

## A NEW FISH PARASITE (COPEPODA: SIPHONOSTOMATOIDA: CALIGIDAE) FROM THE TIMOR SEA, AUSTRALIA.

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### ABSTRACT

A new species of parasitic copepod, *Pseudopetalus timorensis* n. sp., is described based on a single specimen (female) obtained from a pelagic fish, possibly a flying fish (Exocoetidae) or a long tom (Belonidae), collected by a dip net at night in the Cartier Reef, Timor Sea, Australia, in May, 1992. The species is distinguishable from its congeners in having a proportionally long aliform abdomen with strongly curled edges.

KEYWORDS: new species, fish parasite, Copepoda, Siphonostomatoida, Caligidae, *Pseudopetalus*, Timor Sea, Australia.

### INTRODUCTION

A parasitic copepod of the genus *Pseudopetalus* Pillai, 1962 (Caligidae), deposited in the Museum and Art Gallery of the Northern Territory, Darwin, is here described as a new species. Currently four species of *Pseudopetalus* are known (Table 1). They are parasitic in the buccobranchial cavities of clupeid and belonid fishes in Indo-Pacific waters. This is the first record of *Pseudopetalus* from Australian waters.

Abbreviations used in the figures are: A', antennule; A'', antenna; Lu, lunule; Mt, mouth tube; Mx', maxillule; Mx'', maxilla; Mxp, maxilliped; Pap, postantennal process.

### MATERIAL AND METHODS

The specimen was found loose in a mixed collection obtained by using a dip net. The collection was made at night at the west end of Cartier Reef, Timor Sea, Australia (12°32.2'S 123°31.7'E) by Dr B. C. Russell on 6 May 1992. The host fish is unverifiable, but it was suspected to be either a flying fish (Exocoetidae) or a long tom (Belonidae). The specimen, preserved in alcohol, was examined in lactic acid under both dissecting and compound microscopes. Drawings were made using a drawing tube.

### SYSTEMATICS

#### Caligidae

#### *Pseudopetalus* Pillai

#### *Pseudopetalus timorensis* n. sp. (Figs 1-4)

**Type material.** The holotype is deposited in the Museum and Art Gallery of the Northern Territory, Darwin (NTM Cr. 009414).

**Description.** Female: Total length (excluding egg sacs) 8.9 mm, greatest width about 2.2 mm. Body (Fig. 1) elongated, about four times longer than wide, divisible into three parts: anterior oval cephalothorax; median enlarged, flexible genital complex, which attaches to cephalothorax through the small fourth pediger; and posterior prominent troughlike abdomen, in which egg sacs are held. Egg sac nearly straight, 5.5 mm long and 0.4 mm in diameter, containing about 67 flattened eggs arranged uniserially.

Cephalothorax longer than wide (1.7 X 1.3 mm), with brownish pigment spots scattered over convex dorsal shield with relatively narrow membranous flange along border accompanied sparsely by sensory hairs (Fig. 2A). Four areas of dorsal shield well demarcated by sutures; cephalic area extending about two thirds of cephalothoracic length, with frontal plate carrying pair of lunules. Frontal plate indented at

middle of anterior margin, with ring-like sclerite at middle of ventral side and membranous flange on anterior margin between lunules. Lunules consist of rugose adhesive disc and marginal membrane (Fig. 2A). Thoracic area wider than long, with posterior sinuses and gently curved

posterior margin. Lateral areas small, bearing sensory crypt posterolaterally.

Fourth pedigerous somite small, wider than long (0.2 X 0.4 mm) and tapered anteriorly.

Genital complex 3.2 mm long (including posterior lobes) and 1.6 mm wide (in posterior third).

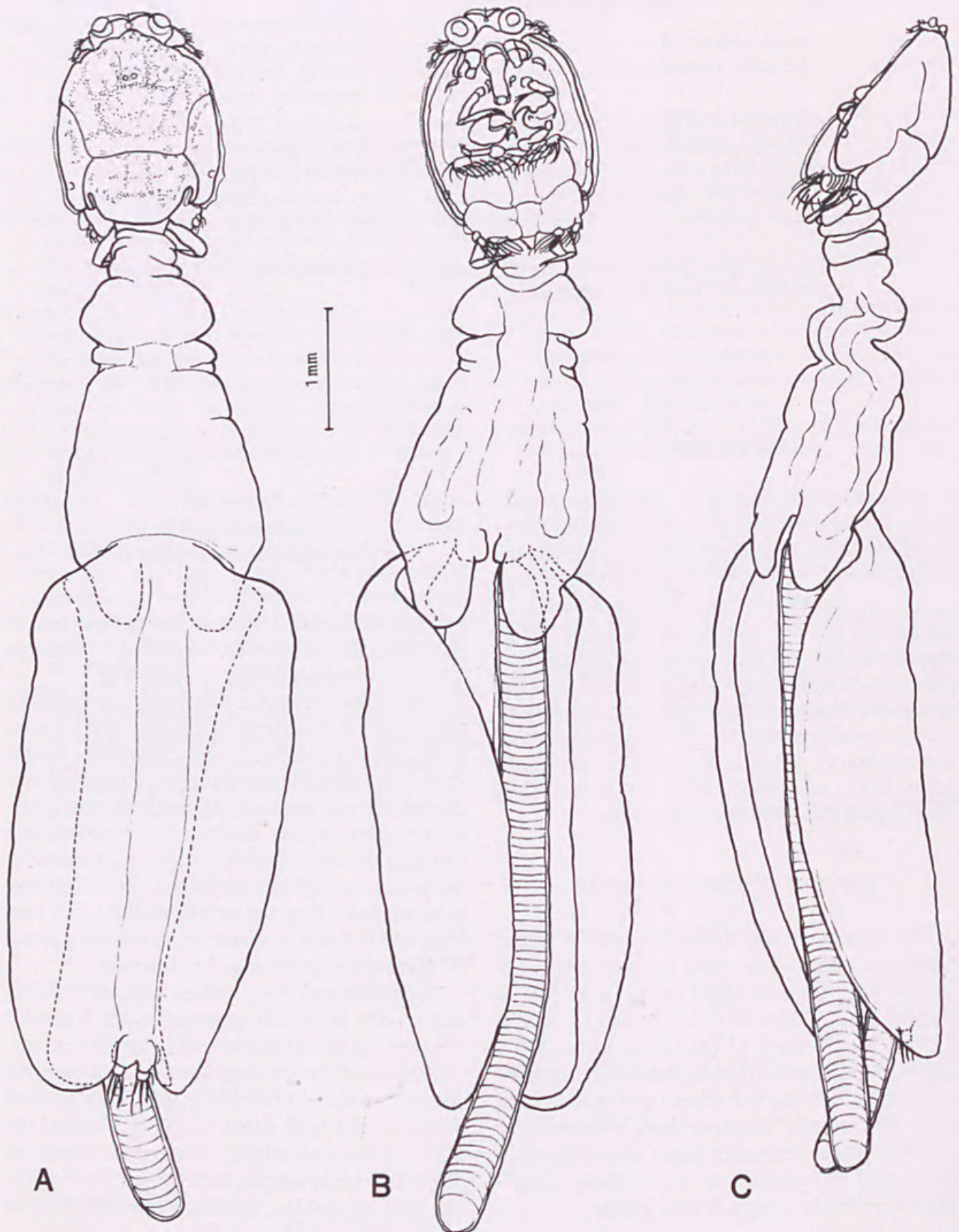


Fig. 1. *Pseudopetalus timorensis* n. sp., female. A, habitus, dorsal; B, same, ventral; C, same, lateral.

Anterior eighth of genital complex narrow and cylindrical and succeeded by slightly broadened portion with winglike lateral expansions. Posterior two-thirds gradually broadened posteriorly and ending in pair of lamelliform lobes, at their bases, a pair of genital processes bearing the genital pore medially. No rudiments of fifth and sixth legs on genital complex.

Abdomen large, 4.5 mm in length and composed of two segments; first segment long, broadly expanded laterally and strongly curled ventrally, with lateral margins nearly touching each other and posterior margin extending beyond small second segment. Latter shorter than wide, carrying caudal rami. Abdomen attached to posterodorsal part of genital complex above genital processes. Ventral side of abdomen slightly inflated along midline; gut visible by its brownish contents.

Antennule (Figs 2A, 2B) two-segmented, 0.3 mm long. First segment somewhat flattened dorsoventrally and broadened distally, with 26 plumose setae, of which 19 are arranged in two rows ventrolaterally, six dorsolaterally and one mediodistally. Second segment rodlike, with 12 simple setae and one aesthetasc distally and one seta medially.

Antenna (Fig. 2A) four-segmented. First segment arising from sternal swelling and laid in sternal groove, unarmed. Second segment short, with spiniform process projected posteromedially. Third segment robust, unarmed; and fourth segment bearing strong claw with two setules, one ventral near base and another midway on segment.

Hooked postantennal process (Fig. 2A) laterally to antennal base, with three basal setiferous papillae.

Mouth tube (Fig. 2A) 0.45 mm long and 0.08 mm wide, reaching far beyond bases of maxillae, with membranes around opening.

Mandibles originating laterally to mouth tube and inserting their distal portions laterally into mouth tube.

Maxillules (Fig. 2A) flanking mouth tube and mandibles, composed of hook and papilla tipped with three setules.

Maxilla (Fig. 2A) slender, three-segmented: first and second segments naked; third segment slender, with flabellum on distal fourth of anterior side and two subequal, feeble membranous claws at tip.

Maxilliped (Fig. 2A, Mxp; 2D, 2E) stout, three-segmented: first segment (corpus

maxillipedis) robust, with pointed process and ridgelike bulge on medial side, and small swelling on posterior side; distal two segments forming strong claw, with small knob and setule at midlength.

Sternal furca (Fig. 2A, C) between bases of maxillipeds, with somewhat elongate base and moderately diverging fork, without flange.

First leg (Fig. 3A) smaller than following pairs, composed of two-segmented protopod and exopod. Coxa with setule laterally on anterior side; basis with digitiform rudiment of endopod on unsclerotized distal portion, long, plumose lateral seta, short plumose seta on mediodistal corner, and spinules scattered on anterior side mediodistally. First exopod segment elongate, with small subterminal, lateral spine and row of spinules on medial edge; second segment with four pinnate setae and three distal spines; outermost spine with membranes and other two spines with accessory blades.

Second leg (Fig. 3B) large and elaborate. Intercostal plate flaplike, two times as wide as long, with broad membranous flange along free margin. Protopod two-segmented: coxa broad but short, with membrane along lateral free margin and medial plumose seta and unarmed setule; basis narrower, but longer than coxa, with simple lateral seta, broad membrane and fine unarmed seta on distal free margin. Exopod three-segmented: first segment nearly as long as distal two segments combined, with spine accompanied by flabellum at base on distolateral swelling, pinnate seta mediodistally, and membranous flange and row of setules on outer and medial margins, respectively; second segment short, with spine on outer distal swelling and pinnate seta medially; and third segment with three spines and five pinnate setae. All spines of exopod with membranes, but distalmost spine with pinnules on medial side. Endopod three-segmented; first segment with row of spinules on outer distal margin and medial pinnate seta; second segment largest, armed with 14 stout cuspid-like processes arranged in two rows along outer margin and two medial pinnate setae; third segment small and semicircular, with six pinnate setae.

Third leg (Fig. 4A) consists of broad protopod and small rami. Apron longer than wide, with membranous flange along free margin and digitiform sclerotized lateral process. Coxa and basis almost completely fused together, armed with medial spinous pad on ventral side, spinulose patches on ventrolateral side, fine sculpture on

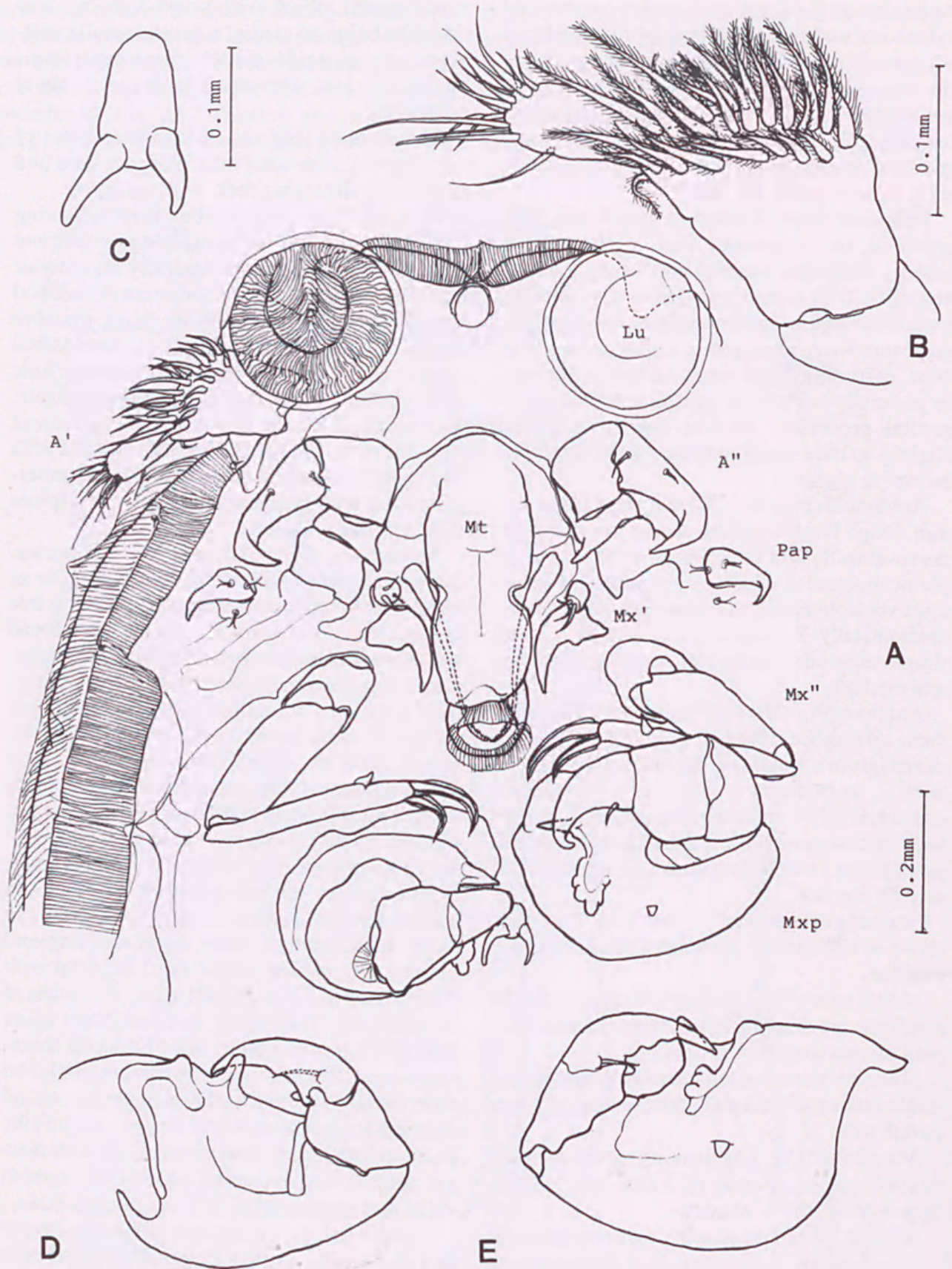


Fig. 2. *Pseudopetalus timorensis* n. sp., female. A, the anterior half of cephalothorax, ventral; B, antennule, ventral; C, sternal furca, ventral; D, maxilliped, anterior; E, same, posterior.

proximal dorsolateral margin, broad membranous flange on lateral margin, plumose lateral seta on distal corner, pinnate seta on mediolateral

corner, and membranous flange accompanied by two setules on mediolateral free margin. Exopod three-segmented: first segment small, with sin-

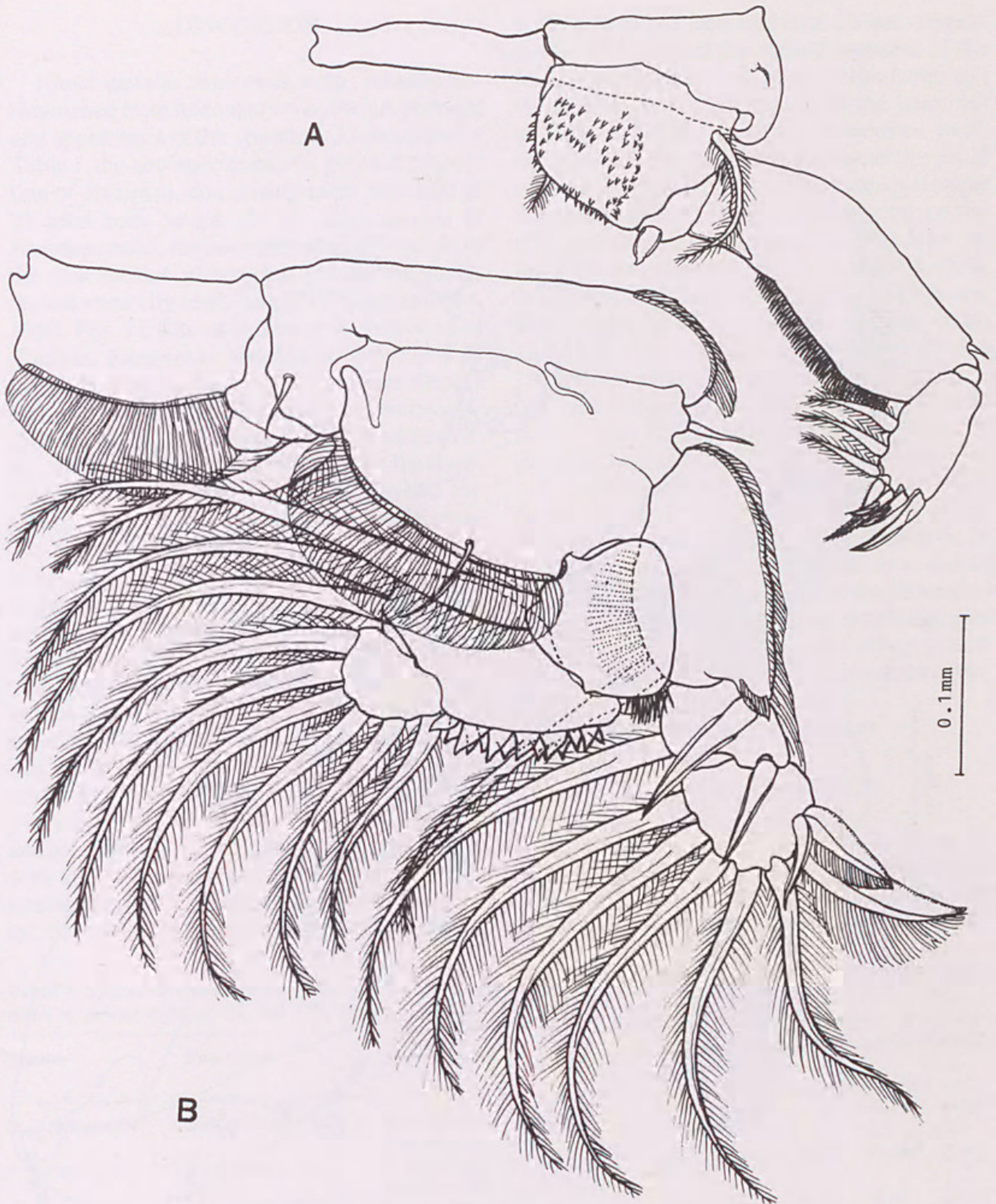


Fig. 3. *Pseudopetalus timorensis* n. sp., female. A, first leg, anterior; B, second leg, anterior.

gle spine (missing in Figure 4A); second segment with row of fine setules and simple, weak outer spine, and pinnate medial seta; third segment with row of setules on outer edge, three spines, and four pinnate setae. Endopod two-segmented: first segment flaplike, broadly articulated to basis, with row of setules along entire margin and pinnate medial seta; second

segment with row of setules laterally and six pinnate setae.

Formulae of spines and setae of legs 1-3 as follows:

Leg 1	Coxa 0-0 Basis 1-1	Exopod I-0; III,1,3
Leg 2	Coxa 0-1 Basis 1-0	Exopod I-1; I-1; III,5
		Endopod 0-1; 0-2; 6
Leg 3	Coxa+Basis 1-1	Exopod I-1; I-1; III,4
		Endopod 0-1; 6

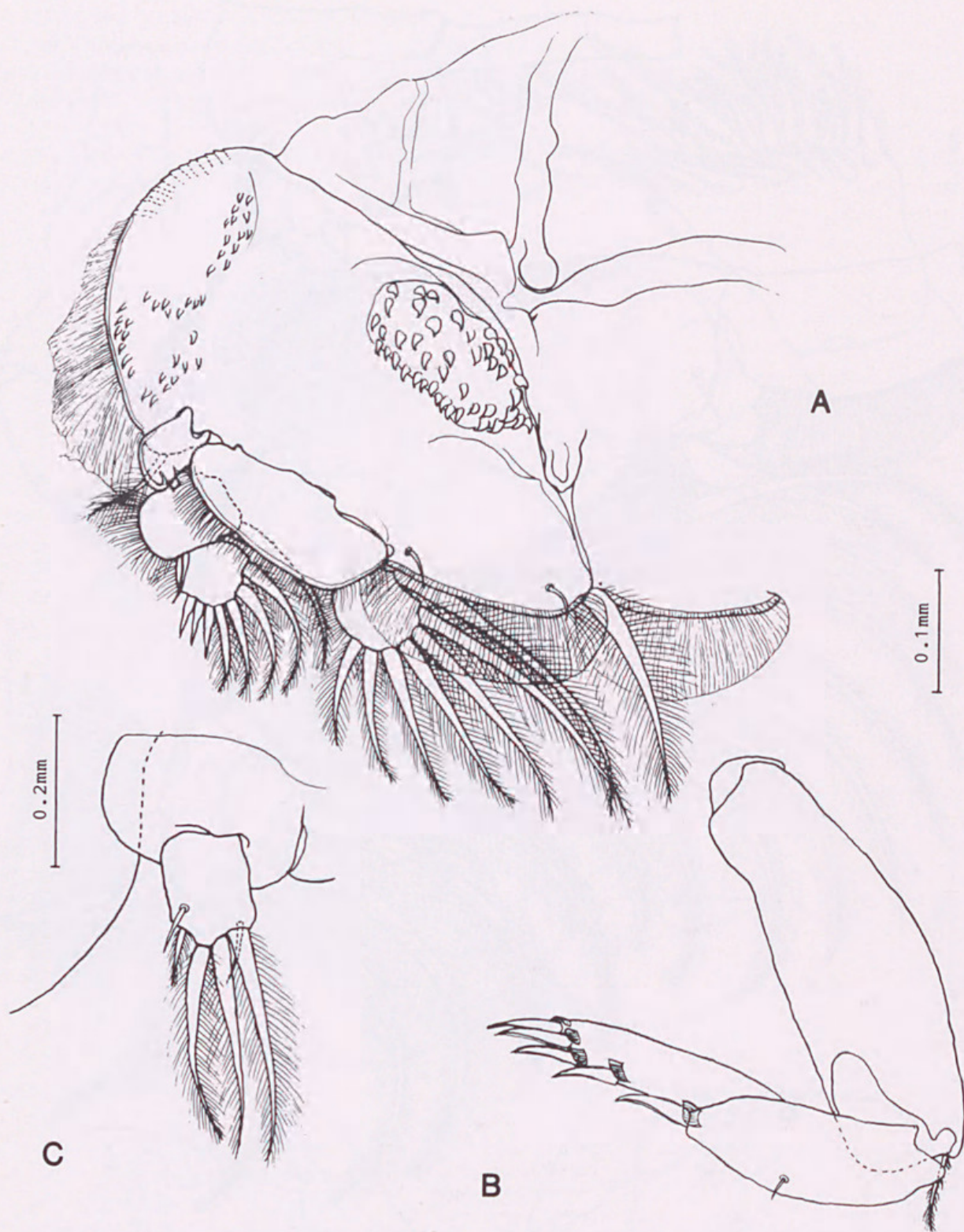


Fig. 4. *Pseudopetalus timorensis* n. sp., female. A, third leg, ventral; B, fourth leg, anterior; C, posterior portion of abdomen and a caudal ramus, ventral.

Fourth leg (Fig. 4B) three-segmented, uniramous; first segment (sympod) as long as distal two segments combined, with plumose distolateral seta; second segment with distal spine and fine setule on outside; third segment with

four spines; all spines clawlike, with fine membranes and accompanied by flabellum at base.

Caudal ramus (Fig. 4C) rectangular, tipped with three long pinnate setae and three small setae.

## DISCUSSION

*Pseudopetalus timorensis*, n. sp., is easily distinguished from its congeners by the proportions and appearance of the abdomen. As indicated in Table 1, the new species has the greatest proportion of abdomen, comprising more than half of its total body length. In all other species of *Pseudopetalus*, the abdomen does not curl as in the new species, although it was shown gently curved ventrally in *P. caudatus* (Gnanamuthu, 1950, Fig. 1). The abdomen of *P. formicoides* (Redkar, Rangnekar and Murti, 1949) and *P. dussumieri* (Rangnekar, 1957) is more slender than that of *P. caudatus* and *P. denticulatus* (Shen, 1957). In *P. caudatus* and *P. timorensis* n. sp., the aliform posterior edge of the first segment of the abdomen reaches far beyond the second abdominal segment, but no such formation is found in *P. formicoides*, *P. denticulatus*, and *P. dussumieri*. Though similar to *P. caudatus* among its congeners in having a broad abdomen with posterior lobes, *P. timorensis* n. sp. differs from *P. caudatus* (Pillai 1968, 1985) in armature of the appendages as follows: in *P. timorensis* n. sp. the maxilliped has a pointed tooth on myxa other than a ridgelike bulge instead of two teeth. The antennal posterior process projects posteromedially in *P. timorensis* n. sp., while it projects posterolaterally in *P. caudatus*. The first and second endopod segments of leg 2 are armed with a row of fine spinules and 14 teeth on the lateral margins respectively in *P. timorensis* n. sp., but in *P. caudatus* these segments are armed

with three to four teeth and 10 to 12 teeth respectively. The teeth of the second segment of the former are thicker than those of the latter and these teeth arise contiguously at the bases instead of at regular intervals. Moreover, in *P. timorensis* n. sp. three medial setae of the distal exopod segment of leg 1 are pinnate and longer than distal spines, but these setae are replaced by short simple setae in *P. caudatus*. The setae on the terminal segment of leg 1 show various degrees of reduction in this genus. They are rudimentary in *P. formicoides* (Redkar et al. 1949; Pillai 1962) and *P. caudatus* (Gnanamuthu 1950; Pillai 1962), about as long as the segment in *P. denticulatus* (Shen 1957) and *P. timorensis* n. sp., and longer than the segment in *P. dussumieri* (Rangnekar 1957; Pillai 1968).

*P. denticulatus* was treated as a variety of *P. formicoides* by Pillai (1962) and then as a synonym of the latter by Pillai (1985). However, it must be considered a valid species, as it is distinct from the latter in the shape of the abdomen, armature of the maxilliped myxa, relative length of setae on the terminal segment of leg 1, and shape and number of cuspid-like processes of the second endopod segment of leg 2.

Males are unknown for this genus.

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Table 1. Species of *Pseudopetalus*, with morphometric comparisons. BL, total body length; GL and GW, length and width of genital segment; AL and AW, length and width of abdomen.

Taxon	Reference	Host	BL (mm)	GL/BL	GW/GL	AL/BL	AW/AL
<i>P. formicoides</i>	Redkar et al. (1949)	on <i>Dussumieria acuta</i> from Bombay, India Ocean	9.0	0.40	0.45	0.47	0.49
<i>P. formicoides</i>	Pillai (1962)	on <i>Sardinella fimbriata</i> , from Madras, Indian Ocean	10.2	0.41	0.35	0.49	0.38
<i>P. caudatus</i>	Gnanamuthu (1950)	on <i>Dussumieria acuta</i> from Madras	7.4	0.44	0.52	0.46	0.81
<i>P. caudatus</i>	Pillai (1962)	on <i>Dussumieria hasseltii</i> from Trivandrum, Indian Ocean	8.5	0.39	0.52	0.44	0.80
		on <i>Ablennes hians</i> from Trivandrum	9.1	0.44	0.44	0.42	0.95
<i>P. denticulatus</i>	Shen (1957)	on <i>Dussumieria hasseltii</i> from Hai-Nan Is., South China Sea	6.7	0.38	0.55	0.50	0.64
<i>P. dussumieri</i>	Gnanamuthu (1957)	on <i>Dussumieria acuta</i> from Bombay	6.2	0.31	0.73	0.43	0.28
<i>P. dussumieri</i>	Pillai (1968)	on <i>Dussumieria hasseltii</i> from Trivandrum	5.2	0.37	0.68	0.39	0.52
<i>P. timorensis</i> n.sp.	this paper	on flying fish or long tom, Cartier Reef, Timor Sea	8.9	0.37	0.48	0.52	(0.47)

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