

TWO BOTTON LIVING COPEPODA CALANOIDA AETIDEIDAE -
BRADYIDIUS PLINIOI AND LUTAMATOR ELEGANS N.SP
COLLECTED IN BRAZILIAN WATERS

MARIA PALOMA JIMENEZ ALVAREZ

Departamento de Zoologia, Instituto de
Biociências, Universidade de São Paulo,
Caixa Postal 20520, 01000 - São Paulo -
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RESUMO - O macho de *Bradyidius plinioi* Campaner, 1978, é descrito. As duas subespécies *B. plinioi plinioi* e *B. plinioi minor* são consideradas sinônimas devido à observação de espécimens intermediários. Foi redefinido o gênero *Lutamator* Bradford, 1969, registrado pela primeira vez em águas brasileiras. A fêmea de *Lutamator elegans* n.sp. é descrita e comparada com a espécie-tipo do gênero *L. hurleyi*.

ABSTRACT - The male of *Bradyidius plinioi* Campaner, 1978, is described. The two subspecies *B. plinioi plinioi* and *B. plinioi minor* are considered synonyms based on the discovery of intermediate specimens. The genus *Lutamator* Bradford, 1969, registered for the first time in brazilian waters, is redefined. The female *Lutamator elegans* n.sp. is described and compared with the type species of the genus *L. hurleyi*.

INTRODUCTION

While studying samples from the M.B.T series, specimens of *Bradyidius plinioi* Campaner, 1978, were found, including an unknown male, which is here described.

Specimens of the genus *Lutamator* Bradford, 1969, were also found. This genus is thus registered for the first time in brazilian waters. The female of the new species *Lutamator elegans* is described.

The M.B.T series was collected by Dr. Plínio Soares Moreira from the Instituto Oceanográfico da Universidade de São Paulo, from the oceanographic ship "Wladimir Besnard". The plankton net used had 0.67 mm mesh aperture and was adapted to a special M.B.T dredge devised for collections just above the sea bottom. The specimens were fixed in ethyl alcohol at 70% concentration.

Genus *Bradyidius* Giesbrecht, 1897
Bradyidius plinioi Campaner, 1978
 Synonymy: *B. plinioi minor* Campaner, 1978 Syn. nov.

MATERIAL AND OCCURRENCE

Thirteen adult females, 4 young females, one adult male and one young male, from a collection made just above the bottom of the continental shelf, at 135 m depth; at 21:30 hs of the 22nd, June 1970; in latitude 28°36'S and longitude 47°55'W.

The adult male was deposited in the Museu de Zoologia of the University of São Paulo, numbered 5247

Description of adult male (Figs. 1 to 12)

Length along the mid-dorsal line - 1.5 mm. Relation prosome - urosome length: 76:24.

Cephalosome narrower than metasome (Fig. 1 and 2) partially fused to 1st metasomal segment, the dorsal visible setae almost complete. Anterior region with 2 setae ventrally projected on a bifid rostrum (Fig. 3) with strong and thick points. The 4th and 5th metasome segments almost completely fused, ending in postero-lateral projections, acutely pointed and slightly asymmetrical; the left, a little longer, overreaches the posterior margin of genital segment. Relation between cephalosome and metasome segments (including its lateral projections) = 42.3:18.5:9.0:8.5:21.7 = 100.

Urosome five-segmented, genital segment slightly asymmetrical, anal segment very reduced and only ventrally visible. Caudal rami with one short lateral seta and three terminal setae. Proportion between the lengths of urosome segments and of furcal rami = 21.7:20.0:16.7:15.0:26.7 = 100.

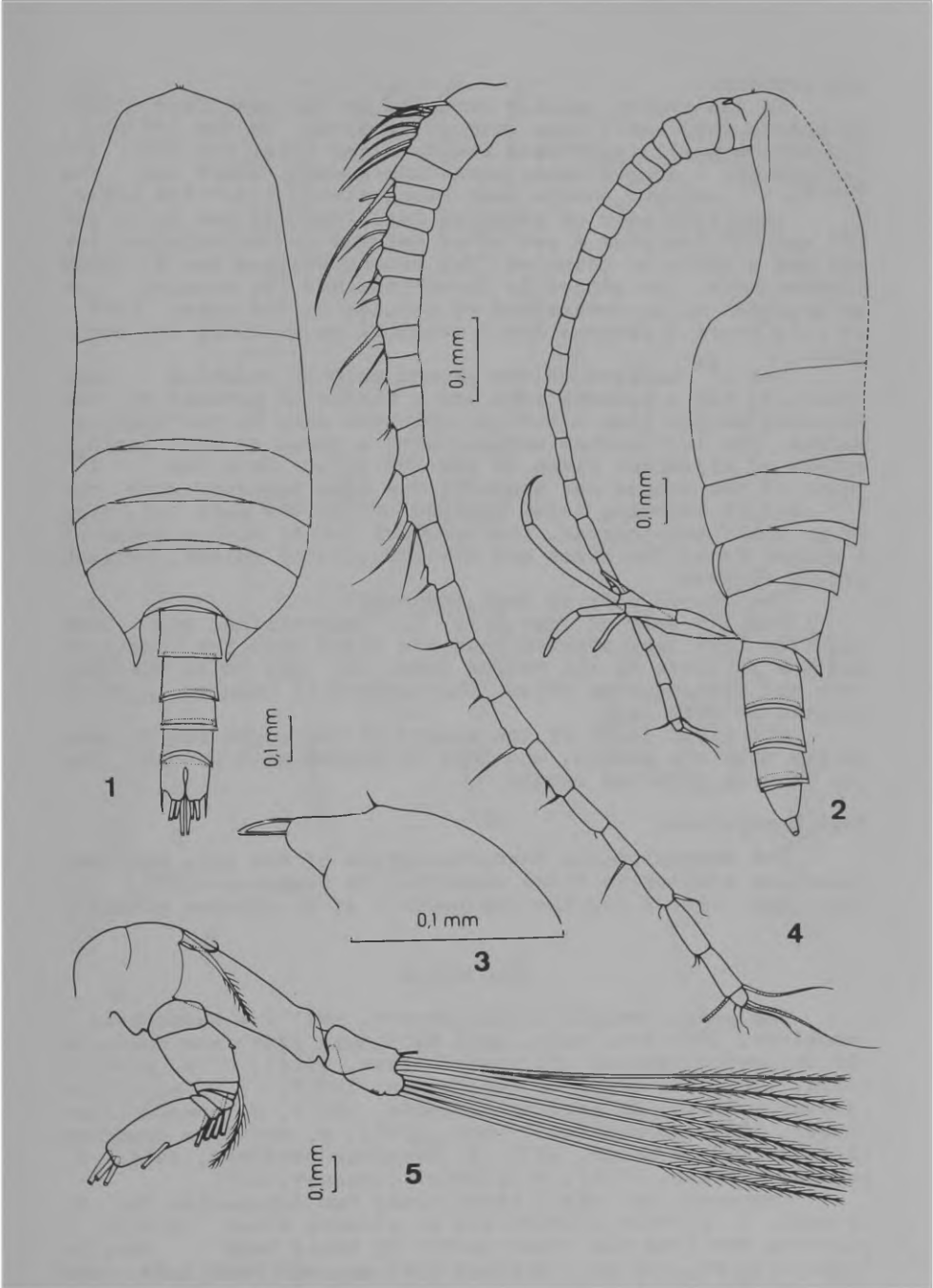
The left antennule (Fig. 4) is 24-jointed and, when fully distended, reaches the furcal rami. It bears thick sensory setae up to the 13th joint included, and, then thinner ones up to the end and other very thin setules. The relative lengths of the antennular joints are: 50:55:23:20:20:26:23:47:29:32:35:44:53:58:58:58:52:58:50:44:50:53:47:15. The right antennule had been lost.

The second basipod of the antenna (Fig. 5) has 2 setae. The lengths of the exopod and of the endopod are almost equal. In the second endopod joint there are 5 subterminal and 4 terminal setae on the lateral margin; externally, there is a group of very small spines.

The mandibular palp (Fig. 6), has a well developed basipod with an internal marginal seta. The two-jointed endopod is short. The exopod has a long thick seta on each of its four first joints, the last has two setae.

The gnathobase of the mandible was not found in this animal.

The reduced maxillule (Fig. 7) has 3 setae on the first external lobe, 9 setae on the exopod, no setae on the first internal lobe, 2 setae on the other internal lobe and 6 fine setae plus a very long one on the fused 2nd basipod



Bradyidius plinioi male - Fig. 1: dorsal view; Fig. 2: lateral view; Fig. 3: rostrum, lateral; Fig. 4: antennule; Fig 5: antenna.

and endopod.

In the region usually occupied by the maxillule there is only a very small lobe with a few setae. In the 1st basipod of the maxilliped there are no setae (Fig. 8) The 2nd basipod has 2 long plumose setae and a very short one. The 1st to 5th endopod joints bear respectively 5:3:4:3:4 setae.

The first pair of swimming legs (Fig. 9) has in the 1st and 2nd basipods a series of setules on the internal margin and a bunch of spinules. The second basipod has a long plumose seta. The exopod is three-jointed. The endopod has an external bulge ornamented by setules on its upper half. It also bears 3 lateral and 2 terminal setae along its margins.

The 1st basipod of the second pair of swimming legs (Fig. 10) has a plumose seta and a series of setules on the internal margin plus a tuft of spinules near to the external margin. The two-jointed endopod with a group of 11 laminar spines of different sizes on the 2nd joint. Only the 1st joint of the exopod was present. The same happened with the 3rd pair of swimming legs. Endopod of the 3rd pair of legs (Fig. 11) three-jointed, the two last joints with a group of 6 spines each. The sizes and distribution of spines, in each group, differs.

The fourth pair of legs, damaged.

The 5th pair of legs (Fig. 12) asymmetrical and very big. The left leg, shorter than the right with the basipods and the 3 joints of the exopod long, the last joint the shortest and bearing some setae. The endopod is reduced, one-jointed in both legs.

The first joint of the exopod of the right leg is much longer than the second, and this is curved with a bulge on the lateral internal margin.

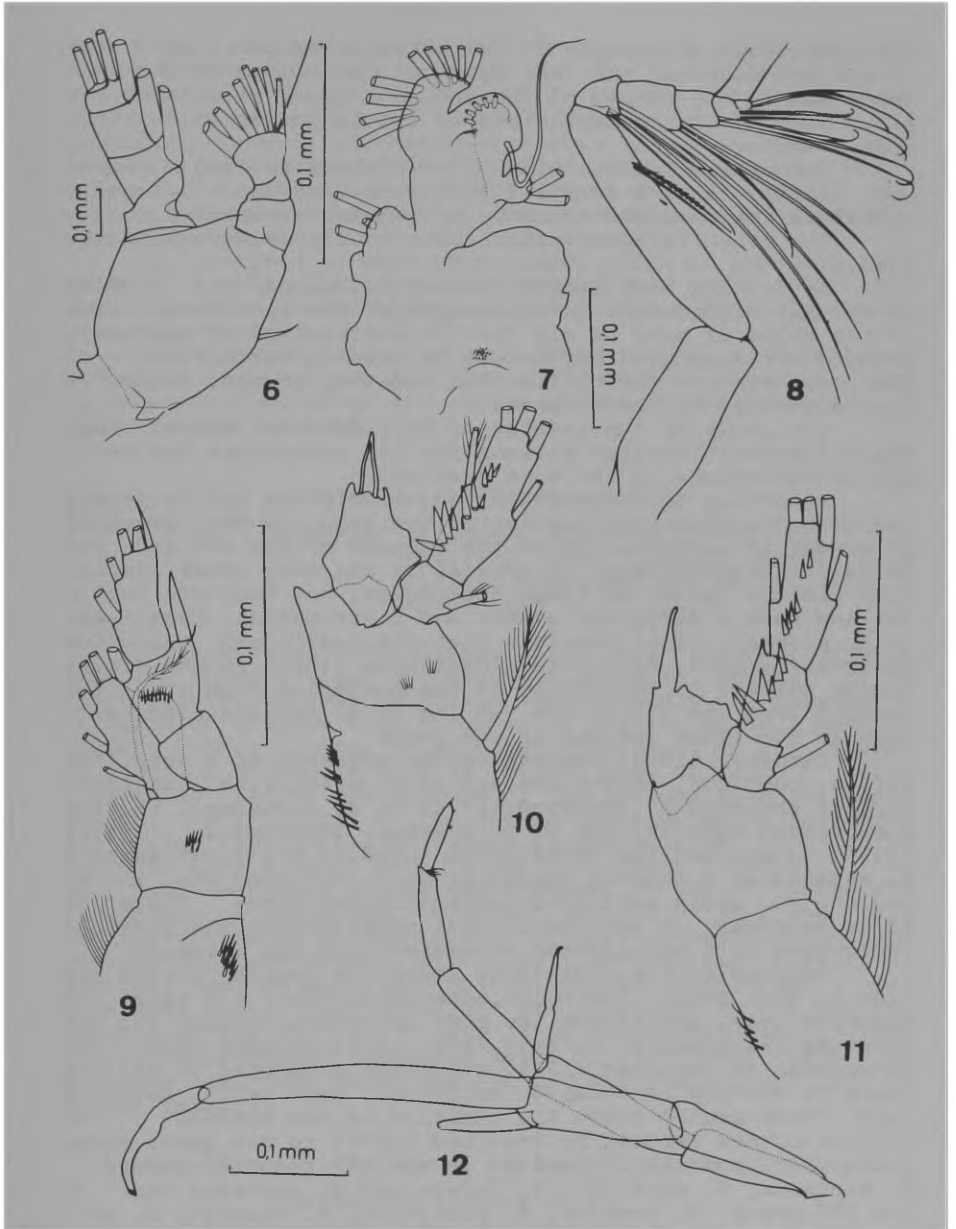
Male copepodite:

The morphological characteristics of the only specimen found are similar to those described by Campaner (1978, p. 871, figs. 26-28) for the copepodit V of *B. plinioi plinioi*.

DISCUSSION

The genus *Bradyidius* Giesbrecht, 1897 (= *Undinopsis*, Schneider, 1884 *nom. nud.*, apud Matthews, 1964) now contains the following species: *B. bradyi* (Sars, 1903), *B. similis* (Sars, 1903), *B. tropicus* (Wolfenden, 1905), *B. pacificus* (Brodsky, 1950), *B. angustus* (Tanaka, 1957), *B. arnoldi* Fleminger, 1957, *B. saanichi* (Park, 1966), *B. spinifer* Bradford, 1969, *B. luluae* Grice, 1972, *B. hirsutus* Bradford, 1976, *B. rakuma* (Zvereva, 1976), *B. plinioi* Campaner, 1978.

Campaner (*op. cit.*) established two subspecies for *B. plinioi*, *B. plinioi plinioi* and *B. plinioi minor* distinguishing one from the other mostly by their body lengths (from 2.45 to 2.52 mm - average 2.48 mm, and from 1.85 and 1.95 mm, average = 1.90 mm respectively) These two groups also showed differences in the relative proportions of the prosome: urosome and length: width of the genital segment, in



Bradyidius pliniei male - Fig. 6: mandible palp; Fig. 7: maxillule; Fig. 8: maxilliped; Fig. 9: 1st pair of legs; Fig. 10: 2nd pair of legs; Fig. 11: third pair of legs; Fig. 12 : fifth pair of legs

the morphology and length of the metasome margins, in the length and width of the last joint of the exopod of the antenna and in the length of the median - terminal seta of the first basipod of the maxilliped (a little longer in *B. plinioi minor*).

The mature females of *B. plinioi* here studied showed body lengths varying from 1.8 to 2.3 mm (average = 2.1 mm), therefore intermediate to those of the two subspecies.

The other characteristics above mentioned were also variable.

As for the body length, Gurney (1931, pg. 36) already wrote that differences in the length of the specimens have little value or none at all for the distinction of species, because their lengths may be due to varying retractions of the body segments during fixation and they present themselves telescoped to the observer.

The study of the females of this material shows that the differences noticed between the two subspecies are caused by variations in the same species.

According to Campaner (1976), *B. plinioi* can be separated from the remaining species of the genus by the presence of groups of large spines on the endopod of the 2nd and 3rd pairs of swimming legs. *B. arnoldi* is the only other species with similar spines on these appendages, but they are smaller and have a different aspect and distribution relatively to *B. plinioi*. It is possible that the individual variation observed by Shih, Rainville & Maclellan (1981) in the distribution pattern of the spines of the posterior face of the endopod from the 2nd to the 4th leg of *B. similis* also occurs in the other species of the genus.

Campaner (1978) registered the presence of a very fine suture, complete, in the females of *B. plinioi*, a character already observed by Bradford (1976) in *B. hirsutus*. In the most recent redefinition of this genus, Bradford & Jillet (1980) maintained the cephalosome fused to the first metasome segment as a generic characteristic, although she included the two above mentioned species in the genus. Therefore it is necessary to mention in that redefinition the possible occurrence of a cephalosome separated from the metasome.

Because of the similarity among the females of the species in this genus, the males, especially their 5th pair of swimming legs, constitute the most important feature for separating the species. Firstly they can be grouped into two categories as Campaner (1976) suggested according to the presence or absence of endopods on the 5th pair of swimming legs. These groups (with the addition of new species or without others removed by Bradford (1976) to the genus *Pseudotharybis*) are the following: in the 1st group *B. bradyi*, *B. hirsutus*, *B. spinifer*, *B. luluae* and *B. augustus* and in the 2nd group *B. similis*, *B. pacificus*, *B. saanich*, *B. arnoldi* and *B. plinioi*. The males of *B. tropicus* and *B. rakuma* are not known.

The males of *B. plinioi* and *B. arnoldi* are also, like the females, those most similar to each other, especially because they have the 1st and 2nd basipods and the exopods of both legs of the fifth pair with lengths and other features very much alike. In this they diverge from the others of the

same group. The endopod of the left leg has a different number of joints (two in *B. arnoldi* and one in *B. plinioi*)

The male *Bradyidius* generally have the fifth pair of legs structured very much like the fifth pair of legs in the genera *Aetideopsis* and *Pseudotharybis*. As the females in these genera are also similar (Bradford, 1976; Campaner, 1976) only after a critical more minute study of both sexes it will be possible to arrive at a more precise distinction among these genera.

As observed in some other adult males of species associated to the substratum (Matthews, 1964) those of *B. plinioi* also bear buccal appendages which are very simplified or much reduced.

This feature could be associated to a very transitory existence of these animals, and would explain why they are so rarely collected or are always absent of the usual samples (Campaner, 1974).

Genus *Lutamator* Bradford, 1969

Synonymy: *Lutamator* Bradford, 1969b, pg. 491, 493, 502, figs. 128-142; Bradford & Jillet, 1980, pg. 11, 61, 63, figs 42, 71 and 92

Redefinition: Cephalosome fused to 1st segment of metasome and fused 4th and 5th metasome segments, ending in short points. Rostrum short and rounded. Terminal margins of segments of urosome with a fringe of chitine setae. Genital segment with a lateral bulge latero-ventrally in its anterior portion. Antennule with 24 joints; some of which with long setae. Exopod and endopod of the antenna with the same length, the 1st joint of the endopod much wider in the proximal region than distally. Exopod of the antenna tapering distally with a short seta on the 1st joint, 2 setae (one short and the other longer and thinner) on the 2nd joint and 3 terminal setae on the 7th joint, this being long and thin and the 1st joint of the endopod without setae, the endopod reduced and two-jointed, with four fine terminal setae. First internal lobe of maxilla with 11-12 setae. Maxilliped well developed with 2 long setae and one short one on 2nd basipod. Endopod of the 1st to 4th pair of swimming legs with 1:2:3:3: joints respectively. Terminal spine of the 3 last pairs of swimming legs with denticles connected to each other by a chitin lamella.

Type-species: *Lutamator hurleyi* Bradford, 1969

Lutamator elegans n.sp.

MATERIAL AND OCCURRENCE

Two females were collected from 900 m depth, at 5:30 o'clock on the 7th September 1970 in waters from off the Brazilian coast (21°37'S-40°03'W) The other two females were collected from 460 m at 12:45 o'clock on the 3rd June 1971

at 24°11'S-43°19'W.

The holotype was placed in the Museu de Zoologia of the University of São Paulo, numbered 5251 and a paratype was placed in the Department of Zoologia of the Instituto de Biociências of the University of São Paulo, numbered 187.

Description of adult female (Figs. 13 to 30)

The length along the median dorsal line is 5.2 mm in all 4 specimens.

Cephalosome relatively long and slightly narrower in the anterior region (Figs. 13 and 14) and it is fused with the 1st metasomal segment. The 4th and 5th metasomal segments are fused, ending in a small point. Rostrum short and rounded (Fig. 15 and 16).

Proportional lengths of cephalosome and metasome segments (including its lateral projections) = 67.3:9.2:9.2:14.3 = 100. Relation prosome: urosome = 74:26.

Urosome (Fig. 17 and 18) four-segmented, the genital segment with a pronounced ventral bulge. Terminal margins of 3rd and 4th segments fringed with very fine setules.

Proportional lengths of the urosome segments and furcal rami = 45.8:18.1:12.5:9.7:13.9 = 100.

Antennule (Fig. 19) 24-jointed, and when totally distended laterally, reaches the posterior end of metasome. Proportional lengths of antennular segments: 42:83:37:32:33:28:32:46:28:23:32:37:51:46:46:51:61:51:46:46:37:51:42:19.

Antenna (Fig. 20) with endopod of same length as exopod. First joint of endopod much wider in proximal than in distal region. Last joint of exopod long and much thinner than preceding ones, which gives the exopod tapering form at its end.

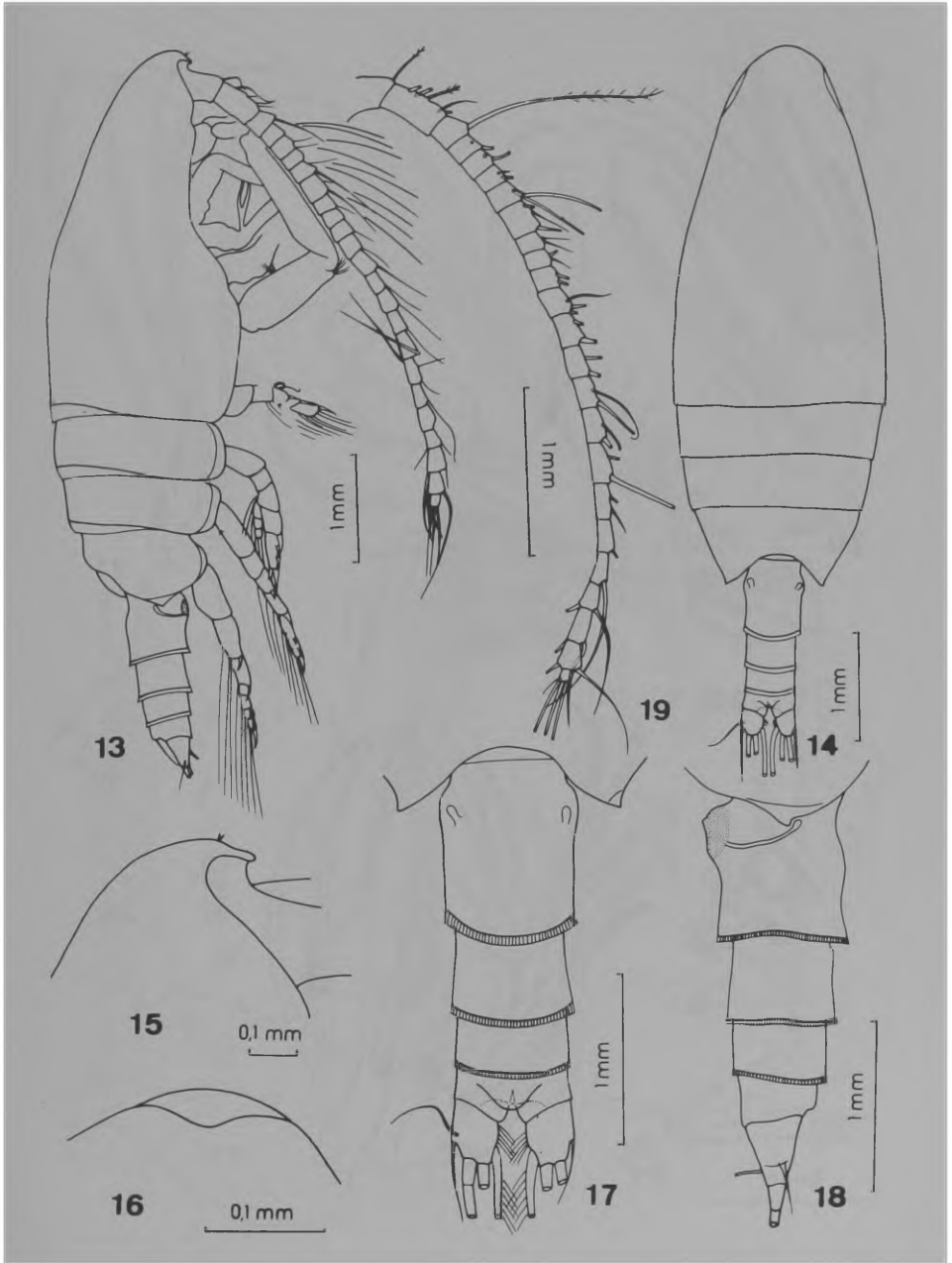
Mandible palp (Fig. 21) without setae on its basipod and with very reduced endopod. Mandibular gnathobase (Fig. 22) with a setose seta, 7 teeth and some tufts of small setules.

Maxillule (Fig. 23) with 8 setae on 1st external lobe, 11 plumose setae on exopod; 12 setae on 1st internal lobe, 5 setae on 2nd internal lobe, one short seta and a very long and serong seta (both ornamented with a series of numerous setules on one side and another of shorter setules, more spaced, on the other side) on 3rd internal lobe; 4 setae on basipod and 7 long setae and 4 short ones on endopod. Ventral face of 1st and 2nd internal lobes with some groups of little spines, near to the insertion of setae, as in the figure.

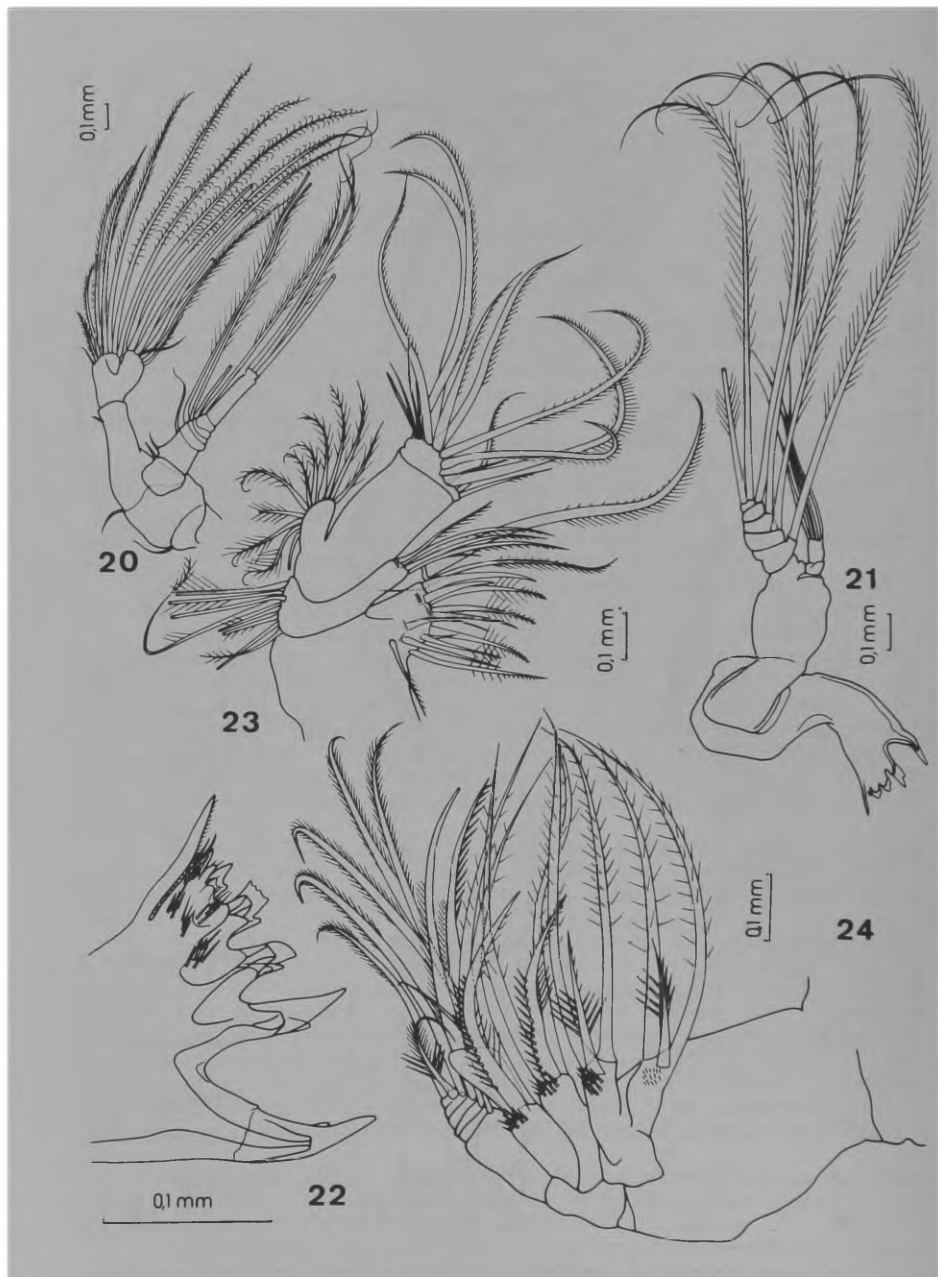
Maxillule (Fig. 24) robust with 3 strong setae in each of its 5 lobes. On ventral face of 4 first lobes tufts of spinules near to the superior margin.

Maxilliped (Fig. 25) well developed and robust. Median region of second basipod with 3 setae, of which one is very fine and two are longer and ornamented with a series of numerous and very short setules.

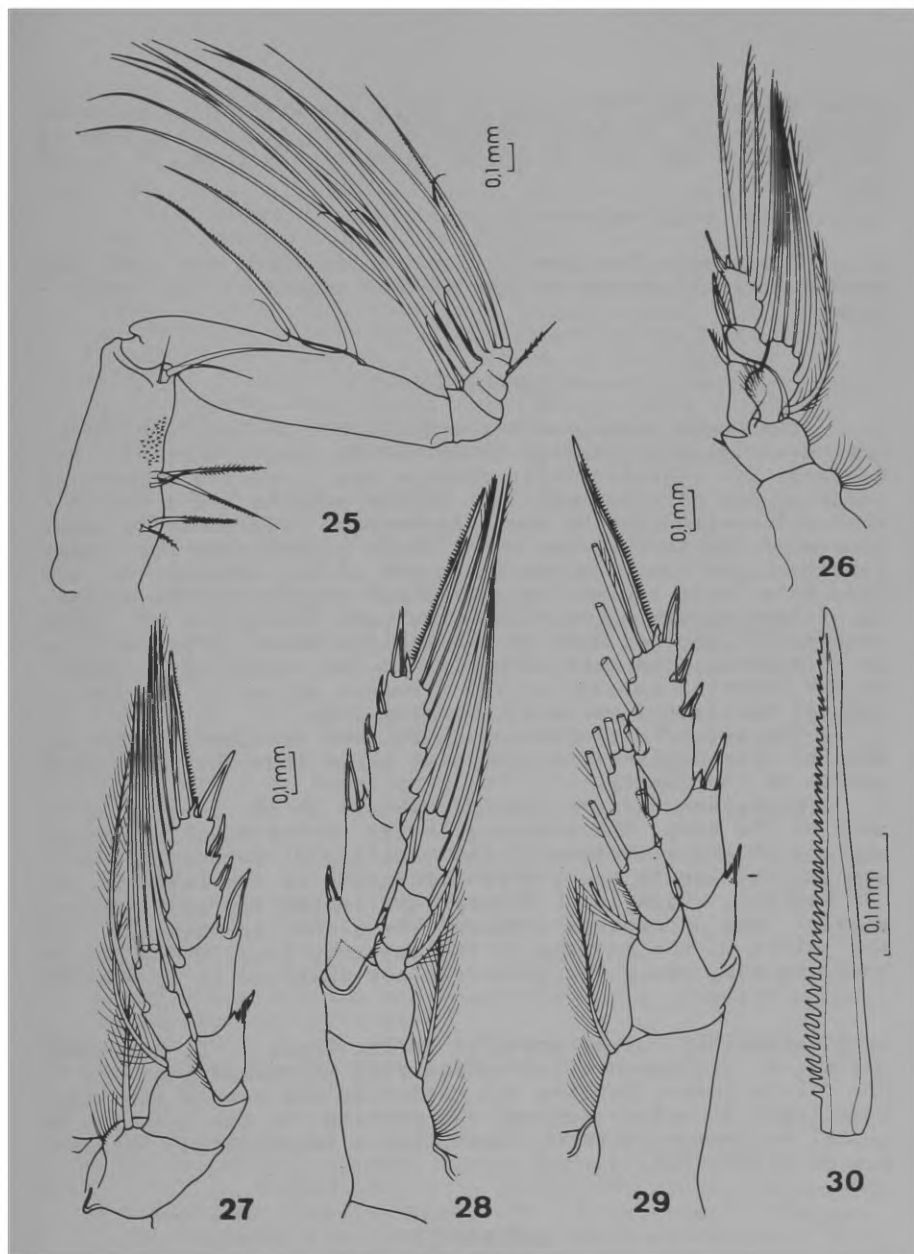
Leg exopods (Figs. 26, 27, 28 and 29 respectively from the 1st to the 4th pair) bear laminar spines on their outer margins. From 2nd to 4th pair of legs there is a terminal la



Lutamator elegans n.sp. female - Fig. 13: lateral view; Fig. 14: dorsal view; Fig. 15: rostrum, lateral; Fig. 16: rostrum, ventral; Fig. 17: urosome, dorsal; Fig. 18: urosome, lateral; Fig. 19: antenna.



Lutamator elegans n.sp. female - Fig. 20: antennule; Fig. 21: mandible palp; Fig. 22: mandibular gnathobase; Fig. 23: maxillule; Fig. 24: maxilla.



Lutamator elegans n.sp. female - Fig. 25: maxilliped; Fig. 26: 1st pair of legs; Fig. 27: 2nd pair of legs; Fig. 28: 3rd pair of legs; Fig. 29: 4th pair of legs; Fig. 30: distal spine on the exopod of 2nd pair of legs.

minar spine (Fig. 30) which is large and with an external chitin lamella, serrated. Number of teeth of these spines varies in each leg (46, 50 and 54 respectively from 2nd to 4th pair).

Male: still unknown.

Etymology: The name of the species (from the Latin *elegans* = elegant) refers to the general aspect of the specimens.

DISCUSSION

The genus *Lutamator* was established by Bradford (1969b) when describing *L. hurleyi* collected in deep waters of New Zealand. Its characteristic feature was a reduced number of setae on the 1st internal lobe of the maxilla and a few other differences in the mouth appendages relatively to other genera of the Aetideidae. Among these differences the most important are the peculiar structure of the antenna, of the mandibular palp and of the maxilliped especially the presence of long setae on its second basipod. The number of setae on the 1st internal lobe of the maxilla seems to be variable in this genus, the same happening to the number of "teeth" on the serrated lamella of the terminal spines of the exopods of the last 3 pairs of swimming legs.

The set of differential characters mentioned above permits to distinguish with ease this genus from the remaining genera of the family.

L. elegans differs from *L. hurleyi* in the general aspect of the body, the number of setae of the maxillule's lobes and in the structure of the maxilliped, especially concerning the length and the ornamentation of the setae of the 2nd basipod, which in *L. hurleyi* are longer and with two series of long and spaced setules. The glandular openings on the joints of the exopods of the natatory legs, described by Bradford (*op. cit.*, pg. 491) were not observed in *L. elegans*.

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REFERENCES

- BRADFORD, J. 1969a. New species of *Aetideopsis* Sars and *Bradydidius* Giesbrecht (Copepoda: Calanoida) from the Southern hemisphere. *N.Z. J. L. mar. Freshwat. Res.*, Wellington, 3(1):93-7.
- BRADFORD, J. 1969b. New genera and species of benthic calanoid copepods from the New Zealand slope. *N.Z. J. L. mar. Freshwat. Res.*, Wellington, 3(4):473-505.

- BRADFORD, J 1976. A new species of *Bradyidius* (Copepoda Calanoida) from the Mgazana estuary, Pondoland, South, Africa, and a review of the closely related genus *Pseudotharyx* *bis*. *Ann.S.Afr.Mus.*, Cape Town, 72(1):1-10.
- BRADFORD, J & J.B. JILLET 1980 The marine fauna of New Zealand: pelagic calanoid copepods: family Aetideidae. *Mem.N.Z.oceanogr.Inst.*, Wellington, 86:3-101.
- BRODSKY, K.A. 1950. *Calanoida of the Far Eastern and Polar basin of the USSR*. Translated from the Russian. Jerusalem, Israel Program for Scientific Translations. 440p. (Keys to the Fauna of the USSR, published by the Zoological Institute of the Academy of Sciences of the USSR, n° 35).
- CAMPANER, A.F 1974. *Copépodos (Crustacea) planctobentônicos da Plataforma Continental Brasileira (21°15'S-30°03'S)*. São Paulo. 87p. Master thesis Departamento de Zoologia of the Instituto de Biociências of the University of São Paulo.
- CAMPANER, A. F. 1976. *On some new planctobentic Aetideidae and Phaennidae (Copepoda, Calanoida) from the Brazilian Continental Shelf (23°-25°S and 41°-46°W)* São Paulo, U.S.P., 103 p., D Sc Thesis, Zoology Dept., Inst. Biociências, Universidade de São Paulo, Brazil.
- CAMPANER, A.F 1978 On some planktobentic Aetideidae and Phaennidae (Copepoda, Calanoida) from the Brazilian continental shelf I Aetideidae. *Ciênc. Cult.* São Paulo, 30(7):863-76.
- FLEMINGER, A. 1957 New genus and two new species of Tharybiidae (Copepoda Calanoida) from the Gulf of Mexico with remarks on the status of the family. *Fishery Bull.* Fish Wildl. Serv. U.S. Washington, 57(116):347-54.
- GIESBRECHT, W. 1897. Notizen zur Systematik der Copepoden *Zool.Anz.*, Leipzig, 20:253-4.
- GRICE, G.D. 1972. The existence of a bottom-living calanoid copepod fauna in deep water with descriptions of five new species. *Crustaceana*, Leiden, 23(3):219-42.
- GURNEY, R. 1931. British freshwater copepoda, v. 1. London Ray Society. 238p.
- MATTHEWS, J.B.L. 1964. On the biology of some bottom-living copepods (Aetideidae and Phaennidae) from Western Norway. *Sarsia*, Bergen, 16:1-46.
- PARK, T.S. 1966. A new species of *Bradyidius* (Copepoda:Calanoida) from the Pacific coast of North America. *J.Fish. Res. Bd Can.*, 23(6):805-11.
- SARS, G.O. 1903. *An account of the Crustacea of Norway, with short descriptions and figures of all the species* 5. *Copepoda, Calanoida*. Bergen, Bergen Museum 171p. 108 pls.
- SHIH, C.T., L. RAINVILLE & D.C. MACLELLAN 1981. Copepodids of *Bradyidius similis* (Sars, 1902) (Crustacea: Copepoda) in the Saguenay fjord and the St. Lawrence estuary. *Can. J.Zool.*, Ottawa, 56(6):1079-1093.
- TANAKA, O. 1957 The pelagic copepods of the Izu region, middle Japan. Systematic account III. Family Aetideidae(part). *Publs Seto mar.biol.Lab.*, Sirahama, 6(1):31-68.
- WOLFENDEN, R.N. 1905. Notes on the collection of Copepoda. In: GARDINER, J.S. *The fauna and geography of the Maldivé and Laccadive Archipelagoes*. V 2, suppl. 1. Cambridge, University Press. p.989-1040, pls. 96-100.

ZWEREVA, J.A. 1976. A new species of *Aetideopsis* Sars (Copepoda, Calanoida) from Aniva Bay (Okhotsk Sea) *Issled. Fauny Morei, Moskva*, 20(28):6-8