

## Two *Paralamprops* species (Crustacea : Cumacea) from the deep Atlantic

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**Abstract :** A new species of Cumacea, *Paralamprops tuberculatus* sp. nov. is described, and *P. semiornatus* is redescribed, both based on specimens collected in the deep waters of the North Atlantic. For *P. semiornatus*, two forms are defined. In addition, the parasitization of some specimens of this species by an epicaridean, a rhizocephalan, or a copepod is reported.

**Résumé :** A partir d'exemplaires provenant des eaux profondes de l'Atlantique Nord, une nouvelle espèce de Cumacea, *Paralamprops tuberculatus* sp. nov. est décrite et l'espèce *P. semiornatus* est redécrite. En ce qui concerne *P. semiornatus* deux formes morphologiques sont signalées. De plus, quelques exemplaires de cette espèce étaient parasités soit par un épicaride, soit par un rhizocéphale, soit encore par un copépode.

### INTRODUCTION

The genus *Paralamprops* Sars, 1887 contains 14 species. Eight species have been reported from the Atlantic (Calman, 1905, 1912 ; Stebbing, 1912 ; Fage, 1929 ; Day, 1978 ; Reyss, 1978a, 1978b), two from the Pacific (Jones, 1969 ; Gamô, 1984), and four from Antarctic-Subantarctic waters (Sars, 1887 ; Zimmer, 1907, 1913 ; Hale, 1937 ; Jones, 1971). The combined range of vertical distribution for these species is 232-5370 m, although Belyaev (1972 ; table XIV) has additionally reported the occurrence of this genus in the hadal zone (6065 m).

As a result of the difficulties of collecting specimens in deep waters, our knowledge of the genus *Paralamprops* is very fragmentary. This is illustrated by the fact that eight of the species included in this genus were erected based on single specimens. In addition, *Paralamprops* is a rather variable genus and it is not possible, with the small amount of information available at present, to be sure that it comprises a natural group. The aim of this paper is to provide some new information about this genus. To this end, a new species is described, and the description of *P. semiornatus* Fage, 1929 is completed.

### MATERIAL AND METHODS

The type material and reference specimens have been deposited in the Crustacea Section, Natural History Museum (NHM), London. The abbreviation COB refers to the

Centre Océanologique de Bretagne, Brest ; IOS to the Institute of Oceanographic Sciences, Wormley ; SMBA to the Scottish Marine Biological Association, Dunstaffnage ; WHOI to the Woods Hole Oceanographic Institution.

*Paralamprops tuberculatus* n. sp.

(Figs 1-14)

Material examined : SMBA, CHALLENGER : Sta. ES27 : approx. 54°40'N, 12°16'W ; 2900 m (SMBA Permanent Station in Rockall Trough, referred to below as the RPS) ; November 3, 1973 : 1 manca. Sta. ES56 : RPS, March 1, 1976 : 1 adult ♂. Sta. ES59 : RPS ; June 21, 1976 : 1 marsupial ♀. Sta. ES129 : RPS ; April 7, 1977 : 1 adult ♂, 2 juveniles (one of these juveniles designed PARATYPE, NHM #1994.2139). Sta. ES135 : RPS ; August 7, 1977 : 1 juvenile. Sta. ES137 : RPS ; February 22, 1978 : 1 preparatory ♀, 1 preparatory ♂. Sta. ES185, RPS ; April 10, 1981 : 1 preparatory ♂, 1 juvenile. Sta. ES401, RPS ; September 10, 1990 : 1 adult ♂. COB, INCAL : Sta. DS09 : 55°07.7'N, 12°52.6'W ; 2897 m ; July 20, 1976 : 6 juveniles. COB, BIOGAS IV : Sta. DS55 : 47°34.9'N, 9°40.9'W ; 4125 m ; February 22, 1974 : 1 adult ♂ (HOLOTYPE, NHM #1994.2140).

Description of the adult male

Length : approx. 12 mm.

Integument calcified, with numerous club-shaped projections (see detail Fig. 2a) and some setae. In the adult males examined most of these ornamentations are broken and setae are present on carapace only ; in some immature specimens setae are also present on thorax and abdomen.

Carapace (Figs 1, 2) slightly more than 1/4 total length (including telson). Width approximately 3/4 length, depth approximately 1/2 length. Marginal carina divided into a series of lamellar projections, encircling entire carapace except for posterior margin (these projections are damaged in the specimen drawn, see detail from another adult male, Fig. 2b). Eyelobe triangular, without eyes ; carapace with 3 dorsal rows of club-shaped projections behind the eyelobe. Branchial region somewhat inflated, resulting in a shallow mid-dorsal depression. Antero-lateral angle absent.

Thorax slightly more than 1/2 length of carapace.

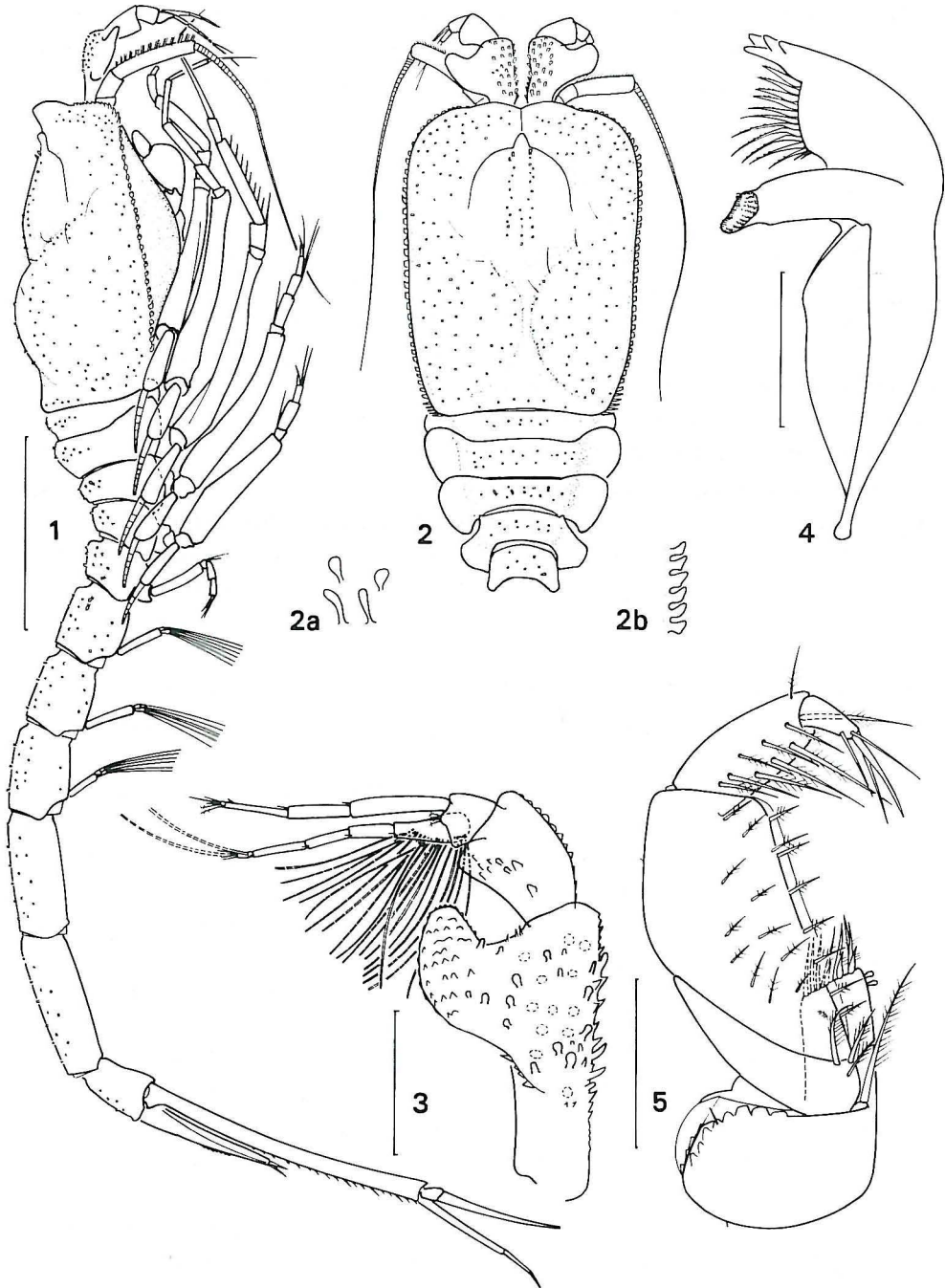
Abdomen longer than cephalothorax by length of last segment. Telson (Fig. 14) : slightly more than twice as long as last abdominal segment, with 3 distal spines, central spine slightly longer than lateral ones.

First antenna (Fig. 3) : peduncle, first article, outer margin expanded into a large distal lobe ; dorsal surface with numerous teeth and club-shaped projections (in the specimen drawn, most projections are missing, a circular hole remains at the insertion site). Flagella subequal in length ; outer flagellum composed of 5 articles, first with numerous aesthetascs (only some drawn), fourth and fifth with one aesthetasc each (in the specimen drawn the distal ends of both aesthetascs are missing) ; inner flagellum with 4 articles, fourth minute.

Second antenna, peduncle 5-articulate, last two articles slightly compressed, thickly beset with setae. Flagellum reaching end of carapace only.

Mandible as shown in Fig. 4 (left mandible with lacinia mobilis).

First maxilla with a normal palp bearing 2 distal filaments.



Figs 1-5: *Paralamprops tuberculatus* n. sp. Adult  $\sigma$ : 1, entire animal (lateral view); 2, carapace and thorax (dorsal view); 2a, club-shaped projections (detail); 2b, marginal carina (detail); 3, first antenna; 4, right mandible; 5, first maxilliped. Scales: Figs 1, 2: 2 mm (same scale); Fig. 3: 0.5 mm; Figs 4,5: 0.25 mm.



First maxilliped (Fig. 5, epipodite omitted) : basis short, endite more than 1/2 of article length. Carpus, ventral surface with several plumose setae, inner margin with a hyaline lamella and a row of plumose setae similar to, or slightly thicker than, those located on ventral surface. Propodus with numerous setae on inner margin (only some drawn). Dactylus 0.4 times as long as propodus, with 4 terminal setae. Epipodite with 1 branchial lobule only.

Second maxilliped (Fig. 6) : stout and flat, filling the space between the infero-lateral folds of the carapace and housing the first maxillipeds and other mouthparts. Basis short, approximately as long as carpus. Ischium without setae. Merus, outer margin developed into a lobe, with several plumose setae proximally and 1 plumose seta distally. Carpus, articulated on inner distal margin of merus, narrow proximally, becoming much wider distally, inner margin with alternating long and short plumose setae. Propodus triangular, articulated on outer distal margin of merus, with numerous plumose setae, viz., 5-6 on outer margin, 5-6 on dorsal surface, and 9-11 on distal margin (these setae are arranged in two rows, only dorsal row drawn). Dactylus slightly less than 1/2 as long as propodus.

Third maxilliped (Fig. 7) : basis slightly longer than remaining articles together. Carpus approximately twice as long as ischium and merus together, inner margin with a row of strong simple setae flanked by some weaker, simple or barely plumose, setae (more ventral setae not drawn). Propodus with numerous setae, those on inner margin arranged in two rows of 2-3 setae (not drawn) and 5-6 setae, respectively. Dactylus approximately 0.6 times as long as propodus.

First pereopod (Fig. 8) : basis slightly longer than the remaining articles together. Merus, propodus, and dactylus approximately equal in length. Carpus approximately 1/3 longer than merus.

Second pereopod (Fig. 9) : basis slightly shorter than the remaining articles together. Ischium and merus with a distal spine on inner margin. Carpus approximately twice as long as ischium and merus together, with 8 spines on inner margin. Dactylus slightly shorter than carpus, with 4-5 small spines on inner margin and 3 unequal spines distally.

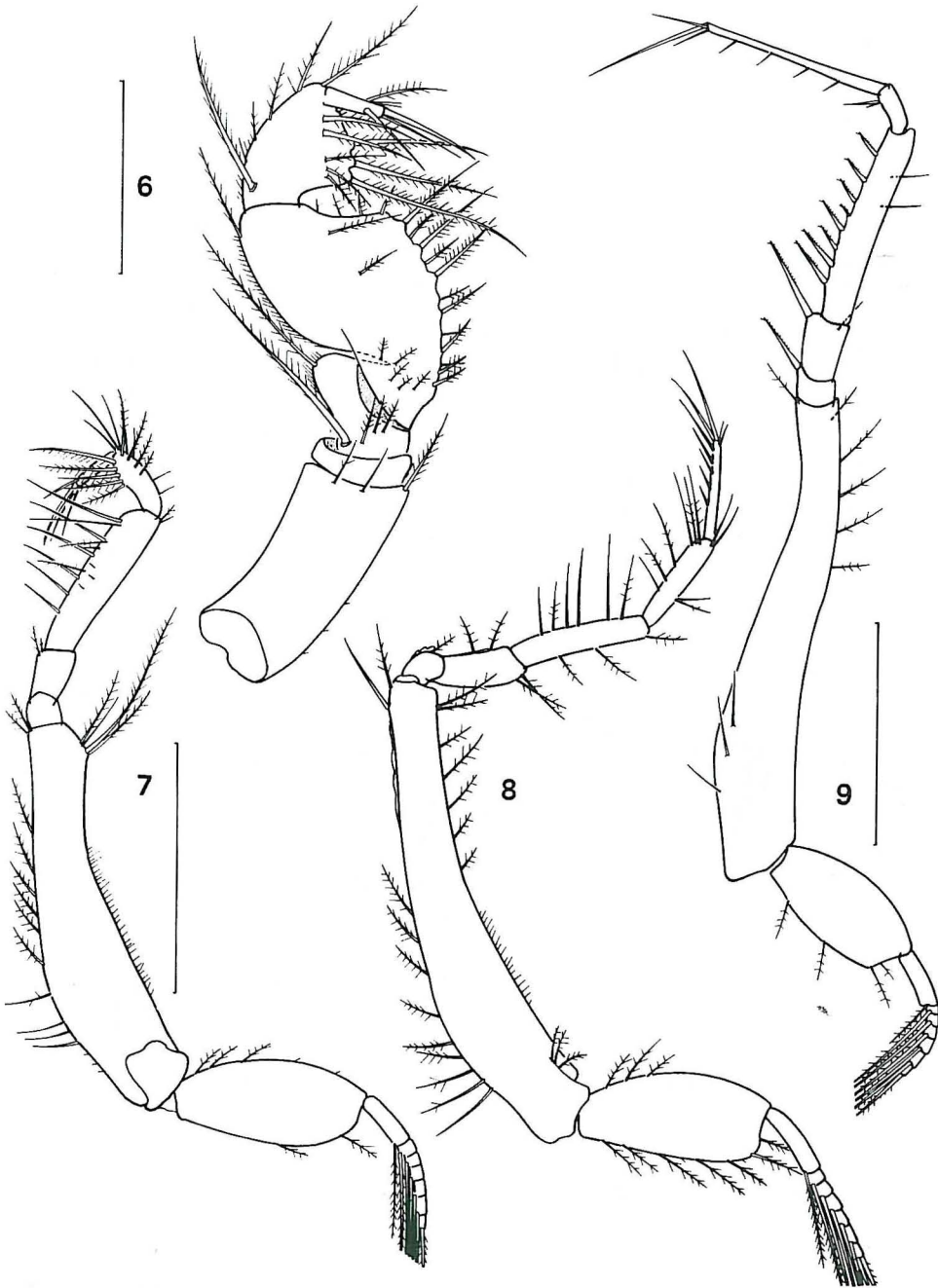
Third to fifth pereopods as shown in Figs. 10-12. Entire length of fifth pereopod shorter than basis of fourth pereopod.

Pleopods, 3 pairs ; inner ramus 1-articulate, with a finger-shaped process on outer margin ; outer ramus 2-articulate (Fig. 13).

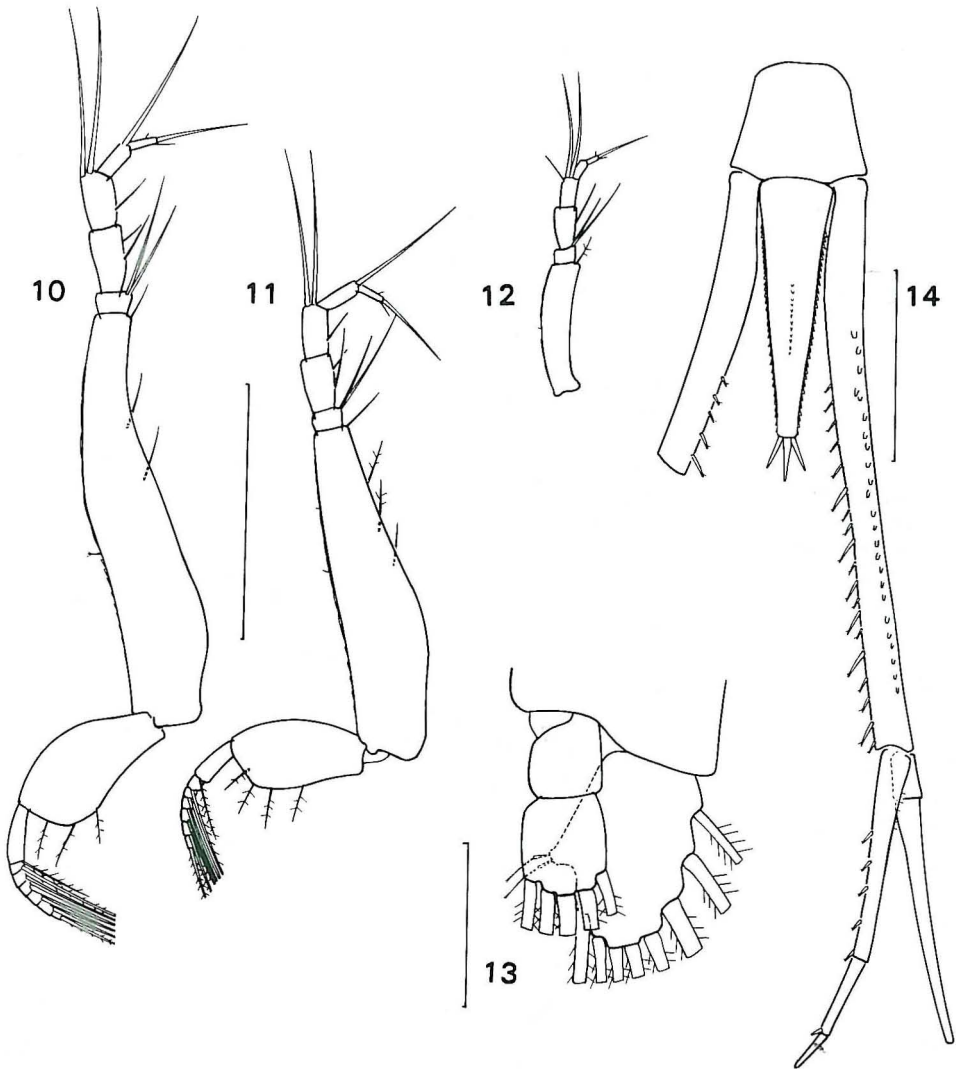
Uropod (Fig. 14) : peduncle 2.1-2.2 times as long as telson, with 17-19 spines on inner margin. Exopod approximately 1/2 as long as peduncle, proximal article much shorter than distal (distal spines missing). Endopod 3-articulate, proximal and medial articles combined approximately as long as exopod, with 5-6 and 1 spines on inner margin, respectively (spines from distal article missing).

The only marsupial ♀ available is badly damaged. This specimen has a rudimentary exopod on the third and fourth pereopods, and a fifth pereopod somewhat shorter than in the male. The first antenna has a wing-like process similar to that of the male (this is also valid for the immature instars).

Distribution : west of Ireland and Biscay Bay, between 2897 and 4125 m.



Figs 6-9: *Paralamprops tuberculatus* n. sp. Adult ♂ : 6, 7, second and third maxillipeds ; 8, 9, first and second pereopods. Scales : Fig. 6 : 0.5 mm ; Figs 7-9 : 1 mm (Figs 8, 9, same scale).



Figs 10-14 : *Paralamprops tuberculatus* n. sp. Adult ♂ : Figs. 10-12, third-fifth pereopods ; 13, pleopod rami (detail) ; 14, last abdominal segment, telson, and right uropod. Scales : Figs 10-12, 14 : 1 mm (10-12, same scale) ; Fig. 13 : 0.1 mm.

*Paralamprops semiornatus* Fage, 1929

(Figs 15-33)

*Paralamprops semiornata* Fage, 1929 : 24-26, figs. 56-63 (descrip. marsupial ♀ from W. Portugal, 3789 m). Fage, 1932 : 208 (list). Zimmer, 1941 : 32, fig. 38 (morphol.). Belloc, 1960 : 2 (list of type-specimens). Jones, 1969 : 123 (key), 170 (list). Day, 1978 :

148 (key). Reys, 1978a : 20 (key). Bocquet-Védrine & Bourdon, 1984 : 261 (host of a rhizocephalan parasite). Jones, 1985 : 431 (cit. Biscay area, approximately 2000-4000 m). Høeg & Rybakov, 1992 : 604 (list).

*Paralamprops semiornatus* : Reys, 1978a : 12 (cit. West Atlantic, 2802-2886 m). Băcescu, 1988 : 25 (catalogue).

Material examined : SMBA, CHALLENGER : Sta. ES10 : 56°37'N, 11°04'W ; 2540 m ; July 4, 1973 : 2 preparatory ♂♂. Sta. ES59 : approx. 54°40'N, 12°16'W ; 2900 m (SMBA Permanent Station in Rockall Trough, referred to below as the RPS) ; June 21, 1976 : 1 juvenile. Sta. ES135 : RPS ; August 7, 1977 : 1 preparatory ♀, 1 preparatory ♂. Sta. ES137 : RPS ; February 22, 1978 : 6 juveniles, 1 adult ♂. Sta. ES140 : RPS ; April 13, 1978 : 1 juvenile. Sta. ES143 : RPS ; April 14, 1978 : 1 preparatory ♂. Sta. ES147 : RPS ; June 2, 1978 : 1 marsupial ♀, 1 preparatory ♀, 1 adult ♂, 4 juveniles. Sta. ES185 : RPS ; April 10, 1981 : 2 marsupial ♀♀, 1 preparatory ♂, 1 juvenile. Sta. ES401 : RPS ; September 10, 1990 : 6 preparatory ♀♀, 1 juvenile, 1 manca. IOS, DISCOVERY : Sta. 7709/62 ; 59°58.8'N, 19°59.4'W ; 2714 m ; May 1, 1971 : 9 marsupial ♀♀, 4 preparatory ♀♀, 1 adult ♂, 8 preparatory ♂♂, 2 juveniles (NHM #1994.2141-2142 : 1 marsupial ♀ form A and 1 marsupial ♀ form B). Sta. 7709/66 ; 59°58.7'N, 19°53.5'W ; 2712 m ; May 3, 1971 : 1 marsupial ♀, 1 preparatory ♀. Sta. 7709/72 ; 60°06.9'N, 19°42.4'W ; 2649 m ; May 5, 1971 : 12 marsupial ♀♀, 3 preparatory ♀♀, 1 adult ♂, 2 preparatory ♂♂, 19 juveniles (NHM #1994.2143-2145 : 2 marsupial ♀♀ form A both infested by an epicaridean, 1 marsupial ♀ form B). Sta. 7709/73 ; 60°07.1'N, 19°30.3'W ; 2636 m ; May 5, 1971 : 25 marsupial ♀♀, 4 preparatory ♀♀, 6 adult ♂♂, 2 preparatory ♂♂, 16 juveniles (NHM #1994.2146-2149 : 2 marsupial ♀♀ form A both infested by an epicaridean, 2 adult ♂♂). Sta. 7709/85 ; 59°57.7'N, 19°55'W ; 2708 m ; May 7, 1971 : 12 marsupial ♀♀, 4 preparatory ♀♀, 2 adult ♂♂, 4 preparatory ♂♂, 3 juveniles (NHM #1994.2150-2154 : 2 marsupial ♀♀ form A, 1 marsupial ♀ form B infested by an epicaridean, 1 adult ♂, 1 juvenile infested by a rhizocephalan). Sta. 10112 ; 50°19.1'N, 13°25.8'W ; 2640 m ; Sept 9, 1979 : 1 marsupial ♀, 3 preparatory ♀♀, 1 adult ♂, 5 juveniles, 2 mancas. IOS, CHALLENGER : Sta. 50913 ; 50°11.9'N, 13°39.8'W ; 3040 m ; Nov. 12, 1980 : 3 marsupial ♀♀, 9 preparatory ♀♀, 2 adult ♂♂, 1 preparatory ♂, 9 juveniles. WHOI, CHAIN 106 : Sta. 321 ; 50°12.3'N, 13°35.8'W ; 2890 m ; August 20, 1972 : 2 marsupial ♀♀, 6 preparatory ♀♀, 3 preparatory ♂♂, 23 juveniles, 12 mancas. Sta. 323 ; 50°08.3'N, 13°53.7'W ; 3356 m ; August 21, 1972 : 2 preparatory ♀♀, 3 juveniles. WHOI, KNORR 35 : Sta. 340 ; 39°14.4'N, 70°20.3'W ; 3356 m ; November 24, 1973 : 2 marsupial ♀♀, 1 preparatory ♀, 1 manca. COB, POLYGAS : Sta. DS26 ; 44°08.2'N, 4°15'W ; 2076 m ; November 1, 1972 : 3 marsupial ♀♀. COB, BIOGAS II : Sta. DS31 ; 47°32.5'N, 9°04.2'W ; 2813 m ; April 19, 1973 : 1 marsupial ♀ (NHM # 1994 : 4095 : 1 juvenile infested by a nichthoid copepod). COB, BIOGAS III : Sta. DS41 ; 47°28.3'N, 9°07.2'W ; 3548 m ; August 26, 1973 : 1 marsupial ♀, 6 preparatory ♀♀, 1 adult ♂, 7 juveniles, 7 mancas.

HOLOTYPE : 1 marsupial ♀ ("Prince Albert I", Stn. 482 ; parages ouest du Portugal ; 3789 m ; 14-15 juillet, 1894").

Description of the marsupial female

Length : 8.6-10.1 mm.

Integument smooth, with a few setae on carapace.

Carapace (Figs 15, 16) oval in dorsal view, approximately 1/4 total length, (including telson). Width 0.70-0.80 times length, depth more than 0.5 times length. Marginal carina dentate, encircling entire carapace except for posterior margin (in all specimens examined, most teeth are broken ; see detail from other adult female, Fig. 16a). Mid-dorsal line with sharp carina minutely dentate, extending posteriorly from just behind ocular lobe halfway or slightly more than halfway along carapace. Eyelobe without eyes. Branchial region somewhat inflated, resulting in a shallow mid-dorsal depression. Antero-lateral angle absent.

Thorax approximately 3/4 as long as carapace. All five segments with dentate margins, teeth more well-developed on first three segments. First segment divided by a transverse depression. Third and fourth segments with 2 dentate carinae on each side of mid-line ; fifth segment with 1 dentate carina on each side.



Abdomen equal to or slightly shorter than cephalothorax. First five segments with 1-2 strong mid-dorsal teeth and a transverse, very finely dentated, dorsal arch on posterior margin (these arches are slightly inclined in relation to posterior margin of segment ; arch on fifth segment almost unnoticeable or absent). First four segments with a minute lateral projection behind articular angularity, these projections gradually change in position from latero-ventral (first segment) to lateral (fourth segment) ; fifth segment with a larger lateral projection above articular angularity.

Telson (Fig. 26) : 2.4-2.8 times as long as last abdominal segment, with 8-13 lateral spines and 3 distal spines (central spine slightly longer than lateral ones).

First antenna (Fig. 17) : peduncle, first and second articles with strong teeth on inner margin, second and third articles with numerous simple setae on inner margin. Flagella subequal ; outer flagellum 5-articulate, fourth and fifth articles with 1 aesthetasc each ; inner flagellum 4-articulate, distal article minute.

Second antenna small, 4-articulate.

Mandible as shown in Fig. 18 (left mandible with lacinia mobilis).

First maxilla with a normal palp bearing 2 distal filaments, as illustrated by Fage (1929, fig. 59).

First maxilliped (Fig. 19, epipodite omitted) : basal endite distinctly shorter than 1/2 of basis length. Merus and carpus with a long plumose seta distally on outer margin. Carpus, ventral surface with numerous plumose setae, inner margin with a hyaline lamella and 8-10 modified spines (see detail). Propodus with setae and spines, longest spine surpassing longest spine on dactylus. Dactylus, with 2 unequal distal projections, 2 spines, and 2 minute setae, distally.

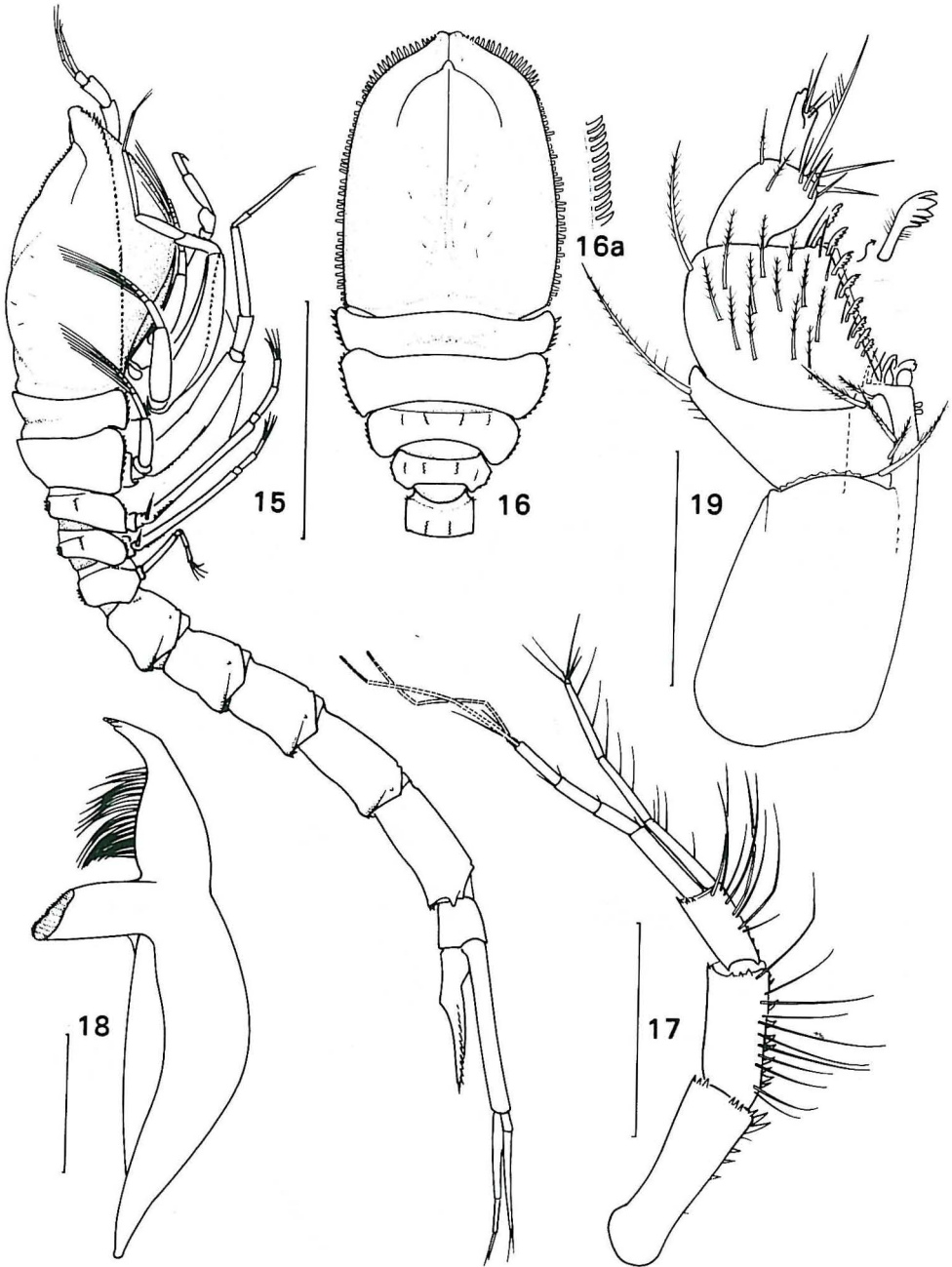
Second maxilliped (Fig. 20) leg-like. Basis approximately twice as long as carpus. Ischium without setae, dactylus with 3 long simple setae, remaining articles with abundant plumose setae.

Third maxilliped (Fig. 21) : basis slightly longer than remaining articles together, with plumose setae and serrations. Carpus approximately 1.5 times as long as ischium and merus combined ; inner margin serrated, with approximately 10 setae arranged in two rows, outer margin with 1 plumose seta at midpoint of article. Propodus, inner margin with 8-9 setae arranged in two rows (only ventral row drawn), outer margin with 4 small setae. Dactylus approximately 1/2 as long as propodus.

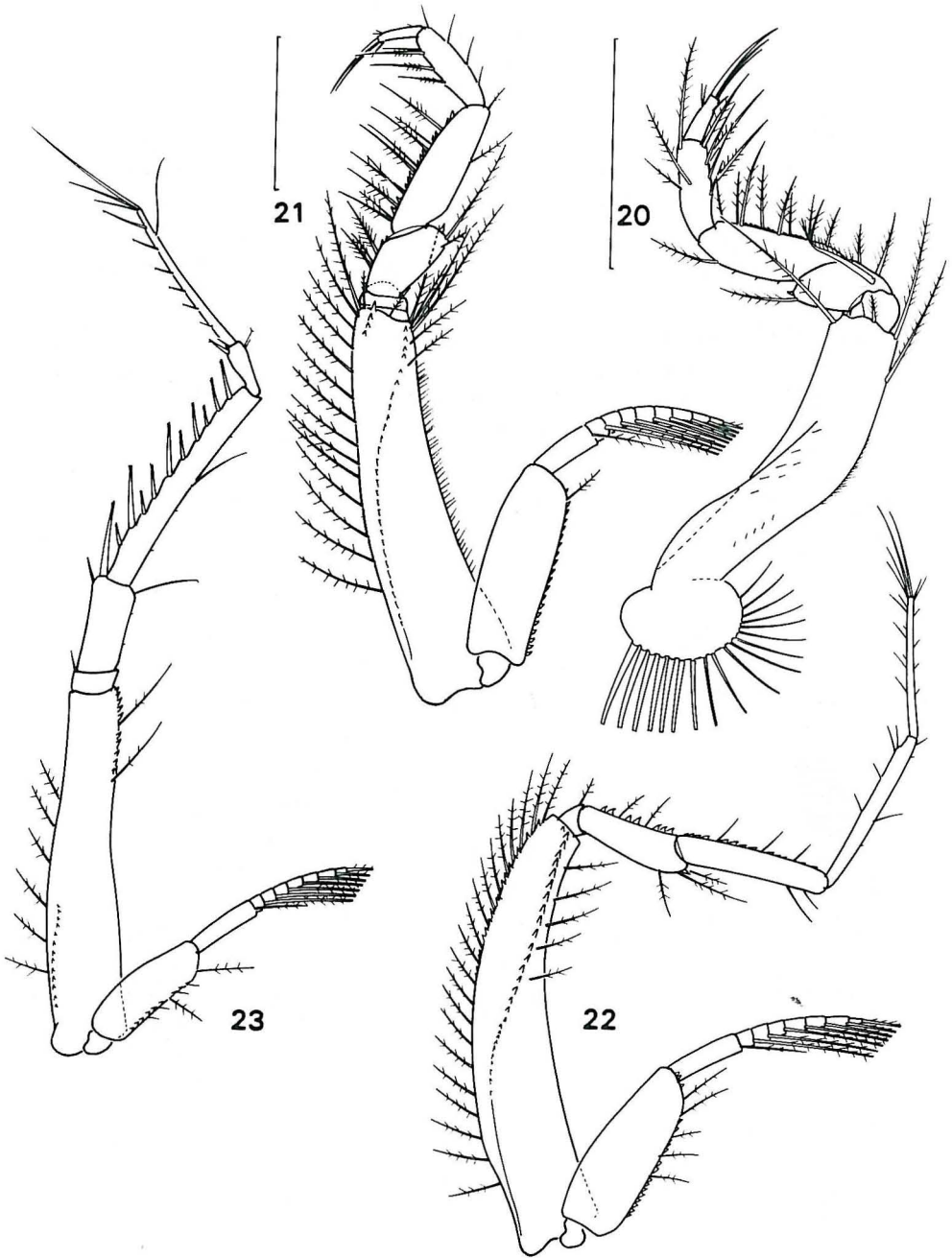
First peraeopod (Fig. 22) : basis approximately 3/4 as long as remaining articles together, with plumose setae and strong serrations. Merus approximately 3/4 as long as carpus. Carpus slightly shorter than propodus, equal to or slightly longer than dactylus. Both merus and carpus with strong serrations on inner margin, more well-developed on merus than on carpus.

Second peraeopod (Fig. 23) : basis approximately 2/3 as long as the remaining articles together, with plumose setae and serrations. Ischium with a few setae or feeble spines distally (all of them shorter than half of merus length, only one drawn). Merus with 1 very strong spine, 1 short seta (or feeble spine) and 2 long setae (only one drawn), distally. Carpus





Figs 15-19: *Paralamprops semiornatus* Fage, 1929. Marsupial ♀ form A : 15, entire animal (lateral view) ; 16, carapace and thorax (dorsal view) ; 16a, marginal carina (detail) ; 17, first antenna ; 18, right mandible ; 19, first maxilliped. Scales : Figs 15, 16 : 2 mm (same scale) ; Fig. 17 : 0.5 mm ; Figs 18, 19 : 0.25 mm.



Figs 20-23 : *Paralamprops semiornatus* Fage, 1929. Marsupial ♀ form A : 20, 21, second and third maxillipeds ; 22-23, first, second pereopods. Scales : Figs 20-23 : 0.5 mm (Figs 21-23, same scale).

approximately twice as long as ischium and merus combined, slightly longer than propodus and dactylus combined, with 8-10 strong spines on inner margin and 1 seta at midpoint of outer margin. Propodus with a small spine on inner distal margin. Dactylus with several setae on inner margin and distally, and a subterminal simple seta on outer margin.

Third peraeopod (Fig. 24) : carpus and propodus with 2 and 1 strong distal setae, respectively ; dactylus with two distal setae, one clearly larger than the other ; exopod rudimentary. Fourth peraeopod like third, but somewhat shorter. Fifth peraeopod (Fig. 25) : entire length shorter than basis of fourth peraeopod ; carpus and propodus with 3 and 1 strong distal setae, respectively ; dactylus reduced, with two small subequal distal setae ; exopod absent.

Uropod (Fig. 26) : peduncle 1.2-1.3 times as long as telson, inner margin with 14-19 spines. Exopod 0.7-0.8 times as long as peduncle, proximal article much shorter than distal, distal article with simple setae on both sides and two unequal spines distally. Endopod 3-articulate, proximal and medial articles combined approximately as long as exopod, with 8-9 and 2 spines on inner margin, respectively ; distal article with 2 unequal distal spines.

Two distinct forms occur in the material examined and both forms co-exist in the larger samples. The above description applies to form A ; the marsupial female of form B differs from that of form A in the following : Carapace (Fig. 27), width 0.67-0.74 times length, mid-dorsal carina with longer, spiniform, teeth ; branchial areas usually with some small denticles. Thorax with 2 dentate carinae on each side of last four segments, those carinae already present in form A are more developed in form B. Abdomen, first four segments (usually fifth as well) with some small denticles laterally ; denticles of transverse arches larger than in form A ; mid-dorsal teeth varying from 1 to 3 ; lateral projections of first four segments more developed, appearing as small triangular flaps. Telson, number of lateral spines ranging from 5 to 9. First peraeopod, carpus approximately as long as propodus and slightly longer than dactylus. Uropod, peduncle 1.35-1.45 times as long as telson.

#### Description of the adult male

As in marsupial female (form A), except as follows :

Length : 7.8-8.1 mm.

Carapace (Fig. 28) quadrangular in dorsal view, width 0.76-0.81 times length, somewhat more depressed than in female. Mid-dorsal carina double, running from behind ocular lobe to approximately halfway down carapace, these carinae and upper outline of branchial areas very finely denticated.

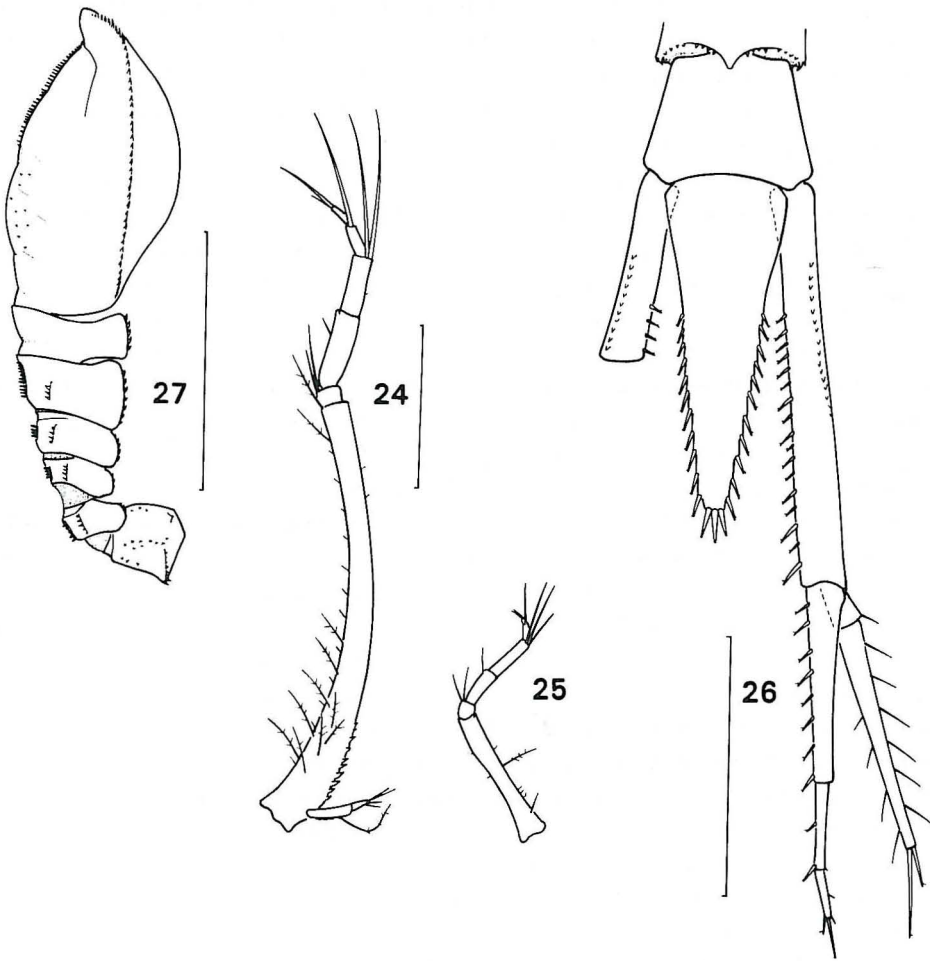
Thorax, last four segments with 2 dentate carinae at each side of mid-line (arrangement and development as in female form B).

Abdomen, lateral projections on fourth and fifth segments only. Some specimens have small lateral denticles on first three segments.

Telson (Fig. 33) : thinner than in female, with 4-6 lateral spines and 3 distal spines (distal spines missing in the specimen drawn).

First antenna (Fig. 29) : more robust than in female. Peduncle, first two segments without strong teeth. Outer flagellum, first article with numerous aesthetacs (only some drawn, distal ends of these aesthetascs and those of fourth and fifth articles are missing in the specimen drawn).





Figs 24-27 : *Paralamprops semiornatus* Fage, 1929. Marsupial ♀ form A : 24, 25, third and fifth pereopods ; 26, last abdominal segment, telson, and right uropod. Marsupial ♀ form B : 27, carapace, thorax and first abdominal segment (lateral view). Scales : Figs 24-25 : 0.5 mm (same scale) ; Fig. 26 : 1 mm ; Fig. 27 : 2 mm.

Second antenna (Figs. 30, 30a) : peduncle 5-articulate, last two articles slightly depressed, thickly beset with setae, longest setae projecting on right angles on both margins. Flagellum approximately reaching end of thorax.

Second pereopod, basis approximately  $\frac{3}{4}$  as long as remaining articles together. Ischium with a few setae or feeble spines, the largest surpassing half of merus in length. Carpus with 7-9 spines on inner margin. Third (Fig. 31) and fourth pereopods, basis somewhat wider than in female, with a well developed exopod ; fourth and fifth (Fig. 32) pereopods with reduced dactylus, each with 2 small subequal setae. Pleopods, 3 pairs ; similar to those of *P. tuberculatum* but with finger-shaped process somewhat less developed.

Uropod (Fig. 33) : Except for the uropod of the specimen drawn, this appendage is severely damaged in all specimens examined. Peduncle 1.53-1.55 times as long as telson, with 23-24 inner spines in the specimen drawn, and 15-19 in other specimens. Exopod approximately 0.8 times as long as peduncle in the specimen drawn, and approximately 0.7 times in the few other specimens where these two articles are complete. Endopod as in female (only present in the specimen drawn, distal spines broken).

Parasites : A nicothoid copepod and a rhizocephalan cirripede were found in the branchial chamber of one and twelve non-adult specimens, respectively. In addition, an epicaridean isopod, instead of eggs, were found in the marsupium of ten adult females. Both forms of *P. semiornatus* harboured epicaridean and rhizocephalan parasites.

Distribution : Previously recorded from west of Portugal (3789 m), the Biscay area (approximately 2000-4000 m), and the east of USA (2802-2886 m). Further records extend the horizontal distribution of this species to 60°N, but fall within the previously known vertical range.

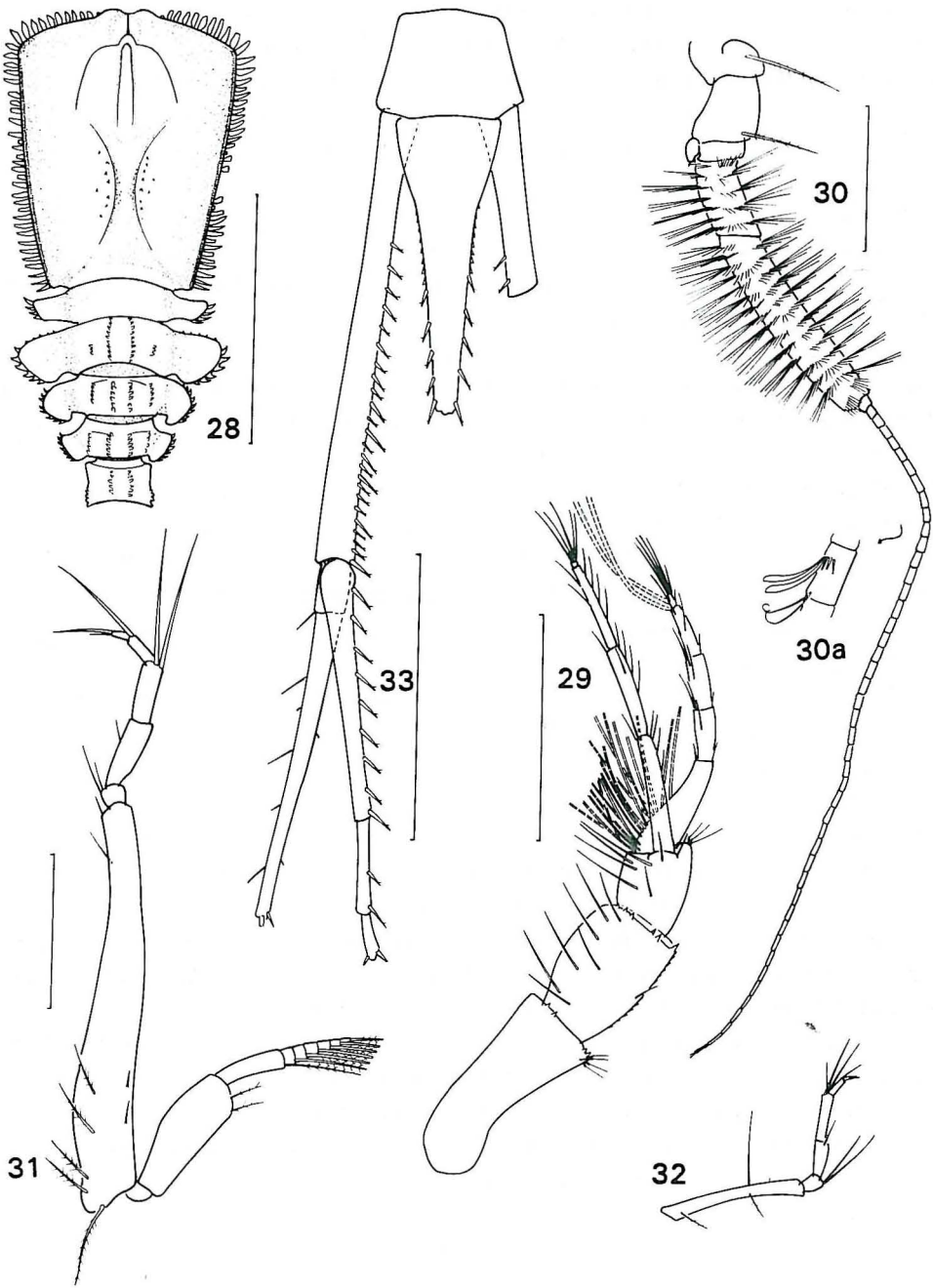
Remarks : There are 14 previously recognized species in the genus *Paralamprops* Sars, 1887 : *P. arafurensis* Jones, 1969 ; *P. asper* Zimmer, 1907 ; *P. cherkii* Reyss, 1978 ; *P. corollifera* Gamô, 1984 ; *P. girardi* Reyss, 1978 ; *P. grimaldii* Fage, 1929 ; *P. ledoyeri* Reyss, 1978 ; *P. margidens* Day, 1978 ; *P. mawsoni* (Hale, 1937) ; *P. orbicularis* (Calman, 1905) ; *P. peringueyi* (Stebbing, 1912) ; *P. rossi* Jones, 1971 ; *P. semiornatus* Fage, 1929 ; and *P. serratocostatus* Sars, 1887.

*Paralamprops tuberculatus* n. sp. is easily distinguished from all other species of the genus by the large wing-like expansion on the antennula, and by the minute club-shaped projections sprinkled all over the surface of the animal (these two characters apply to all instars of the species).

*Paralamprops tuberculatus* n. sp. seems to be closely related to *P. girardi* and *P. corollifera*. These three species have a crenulate marginal carina on the carapace, a stout second maxilliped, and uropodal peduncles distinctly longer than the telson. In addition, the first maxilliped of *P. corollifera* appears to be similar to that of *P. tuberculatus* (Gamô (1984) illustrated this appendage but he did not describe it ; Reyss (1978a) omitted mentioning this appendage at all).

*P. semiornatus* was described by Fage (1929) on the basis of a single damaged adult female collected off Portugal. Fage described four carapace carinae for this species. His first and third carinae correspond to the mid-dorsal and marginal carinae of the present redescription. Fage's second carina is absent in all the specimens examined herein. Finally, Fage's fourth carina corresponds to the folded ridge that divides the dorsal and ventral areas of the carapace in all cumaceans (since the carapace of *P. semiornatus* is somewhat depressed and it has a strong marginal carina, this folded ridge appears in ventral view in the middle of the submarginal area).

Unfortunately, the type specimen of *P. semiornatus* is very badly damaged. Fage's second carina is unnoticeable, but since this specimen is strongly decalcified, this carina could be secondarily absent. Except for the absence of the second carina, the specimens stu-



Figs 28-33: *Paralamprops semiornatus* Fage, 1929. Adult  $\delta$ : 28, carapace and thorax (dorsal view); 29, first antenna; 30, second antenna; 30a, article of flagellum (detail); 31, 32, third and fifth pereopods; 33, last abdominal segment, telson, and left uropod. Scales: Fig. 28: 2 mm; Figs 29-32: 0.5 mm (Figs 31, 32, same scale); Fig. 33: 1 mm.



died herein agree well with Fage's description, and there is no doubt that they belong to *P. semiornatus*. The type specimen appears to belong to the form B described herein, but the poor state of preservation of this specimen prevents establishing this with certainty.

In appearance, *P. semiornatus* is very similar to *P. margidens*. However, the latter apparently has no palp on the first maxilla, and has a longer first peraeopod.

Two different forms are described herein for *P. semiornatus*. Bishop (1980) also reported two forms for *Ceratocuma horridum* Calman, 1905 based on a large series of deep-sea samples from the Bay of Biscay. As in *P. semiornatus*, these two forms could be present in the same sample (Bishop, pers. comm.). The source of this variability is unknown in either case.

Owing to the difficulties inherent in collecting in deep waters, many of the species included in *Paralamprops* have been described based on a single specimen. In addition, this genus is rather variable: the first maxilla may or may not have a palp, the females may or may not have a rudimentary exopod on the third and fourth peraeopods, and the morphology of the first and second maxillipeds seems to be variable as well. A more comprehensive study of this genus must await further collections.

Records of parasitization in Cumacea are scarce; only a few nicothoid copepods, epicaridean isopods, and a rhizocephalan cirripede have been reported (Hansen, 1897; 1916; Scott, 1904; Bonnier, 1903; Bourdon 1972; Bishop, 1982; Bocquet-Védrine & Bourdon, 1984). Bocquet-Védrine & Bourdon (1984) described *Cryptogaster cumacei* on the basis of some specimens found in the branchial cavity of *P. semiornatus*. More recently, Huys *et al.* (1993) transferred *Cumoniscus kruppi* (which was reported by Bonnier (1903) as an epicaridean from a cumacean host) to Tantulocarida.

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