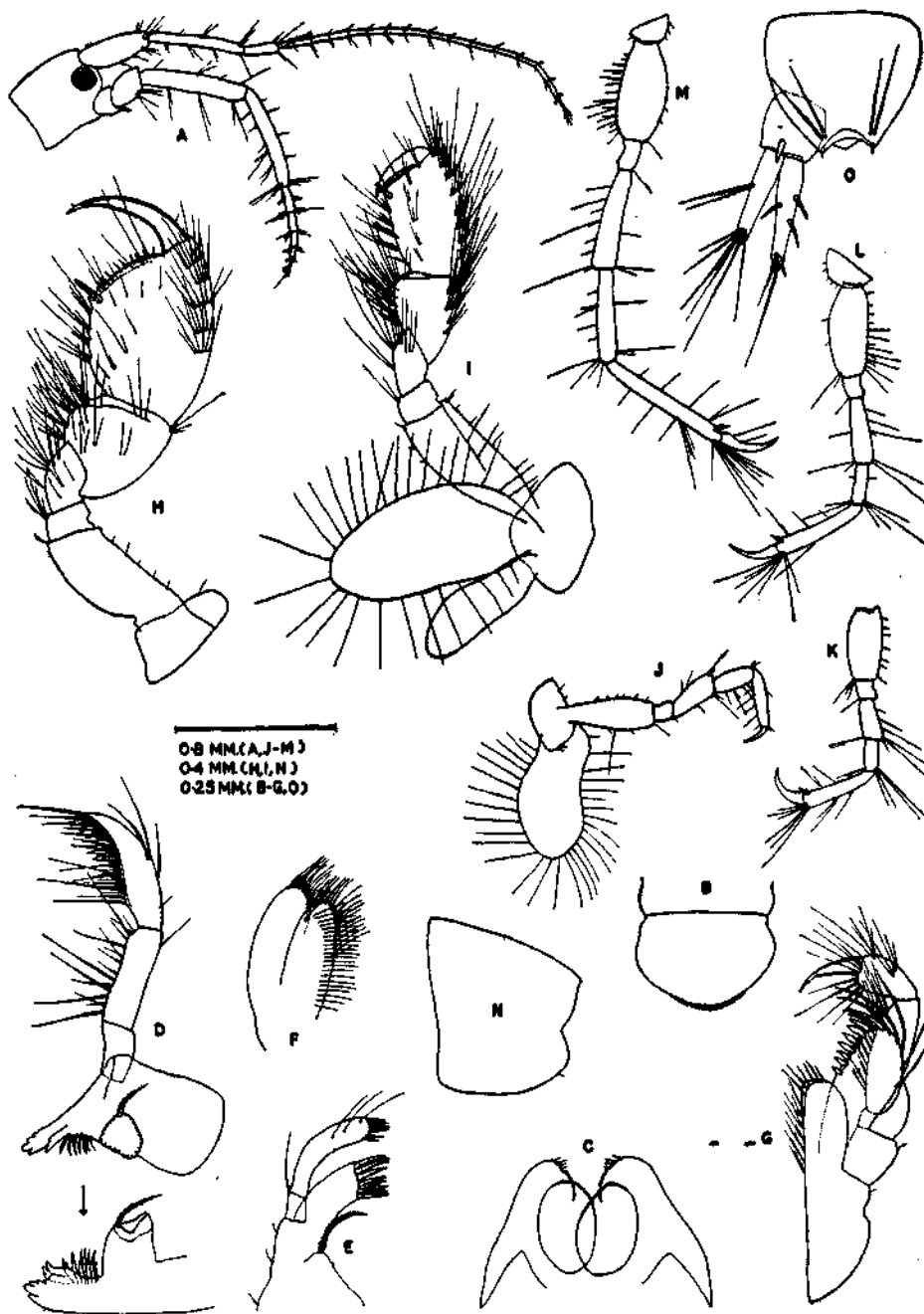


FIG. 3. *Lembos leapakahi* J. L. Barnard. Female: A. head with antennae; B. upper lip; C. lower lip; D. mandible; E, F. maxillae 1, 2; G. maxilliped; H, I. gnathopods 1, 2; J, K, L, M. pereopods 1, 3, 4, 5; N. epimeral plate 3; O. uropod and telson.

Description : Female : Body smooth with a pair of setae on pleon segments 1-3 and urosome 1. Dark pigmentation on peraeon segments 1-4, but appears to have been lost on other segments. Head with minute rostrum. Eyes dark and oval. Lateral lobes quadrate-rounded. Post-antennal lobe acute. Epimeral plate 3 with posterolateral corner rounded.

Antenna 1 about $\frac{3}{4}$ as long as body. 1st joint of peduncle stout, with 3 slender spines on lower margin. 2nd joint is the longest. Flagellum $1\frac{1}{2}$ times as long as peduncle, with 16 joints. Accessory flagellum short and 2-jointed. Antenna 2 rather stout and subpediform and reaches middle of flagellum of antenna 1. Peduncle stout, last joint longer than the preceding and $\frac{1}{4}$ as long as flagellum which has 6 stout joints, the last one with 2 curved spines.

Upper lip broader than long. Lower lip with outer lobe rounded and with a slight indent on inner margin. Inner lobes well-developed. Mandibular process long, slender and pointed. Mandible with primary cutting plate 6-dentate and the accessory tridentate. Spine row with 6-7 spines. Molar quadrate, with a plumose seta. Palp not stout, 2nd joint $\frac{2}{3}$ as long as 3rd, inner margin setose along two edges. 3rd joint slightly falcate, inner and outer margins with long setae. Maxilla 1, inner plate with a long plumose seta. Outer plate with 10 spines. 2nd joint of palp with 6 spines and 4 setae. Maxilla 2 as usual. Maxilliped well-developed, inner plate setose on inner and apical margins and outer plate with long and curved spines on inner margin. Palp as usual.

Gnathopod 1 stout and larger than the next. Side plate very narrow, anterior corner rounded. 2nd joint stout. 5th joint $\frac{3}{4}$ as long as and $\frac{1}{2}$ as broad as 6th. Hind margin rounded and densely setose. 6th joint broadly oval, $1\frac{1}{2}$ times as long as wide. Front margin convex and setose. Hind margin nearly straight, with 4 setiferous notches. Palm shorter than hind margin, oblique, convex, granular, with short setae and with a slight notch near defining angle, through which passes a long and stout spine. Dactylus curved, serrulate and overlapping palm. Gnathopod 2 with 2nd joint longer than next three combined. 5th joint about $\frac{3}{4}$ as long as and a little narrower than 6th, both joints densely setose on front and hind margins. 6th joint oblong, $1\frac{1}{2}$ as long as broad. Palm transverse, granular and defined by a long spine. Dactylus overlapping palm.

Peraeopods 1 and 2 alike, the latter a little shorter. 2nd joint long and widening distally. 4th and 5th joints not specially wide. 6th joint slender. Dactylus slender and slightly curved. Peraeopods 3-5 alike but increasing in length, with 2nd joint narrow, with long and fine setae and devoid of any spines excepting a pair at distal end of 6th joint. Peraeopod 3 with 2nd joint narrow, oblong, more than twice as long as broad. Hind margin with sparse, short setae and angular proximal lobe. 4th and 5th joints short and together as long as 6th. Peraeopod 4 intermediate and with sparse setae on hind margin of 2nd joint. Peraeopod 5 very long. 2nd joint narrow, oblong, twice as long as broad. Front margin a little convex. Hind margin more setose, with the usual angular proximal lobe. 4th joint longer than 5th and shorter than 6th. Dactylus long and curved.

Uropods 1-3 extend to same distance and spinous. Uropod 1 with peduncle longer than subequal rami and with a long distal spine. Uropod 2 with peduncle shorter than rami and outer ramus shorter than inner. Uropod 3 with rami $1\frac{1}{2}$ times as long as peduncle, outer a trifle shorter than inner.

Telson as usual in the genus, with 2 long setae above lateral angles.

Male : Not found in the present material, but as described and figured by Barnard, J. L. (1970).

Remarks : The present material closely agrees with Barnard's (1970) description and figures except for a few minor differences. In the present material, flagellar joints 1-2 of antenna 2 are not coalesced but distinct. Gnathopod 1 has a distinct notch at palmar corner through which passes the defining spine. Inner ramus of uropod 3 has three spines on inner margin and one on outer margin besides the terminal ones. Telson appears to have a blunt spine at lateral corners instead of a pair of processes.

The female of *L. processifer* recorded by Barnard, J. L. (1965, not Pirlot) appears to belong to this species since they are different from Pirlot's (1938) figures and Barnard (1970, p. 87) himself admits his identification was erroneous.

Distribution : Hawaiian Islands. This is the first record of this species from India.

***Lembos bryopsis* J. L. Barnard**

(Fig. 4)

Lembos bryopsis Barnard, J. L., 1965, p. 528, fig. 27.

Material : 1 male from the cavities of sponges at Rameswaram, Palk Bay. Length 7.5 mm.

Description : *Male* : Head with lateral lobes quadrate-rounded. Eyes small, dark and oval. Body smooth. Dark bands (in alcohol) on head, peraeon segments 3 to 5 and pleon segments 1 to 3. A long ventral spine on peraeon segment 2. Epimeral plate 3 with a little tooth at posterolateral corner.

Antennae missing. Mouth parts typical of the genus. Upper lip broader than long, conically rounded below. Lower lip with outer lobe rounded and with a slight indent on inner margin. Inner lobes well-developed. Mandibular process narrow. Mandible with primary cutting plate 5-dentate and the accessory 4-dentate. Spine row with 7 spines. Molar well-developed. Palp stout, 3rd joint a little longer than 2nd, tapering distally and densely setose on inner and outer margins. Maxilla 1, inner plate with a long seta. Outer plate with 10 spines. 2nd joint of palp with 7 spines and a seta apically and a row of 6 setae on lower surface. Maxilla 2 with outer plate a little longer and partly lying below inner plate which is fringed on inner margin. Maxilliped stout, inner plate setose on inner and apical margins. Outer plate with usual curved spines on inner and apical margins. Palp as usual.

Gnathopod 1 large. Side plate longer than deep. 2nd joint stout and 2-ribbed in front. 5th joint triangular, much narrower than 6th and hind lobe not projecting between 4th and 6th. 6th joint oblong, curved, lamellar, about twice as long as broad. Palm short, transverse, formed by a large conical tooth, separated from hinge of dactylus by a shallow cavity and continuous with hind margin. Hind margin curved, minutely serrulate and parallel with front margin and with an

angular projection near the base. Dactylus stout, curved near the base and overlapping palm by half its length. Inner margin serrulate with a few setules. Gnathopod 2 slender. 2nd joint stout, widening distally. Front margin distally with an angular lobe. 3rd joint also with angular lobe in front. 4th joint distally produced. 5th joint as wide as and much longer than 6th. Hind margin broad with dense setae.

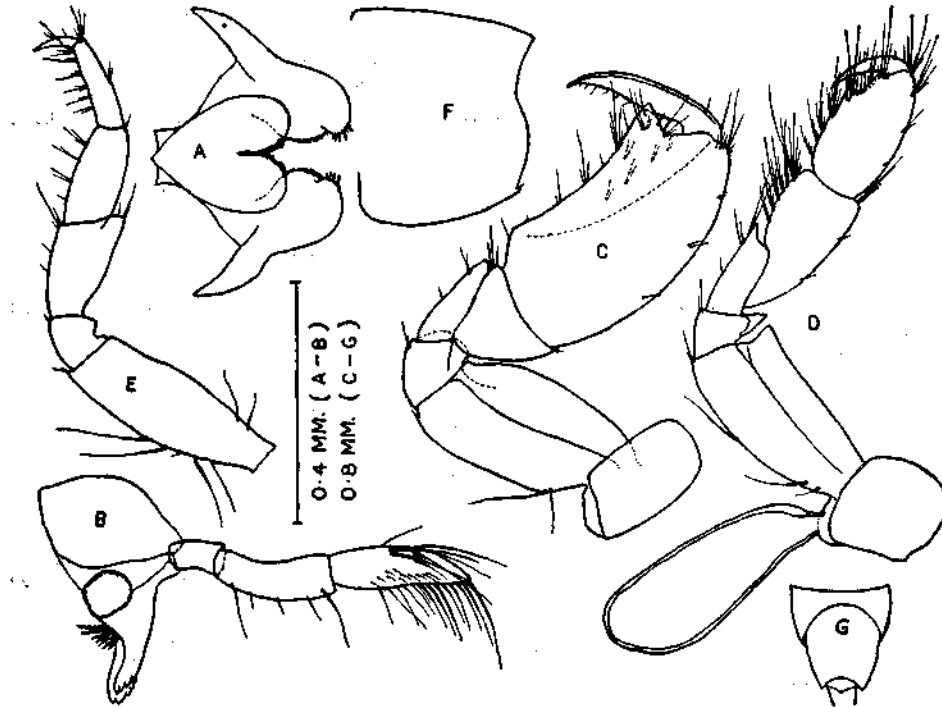


FIG. 4. *Lembos bryopsis* J. L. Barnard. Male: A. lower lip; B. mandible; C, D. gnathopods 1, 2; E. pereopod 1; F. epimeral plate 3; G. 3rd urosome and felson.

6th joint oval, less than twice as long as broad, hind margin densely setose and front margin with a few setae. Palm oblique, with a flat-topped prominence near hinge of dactylus, descending down into shallow excavation and joining hind margin at right angle and defined by a long spine. Dactylus slender, serrulate and overlapping palm.

Pereopods 1 and 2 alike but the latter a little larger. 2nd joint stout and thrice as long as broad. 4th joint widening distally. 6th joint slender. Dactylus slender and curved. Pereopod 3 with 2nd joint oblong, hind margin nearly straight. 4th joint with 2 spines on hind margin, 5th with 1 spine distally and 6th with 5 spines on front margin. Pereopod 4 similar to the 3rd but longer. Pereopod 5 very long. 2nd joint oblong, twice as long as broad. Hind margin with a few setules and distally with 3 feeble spines. 4th joint with 5 spines on hind margin. 5th and 6th joints with about 8 spinules.

Uropods spinous and extend to same distance. Uropod 1 with peduncle longer than rami and distally with a median spine. Inner ramus longer than outer,

Uropod 2 with peduncle shorter than inner ramus which is longer than outer. Uropod 3 with peduncle $\frac{2}{3}$ as long as rami which are subequal. Outer ramus with a minute 2nd joint.

Telson longer than broad, with a long stout seta and a setule on each side above lateral angle.

Female : Not known.

Remarks : The form of the 1st male gnathopod is unique in *L. bryopsis* that the author has no doubt in assigning the present material to it. The antennae still remain to be described in this species, but the peraeopods which were absent in Barnard's material have now been described.

The following differences are noted from Barnard's specimen which appears to be a fully adult male. Gnathopod 1 has hind margin of 6th joint less curved and minutely serrulate and inner margin of dactylus serrulate and lacking a rounded tooth near the base. Gnathopod 2 has 2nd joint not very much inflated and rounded, but produced sharply anterodistally. 6th joint has the palm distinctly though slightly excavate. These are probably due to the less mature condition of the present material.

Distribution : Eniwetok Atoll, Marshall Islands. This is the first record of this species from India.

SUMMARY

Amphipods of the genus *Lembos* Bate belonging to the family Aoridae from the south-east coast of India, are considered in this paper. Besides *L. podocerooides* Walker, *L. chelatus* Walker and *L. leptochirus* Walker previously known from Indian seas, two new species (*L. quadrimanus* sp. nov. and *L. griseus* sp. nov.) and two new records, (*L. leapakahi* J. L. Barnard and *L. bryopsis* J. L. Barnard) are described and figured.

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