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Article *in* Crustaceana · January 1985

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METAPENICULUS ANTOFAGASTENSIS GEN. ET SP. NOV. (COPEPODA, PENNELLIDAE) PARASITIC ON TWO INSHORE FISHES OF ANTOFAGASTA, CHILE, SOUTH PACIFIC

BY

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INTRODUCTION

While examining copepods of the genus *Peniculus* Von Nordmann, 1832 (Pennellidae: Siphonostomatoida), parasitic on the fishes of Antofagasta (Chile), the authors came across some specimens that closely resembled that genus, yet differed from it in having only three pairs of thoracopods, situated some distance behind the level of the posterior margin of the dorsal shield.

These specimens could not be accommodated in *Peniculus* or other known genera of Pennellidae. The authors propose to place them in a new genus. This paper describes and illustrates the proposed new genus on the basis of examination of these specimens.

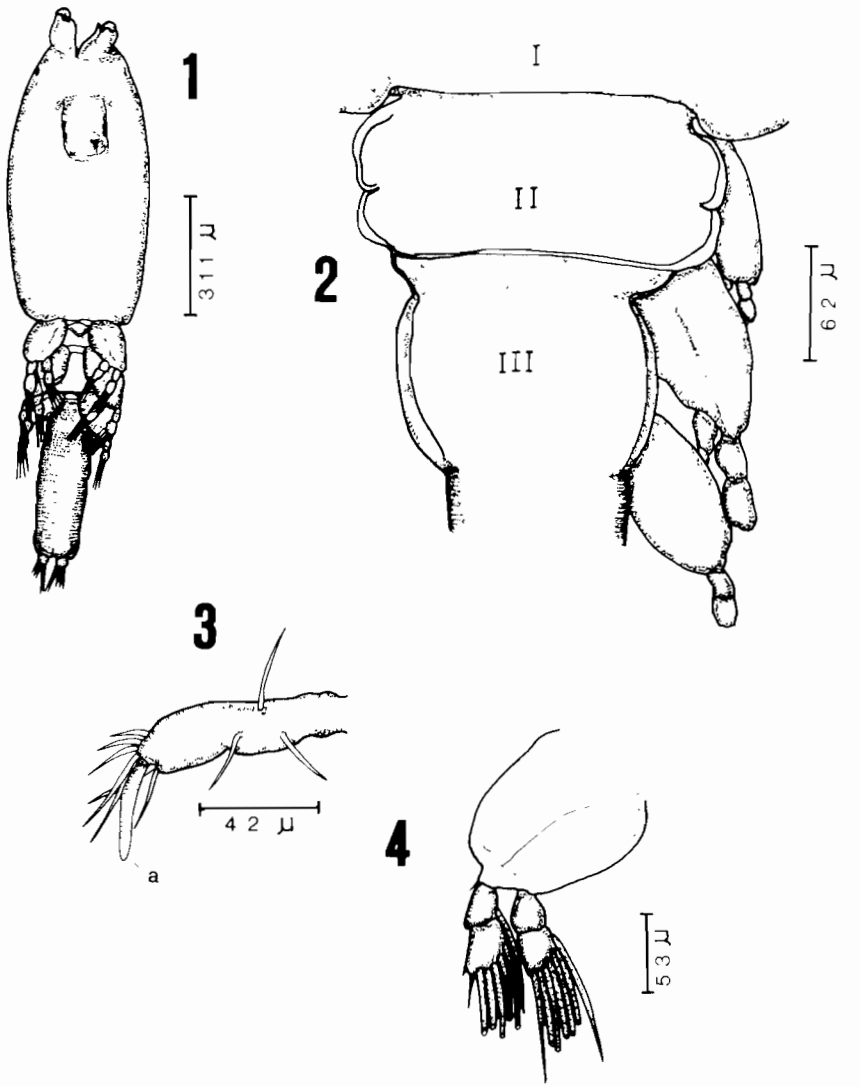
Specimens were fixed in alcohol 70%. Pre-metamorphosis and metamorphosing females were mounted in toto in a water-glycerine mixture, and cleared in lactic acid, as necessary. Some were dissected for a detailed study of their appendages which were prepared for examination in the same way as the whole mounts. Drawings were prepared with the aid of a camera lucida. All measurements are given in micrometers (μm).

Metapeniculus antofagastensis gen. et sp. nov. (figs. 1-22)

Specimens examined. — One pre-metamorphosis and one metamorphosing female; one juvenile female and 59 post-metamorphosis females, taken between 15 May 1980 and 26 December 1982 near Isla Santa María (Antofagasta) position 23°26′S 70°36′W. Specimens are deposited in the United States National Museum. Holotype female, No. 210487 U.S.N.M.; paratypes (12 females) No. 210488 U.S.N.M.; Lot. No. 356569.

Host. — *Anisotremus scapularis* (Tschudi) (type host) and *Doydixodon laevifrons* (Tschudi), on rays of caudal, pectoral, dorsal, and ventral fins.

Description. — Pre-metamorphosis female (figs. 1-7). Cephalothorax (fig. 1) oblong, constituting about 0.5 of body length, with rounded anterior, truncated posterior and slightly convex lateral margins; length:width ratio 1.73:1. Posterior half of body consisting of two pedigerous segments (fig. 2), followed



Figs. 1-4. *Metapeniculus antofagastensis* gen. et sp. nov., pre-metamorphosis female. 1, ventral view; 2, dorsal view of thoracic segments (I = first; II = second and III = third segment); 3, first antenna (a = aesthete); 4, first leg.

by genital complex. Second free pedigerous segment narrower and slightly longer than first, with notched lateral margins; genital complex subcylindrical, with profuse fine transverse wrinkling. Uropods well developed. Dimensions: total length (uropods included) 1,362.7; cephalothorax length 760, width 437; first free pedigerous segment length 102.5; second segment length 106, width 205; genital complex length 304, width 152; uropods length 16.4, width 24.6.

First antenna (fig. 3) apparently unsegmented, bearing three setae in addition to apical armature; latter consisting of seven setae and one aesthete (a, fig. 3). Second antenna subchelate. Other cephalothoracic appendages not examined. First two pairs of thoracopods (figs. 4-5) biramous, third (fig. 6) uniramous; all rami two-segmented. Armature of thoracopod rami as follows:

	Exopod		Endopod	
	1	2	1	2
I	0-1	II-5	0-0	1-6
II	0-1	II-6	0-0	1-6
III	0-0	5	—	—

Uropods with six setae (fig. 7).

Metamorphosing female (fig. 9) resembling pre-metamorphosis stage, except for elongation of the first pedigerous segment, subcylindrical and wrinkled-like genital complex. Dimensions: cephalothorax (to posterior end of dorsal shield), length 874; first pedigerous segment length 342, width 247; second pedigerous segment length 90.2, width 200; third pedigerous segment length 83.1, width 151.7; genital complex length 456, width 190.

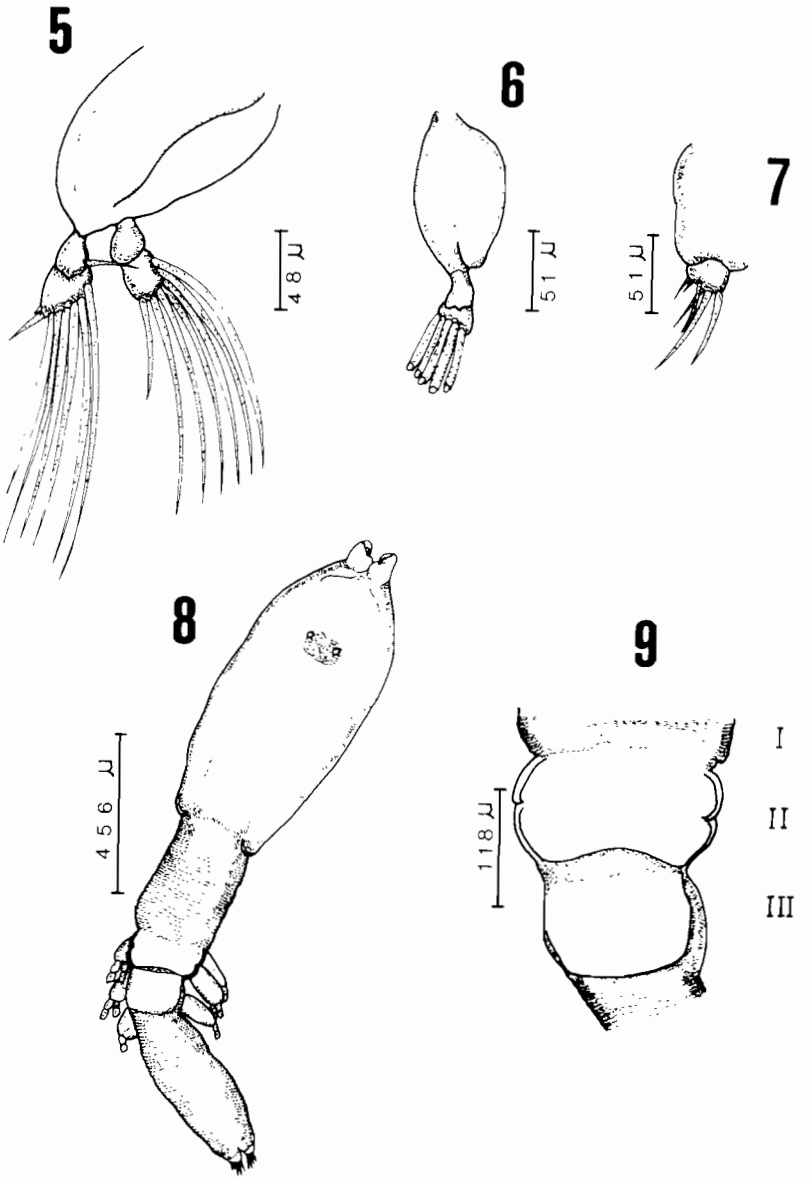
Preadult female (fig. 10). Cephalothorax with developing anterolateral lobes, prominent mouth cone with apical buccal tube (fig. 12) and conspicuously elongated first pedigerous segment, latter forming subcylindrical neck, no longer transversally wrinkled. Boundaries of pedigerous segments largely indistinct, especially in dorsal aspect. Genital complex wider than neck. Uropods (fig. 11) still retaining their armature.

Adult female (fig. 16). Cephalothorax consisting of subcircular anterior part (figs. 13-16) and subcylindrical posterior neck. Auriform process in anterolateral corners of anterior part, proboscis-like mouth (with apical buccal tube) near centre of its ventral surface. Ventrolateral rows of heavy cuticular plaques on neck, imperceptibly passing into trunk-like genital complex at level of distinct pedigerous segments. Trunk subcylindrical, somewhat wider posteriorly, its length: width ratio varying from 4.4:1 to 11.1:1; posterior margin (figs. 21-22) with two rounded posterolateral lobes and central swelling representing vestigial abdomen (with uropods).

Etymology. — The generic name is derived from Greek "meta" meaning "beyond" plus the generic name *Peniculus*. *Metapeniculus* thus refers to the possible evolution of the new genus from *Peniculus*. The specific name *antofagastensis* refers to Antofagasta, the locality were the parasities were captured.

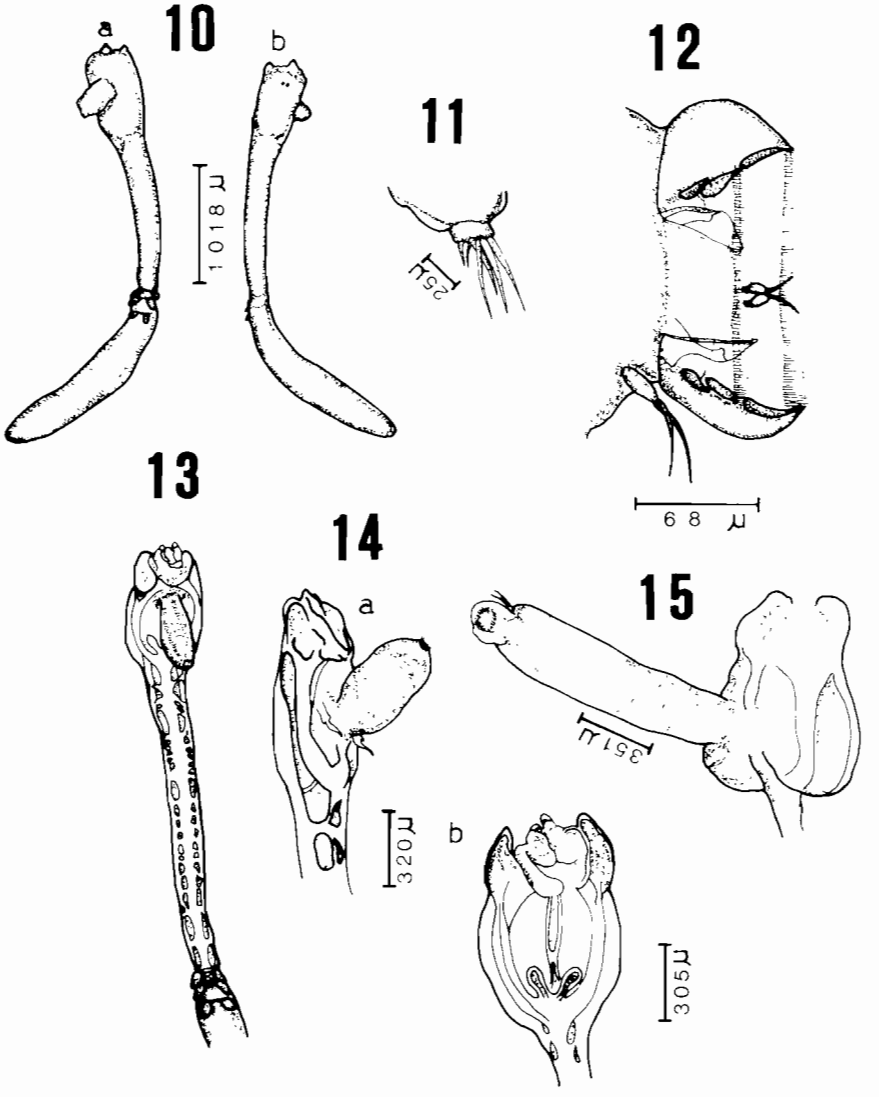
DISCUSSION

The family Pennellidae currently includes 18 genera (disregarding two genera inquirendae). Most of these consist of species possessing four pairs of thoracopods. *Cardiodectes* Wilson, 1917, and *Phrixocephalus* Wilson, 1908, con-



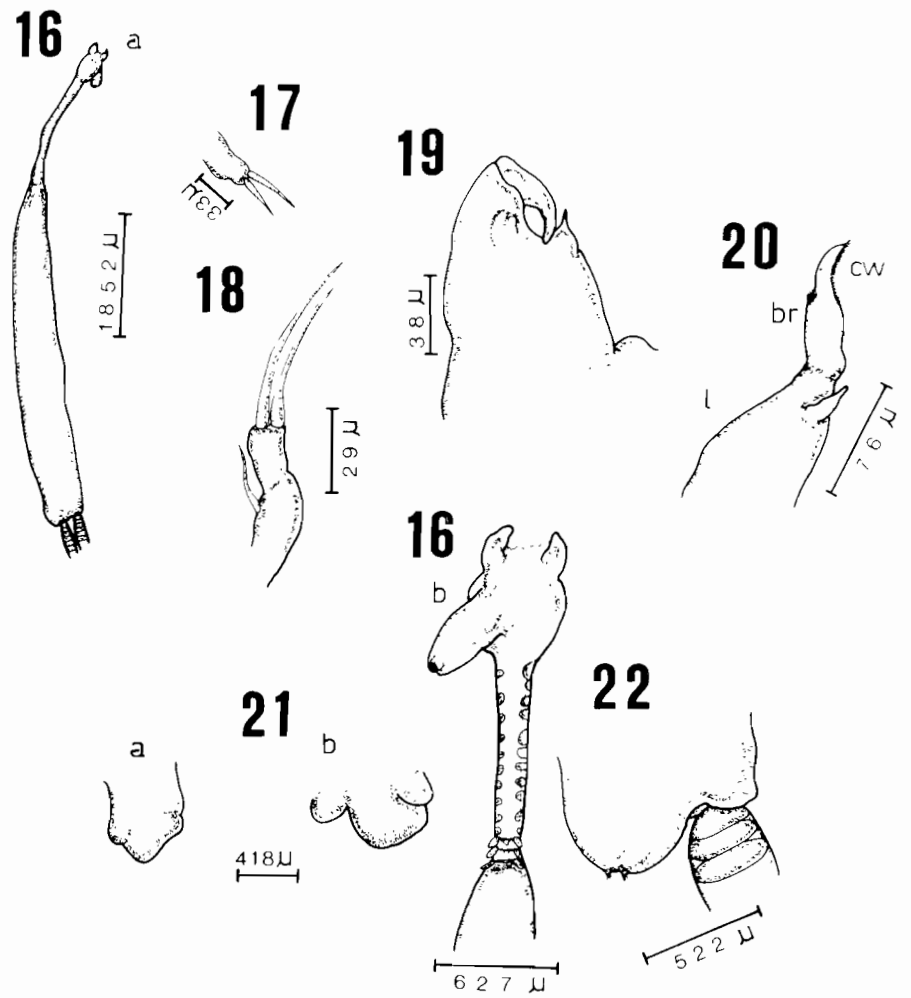
Figs. 5-9. *Metapeniculus antofagastensis* gen. et sp. nov. 5-7, pre-metamorphosis female; 5, second leg; 6, third leg; 7, partial view of abdomen, with the uropods and their armature; 8-9, metamorphosing female; 8, habitus: note the growth of the first thoracic segment; 9, second (II) and third (III) thoracic segments, dorsal view.

tain species with both four and three pairs of thoracopods; these genera are subject to revision. Only one pair of thoracopods was found in *Impexus* Kabata, 1972, but the information available on this genus cannot be considered definitive. Nothing is known about the number of thoracopods in *Parinia*



Figs. 10-15. *Metapeniculus antofagastensis* gen. et sp. nov. 10-12, preadult females; 10a, ventral view; 10b, dorsal view; 11, abdomen, uropods and their armature; 12, buccal cone, detail; 13-22, adult female; 13, medial anterior region, ventral view; 14a, cephalothorax, anterior part; 14b, ditto, dorsal view; 15, ditto, dorsal view with the proboscis extended.

Kazachenco & Avdeev, 1977, and *Serpentissacus* Blasiola, 1979. *Sarcotretes* Jungersen, 1911 (cf. Wilson, 1917), has only three pairs of thoracopods. According to Kabata (1981), the absence of the fourth pair is clearly related to the disappearance of the fourth chalimus stage, during which it normally develops. The successive pairs of thoracopods tend to be close to one another, though the third and fourth pairs are further away from their predecessors in some genera.



Figs. 16-22. *Metapeniculus antofagastensis* gen. et sp. nov., adult female. 16a, dorsolateral view complete; 16b, anterior region, ventral view; 17, oral stylet; 18, first maxilla; 19, second antenna; 20, second maxilla (l = lacertus, br = brachium, cw = claw); 21a, caudal part of trunk, dorsal view; 21b, ditto, ventral view; 22, detail of same, lateral view.

In all instances, however, the legs are situated on the ventral surface at the level of the posterior margin of the dorsal shield.

The specimens described in this paper bear superficial resemblance to *Peniculus*. They differ from this genus in having only three pairs of thoracopods and in the elongation of the first pedigerous segment. The latter development displaces the thoracopods posteriorly for some distance from the margin of the dorsal shield. Comparison with *Sarcotretes*, the other genus with only three pairs of thoracopods, shows that it differs from the specimens described here in its general morphology. The same is true of *Cardiodectes* and *Phrixocephalus* (cf.

Kabata, 1967, 1969) some species of which also have three pairs of thoracopods. Both these genera have well-developed holdfasts, absent from the present material. So, no known pennellid genus can accommodate the newly discovered copepods. The authors propose, therefore, to place them in a new genus, *Metapeniculus*. The diagnosis of the genus is as follows.

Metapeniculus gen. nov.

Female: Cephalothorax without holdfast, with or without anterolateral processes and proboscis-like mouth-tube. First pedigerous segment elongated, second and third shorter than wide. Genital complex subcylindrical. Buccal appendages as in other Pennellidae. Only three pairs of thoracopods present, first two biramous, third uniramous; all rami two-segmented. Uropods present, armed.

Male: Unknown.

The similarity of *Metapeniculus* to *Peniculus* suggests that the former might have descended from the latter by the elongation of the first pedigerous segment and the loss of the fourth pair of thoracopods (and, probably, of the fourth chalimus stage from the life cycle). The presence of the heavily sclerotized plaques on the "neck" is reminiscent of some species of *Peniculus* in which this part of the body is reinforced by bars of heavy cuticle: *P. theraponi* Gnanamuthu, 1951; *P. scomberi* Gnanamuthu, 1952; *P. stromatei* Gnanamuthu, 1952. Such cuticular modifications are likely to evolve in unrelated copepods as a response to the conditions at the site of attachment and cannot be seen as indicators of relationships. The population of *M. antofagastensis* from the type host comprised in all 98 parasites, both adults and juveniles. Of this number, 25.5% were attached to the pectoral fins; 57.1% to the caudal; 10.2% to the ventral, and 7.2% to the dorsal fins. The copepods on the other host (*Doydixodon laevifrons*) were similarly distributed. The caudal fin, therefore, appears to be the site of preference for this copepod species.

ACKNOWLEDGEMENTS

We wish to thank Dr. Z. Kabata (Pacific Biological Station, Nanaimo, B.C., Canada) for his constructive criticism of the manuscript. We are grateful to our colleagues R. Wilson and M. Avendaño and to the students M. Araya, M. Escalera, and A. Ortega for help given to us in collecting host fishes. Their assistance is greatly appreciated.

RÉSUMÉ

Un Copépode pennellide, *Metapeniculus antofagastensis* gen. et sp. nov., parasite de deux poissons côtiers, à Antofagasta (Chili): *Anisotremus scapularis* (Tschudi) (type hôte) et *Doydixodon laevifrons* (Tschudi), est décrit et illustré.

Ce nouveau genre ressemble à *Peniculus*, dont il diffère par les pattes; il en possède trois paires, et leur position le distingue de tous les autres pennellides; ces trois paires de pattes sont placées plus en arrière que d'habitude, en raison de la longueur du premier segment qui porte des pattes.

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Received for publication 10 January 1984.