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# Pisionidae (Polychaeta) from Coiba National Park with the description of a new species and two new reports of *Pisione*

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Four species of Pisionidae (Polychaeta) are reported from Coiba National Park (Pacific, Panamá), one is a well known species of the area *Pisionidens indica*, one is a new species of *Pisione* and there are two new reports: *Pisione galapagoensis* and *Pisione* cf. *papuensis*. *Pisione longispinulata* sp. nov. possesses buccal aciculae distally elongated with a conspicuous notch, three compound chaetae per parapodium, with dense and long spines on margins, and a single pair of copulatory organs, each with modified ventral cirrus, distal spherical enlargement and distal papillae. The closest species is *Pisione garciavaldecasasi*, also from the Coiba National Park, although it lives in freshwater streams in the northern part of Coiba Island.

## INTRODUCTION

Pisionids are a family of polychaetes generally associated with interstitial marine environments. They are carnivores and active burrowers, generally found in the soft-bottoms of intertidal and shallow depths. They have been recorded predominantly from warm to tropical seas, and are one of the less common families found during benthic studies, probably due to the few studies carried out on interstitial fauna (Hutchings, 2000). Fauchald (1977) recognized four genera: *Anoplopisione* Laubier, 1976; *Pisione* Grube, 1857; *Pisionella* Hartman, 1939 and *Pisionidens* Aiyar & Alikunhi, 1943. The genus *Pisione* has the highest number of known species of the family, with more than 30 species (Moreira et al., 2000). The high number of recently new discovered species indicates that the diversity of the group is still not well known (Pleijel, 2001).

The pisionids from the Pacific Ocean were studied by several authors. Westheide (1974) studied interstitial polychaetes from the Galápagos Islands, finding a new species and a new subspecies of *Pisione*. Yamanishi (1976, 1992, 1998) studied the interstitial polychaetes of Japan and described 14 new species of *Pisione*. He also compared the copulatory organs from several species, stabilizing four groups for which he discussed the phylogenetic relationships and possible evolutionary trends (Yamanishi, 1998). Australian pisionids have been studied by Hartmann-Schröder & Parker (1990); by Govaere & de Wilde (1993) and de Wilde & Govaere (1995) described those from Papua New Guinea. For the Panamanian Pacific, only three species have been previously reported: *Pisionidens indica* Aiyar & Alikunhi, 1940, *Pisione remota* Southern, 1914 (Fauchald & Reimer, 1975), and *Pisione garciavaldecasasi* San Martín, López & Camacho, 1998, the latter being described from freshwater environments from the Island of Coiba. San Martín et al. (1998) provided a key for all the species of *Pisione* described to that date.

Actually, a total of six species of pisionids are known from Panamanian Pacific: *Pisionidens indica*, *Pisione remota*, *Pisione garciavaldecasasi*, *Pisione galapagoensis* Westheide, 1974, *Pisione* cf. *papuensis* Govaere & de Wilde, 1993 and *Pisione longispinulata* sp. nov. However, the report of *Pisione remota* is dubious, since it is a species reported from the North Atlantic Ocean and the Mediterranean Sea, and other reports from other areas could also be misidentifications (San Martín, in press). Four species and two genera of Pisionidae have been included in this report.

## MATERIALS AND METHODS

The material for this study was collected during the expedition in 1998 to the Coiba National Park, carried out by staff members of the Marine Biology and Invertebrate Laboratory of the Universidad Autónoma de Madrid (Spain) within the project 'Inventario de Flora y Fauna del Parque Nacional de Coiba (Panamá)'. (For further details see Capa et al., 2001.)

Pisionids were collected from two samples of soft substrates, taken at the sample sites of Mali Rock (7°39′00″N 81°41′40″W), (10 m depth, coarse sand derived from coral erosion) and El Gambute (7°37′25″N 81°43′00″W), (intertidal, medium to coarse sand). Samples were obtained by introducing 11 capacity PVC tubes (core) into the sediment and filtered through a 0.1-mm mesh sieve; the retained material was fixed in 4% formalin in seawater and preserved in 70% ethanol. Specimens were examined using a optic microscope equipped with interferencial Nomarsky system, and drawings were made using a camera lucida drawing tube attached to it. Specimens are deposited at the Museo Nacional de Ciencias Naturales (MNCN—CSIC) de Madrid, Spain.

## RESULTS

### Genus *Pisione* Grube, 1857

### *Pisione galapagoensis* Westheide, 1974

*Pisione galapagoensis* Westheide, 1974: 206–211, figures 3–5; Hartmann-Schröder, 1992: 220–222, figures 1–6.

*Material examined*

Mali Rock, 4 specimens, MNCN 16.01/8878.

*Type locality*

Galápagos Islands.

*Distribution*

Central Atlantic (Ascensión Island) and central Eastern Pacific (Galápagos Islands and Panamá).

*Remarks*

The specimens agree widely with the original description.

*Pisione* cf. *papuensis* Govaere & de Wilde, 1993

Figure 1

*Pisione papuensis* Govaere & de Wilde, 1993: 65–70, figures 1–3.

*Material examined*

El Gambute, 2 specimens, MNCN 16.01/8879.

*Description*

One specimen 10.3 mm long, 0.32 mm wide (chaetiger 5) with 78 chaetigers; the other 10.8 mm long, 0.4 mm wide (chaetiger 5), with 60 chaetigers, posterior end lost. Prostomium small, surrounded by the buccal segment; length

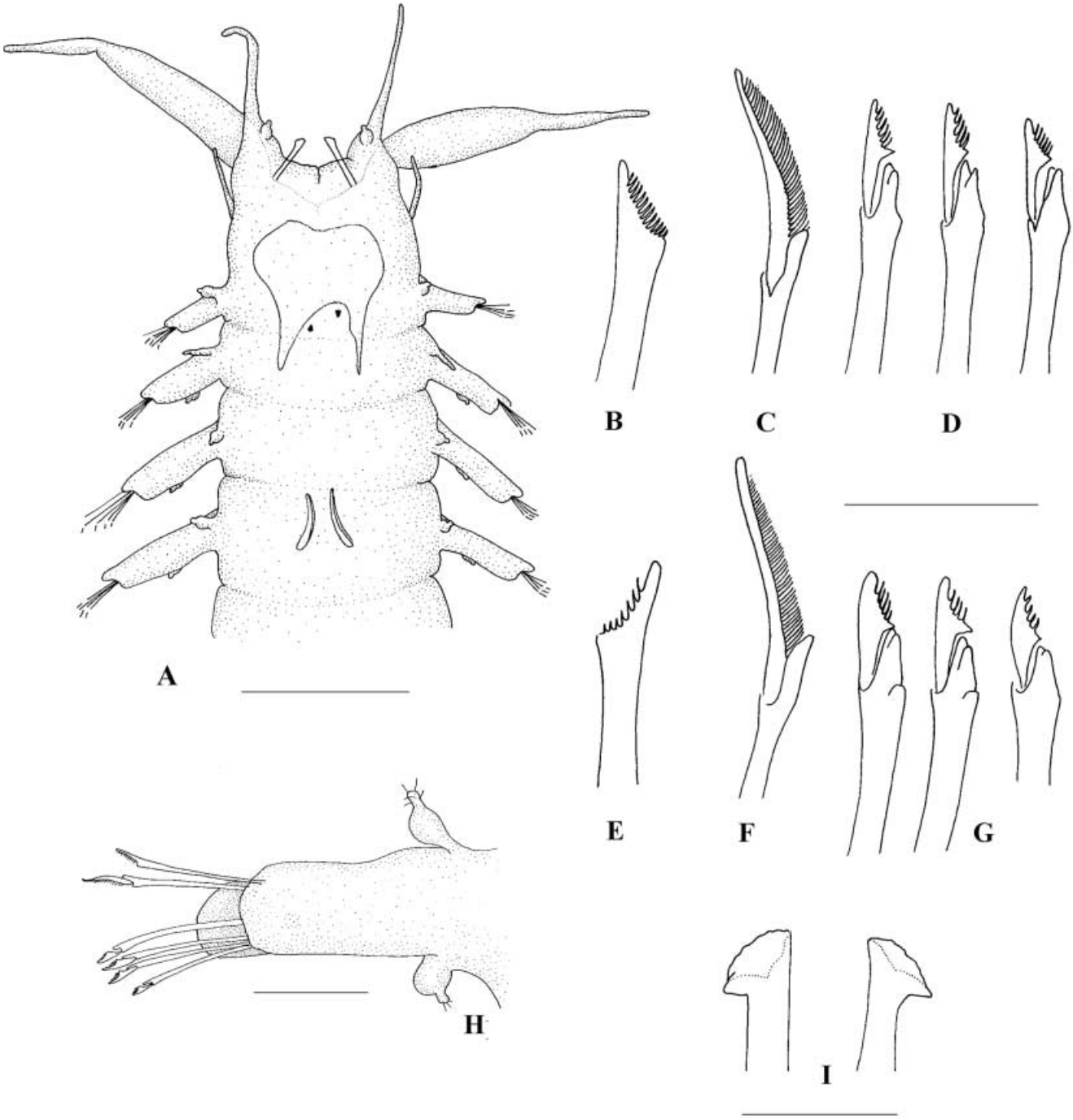


**Figure 1.** *Pisione* cf. *papuensis*. (A) Anterior end, dorsal view; (B) simple chaeta, anterior chaetiger; (C) upper compound falciger, anterior chaetiger; (D) lower compound falcigers, anterior chaetiger; (E) simple chaeta, posterior chaetiger; (F) upper compound falciger, posterior chaetiger; (G) lower compound falcigers, posterior chaetiger; (H) left parapodia, posterior view, median segment; (I) buccal aciculae. Scale bars: A, 0.18 mm; B–G, 20 μm; H, 48 μm; I, 18.5 μm.



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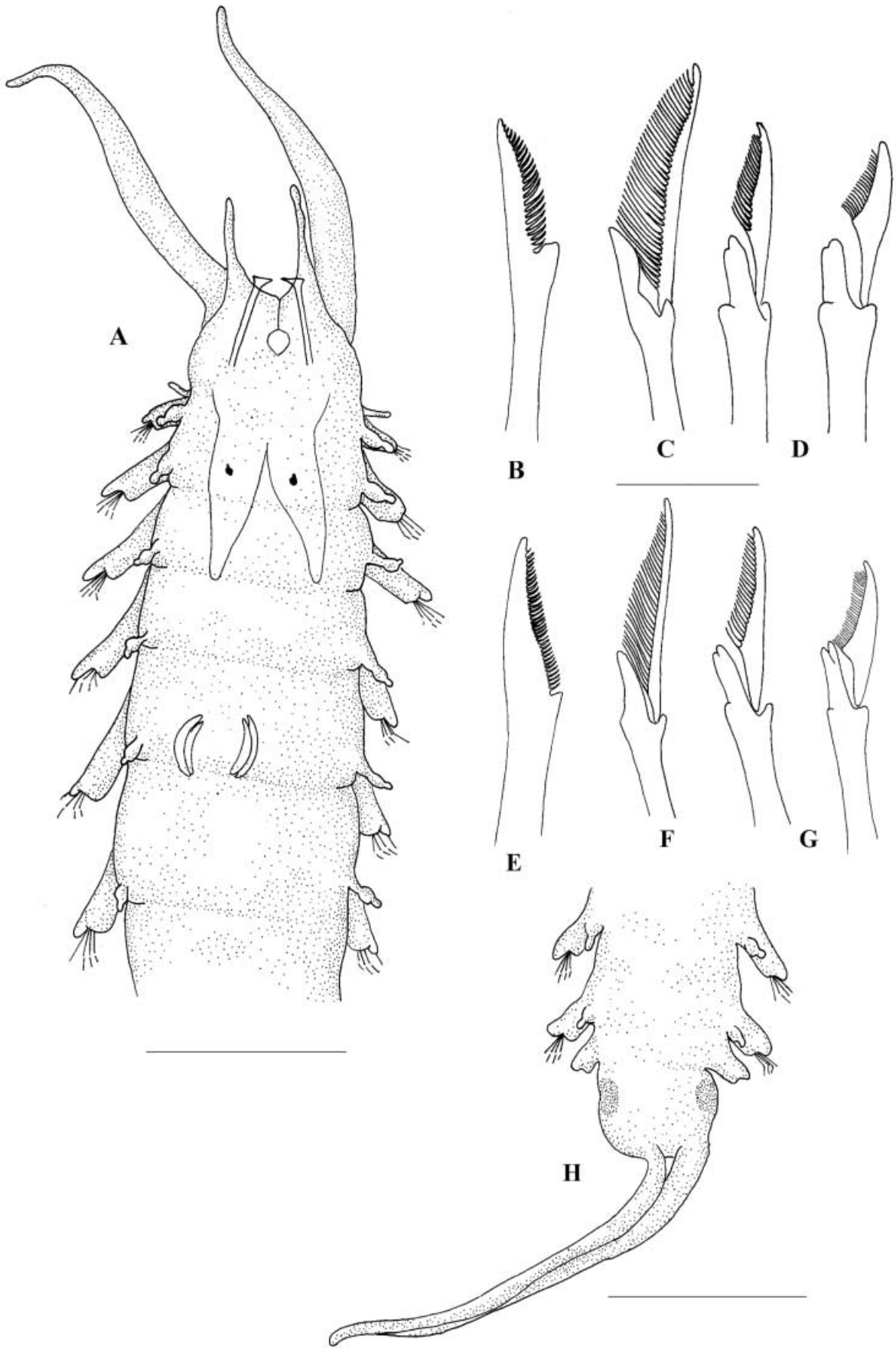


**Figure 2.** *Pisione longispinulata* sp. nov. (A) Anterior end, dorsal view; (B) simple chaeta, anterior chaetiger; (C) upper compound falciger, anterior chaetiger; (D) lower compound falcigers, anterior chaetiger; (E) simple chaeta, posterior chaetiger; (F) upper compound falciger, posterior chaetiger; (G) lower compound falcigers, posterior chaetiger; (H) pygidium, dorsal view. Scale bars: A, 0.18 mm; B–G, 10 $\mu$m; H, 0.18 mm.



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of palps exceeding length of prostomium and first two segments; dorsal cirri of buccal segment long, reaching almost half length of palps, ventral cirri short and globular (Figure 1A). Buccal aciculae stout, distal end enlarged (Figure 1I). Ventral cirri of chaetiger 1 elongated and tapering, tips reaching beyond base of palps. Dorsal cirri of chaetiger 2 approximately twice longer than remaining dorsal ones. Parapodia of chaetiger 1 shorter than those of following segments (Figure 1A). Parapodia with rounded prechaetal lobe, bearing short and globular dorsal cirri with one distally ciliated papilla; ventral cirri similar to dorsal ones (Figure 1H); two aciculae per parapodium, dorsal one short, not protuding, and ventral one with distal end slightly curved (Figure 1H). Five chaetae per parapodium, consisting of one simple upper chaeta stout and spinulated (Figure 1B) and four compound heterogomphs chaetae. Dorsal compound one with a long blade, slender (22–23 $\mu$m) and densely spinulated (Figure 1C); remaining three compound chaetae with short blades (9.6–10.4 $\mu$m long), stout and spinulated (Figure 1D). Blades of posterior chaetigers slightly longer with shorter spinulation (Figure 1E–G). Pygidium rounded; complete specimen without anal cirri. Pharynx eversible with two pairs of jaws. No specimens with copulatory organs.

*Remarks*

According to San Martín et al. (1998) (key), the above described specimens are close to *Pisione papuensis* Govaere & de Wilde, 1993 (recorded from Papua New Guinea) and *Pisione oerstedi oerstedi* Grube, 1857 (recorded from Perú, Chile, New Zealand, India, Chinese Sea), because they have compound chaeta very similar to those of *P. oerstedi oerstedi*, and the proportions of cirri similar to those of *P. papuensis*. *Pisione oerstedi oerstedi* possesses very long dorsal cirri of chaetiger 2, exceeding parapodial lobes; these cirri are shorter in our specimens, in which they are double the length of the remaining dorsal ones but they never exceed parapodial lobes. *Pisione papuensis* has blades of compound chaetae with thick spines on margin, while the spinulation is not so thick in our specimens.

Moreira et al. (2000) add a new species to those included in the key of San Martín et al. (1998), *Pisione parapari* Moreira, Quintas & Troncoso, 2000 (northwest Atlantic), which is different from the remainder due to their copulatory organs (modified ventral cirri of copulatory parapodia provided with spines along their whole length). This species possesses cirri of chaetiger 2 and chaetae of the same type as *P. papuensis*, but the simple chaetae from *P. parapari* is bifid, character absent in specimens from Coiba. Specimens from Coiba agree quite well with the description given for *P. papuensis*, although the spinulation of chaetae is more slender. This difference, as well as the lack of specimens in our collection with copulatory organs, make the identification dubious, therefore specimens are reported as *P.* cf. *papuensis*.

*Type locality*

Papua New Guinea.

*Distribution*

Pacific (Papua New Guinea and Panamá).

*Pisione longispinulata* sp. nov.
Figures 2 & 3

*Material examined*

El Gambute, 5 specimens, Holotype (male) MNCN 16.01/8876a; paratypes (one male and one female) MNCN 11601/8876b; additional material (two females).

*Description*

Holotype is a male 4.4 mm long, 0.26 mm wide (chaetiger 5), with 32 chaetigers; longest female is 5.43 mm long, 0.34 mm wide (chaetiger 5), with 37 chaetigers. Prostomium small, surrounded by buccal segment, long palps, dorsal cirri of buccal segment elongated (approximately $\frac{1}{4}$ of the palp length) and ventral cirri small and globular. One pair of eyes in posterior brain lobes, at level of chaetiger 2 (Figure 2A). Buccal aciculae strong and stout, distally expanded, obliquely truncated, with a distinct distal incision (Figure 3C). Dorsal cirri similar in shape and size, short, globular with a distal small and spherical papilla. Ventral cirri similar to dorsal ones; the ones of chaetiger 1 slightly elongated (Figure 2A). Parapodia long, with a rounded prechetal lobe and two aciculae, upper one short and dorsally curved, not protruding, and lower one longer and straight (Figure 3D). Four chaetae per parapodium, one simple dorsal chaeta stout, with dense spinulation on margin and distinct notch at base of spinulation, and three falcigerous, heterogomph compound chaetae (Figures 2C–G & 3D). Anterior chaetigers each with the upper compound chaeta with unidentate blade, 22–23 $\mu$m long, provided with long, fine, very numerous spines on margin (Figure 2C), and two lower compound chaetae with unidentate blades, 15–16 $\mu$m and 14–15 $\mu$m long respectively, also densely spinulated (Figure 2D). Length of blades and spines on margin decreasing posteriorly, (blades: 16 $\mu$m, 14.4 $\mu$m and 12 $\mu$m, on posterior parapodia) (Figure 2E–G). Pygidium rounded, with two dark glandular areas and two very long anal cirri (approximately twice longer than pygidium plus last segment) (Figure 2H). Males with a single pair of copulatory organs, holotype on chaetiger 20; paratype with 26 chaetigers on chaetiger 18 (Figure 3A,B). Copulatory organs are modified parapodia with aciculae and dorsal cirrus similar to the other ones; ventral cirri modified, spherical and enlarged, with a ventral, approximately circular area covered by minute papillae (Figure 3B) and without chaetae. Distal end of copulatory organ curved, ending in two spherical enlargements with two laminae provided with pointed papillae and a large concavity on distal end, probably a pore (Figure 3B). Four reproductive glands inside the segment with copulatory organs, and another posterior intersegmental gland (Figure 3A).

*Remarks*

*Pisione longispinulata* sp. nov. possesses buccal aciculae with long, distal prolongation distinctly incised, four chaetae per parapodium, one simple and three compound provided with very long and dense spinulation on margin of blades, and a single pair of copulatory organs (lacking chaetae) on segments 18–20. The combination of these characters segregates *P. longispinulata* sp. nov. from any other closely similar described species (Table 1).

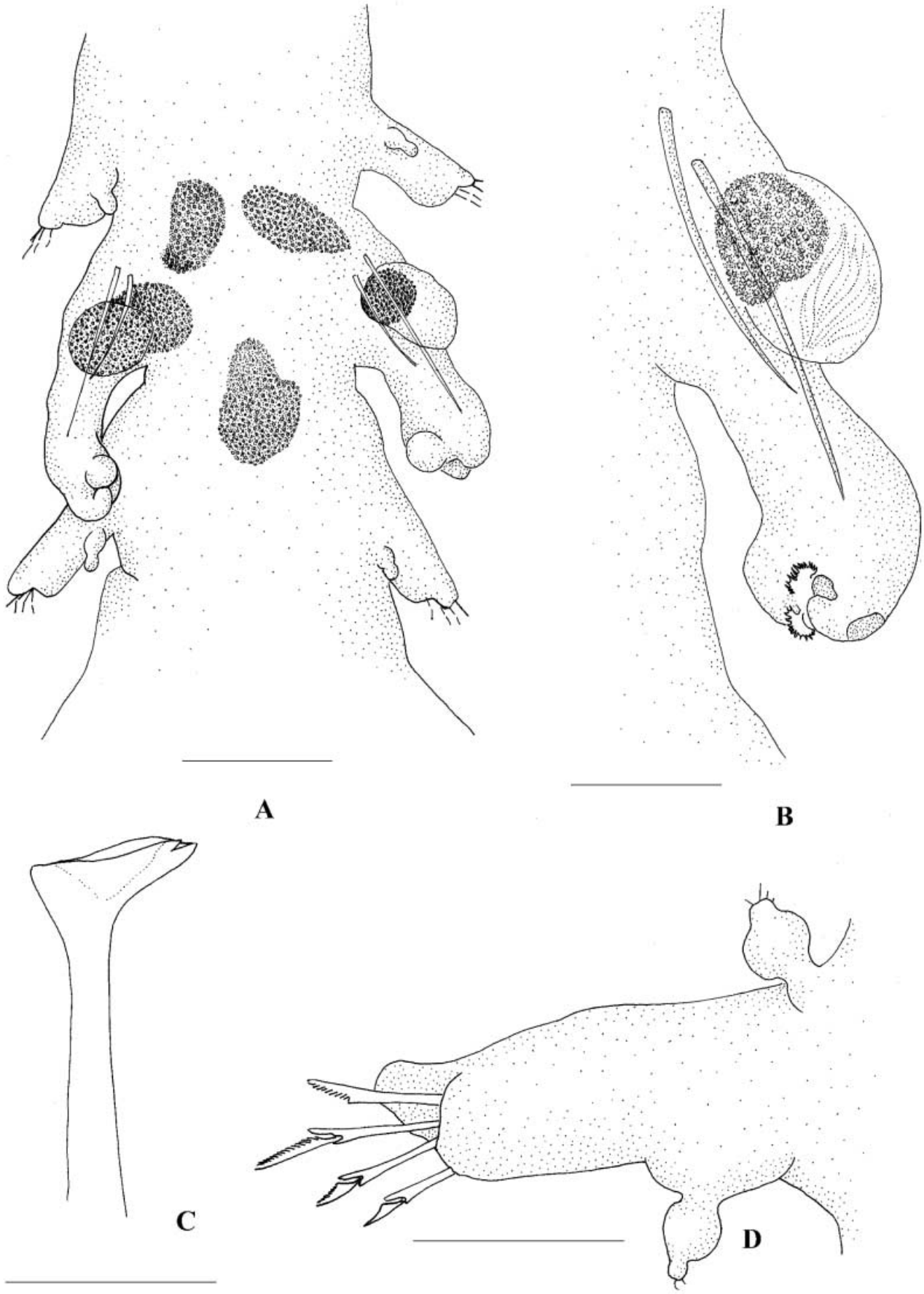


**Figure 3.** *Pisione longispinulata* sp. nov. (A) Copulatory organs, ventral view, chaetiger 18; (B) detail of right copulatory organ, ventral view; (C) buccal acicula; (D) left parapodia, posterior view, medium segment. Scale bars: A, 0.1 mm; B, 46 μm; C, 20 μm; D, 37 μm.



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**Table 1.** *Distinguishing characters of* Pisione longispinulata *sp. nov. and its more similar species.*

| | Distal enlargement of buccal aciculae | Chaetae per parapodium | Spinulation | Copulatory organs | Segment with copulatory organs | Ventral cirri of copulatory organs |
|---|---|---|---|---|---|---|
| *Pisione longispinulata* sp. nov. | Enlongated Distinctly incised | 4 | Very long | Single pair Parapodia without chaetae | 18–20 | Spherical with papillae |
| *Pisione gopalai* | Less elongated Slight terminal incision | 5 | Shorter | Single pair Parapodia without chaetae | 15–26 | Small with cuticular projections |
| *Pisione bulbifera* | Less elongated Without terminal incision | 5 | Shorter | Single pair Parapodia with chaetae | 19–26 | Elongated and bulbous in basis with many palpocils |
| *Pisione paucisetosa* | Less elongated Slight terminal incision | 4 | Shorter | Single pair Parapodia without chaetae | 50–54 | Elongated with conspicuous spinous papillae |
| *Pisione garciavaldecasasi* | Less elongated Without terminal incision | 5 | Shorter | 3–5 pairs Parapodia without chaetae | 45–79 | Rounded with pilose surface |

*Pisione gopalai* Alikunhi, 1941 (India, South Australia), *Pisione bulbifera* Yamanishi, 1998 (Japan) and *Pisione paucisetosa* Yamanishi, 1998 (Japan) also have a single pair of copulatory organs. *Pisione gopalai* possesses buccal aciculae with a distal notch, but it is shorter and smaller than that in *P. longispinulata* sp. nov., and the shape of the buccal aciculae is also different, less elongated. *Pisione gopalai* has four compound chaetae per parapodium with distinct difference on blades length, while in *P. longispinulata* sp. nov. there are only three compound chaetae with long spinulation; and finally, *P. gopalai* has more conspicuous caudal glands and the copulatory organs have much smaller ventral cirri with cuticular projections, although the distribution of the copulatory organs in both species is similar (segments 14–21 in *P. gopalai* and segments 18–20 in *P. longispinulata* sp. nov.).

*Pisione bulbifera* possesses buccal aciculae not very expanded in its distal end and four compound chaetae per parapodium; while *P. longispinulata* sp. nov. has a distally expanded buccal acicula and three compound chaetae per parapodium. The compound chaetae in *P. bulbifera* also show a dorsoventral gradation in blades length as in *P. longispinulata* sp. nov., but the spines on margin are distinctly shorter. Both species have similar distribution of copulatory organs (parapodia 19–26 in *P. bulbifera*; parapodia 18–20 in *P. longispinulata* sp. nov.), but *P. bulbifera* has different ventral cirri, elongated and bulbous in basis with many palpocils, and the chaetae of the parapodial stems remain unmodified; *P. longispinulata* sp. nov. has a spherical ventral cirrus with papillae and the chaetae are absent.

*Pisione paucisetosa* has a slight terminal incision in the buccal acciculae, and its distal enlargement is smaller than that of *P. longispinulata* sp. nov. This species possesses four chaetae as *P. longispinulata* sp. nov., but with much shorter spines on margin of blades. Copulatory organs of *P. paucisetosa* appear at the posterior segments of the body (setigers 40–54), they have hooks, and the papillae of ventral cirri are larger than those of *P. longispinulata* sp. nov. (see Alikunhi, 1941, 1951; Hartman-Schröder & Parker, 1990; Yamanishi, 1998).

More similar species, sharing the shape and structure of copulatory organs, to *P. longispinulata* sp. nov. is *Pisione garciavaldecasasi* San Martín, López & Camacho, 1998 (described from several creeks of Coiba). However, the number and distribution of copulatory organs are different and the distal enlargements in the freshwater species are less expanded. *Pisione garciavaldecasasi* has three to five pairs of non successive copulatory organs, which appear on chaetigers 45–54–60–68, 45–53–62, 45–53–61–69, 45–54–61–70–79, 53–62–73, 45–52–59–66. Distal enlargement of buccal aciculae in *P. longispinulata* sp. nov. is considerably larger than that of *P. garciavaldecasasi*, which also does not bear a deep terminal incision. Finally, *P. garciavaldecasasi* has five chaetae per parapodium (*P. longispinulata* sp. nov. has four); bi-lobed pygidium, which is not bi-lobed in *P. longispinulata* sp. nov.; and lacks caudal glands, which are present in *P. longispinulata* sp. nov. (San Martín et al., 1998).

All these species can be compared in Table 1.

*Type locality*

Coiba Island.

*Distribution*

Coiba, Panamanian Pacific.

*Etymology*

The specific name refers to the long spines present on the margin of blades of compound chaetae.

Genus *Pisionidens* Aiyar & Alikunhi, 1940

*Pisionidens indica* (Aiyar & Alikunhi, 1940)

*Pisionidens indica*: Day, 1967: 133, figure 4 I, f–j; Fauchald & Reimer, 1975: 81; Bastida-Zavala, 1991: 75–77, figure 1.

*Material examined*

El Gambute, 3 specimens, MNCN 16.01/8877.

*Type locality*

Madras, India.

*Distribution*

Tropical areas of the Indian Ocean, southern Africa, the Atlantic (Gulf of México) and the Pacific (Panama).

*Remarks*

The specimens agree widely with the descriptions of the species.

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