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# A new species of *Pseudobranchiomma* Jones (Polychaeta: Sabellidae) found amongst Brazilian coral, with a redescription of *P. punctata* (Treadwell, 1906) from Hawaii

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A new species of *Pseudobranchiomma* Jones, 1962 is described from a collection of polychaetes associated with stony coral on the coast of São Paulo State, Brazil. *Pseudobranchiomma minima* sp. n. differs from the type species *P. emersoni* Jones and from most other *Pseudobranchiomma* species in lacking serrations along the outer surface of the crown radioles. Only one other recorded fairly small species, *Pseudobranchiomma punctata* (Treadwell, 1906, new combination), lacks such serrations and is redescribed here. The two species differ mainly in the configurations of the collars and chaetae. This genus has characters more in common with *Bispira* than with *Branchiomma*.

KEYWORDS: *Pseudobranchiomma*, coral, *Branchiomma*, *Bispira.*



## Introduction

Jones (1962) based the genus *Pseudobranchiomma* mainly on the character of a short thorax with four setigers instead of the eight usually seen in Sabellidae. The short thorax as found in our new species is typical of imperfect regeneration after scissiparity. It is also found, however, in other genera, as was noted for *Branchiomma curta* (Ehlers, 1907) by Augener (1922, 1926) and Benham (1927, as *Dasychone cingulata* var. *curta*). On the other hand, Knight-Jones and Perkins (1998: 433) pointed out that imperfect regeneration can produce up to 15 thoracic segments in *Bispira brunnea* (Treadwell, 1917). Records of species now in *Pseudobranchiomma* show at least six to eight segments, and inclusion of this character is not useful for generic diagnosis.

Jones (1962) also listed as generic characters the reduced external radiolar appendages and the lack of radiolar eyes. Fitzhugh (1989), in his rediagnosis of *Pseudobranchiomma*, also listed these, but neither author seemed to realize that the

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outer radiolar appendages of *Pseudobranchiomma* are merely regular serrations in paired flanges, quite different from the paired transversely orientated epithelial flaps (stylodes) of *Branchiomma*, a genus from which radiolar flanges are always absent. Several genera, furthermore, can be with or without eyes. Knight-Jones (1994) drew attention to these points and briefly rediagnosed *Pseudobranchiomma*, noting that radiolar serrations, though regular, can be variable in range; they may cover the whole length of the radiole, be present only distally or, as here, absent altogether.

## Materials and methods

Collections were made sublittorally off rocky shores at Laje de Santos (24°19′S, 46°11′W) and Alcatrazes Island (26°06′S, 45°42′W), on 17 March 1996 and 4 December 1996, respectively. Amongst colonies of cnidarians *Palythoa* and *Zoanthus* (and some algal tufts) on rocky substratum, were 12 massive hemispheric colonies of the coral *Mussismilia hispida* (Verrill). Some of these were examined yielding new taxa of Eunicidae (Nogueira *et al.*, 2001), Syllidae (Nogueira *et al.*, in press a), Terebellidae (Nogueira and Amaral, 2001) and Sabellidae (Nogueira and Amaral, 2000). Another sabellid is described below.

Three of the colonies of *Mussismilia hispida* (displacing 180, 450 and 520 ml) from 3 to 10 m depths yielded the new sabellid. The lumps of coral were fixed with formalin (4%) and subsequently decalcified with formalin-formic acid solution; polychaetes were sorted from the sediment, washed in water, stored in 70% alcohol, and identified. Observations and measurements were made from mounts in glycerine jelly using interference contrast optics (Nomarsky) and a drawing tube. Observations by scanning electron microscopy (SEM) were made with DSM 940 equipment, after critical-point drying and coating with 25 nm of gold.

Material of the new species is deposited at Museu de História Natural, Instituto de Biologia, Universidade Estadual de Campinas (MNH-BPO), and Department of Zoology, National Museum and Galleries of Wales, Cardiff (NMW.Z).

## Systematics

### Genus *Pseudobranchiomma* Jones, 1962, emended Knight-Jones, 1994

*Type species. Pseudobranchiomma emersoni* Jones, 1962.

*Diagnosis*. Base of crown involuted midventrally, each side forming partial circle or (rarely) spiral; radioles with or without compound eyes and usually with paired longitudinal flanges with or without serrations; interradiolar web present; dorsal lips tapered and grooved (with midrib support), webbed to base of adjacent dorsal rachis (figure 1H dl), with or without pinnular support; ventral lips rounded (figure 1H vl); collar with two ventral lappets separated by midline cleft; dorsal collar margins usually free and well separated (not forming collar pockets by fusion to sides of midline dorsal groove); collar cleft adjoined to short parallel lamellae leading to bulbous paired ventral sacs outside crown base; anterior margin of first ventral shield indefinite, straight or M-shaped with small midline embayment or cleft; all thoracic chaetae in compact fascicles with scarcely geniculate superior chaetae arranged in arc anterodorsal to compact group of more geniculate inferior chaetae wider at knee; thoracic and abdominal uncini avicular, with end of shaft to breast somewhat shorter than distance between breast and crest; companion chaetae absent; abdominal fascicles (except most recent ones near pygidium) arising within conical

lobes; inferior abdominal chaetae (erstwhile posterior ones when first formed; Knight-Jones and Perkins, 1998) relatively short, geniculate and with sturdy shafts, arranged in C-shaped arc or concentric arcs (concave sides of arcs facing anterodorsally); superior abdominal chaetae (erstwhile anterior ones) long, less geniculate, more slender at 'knee' and with narrower shafts, in larger fascicles often randomly arranged within inferior chaetal arcs; interramal eye-spots present.

Hitherto there are about 10 species of *Pseudobranchiomma* (Knight-Jones, 1994; Knight-Jones and Mackie, in press; Knight-Jones and Giangrande, submitted). Only the type species *Pseudobranchiomma emersoni* is as small as the new species described here and that differs in having distinct radiolar flanges with distinct serrations. One fairly small species, *Pseudobranchiomma punctata* (Treadwell, 1906, as *Laonome*) which was inadequately described, has reduced flanges (figure 1E, F) lacking serrations, like our new species, and a full description is given here for comparison.



***Pseudobranchiomma punctata*** (Treadwell, 1906)
(figure 1)

*Laonome punctata* Treadwell, 1906: 1179, figures 76, 77, Hawaii, 10 paratypes, about half with crown detached, from Waialua Reef, Oahu, Hawaii, AMNH 1902-344 (type not examined, also from Waialua USNM 5223). Hartman, 1959: 548, referred the species to *Sabellastarte indica* (Savigny, 1822, as Sabella Astartae, a tribe; Krøyer (1856: 13) regularized the name as the genus *Sabellastarte*, Knight-Jones and Mackie, in press).

*Pseudobranchiomma punctata* (Treadwell, 1906) new combination, Knight-Jones and Mackie (in press).

The following description is based on the largest complete paratype. First data in parentheses refer to a larger incomplete paratype and data in quote marks are from Treadwell's 1906 paper, based mainly on the holotype.

*Description*. Thorax and abdomen 15 (20, '21') mm long, 2 (3, '3') mm wide; radiolar crown a further 6 (8, '10') mm long (figure 1A), crown base with 19 ('25') colourless radioles, external flanges reduced (figure 1E, F), without serrations or compound eyes; each side of crown base involuted ventrally to a near circle; radioles webbed for 0.5 mm of radiolar length; radiolar tips short and blunt; dorsal lips 2.5 mm long (figure 1H dl); thorax as long as or longer than broad, with five to eight ('five to nine') segments, sometimes with different numbers of parapodia on right and left sides of thorax; dorsal collar margins fused to sides of midline faecal groove (figure 1D), forming vestigial flanking pockets each side, lateral collar margins above junction of crown and thorax (figure 1B), ventral collar extending as two fairly prominent lappets divided by a midline cleft with short parallel lamellae leading to two small ventral sacs (figure 1C); anterior margins of first ventral shield indistinct; first ventral shield (without collar and in lateral view) scarcely longer than following shields, lateral margins of this and following shields well defined; anterior thoracic torus not abutting adjacent ventral shield (figure 1B), but other thoracic tori touching posterior ventral shields (figure 1C); posterior thoracic torus about twice length of first abdominal torus; left fascicle 6 with 20 chaetae (in all); superior chaetae (many broken), scarcely geniculate with knee not much wider than shaft; inferior chaetae more geniculate, knee 1.5 × width of shaft (figure 1J); abdominal inferior chaetae similar (figure 1N), about 6 in segment 3 of abdomen, superior chaetae small, very slender and sparse (figure 1C insert); thoracic uncini (23 in torus 6) with four to six rows of teeth (side view) across crest, distance between shaft and breast much shorter than breast to crest (figure 1L); abdominal uncini (8 in torus 3

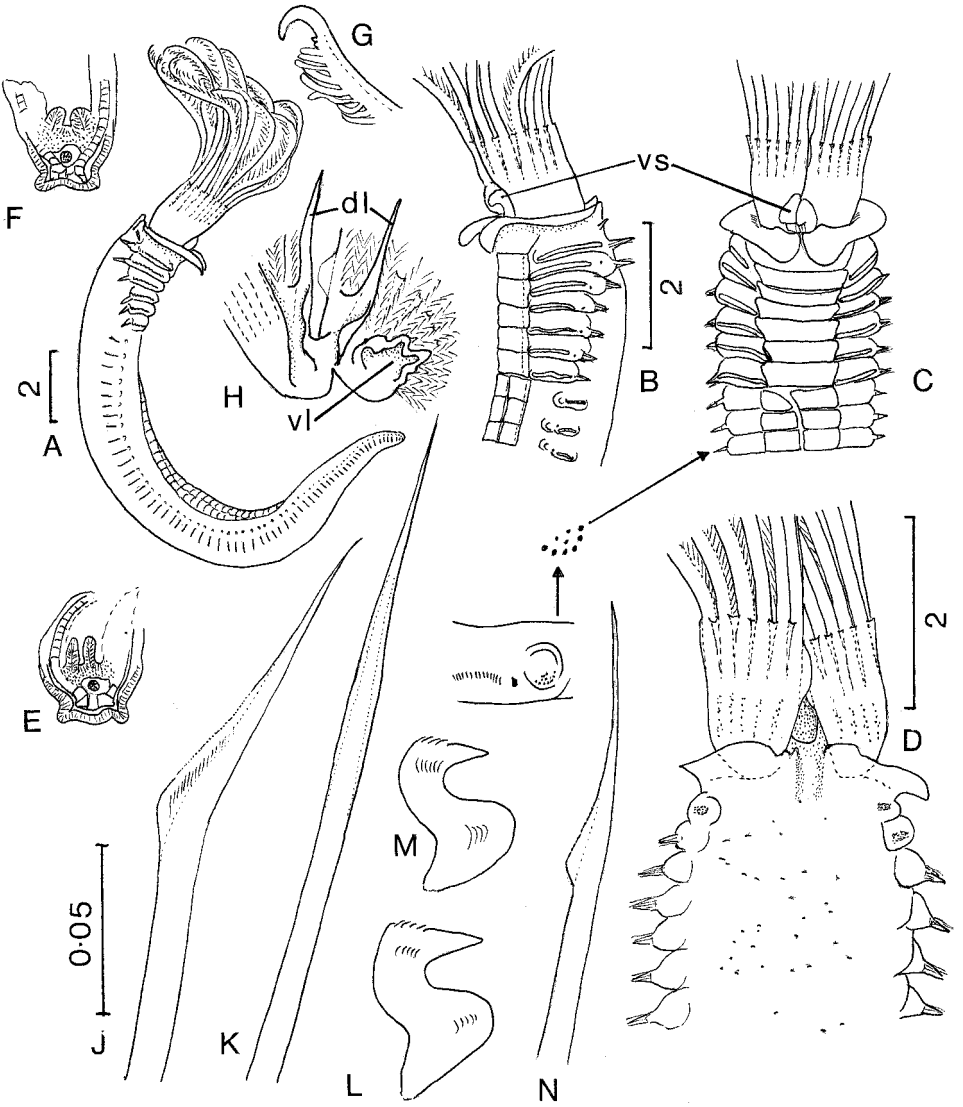


FIG. 1. *Pseudobranchiomma punctata* (Treadwell). (A) Paratype 1, (B–N) paratype 2. (A) Whole worm, right side; (B) lower crown and thorax, left side; (C) same, ventral view, insert showing arrangement of chaetae in 3rd abdominal fascicle on right and position of that fascicle relative to its torus; (D) dorsal view, dotted lines show crown/peristome junction; (E) transverse section of crown radiole near base of crown; (F) TS same radiole subdistally; (G) tip of radiole; (H) basal detail of dehisced crown, ventral view (dl, dorsal lips; vl, ventral lip); (J) inferior thoracic chaeta, side view; (K) superior thoracic chaeta back view; (L) thoracic uncinus, side view; (M) abdominal uncinus side view; (N) inferior abdominal chaeta, side view. Scales in mm: (C) as (B); (K–M) as (J).

on left) similar (figure 1M); body pale with scattered, indistinct, irregular, brown ('purple') spots, more condensed towards collar; radioles with 'basal portion ... more than half length, deep purple', the remainder with 'irregularly alternating bands of white, yellow and purple' (these colours were not distinguishable in the long

preserved paratypes); interramal eye-spots distinct in both thorax and abdomen; 'thick-walled tube covered on outside with layer of brown mud'.

*Remarks*. Treadwell (1906) probably put his species into *Laonome* because of the fusion of the dorsal collar to the midline groove and the lack of companion chaetae, but the thoracic uncini of *Laonome* are unique in being more truncated posteriorly than those of *Pseudobranchiomma*. Hartman (1959) put the species in *Sabellastarte*, but recent studies by Knight-Jones and Mackie (in press) have found that the species remaining in that genus have well-separated finger-like ventral sacs *within* the base of the crown like *Stylomma* (Knight-Jones and Perkins, 1998: figure 29C, D; Knight-Jones and Mackie, in press). *Pseudobranchiomma* is like the other genera in the clade (Fitzhugh and Rouse, 1999), *Branchiomma*, *Bispira* and *Sabella* in having these paired sacs contiguous, *outside* the crown base and close to the cleft between the ventral collar lappets (figure 1B, C; Knight-Jones and Mackie, in press: figure 1B).

The 'fused to the sides of the dorsal midline groove' type of collar, atypical of *Pseudobranchiomma*, is only a specific character, not a generic one. Such fusion occurs in six out of 12 species of *Branchiomma* (Knight-Jones, 1994) and in one out of 19 *Bispira* (Knight-Jones and Perkins, 1998). In the genus *Megalomma* most species have such fusion, only six species having the dorsal collar margins free and widely separated (Knight-Jones, 1997). Of these, some specimens of *Megalomma heterops* Perkins, 1984, can be intermediate in having shallow dorsal collar pockets each side of the faecal groove, as though representing a stage in development between the two styles of collar.

In lacking well-defined flanges (and serrations) *Pseudobranchiomma punctata* is unusual within the genus. The only other recorded species with reduced flanges is *Sabella longa* Kinberg, 1867, recently put into *Pseudobranchiomma* by Knight-Jones (1994), but that large species is very different, with a bispiral crown of four to six whorls, outer radioles bearing irregular unpaired 'eyespots', and collar with widely separated dorsal margins (Day, 1967: figure 37.5A–E, as *Sabellastarte*). Other species of *Pseudobranchiomma* (except for *P. punctata*) have distinct flanges with serrations along the whole length of the radioles, or have these only on the distal parts.

Variability in numbers of thoracic segments indicates regeneration. One scissiparous offspring was amongst the paratypes of *Pseudobranchiomma punctata*. It had a partly developed crown and a normal posterior. Three other paratypes had a small portion of posterior abdomen with very short, narrow segments, indicating recent posterior regeneration.

### ***Pseudobranchiomma minima*** sp. n.
(figures 2, 3)

*Material examined*. Nineteen specimens, all from Ilha dos Alcatrazes. HOLOTYPE MHN-BPO 66/0, mounted; PARATYPES: MHN-BPO 66/1-5, two mounted and three preserved in 70% alcohol; NMW.Z.2000.105.1, two preserved in alcohol and 105.2–4, three mounted. Three specimens observed by SEM not available. Data in parentheses refer to the holotype.

*Description*. Small species with 42–73 segments; thorax and abdomen 5–12.8 (9.1) mm long, 0.75–0.9 (0.84) mm wide, radiolar crown a further 3.2 (3) mm long, crown base in two semicircles each with about five radioles; external radiolar surfaces with reduced flanges and without serrations (figure 3E) or compound eyes; radiolar

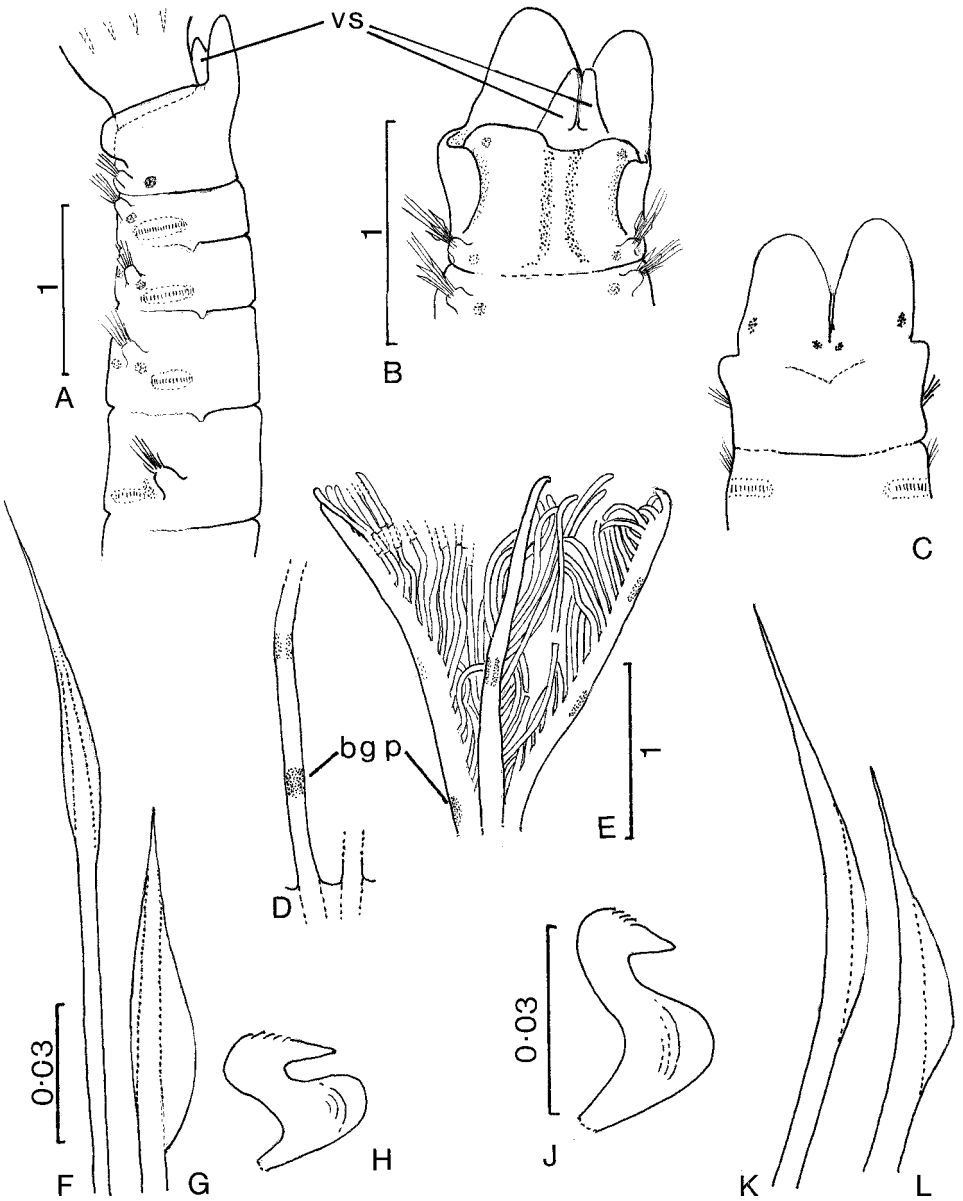


FIG. 2. *Pseudobranchiomma minima* sp. nov. (A, F–H) Holotype, (B–E, J–L) paratypes. (A) Lateral view of thorax and first abdominal segment (right side; vs, ventral sac; dotted line indicates junction of crown and thorax behind collar); (B) anterior thorax, dorsal view, without crown (vs, ventral sacs); (C) same specimen, ventral view; (D) basal part of radiole, schematic and (E) distal parts of three radioles from just below a basal granular patch (bgp); (F) superior thoracic chaeta, back view; (G) inferior thoracic chaeta, three-quarter view; (H) thoracic uncinus, oblique view; (J) thoracic uncinus, side view; (K) superior chaeta, side view; (L) paratype inferior chaeta, side view. Scales in mm: (C) as (B); (D) as (E); (G, H) as (F); (K, L) as (J).

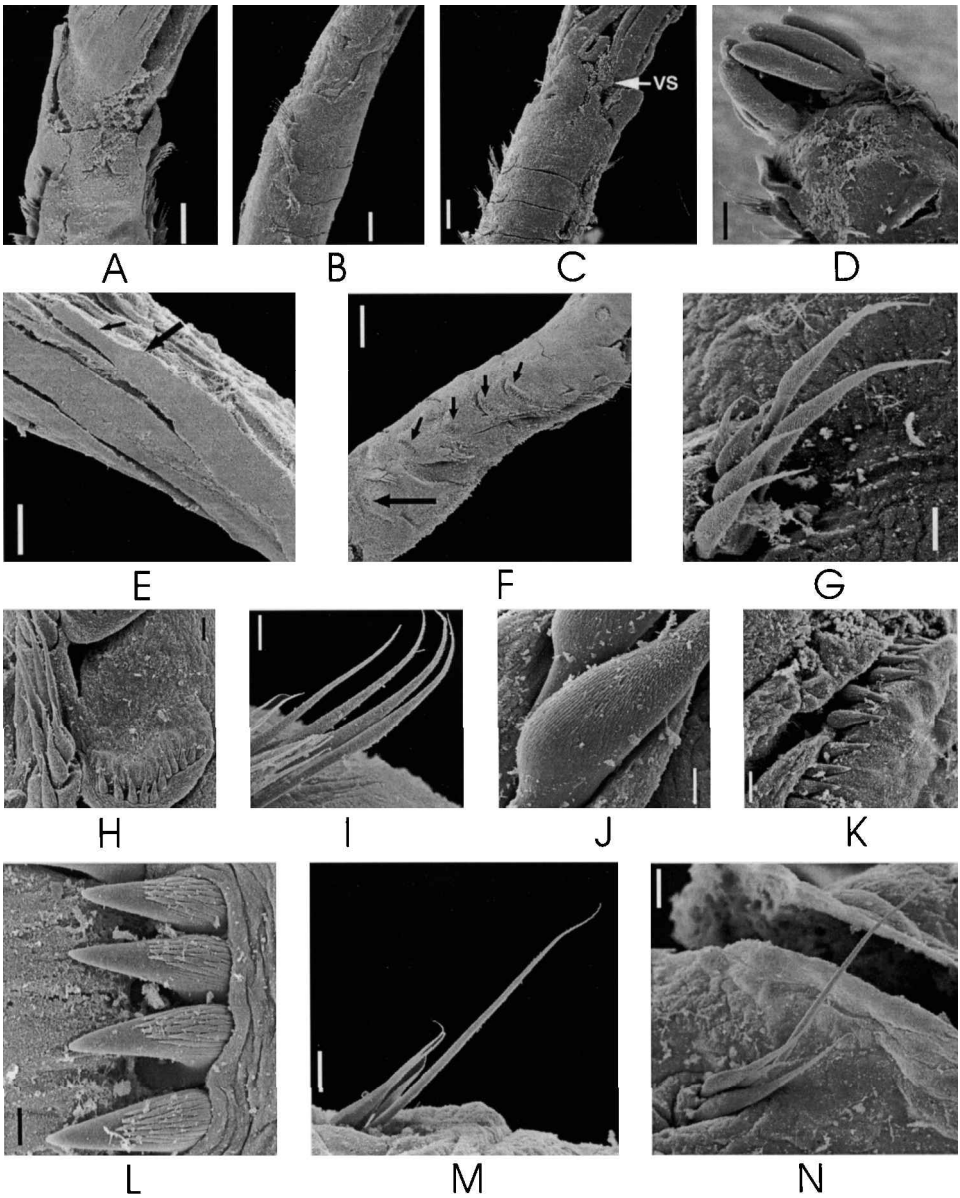


FIG. 3. *Pseudobranchiomma minima* sp. nov. paratypes. (A) Dorsal view; (B) view from right side; (C) ventral view (vs, ventral sac); (D) dorsal view of anterior of specimen with regenerating crown, showing three apinnulate radioles on each side, widely separated free dorsal collar margins and (on left) a collar fascicle; (E) part of crown, small arrow points to distal apinnulate part of radiole, large arrow to radiolar flange (pinnules scarcely visible); (F) view of another from left side (small arrows point to thoracic tori and large arrow points to first abdominal torus, the exchanged positions of tori and fascicles showing chaetal inversion); (G) thoracic collar fascicle; (H) thoracic parapodium (segment 4); (I) superior chaetae (segment 4); (J) knee of inferior chaeta (segment 4); (K, L) distal parts of uncini showing anterior pegs and toothed crests; (M, N) abdominal fascicles. Scale lines in mm: (A–C) 0.2; (D–F) 0.15; (G) 0.02; (H) 0.01; (I) 0.02; (J) 0.005; (K) 0.01; (L) 0.005; (M, N) 0.04.

pinnules relatively long and tips short and blunt (figure 2E); dorsal lips tapered, extending to level of basal granular patch; thorax longer than broad even with as few as five (four) segments (figure 2A); dorsal collar margins with wide separation (figure 2B), lateral collar margins above junction of crown and thorax (figure 2A, 3A), ventral collar extending as two prominent lappets divided by a midline cleft (figure 2B, C, 3C); first thoracic segment nearly twice length of the next one (figures 2A, 3B); anterior margins of 1st ventral shield indistinct (figures 2C); thoracic tori short, anterior ones with 11 (20) uncini, posterior ones with seven to eight (14) uncini, probably with gaps between ventral ends of tori and shields, but lateral margins of shields not visible (figure 2A), last thoracic torus not much longer than adjacent first abdominal torus; collar chaetae (figure 3G) like following thoracic chaetae (figure 3H), superior chaetae scarcely geniculate with knee not much wider than shaft (figure 2F, K), two to four per fascicle (figure 3I); inferior thoracic chaetae more geniculate, broader at knee, about twice width of shaft (figures 2G, K, 3J), four to eight per fascicle (figure 3H); abdominal inferior chaetae similar (figure 3N), superior abdominal chaetae slender and even less geniculate (figure 3M) than those of thorax; thoracic uncini with numerous teeth on crest (figure 3L), four to five 'rows' in side view (figure 2H, J), distance between proximal shaft and breast shorter than breast to crest (figure 2J); abdominal uncini similar; most of surface rather colourless, but red-brown pigments on distal parts of pinnules: three pairs of granular patches on radioles, anterior two reddish brown, basal granular patches, more condensed, darker, almost black (figure 2D, E, bgp); distinct interramal spots (those in abdomen larger than in thorax) and distinct spots dorsal to thoracic fascicles (figure 2A, B); tube of thick mucus with agglutinated debris distally.

*Remarks*. The only other recorded species of *Pseudobranchiomma* that lack serrations along the radiolar flanges are *P. longa* (Kinberg, 1867) and *P. punctata* (Treadwell, 1906). *Pseudobranchiomma longa* differs in being a very large species (thorax up to 15 mm wide) with a bispiral crown. Besides size and more numerous chaetae per fascicle, *Pseudobranchiomma minima* differs from *Pseudobranchiomma punctata* in having wider inferior thoracic chaetae; more slender less truncate uncini (cf. figures 2J and 1L); very indistinct ventral shields; dorsal collar margins free and widely separated and typically fewer thoracic segments. The short thorax is typical of imperfect regeneration and one scissiparous specimen with budding radioles (figure 3D) was found in these collections.

## Discussion

Fitzhugh (1989) suggested that 'A complete revision of *Branchiomma*, however, might either entail (1) moving some of these species into *Pseudobranchiomma* irrespective of number of thoracic setigers, or (2) placing *P. emersoni* into *Branchiomma*, with the general presence of stylodes as a synapomorphy'. As mentioned above, having a small number of thoracic segments is unimportant, but the outer radiolar appendages of the two genera are very different (Knight-Jones, 1994). *Branchiomma* bears its stylodes (epithelial flaps) transverse to the radiolar axis and throughout the length of unflanged radioles. In *Pseudobranchiomma* with outer appendages, these are merely serrations in paired radiolar flanges. The two species described above lack these serrations and their general morphology strongly resembles species of *Bispira*. That genus also has two of its 19 species with reduced flanges (Knight-Jones and Perkins, 1998). The main character separating *Bispira* from *Pseudobranchiomma* is that the latter lacks companion chaetae alongside the thoracic uncini.

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