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A new species of *Trypanosyllis* (Polychaeta: Syllidae) from the Levantine coast of Turkey (eastern Mediterranean)

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The examination of rock and stone samples collected at 0.2–3 m in Mersin Bay (Levantine coast of Turkey) revealed the presence of 14 specimens belonging to a new species of Syllidae (Polychaeta), *Trypanosyllis sanmartini*. The species is mainly characterized by having dark reddish-brown dorsal cirri, pale yellowish body colour, weakly bidentate falcigers, long and filiform dorsal cirri, long proventricle and pharynx, and a trepan with ten large teeth (without a pharyngeal mid-dorsal tooth). The posterior-most segments of the holotype and five paratypes had a cluster of stolons. The morphology and reproductive features of the species are explained and discussed.

INTRODUCTION

The polychaetes inhabiting the Levantine coast of Turkey have been little studied to date. Marenzeller (1893), Ben-Eliahu (1989, 1991), Ben-Eliahu & Fiege (1996) [on the coast of Meis, Kastellorizon], Ergen & Çinar (1997), Çinar & Ergen (1999), Ergen et al. (1998), Emig et al. (2003) and Ergev et al. (2003) reported only a total of 171 polychaete species from the area, whereas more than 500 species were known from the Aegean coast of Turkey and 456 species from Cyprus (Çinar, 2005).

A checklist concerning syllid fauna in the Levantine Sea was published by Çinar et al. (2003) and Çinar & Ergen (2003). A total of 95 syllid species are known from the area, of which three species belong to the genus *Trypanosyllis*: *Trypanosyllis aeolis*, *T. coeliaca* Claparède, 1868 and *T. zebra*. Among them, *T. aeolis* and *T. zebra* were also reported from the Levantine coast of Turkey (Ergen & Çinar, 1997).

To determine the real biodiversity of the Levantine coast of Turkey and impacts of alien organisms on the prevailing ecosystem, a project funded by TUBITAK (The Scientific & Technological Research Council of Turkey) was undertaken in September and October 2005. Plenty of benthic material was collected from different biotopes and depths. Among them, some *Trypanosyllis* specimens, mainly characterized by dark reddish-brown dorsal cirri, were found. The examination of these specimens in comparison with the previously described species of the genus revealed that these specimens in fact belonged to a new species. This paper describes this new species and outlines its ecological and reproductive features.

MATERIALS AND METHODS

The specimens were collected on rock and stone samples by snorkelling at one station (K15) in Mersin Bay (Levantine coast of Turkey) on 18 September 2005 (Figure 1). Different pieces of calcaerous rocks particularly inhabited by calcareous algae, tunicates, and encrusting sponges and bryozoans were randomly broken off from rock blocks by using a hammer. In the field, the material was placed in jars containing 4% formaldehyde solution in seawater. In the laboratory, samples were washed with tap water and sorted according to major systematic groups under a stereomicroscope. The sorted animals were then preserved in 70% ethanol. Specimens of the new species were identified and counted under stereo- and compound microscopes.

Specimens of *Trypanosyllis aeolis*, *T. zebra* and *T. coeliaca*, which were previously collected from the coasts of Levantine and Aegean Seas, were examined and compared with specimens of the new species to find differences between the species.

Drawings were made with the aid of a camera-lucida. The total body length and the width at chaetiger 10 (excluding parapodia and chaetae) were measured with an ocular micrometer.

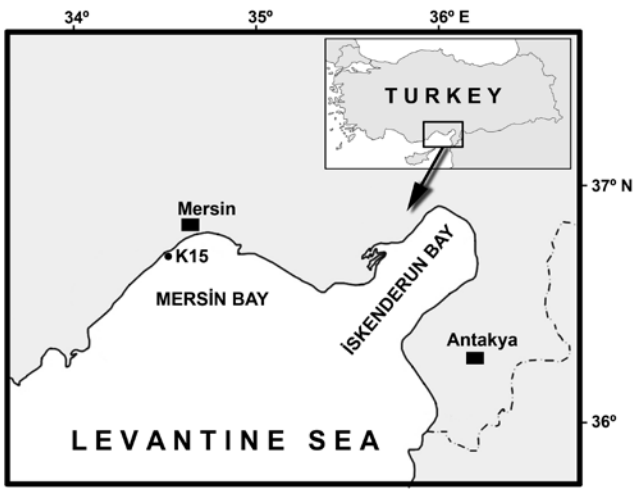

Figure 1. Map of the investigated area showing the Type station.

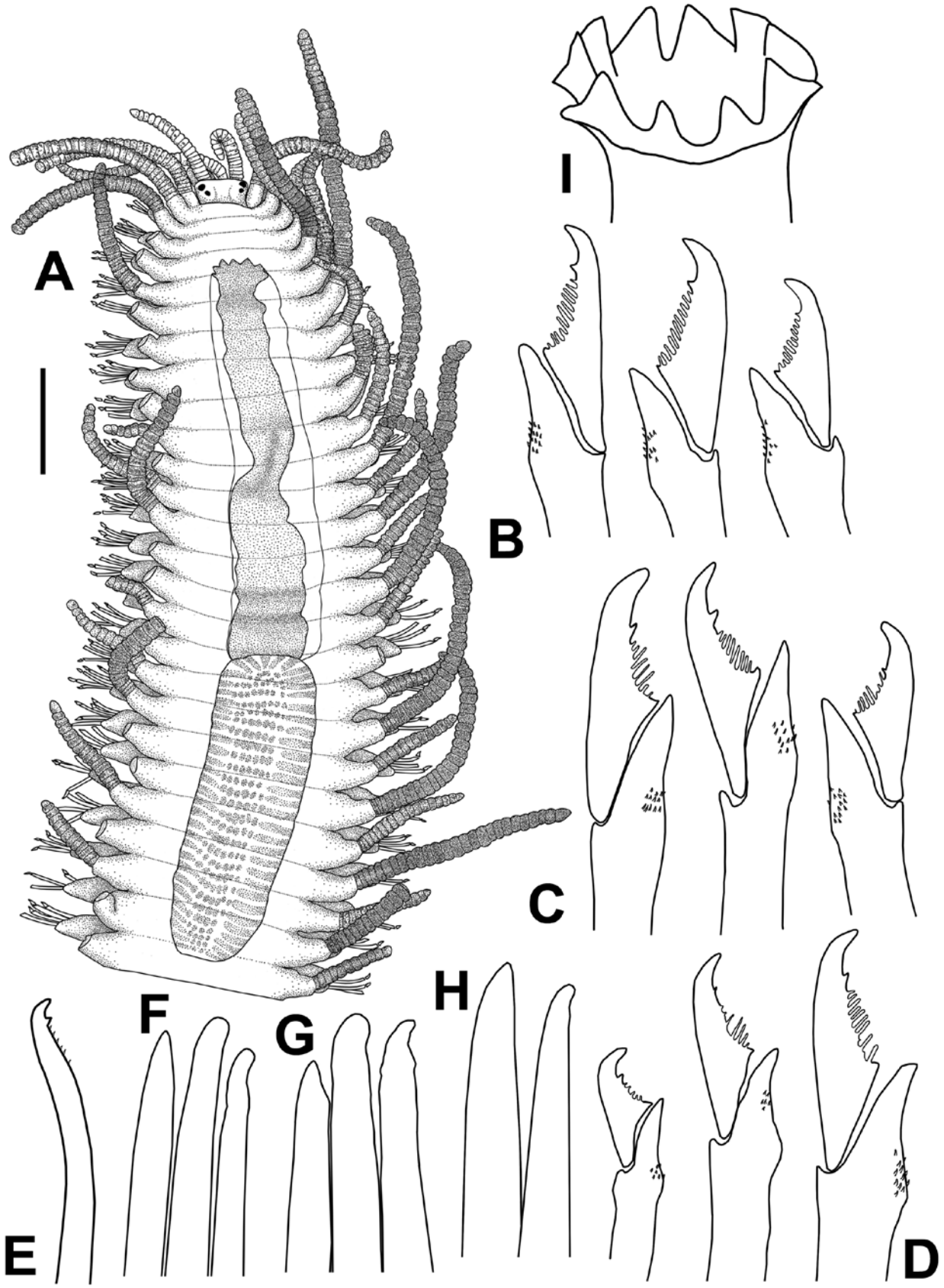

Figure 2. *Trypanosyllis sanmartini* sp. nov. (A) Anterior end, dorsal view, holotype ESFM–POL/05–65; (B) anterior falcigers, holotype; (C) middle falcigers, holotype; (D) posterior falcigers, holotype; (E) ventral simple chaeta, holotype; (F) aciculae on anterior parapodia, holotype; (G) aciculae on middle parapodia, holotype; (H) aciculae on posterior parapodia, holotype; (I) trepan, paratype ESFM–POL/05–66. Scale bar: A, 400 μm; B–D, F–G, 18.2 μm; E, 14.9 μm; I, 72.6 μm.

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Photographs were taken by a digital camera (Olympus, Camedia, C-7070) attached to stero- and compound microscopes.

The type material was deposited at the Museum of Faculty of Fisheries (ESFM), Ege University, Turkey.

SYSTEMATICS

SYLLIDAE Grube, 1850
Trypanosyllis Claparède, 1864
Trypanosyllis sanmartini sp. nov.
(Figures 2–4)

Material examined

Holotype: ESFM–POL/05–65, 18 September 2005, Mersin Bay, Station K15, 36°42'15"N 34°28'00"E, 0.2–3 m deep, on rocks [salinity: 37.8 psu, temperature: 29.8°C, dissolved oxygen concentration: 6.55 mg/l].

Paratypes: ESFM–POL/05–66, 13 specimens, 18 September 2005, Mersin Bay, Station K15, 36°42'15"N 34°28'00"E, 0.2–3 m deep, on rocks.

Description

Holotype complete, with one fully and five partly developed stolons (Figures 2A, 3A–C & 4A). Stock 16.5 mm long, 1.4 mm wide, with 76 chaetigers. Body dorso-ventrally flattened, without colour markings, pale yellow, tapered posteriorly. Dorsum of each anterior segment with two transverse rows of papillae; located on anterior and middle parts of segments. Tentacular and dorsal cirri, proventricle and pharynx densely pigmented (Figures 2A & 4A,B). Antennae weakly pigmented; pale reddish-brown markings on some articles. Tentacular cirri partly pigmented; dark reddish-brown in colour. Articles near base and tip of cirri relatively weakly pigmented, but articles in middle of cirri relatively densely pigmented. Dorsal cirri densely pigmented; dark reddish-brown in colour. Dorsal cirri in middle and posterior regions more densely pigmented than anterior ones (Figure 4A). Short dorsal cirri in anterior region weakly pigmented. Proventricle dark brownish, pharynx reddish (Figure 4A). Prostomium oval, wider than long, with a slight cleft on posterior margin; with two pairs of dark reddish eyes in open trapezoidal arrangement; anterior pair larger than posterior one (Figure 2A). Antennae emerging from anterior margin of prostomium along one line, in front of eyes, with relatively short cirrophores (Figure 2A). Median antenna longer than lateral ones, with 28 articles. Lateral antennae with 20 articles. A pair of weakly ciliated nuchal organ present on dorsum of posterio-lateral part of prostomium. Palps shorter than prostomial lobe, narrow at bases, well separated, originating from antero-ventral margin, bent ventrally on specimen figured. Tentacular segment relatively short dorsally, with two pairs of tentacular cirri; cirrophores well developed, dorsal pair of cirri with 30 articles, ventral pair with 20 articles. Dorsal cirri originating on long cirrophores, alternately long and short; longest ones as long as or slightly longer than body width; with 18–38 articles on anterior parapodia, 12–25 articles on middle parapodia, 12–26 articles on posterior parapodia (Figures 2A & 4A,B). Cirrophores with papillae but without ciliae. Ventral cirri digitiform, shorter than parapodial lobes, relatively thick on anterior parapodia, thin on posterior parapodia. Anterior parapodia with falcigers only, numbering ten; two dorsalmost thicker than others; bidentate, distal tooth coarse, hook shaped; proximal tooth, thin, small, distally directed, minute on inferior falcigers; gap between distal and proximal tooth wide; proximal part of falcigers with long spines on cutting edges; cutting edge of blades crescent-shaped; distal and proximal spines short, spines in between coarse, longer than proximal tooth; blades 27.5–40 μm long; shaft of falcigers with thin spines on tip (Figures 2B & 4E). Falcigers on middle parapodia, numbering seven, morphologically similar to anterior ones but slightly thicker and longer; blades 30–42.5 μm long (Figure 2C). Falcigers on posterior parapodia, numbering seven; blades 25–40 μm long (Figure 2D). Solitary dorsal simple chaetae not seen. Solitary ventral simple chaetae not seen on holotype, but present on last ten chaetigers on a paratype without stolon; short, curved, with subdistal spines, strongly bidentate; teeth about same size (Figure 2E). Parapodia in anterior and middle region of body with three aciculae; those of midbody morphologically similar to anterior ones, but coarser; all slightly protruding from parapodial lobes; one acuminate, with more or less pointed tip; others rounded distally, slightly bending distally (Figures 2F,G). Posterior parapodia with two aciculae; thicker than anterior and middle ones; thickest one acuminate with somewhat pointed tip; thinnest one with rounded tip, slightly bent distally (Figure 2H). Pharynx slightly contracted, reddish, 1.68 mm long, 0.33 mm wide, occupying ~13 segments; trepan with ten large, reddish, triangular teeth; subterminal, mid-dorsal tooth absent; anterior margin of pharynx surrounded by a crown of ten soft, rounded papillae (Figures 2I & 4D). Proventricle 1.35 mm long, 0.45 mm wide, brownish, occupying nine segments, with 27 muscle cell rows (Figure 2A). All specimens without stolons incomplete, without posterior end. Thus, pygidium on non-reproductive specimens, not observed.

Stolon

Sexual reproduction by stolons formed by posterior budding; stolons beginning on chaetiger 76 in the holotype (Figure 4A). Among paratypes, five specimens had stolons (Figure 4C). Stolons contain sperm. Holotype with one fully and five partly developed stolons (Figure 3). Fully developed stolon complete, 0.93 mm long, 0.30 mm wide, with 18 chaetigers, directly attached to the stock. Body pale yellowish, dorsal cirri partly pigmented; pale reddish-brown. Prostomium deeply bifid, median insertion being occupied by antero-median part of old segment (Figure 3). Two pairs of eyes on lateral sides of prostomium, dark reddish; posterior pair 2.6 times larger than anterior ones. Antero-lateral side of each cephalic lobe with a fairly well-developed digitiform structure, which may be lateral antennae. Palps absent. On each postero-lateral part of prostomium, one parapodium together with appendages present. Dorsal cirri with narrow articles at base large articles at tip; with 5–6 articles on anterior parapodia, 4–5 articles on median parapodia, 3–4 articles on posterior parapodia. Parapodia somewhat triangular. Ventral cirri smaller than parapodia lobes, digitiform. Parapodia only with falcigers; bidentate; blades 5–10 μm long. Anal cirri on pygidium on fully

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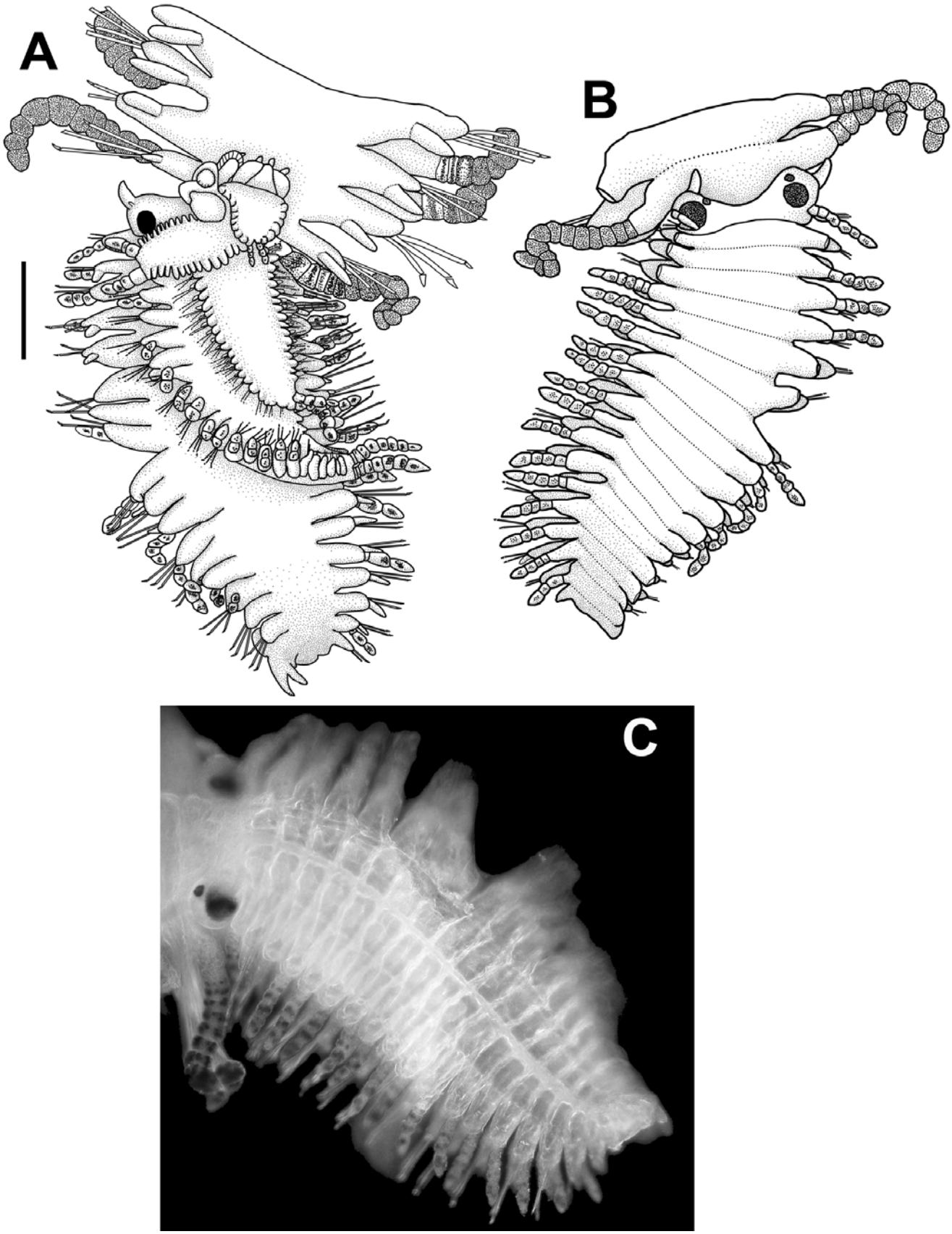

Figure 3. *Trypanosyllis sanmartini* sp. nov. holotype ESFM–POL/05–65. (A) Ventral view of posterior end of stock on which stolons were formed; (B) dorsal view of stolon; (C) dorsal view of stolon. Scale bar: A–C, 200 μm.

developed stolon on holotype missing. Pygidium on fully developed stolons on paratypes with anal cirri; with eight articles, no stylus.

Remarks

Imajima & Hartman (1964) distinguished two major groups representing three subgenera of *Trypanosyllis* based on the

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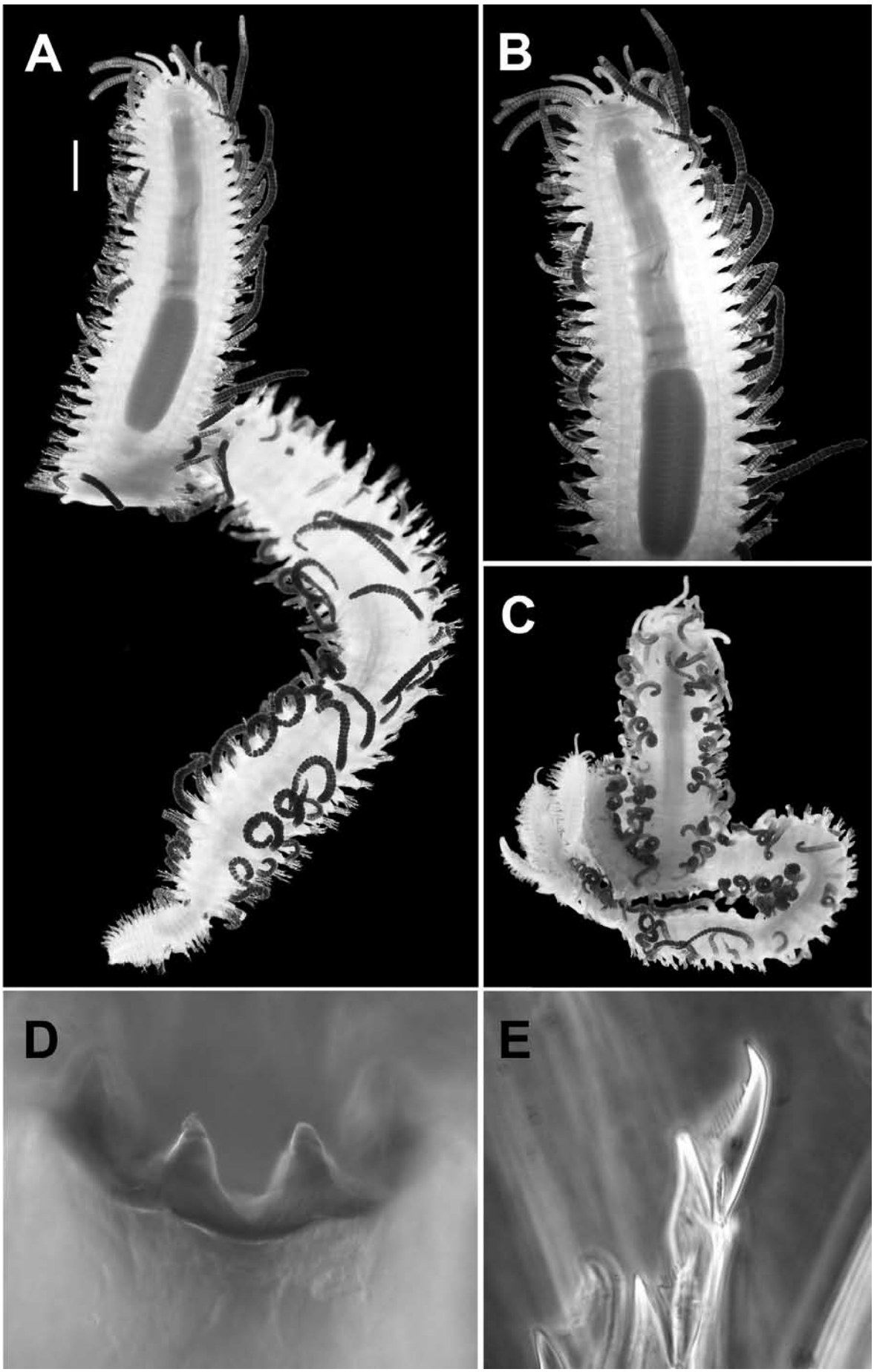

Figure 4. *Trypanosyllis sanmartini* sp. nov. (A) Dorsal view of body, holotype ESFM–POL/05–65; (B) dorsal view of anterior end, holotype; (C) dorsal view of body with stolons, paratype ESFM–POL/05–65; (D) trepan, paratype; (E) falciger on anterior parapodia, holotype. Scale bar: A, 450 μm; B, 340 μm; C, 586 μm; D, 13 μm; E, 12 μm.

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Table 1. *Main morphological characters allowing to distinguish* Trypanosyllis sanmartini *sp. nov. from the most similar species of* Trypanosyllis.

Species	Reference	T	N	E	B	S	P
Trypanosyllis zebra (Grube, 1860)	Grube (1860)	present	40	absent	strongly bidentate	short	12
T. aeolis Langerhans (1879)	Langerhans (1879)	present	33	present	strongly bidentate	short	7
T. gigantea (McIntosh, 1885)	McIntosh (1885)	present	n.d.	absent	strongly bidentate	short	n.d.
T. taeniformis (Haswell, 1886)	Haswell (1886)	present	46	absent	strongly bidentate	short	10
T. vittigera Ehlers, 1887	Ehlers (1887)	present	n.d.	absent	strongly bidentate	short	4
T. intermedia Moore, 1909	Moore (1909)	present	70	absent	weakly bidentate	short	11
T. prampramensis Augener, 1918	Augener (1918)	present	20	absent	unidentate	short	8
T. parazebra Hartmann-Schröder, 1965	Hartmann-Schröder (1965)	present	10	absent	weakly bidentate	n.d.	4
T. ingens Johnston, 1902	Hartman (1968)	absent	36	present	unidentate	absent	n.d.
T. sanmartini sp. nov.	This study	absent	38	absent	weakly bidentate	long	9

T, transversal bars on dorsum of anterior segments; N, maximum number of articles on dorsal cirri; E, presence of expanded articles on dorsal cirri; B, blade of falcigers; S, spines on cutting edge of blades of falcigers; P, number of segments with proventricle; n.d., no data.

presence of a pharyngeal mid-dorsal tooth and the shape of chaetae. The first major group includes the subgenera *Trypanosyllis* (*Trypanosyllis*), which is characterized by the presence of a pharyngeal trepan with a mid-dorsal tooth. Species of the other major group possess a trepan and lack a mid-dorsal tooth, and are represented by two subgenera: *Trypanosyllis* (*Trypanedenta*) with compound chaetae; and *Trypanosyllis* (*Trypanobia*) with simple chaeta only. However, both simple chaetae and falcigers were found on the same specimen of *Trypanosyllis inglei* Perkins, 1980 (type locality: Florida) and *Trypanosyllis* sp. reported from Cuba by San Martín (1991). However, the separation of subgenera needs to be clarified on the basis of a phylogenetic analysis using a combined set of characters. The presence of a pharyngeal mid-dorsal tooth is certainly a generic character among syllids and, more reliably, *Trypanosyllis sensu lato* may become a complex of genera. In addition, it must be taken into account that juveniles of *Trypanosyllis aeolis* have this tooth, which is absent in mature specimens (San Martín, 2003).

Accepting the current subgenera, *Trypanosyllis sanmartini* should be included among *Trypanosyllis* (*Trypanedenta*), as proposed by Imajima & Hartman (1964), lacking a mid-dorsal tooth and having falcigers. It is mainly characterized by having a mid-dorsal pharyngeal tooth, weakly bidentate falcigers and dark reddish-brown dorsal cirri, as well as by lacking a colour pattern on dorsum of body. Pigmentation on dorsal cirri was previously noted for *Trypanosyllis zebra*, *T. aeolis*, *T. taeniformis*, *T. vittigera*, *T. prampramensis*, *T. parazebra*, *T. intermedia*, *T. ingens* and *T. gigantea*. A comparison of their morphological characters with those of *T. sanmartini* is given in Table 1. All these species, except *T. ingens*, have reddish-brown tranversal bars or a reddish-brown pigmentation (*T. intermedia*) on dorsum of anterior chaetigers. Pigmentation, especially colour transversal bars on dorsum of segments, which are not faded in alcohol, is a diagnostic character for Syllidae (San Martín, 2003; Çınar & Gambi, 2005). *Trypanosyllis ingens* is similar to *T. sanmartini* in having dark reddish-brown pigmentation only on dorsal cirri, but differs in the following characters: (1) compound chaetae (unidentate in *T. ingens* vs bidentate in *T. sanmartini*); (2) dorsal cirri [long, with expanded articles (maximum 36 articles) in *T. ingens*, vs long (maximum 38 articles), tapered in *T. sanmartini*]; (3) spines on cutting edge of falcigers (absent in *T. ingens* vs long in *T. sanmartini*); (4) prostomium (posterior part of prostomium with two distinct lobes curving posteriorly in *T. ingens* vs lobes absent in *T. sanmartini*); and (5) eyes (large, overlapping in *T. ingens* vs small, distinct in *T. sanmartini*). *Trypanosyllis aeolis* has a similar chaetal morphology but differs from *T. sanmartini* in having relatively short dorsal cirri [33 articles in the original description by Langerhans (1879)], reddish transverse bars on dorsum of anterior chaetigers and pinkish dorsal cirri, strongly bidentate falcigers, short spines on cutting edge of falcigers, and short pharynx and proventricle (occupying four segments). The morphology of articles on dorsal cirri and the length of anterior dorsal cirri relative to the body width represent other differences between *T. aeolis* and *T. sanmartini*; articles near the middle and tips of some dorsal cirri are expanded in *T. aeolis* (no expanded articles in *T. sanmartini*), anterior dorsal cirri smaller than the body width in *T. aeolis* (longer in *T. sanmartini*). Besides the controversy linked to the correct definition of subgenera (or genera) among *Trypanosyllis* (which solution is far from the objectives of the present paper), the exclusive morphological traits of the specimens found within the frame of the project TUBITAK clearly supports the current description as a new species.

In addition, the few known data on the reproductive traits within the genus also contributes to the distinction of the new species. Some species of *Trypanosyllis* are known to show multiple collateral budding, with either single stolons each one being formed ventrally at a large number of successive posterior segments or with a large number of stolons being produced simultaneously in bundles in a very limited proliferating area near the posterior end of the stock (see Franke, 1999). The holotype and some paratypes of *Trypanosyllis sanmartini* had a bundle of sexual stolons attached to the posterior part of the stock (Figures 3A–C & 4A,C). The stolons are male, containing sperm, and lack swimming chaetae. Although we did not find female stolons, it may be that they had swimming chaetae, as it occurs in *T. gemmipara* Johnston, 1901. Conversely, in *T. ingens* and *T. misakiensis* Izuka, 1912, only female stolons lacked swimming chaetae (Potts, 1911).

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Etymology

The new species is dedicated to Professor Dr Guillermo San Martín, from Universidad Autónoma de Madrid (Spain), who made excellent contributions to the taxonomy of Syllidae.

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