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Peniculus haemuloni, a new species of copepod (Siphonostomatoidea: Pennellidae) parasitic on *Haemulon steindachneri* from Ubatuba, Brazil

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Introduction

The genus *Peniculus* was established by Nordmann, 1832, to accommodate *Peniculus fistula*, a parasite of the teleost fish—*Diplodus annularis* Linnaeus (as *Sargus annularis*). To date 17 nominal species exist although according to Kabata (1979) at least two of them should be regarded as *species inquirendae*: *P. calamus* Nordmann, 1864 and *P. fissipes* Wilson, 1917, the latter probably being a synonym of the type species. The new species is the first record of *Peniculus* from Brazilian waters and the first record of *Haemulon* as a host for *Peniculus*. The structure of the appendages within the Pennellidae is so uniform that they are of little taxonomic value for species recognition. The key to the species of *Peniculus* is based on gross body morphology.

Description of new species

Peniculus haemuloni n.sp.

Adult female: The cephalothorax is about one tenth as long as the trunk (Fig. 1A), ovoidal, and flattened dorsally but convex ventrally (Fig. 1B) with a pair of rounded swellings anteriorly bearing the second antennae (Fig. 1D). The prominent mouth tube is directed posteroventrally (Fig. 1C). The four thoracic segments form a relatively short, uniformly slender neck comprising about one sixth of the trunk length. The neck is slightly flattened dorsoventrally and has a conspicuous internal system of longitudinal and transverse chitinous thickenings (Fig. 1C). Posteriorly the neck bears three pairs of swimming legs. The elongate subcylindrical trunk is slightly dorsoventrally flattened and comprises four-fifths of the total body length (Fig. 1A). A pair of terminal ventrolateral swellings bears the oviduct openings. The egg sacs are straight and uniseriate (Fig. 2B). The small rounded, dorsally placed abdomen bears two groups of four short setae (Fig. 2C) which are presumed to represent the caudal rami. The first antennae are absent. The second antennae are stout with a strongly curved terminal claw. The mouth tube is well developed extending almost to the posterior margin of the cephalothorax. The apex of the mouth tube has a circular opening surrounded by a thin membrane. The swimming legs comprise an oval flattened protopod and a 2-segmented exopod. The first segment is devoid of armature elements, the second has five setae on both the first and the third legs, the second leg armature was missing. Each limb pair is connected by a sternal bar (Fig. 2A). Dimensions of the holotype female: total length (exc. egg sacs) 5.6 mm; trunk length 4.4 mm; trunk width, 0.6 mm; neck length, 0.7 mm; neck width, 0.1 mm; cephalothorax length, 0.5 mm; cephalothorax width, 0.35 mm; egg sac width, 0.16 mm.

MATERIAL EXAMINED. Two adult females from the tail fin of the teleost *Haemulon steindachneri* collected at Ubatuba, Brazil (23°27' S: 45°06' W) by Dr K. Rohde in March 1979. The

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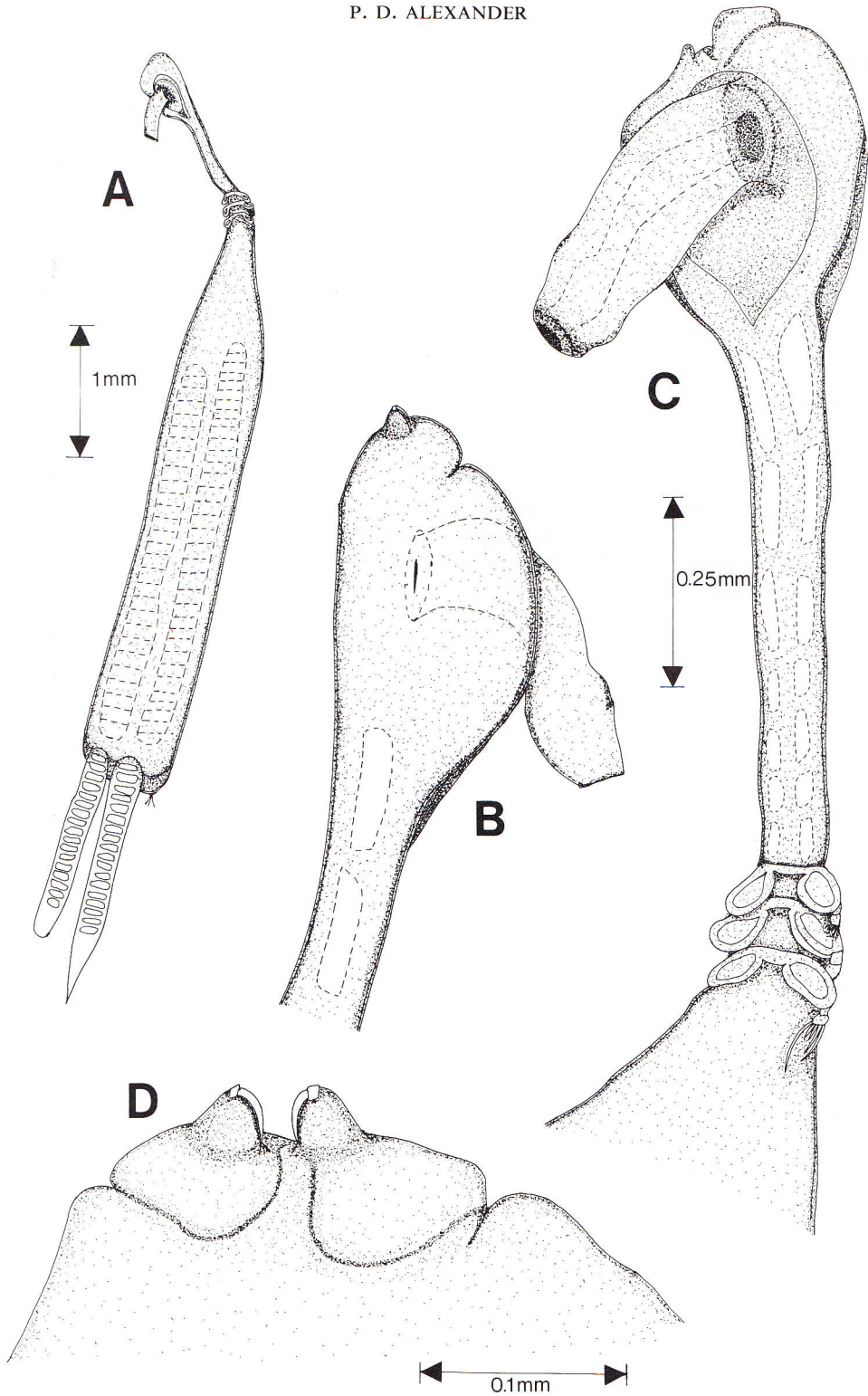


Fig. 1 *Peniculus haemuloni* n.sp. A, Female, ventral; B, cephalothorax, lateral; C, cephalothorax and neck showing mouth tube and internal chitinous framework, ventral; D, Anterior of cephalothorax showing second antennae.

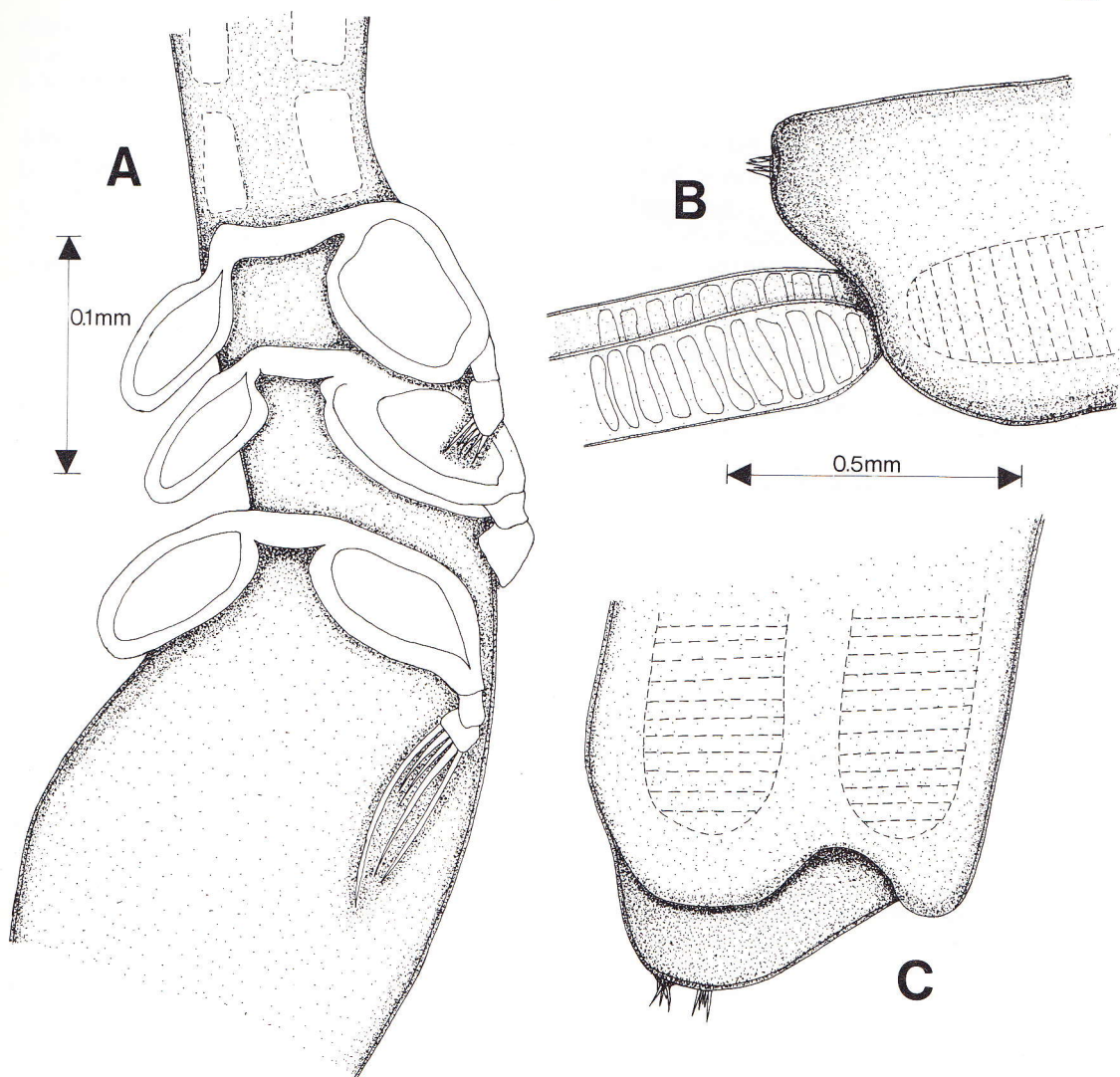


Fig. 2 *Peniculus haemuloni* n.sp. A, Structure and position of the three pairs of limbs, ventral; B, posterior region of trunk and egg sacs, lateral; C, posterior region of trunk showing caudal setae, ventrolateral.

ovigerous female is the holotype, registration number 1979.683; paratype female, registration number 1979.684. Both are deposited in the collections of the British Museum (Natural History), London.

REMARKS. The presence of only three pairs of swimming legs distinguishes *Peniculus haemuloni* n.sp. from most known species of the genus. Two other species, *Peniculus* sp. Kazatchenko & Avdeev, (1977) and *P. sciaenae* Gnanamuthu (1951a), have been described with three pairs of swimming legs. The former has the first two close together with a marked gap before the last pair at the base of the neck, whereas in *P. haemuloni* all three legs are close together at the base of the neck. It is probable that leg 1 of *P. sciaenae* was overlooked by Gnanamuthu (1951a) because this species appears to be closely related to *P. trichiuri*, *P. stromatei*, *P. tharaponi* and *P. scomberi* although the last species apparently lacks legs in the adult female. All of these species were described by Gnanamuthu (1951a, b) each coming from a host belonging to a different family of teleost fish found in Indian waters. All

possess a posterior swelling on the ventral surface of the cephalothorax and exhibit the same distribution of swimming legs, where present, along the neck and trunk. The differences between these species are relatively minor and it is possible that they represent forms of a single variable species.

Another useful character distinguishing *P. haemuloni* is the large prominent mouth tube which is similarly well developed in only two other species, *P. clavatus* Krøyer, 1863 and *P. fistula* Nordmann, 1832. The length to width ratio of the trunk (6·7 : 1) is most closely matched by that of *P. scomberi* (6·5 : 1) and *P. fistula* (6·3 : 1). These characters apart the new species shares many features with other *Peniculus* species, such as cephalothorax shape, the small rounded abdomen and the presence of a chitinous framework in the neck.

Key to the species of *Peniculus* (adult females only)

1	Cephalothorax with 4 large holdfast processes	<i>P. asinus</i> Kabata
–	Cephalothorax without such processes	2
2	Cephalothorax with rounded swelling on ventral surface posterior to mouth tube	3
–	Cephalothorax without posterior swelling on ventral surface	6
3	Swimming legs apparently absent	<i>P. scomberi</i> Gnanamuthu
–	Swimming legs present	4
4	3 pairs of swimming legs present	<i>P. sciaenae</i> Gnanamuthu
–	4 pairs of swimming legs present	5
5	Trunk about 11 times longer than wide	<i>P. trichiuri</i> Gnanamuthu
–	Trunk about 8 times longer than wide	<i>P. stromatei</i> Gnanamuthu/ <i>P. theraponi</i> Gnanamuthu*
6	3 pairs of swimming legs present	7
–	4 pairs of swimming legs present	8
7	All 3 pairs of legs positioned close together at the base of the neck	<i>P. haemuloni</i> n.sp.
–	Last 2 pairs of legs separated by a gap	<i>Peniculus</i> sp. Kazatchenko & Avdeev
8	Legs 3 and 4 closer together than legs 1 and 2	<i>P. communis</i> Leigh-Sharpe
–	Legs 3 and 4 further apart than legs 1 and 2	9
9	Trunk more than 6 times longer than wide	<i>P. fistula</i> Nordmann
–	Trunk between 3 and 4·5 times longer than wide	10
10	Mouth tube forming a massive posteriorly-directed proboscis	<i>P. clavatus</i> Krøyer
–	Mouth tube not forming posteriorly-directed proboscis	11
11	Cephalothorax ovoid	12
–	Cephalothorax widest near posterior margin and tapering anteriorly	<i>P. elegans</i> Leigh-Sharpe
12	Abdomen well developed; longer than wide	<i>P. minuticaudae</i> Shiino
–	Abdomen minute; posterior margin of trunk more-or-less straight	13
13	Trunk 4·3 times longer than wide; neck less than half as long as cephalothorax	<i>P. ostraciontis</i> Yamaguti
–	Trunk 3·3 times longer than wide; neck more than half as long as cephalothorax	<i>P. truncatus</i> Shiino

* N.B. There appear to be no reliable characters separating these two species.

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