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***Procolobomatus Hemilutjani* GEN ET SP. NOV. (Copepoda, Philichthyidae)**  
**FROM THE CHILEAN COAST, SOUTH PACIFIC**

***Procolobomatus hemilutjani* GÉNERO Y ESPECIE NUEVOS (Copepoda, Philichthyidae)**  
**DESDE LA COSTA DE CHILE, PACÍFICO SUR.**

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ABSTRACT

*Procolobomatus hemilutjani* gen. et.sp. nov. (Copepoda: Poecilostomatoida) parasitic in *Hemilutjanus macropthalmus* (Pisces: Teleostei) from the Chilean coast, is described and illustrated. The new genus is distinguished by the typically poecilostomatoid buccal cavity, simple labrum, and presence of two pairs of antennae in both males and females. Both sexes possess four pairs of legs, the fourth pair being reduced to setiferous papillae. These characters, more primitive than those of related species of *Colobomatus* Hesse, 1873, set it apart from them and make necessary establishment of a new genus, *Procolobomatus*. *Colobomatus kyphosus* Sekerak, 1970 is placed in this new genus as *Procolobomatus kyphosus* (Sekerak, 1970). The discovery of this copepod constitutes the first record of a philichtyid from the Chilean waters.

KEY WORDS: Copepods, parasites, taxonomy, Philichthyidae

RESUMEN

Se describe e ilustra *Procolobomatus hemilutjani* género y especie nuevos (Copepoda: Poecilostomatoida), parásito en los canales mucosos mandibulares de *Hemilutjanus macropthalmus* (Pisces: Teleostei), en la costa de Chile. El nuevo género se distingue por presentar la cavidad bucal típica de poecilostomatoides, labro simple y por la presencia de dos pares de antenas, tanto en el macho como en la hembra. Ambos sexos poseen cuatro pares de patas, el cuarto par reducido a una papila llevando tres setas. La presencia de estos caracteres, más primitivos que los de las especies de *Colobomatus* Hesse, 1873, permiten separarlo de éstas y establecen la necesidad de erigir el nuevo género *Procolobomatus*. *Colobomatus kyphosus* Sekerak, 1970 es ubicado en este nuevo género como *Procolobomatus kyphosus* (Sekerak, 1970). El descubrimiento de este copépodo constituye el primer registro de un Philichthyidae desde aguas chilenas.

PALABRAS CLAVE: Copepoda, parásitos, taxonomía, Philichthyidae

INTRODUCTION

The family Philichthyidae Vogt, 1873, is a group of highly modified copepods. During their larval stages they enter lateral line canals or cephalic mucus ducts of fishes and remain in them as endoparasites throughout their lives. The family contains currently eight genera (*Philichthys* Steenstrup 1862, *Sphaerifer* Richiardi 1876, *Leposphilus* Hesse 1866, *Colobomatus* Hesse 1873, *Lerneascus* Claus 1886,

*Sarcotaces* Olson 1872, *Ichthyotaces* Shiino 1932 and *Colobomatoides* Essafi & Raibaut, 1980). No philichthyids have hitherto been found off the coast of Chile. The sole record of a member of this family along the entire coast of South America was that of LUQUE & FARFAN (1990), whom discovered *Colobomatus quadrifarius* Cressey, 1983, taken from *Anisotremus scapularis* in the Peruvian waters.

This paper provides the description of a new genus and species of Philichthyidae, living in the



mandibular mucus ducts of *Hemilutjanus macrophthalmus* (Tschudi) captured off the coast of Chile. The newly discovered parasite constitutes an addition to the Chilean fauna.

Commenting upon *Colobomatus kyphosus* Sekerak 1970, WEST (1992) pointed out that due to the possession of some primitive characters this species is unique within its genus. In spite of this fact, he retained it in *Colobomatus*. The copepod discovered on *H. macrophthalmus* possesses similar primitive features. The close similarity between the new species and *C. kyphosus* and their unique possession of primitive characteristics otherwise not found in *Colobomatus* have prompted me to create for these two species a new genus *Procolobomatus*. *Colobomatus kyphosus* must, therefore, be now designated *Procolobomatus kyphosus* (Sekerak, 1970).

## MATERIAL AND METHODS

Copepods were obtained alive from fishes and fixed in 4% glutaraldehyde for SEM examination in the way described by CASTRO & BAEZA (1991). They were studied at 20 Kv and photographed. Line drawings were prepared with the aid of camera lucida. Measurements are given in micrometers. Terminology follows that adopted by KABATA (1979)

## RESULTS

### *Procolobomatus hemilutjani*

gen. et sp. nov.

(Figs. 1-24)

**Specimens:** Nine females and one male taken on July 7, 1992 and four females and three males collected on December 12, 1993. One female becomes the holotype of the species and is deposited in Museo Nacional de Historia Natural, Chile Reg. MNHN CP-N. 15083. Allotype male Reg. MNHN CP-N. 15085. Paratype females (5) Reg. MNHN CP-N. 15084

**Host:** *Hemilutjanus macrophthalmus* (Tschudi)

**Habitat:** mandibular mucus ducts.

**Locality:** Antofagasta, Chile

**Etymology:** The generic name alludes to the closely related *Colobomatus*, with the prefix "pro"= Greek "before" suggesting primitive character of the new genus. The specific name is the genitive case of the host's generic name.

**Description:** Female (Fig. 1a, b) with single, long, tapering cephalic process. First three thoracic segments fused and inflated, bearing pair of long, anterolateral, tapering, divergent processes and similar pair of posterolateral processes; additional pair of processes arising from common base near centre of dorsal surface. Posterior part of body subcylindrical, genital area (Fig. 15) delimited by two acuminate processes, with single setae on central swelling; body surface bearing several sensory setules (Figs. 12, 13), posterior extremity with prominent caudal furca. Total length (based on 9 specimens), including caudal furca 7,5 (6,60-8,54).

First antenna (Figs 2-4) apparently eight-segmented, armed with at least 24 setae. Second antenna (Fig. 2-4) indistinctly three - segmented; basal segment with one seta, second with one proximal and three distal setae, distal with two setae and one aesthete. Buccal orifice (Fig. 5-7) gaping, with simple, plate-like labrum and rows of spinules along lateral margins at level of maxillae (Figs. 6-7). Maxilla (Figs. 5, 7) with strong basal segment, distally bearing two denticulate spines. Pairs of prominent pores posterior to bases of maxillae. Maxilliped (Fig. 7) with short basal segment surmounted by single spine.

Four pairs of legs present (Figs. 8-11), first three biramous, with one-segmented endopod and two-segmented exopod. Armature of rami as shown below:

	Endopod	Exopod	
	1	1	2
Leg1	2	1-0	5
Leg2	1	1-0	4
Leg3	1	0-0	4

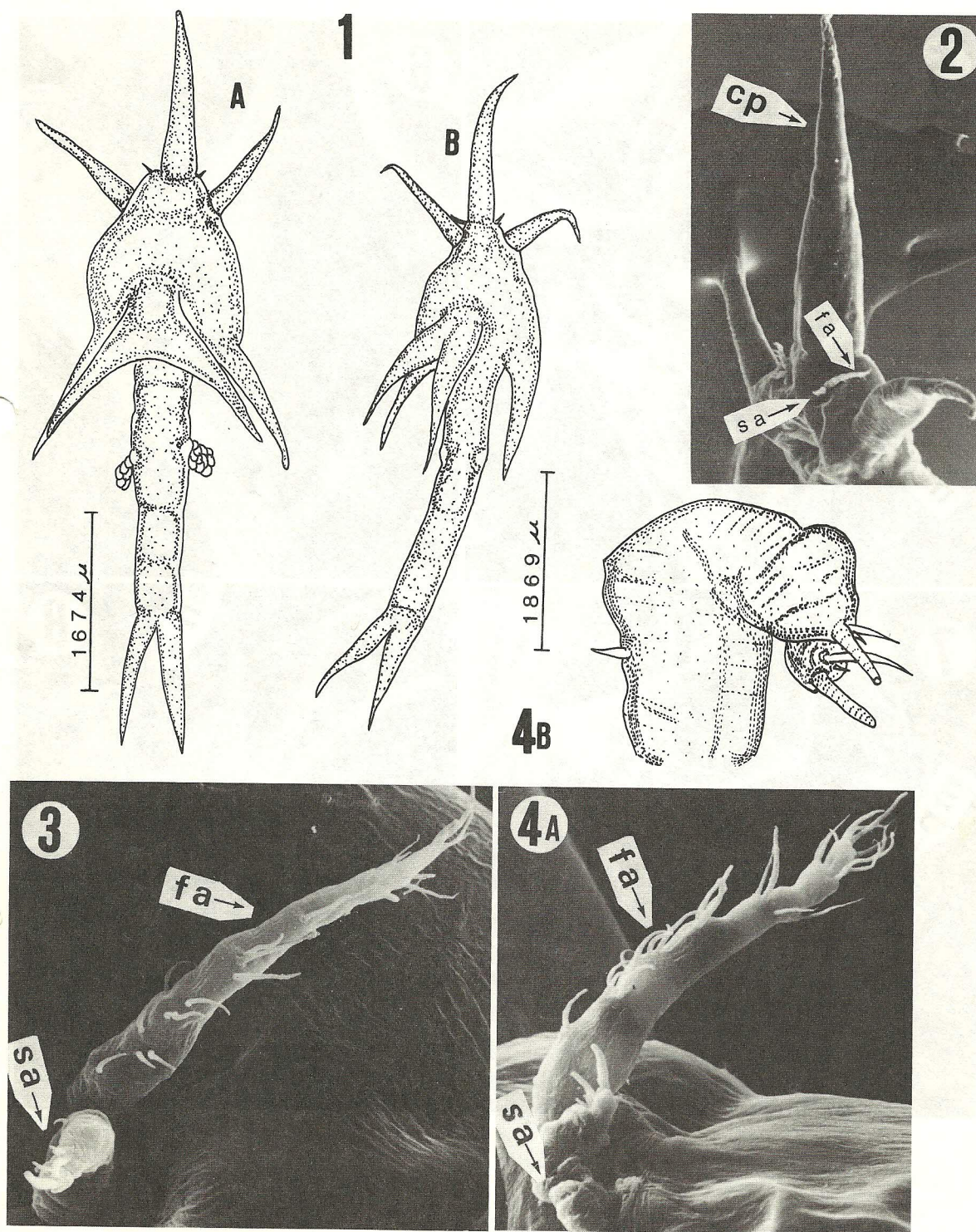
All setae spiniform, unarmed. Fourth leg (Fig. 11) uniramous, ramus two-segmented, basal segment with one seta, terminal with two setae. Caudal ramus (Fig. 14) with one lateral and three apical setae.

Body surface bearing several sensory setae (Figs 12, 13, 14).

**Male:** (Fig. 16): Cephalothorax with well-developed dorsal shield. Second free segment with pair of long, robust posterolateral processes, reaching sixth free segment and slightly curving at apices. Genital segment with simple lateral setae. Abdomen four-segmented, finely spinulated. Caudal ramus slender. Total length (of two specimens, in micrometers) 1,49 and 2,23.

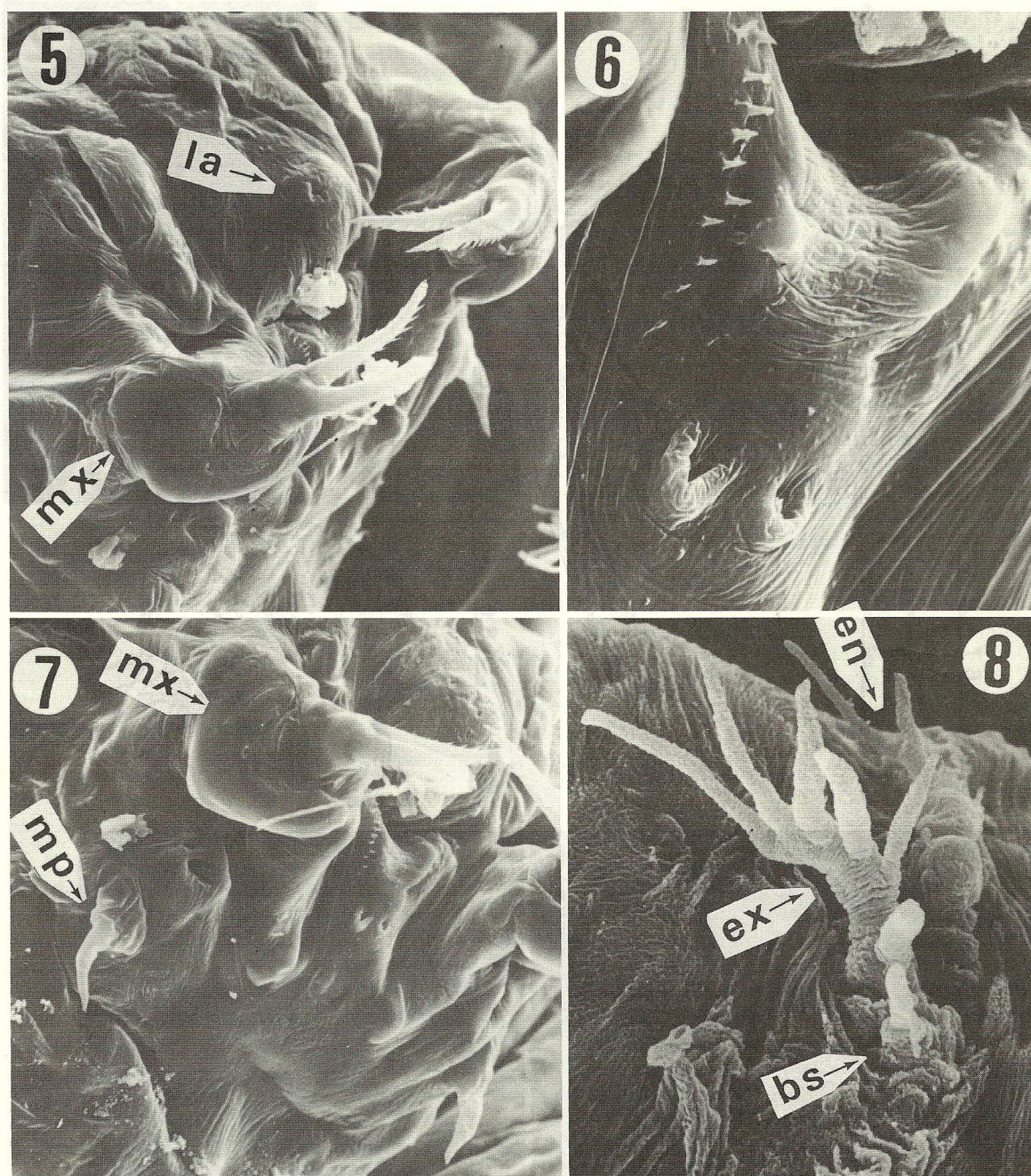
First antenna (Fig. 17) five-segmented, with se-





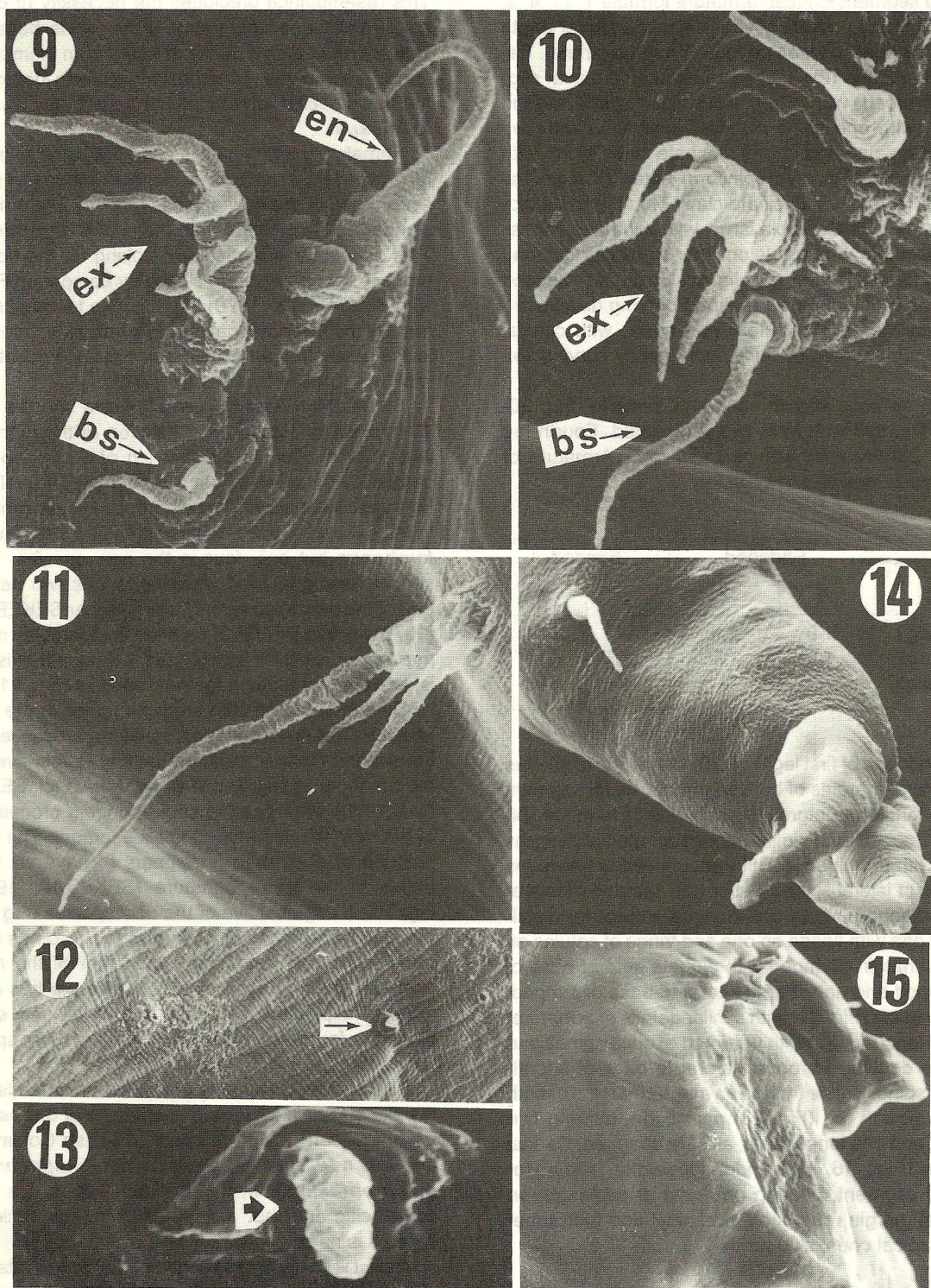
FIGS. 1-4 *Procolobomatus hemilutjani* Female. FIG. 1 a,b, Female FIG. 2 Cephalic area, showing position of the apical process and antennae 360X. (cp= cephalic process, fa= First antenna, sa= Second antenna.). FIG.3 First and Second antenna 1200X (fa= first antenna, sa= second antenna) FIG. 4 A.- First and second antenna other view 1200X (fa= First antenna, sa= Second antenna), B.- Detail of apical armature.





FIGS. 5-8 *Procolobomatus hemilutjani* Female. FIG. 5 Buccal area 480X ( la= labrum, mx= Maxilla). FIG. 6 Intermaxilar area 2000X (aim= Denticles on intermaxilar area). FIG. 7 Buccal area, posterior view. 480X (mx= Maxilla, mp= Maxilliped.). FIG. 8 First leg 1250X ( en= endopod, ex= Exopod, bs= basal seta.).





FIGS. 9-15 *Procolobomatus hemilutjani* Female. FIG. 9 Second leg 1360 X (en= endopod, ex= exopod, bs= basal seta). FIG. 10 Third leg 1600X (en= endopod, ex= exopod, bs= seta basal). FIG. 11 Fourth leg 1600X. FIG. 12 Body surface 840X (arrow showing the sensory seta). FIG. 13 Detail of the sensory seta 8000X. FIG. 14 Caudal process, detail of armature. FIG. 15 Genital area 400X.



cond segment longest, armature formula 1, 11, 4, 3, 4+1 (apical armature of four setae of unequal length and thickness, as well as robust, long aesthete). Second antenna (Fig. 18) four-segmented, basal segment broad, with short, stout distal spine, second long, with one spine on distal half, third with two slender setae and strong uncinuate claw, fourth with two short setae, two spiniform setae of subequal length and apical uncinuate claw. Mouth-parts exposed (Fig. 19). Mandible large, with subtriangular basal segment, one setule on inner surface and strong terminal claw. First maxilla not observed. Second maxilla with elongate basal part bearing distally two denticulated spines. Maxilliped small, with conical base surmounted by fairly short, gently curving spine.

Three pairs of biramous legs present (Fig. 20-22), first two with rami two-segmented. Fourth leg (Fig. 23) vestigial, with reduced rami. Armature of biramous legs as shown below.

	Endopod		Exopod	
	1	2	1	2
Leg1	1-0	2,II	0-I	4,IV
Leg2	1-0	2,III	0-I	4,III
Leg3	I	-	IV	-

Endopod of first leg (Fig. 20) with fringe of setules on lateral margins of both segments, distal segment with dentiform outgrowths at bases of terminal spines. Exopod with similar fringes on medial margins and with prominent dentiform outgrowths between bases of lateral spines. Latter with serrated membranous flange on opposite margins, except for distal-most one with flange on one and fringe of setules on other margin. Sympod with pinnate seta at base of endopod and naked seta lateral to base of exopod. Second leg (Fig. 21) with similar details of armature. Third leg (Fig. 22) with unarmed exopod spines and single dentiform process lateral to base of lateral-most spine. Setule fringes on medial margins of both rami. Fourth leg (Fig. 23) papilliform, bearing two short and one longer seta, all seta unarmed. Caudal ramus (Figs. 16, 24) slender, longer than last abdominal segment, bearing one seta at midlength on lateral margin, one short subapical and four subequal apical ones, all unarmed.

#### DISCUSSION

The most obvious feature of the new species is its close resemblance to *Colobomatus kyphosus*.

This resemblance precludes the necessity of comparing it with any other species of the genus, because *C. kyphosus* is sufficiently different from them to be considered unique. To establish separate identity of the new species, one must compare it only with *C. kyphosus*.

Females of both species have the same number of processes, arranged in identical manner. However, those of the new species (Figs. 1, 2) are more slender and acuminate than those of *C. kyphosus*. This difference is particularly striking for the dorsal process, as can be seen clearly by comparing Fig. 1 with SEKERAK'S (1970) Fig. 25. The terminal segment of the first antenna of *C. kyphosus*, in addition to the aesthete, carries five small setae, in contrast with only three in the new species.

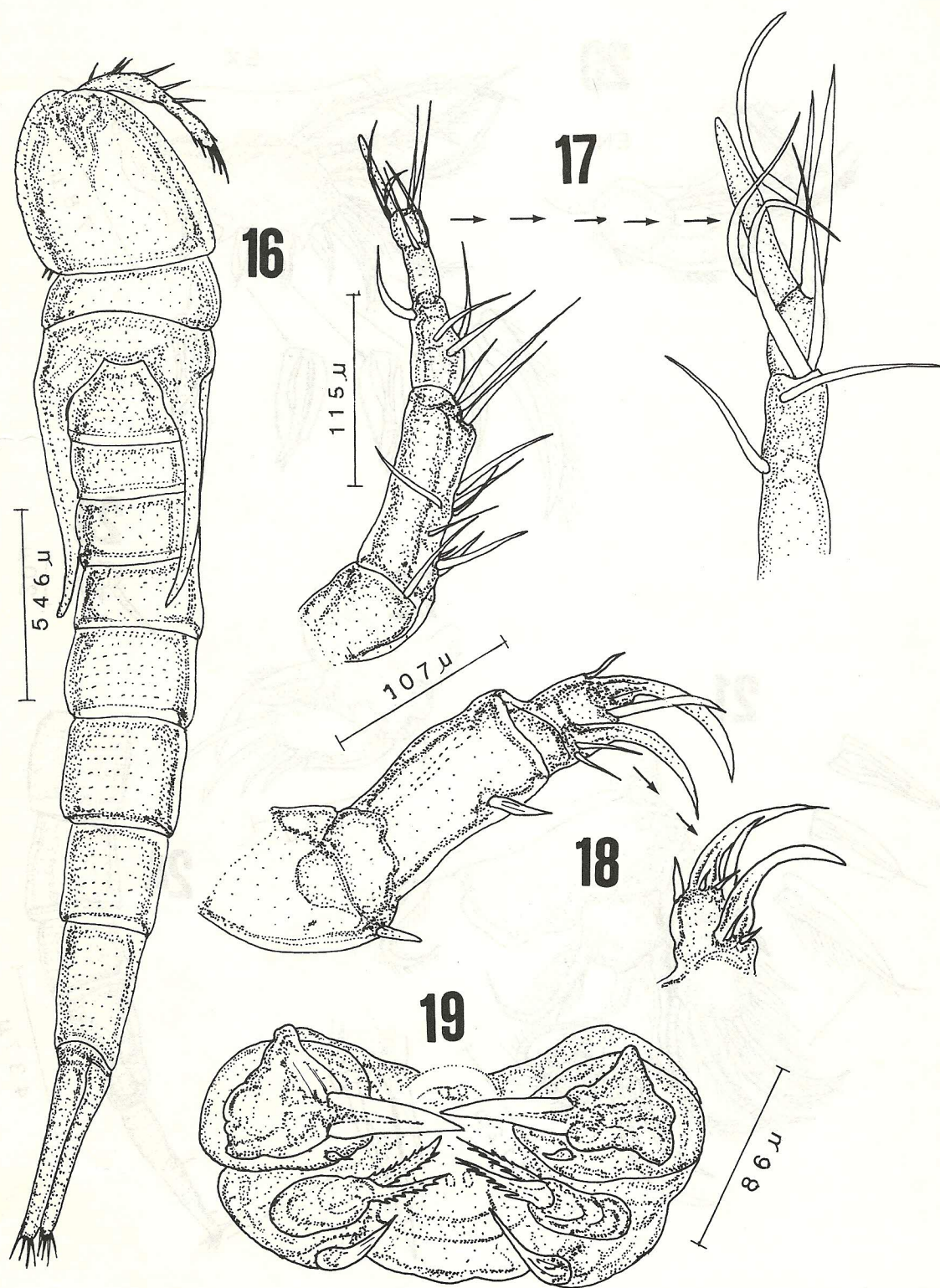
Some differences between the new species and *C. kyphosus* exist also in setation of the thoracic legs. The exopod of the first leg of *C. kyphosus* carries six setae on its second segment, that of the new species only five. The difference is even greater in the second exopod, which carries six setae in *C. kyphosus* but only four in the new species. The second endopod of *C. kyphosus* has two setae, that of the new species only one. Neither SEKERAK (1970) nor WEST (1992) mention the fourth leg of *C. kyphosus*, which may suggest it does not exist. It is, however, present in the new species (Fig. 11).

Differences exist also between males of the two species. The prominent posterolateral processes of the second thoracic segment extend to the level of the fifth thoracic segment in *C. kyphosus* (cf. SEKERAK, 1970), whereas the corresponding processes of the new species reach the six segment. The first antenna of *C. kyphosus* appears to have six elements in its apical armature (SEKERAK, 1970, Fig. 36), as against five of the new species (Fig. 7). The second antenna of *C. kyphosus* also has one element (a long seta) more than that of the new species. The first exopod of *C. kyphosus* has one more (semipinnate) seta than that of the new species. The fourth leg of *C. kyphosus* has two spiniform setae.

The accumulation of these differences leads us to believe that *C. kyphosus*, a parasite of *Sebastes alutus* Gilbert along the coast of British Columbia and the new species, parasitic on *Hemilutjanus macrophthalmus* in the Chilean waters are not conspecific and that a new taxon for the Chilean species is necessary.

Next it is necessary to consider the generic status of both these two taxa. They differ from the more "conventional" species of *Colobomatus* in some significant morphological features. Unlike those species, they have second antennae that did not become modified into the plate-like rim of the labrum. In





FIGS. 16-24 *Procolobomatus hemilutjani* Male. FIG. 16 Entire dorsal view. FIG. 17 First antenna and detail of apical armature. FIG. 18 Second antenna and detail of apical armature. FIG. 19 Buccal appendages.



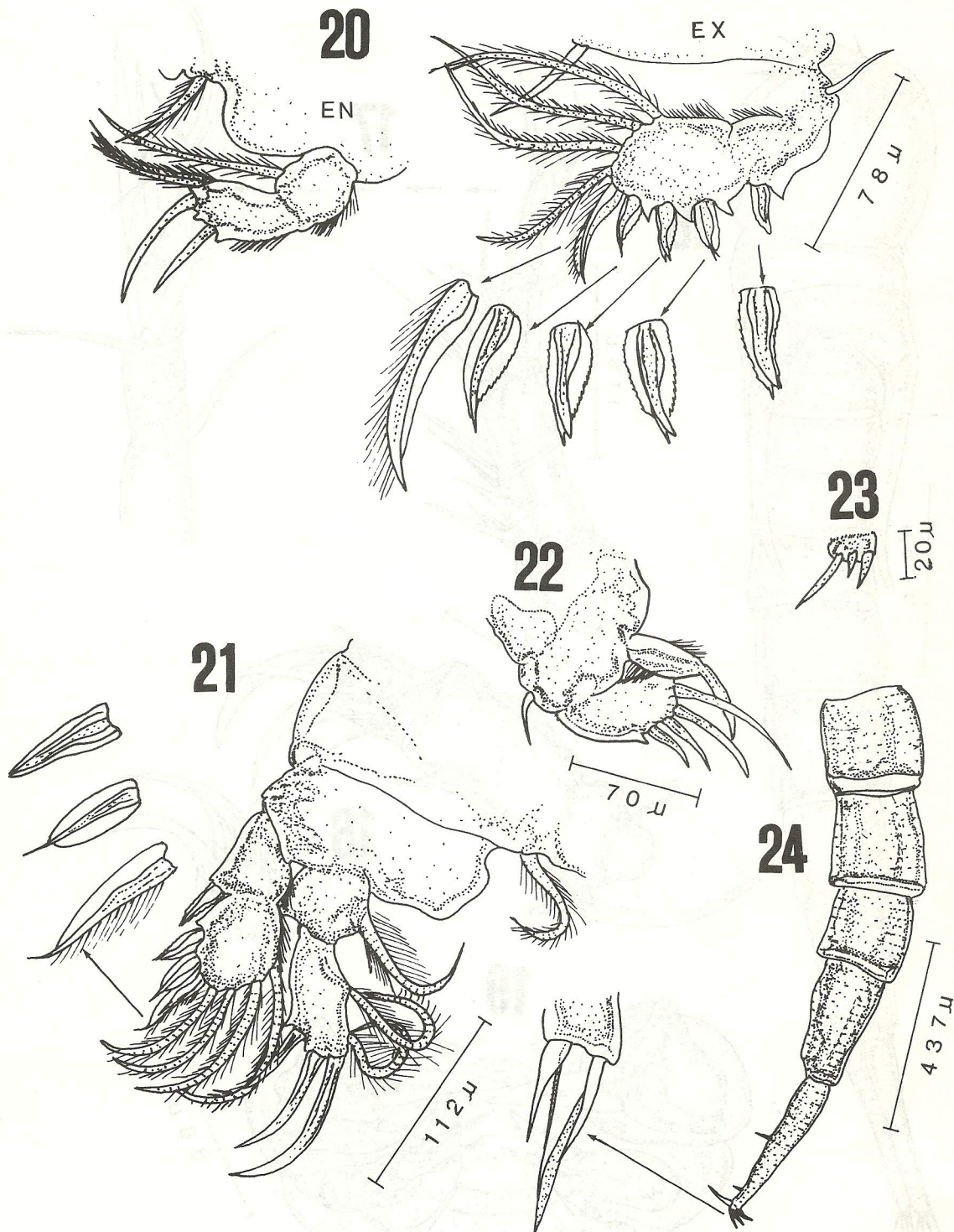


FIG. 20 First leg. FIG. 21 Second leg. FIG. 22 Third leg. FIG. 23 Fourth Leg. FIG. 24 Trunk and abdomen.



consequence the buccal orifice of the two species is gaping, their mouth parts exposed. In other species the mouth is partially concealed by a pseudo-siphon. The female *Colobomatus* possesses three pairs of legs, the new species possess four. The male *Colobomatus* has two pair of biramous and one uniramous leg, as well as a vestigial fourth. In the two species there are three pairs of biramous legs. Both the morphology of the second antennae and of the third pair of leg is a plesiomorphic character that draws a firm dividing line between these two species, on the one hand, and typical *Colobomatus* species, on the other. Consequently it is proposed to erect a new genus, *Procolobomatus*, to accommodate the new species *P. hemilutjani*, and *C. kyphosus*, the latter, in a new combination *Procolobomatus kyphosus* (Sekerak, 1970), to become the type species of the new genus.

The generic diagnosis of *Procolobomatus* is as follows:

Phyllichthyidae. Female as in *Colobomatus* but with second antenna not modified, three-segmented and equipped with setae. Buccal apparatus typical for Poecilostomatoida, not enclosed in a pseudo-siphon, with labrum simple, entire, three pairs of biramous legs, fourth vestigial (or absent).

Male as in *Colobomatus*, but first three pairs of legs biramous, first two with rami two segmented, third with rami one segmented, fourth leg papilliform, setiferous.

#### ACKNOWLEDGEMENTS

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