

# DESCRIPTIONS OF *PSEUDOSTEINERIA HORRIDA* (STEINER, 1916) AND *P. VENTROPAPILLATA* SP. NOV. FROM THE WHITE SEA WITH A REVIEW OF THE GENUS *PSEUDOSTEINERIA* WIESER, 1956 (NEMATODA: MONHYSTERIDA: XYALIDAE)

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**Abstract.**—*Pseudosteineria ventropapillata* sp. nov. (White Sea) belongs to the species group with the amphids situated just anteriorly to the long cervical setae. The new species differs strongly from other species of this group in having a number of preanal midventral supplementary papillae of various sizes. *Pseudosteineria horrida* (Steiner, 1916) is redescribed from specimens from the White Sea. Its geographical area includes the coast of Greenland, Barents Sea and White Sea. An amended generic diagnosis of *Pseudosteineria* is presented. This genus now consists of eleven valid species. A key for their identification is given.



**Key words.**— Monhysterida, Xyalidae, *Pseudosteineria*, White Sea, taxonomy, descriptions.

The genus *Pseudosteineria* Wieser, 1956 (Monhysterida, Xyalidae) is a worldwide marine nematode taxon including ten hitherto known valid species. *Pseudosteineria* species possess exceedingly long subcephalic (or cervical) setae arranged in eight distinct groups. This striking feature readily differentiates the genus *Pseudosteineria* from other xyalid genera. However, both *Pseudosteineria* and *Steineria* do not have other derived characters and hence show rather superficial similarity. *Steineria* possess a ventral gland and spicules more like those of sphaerolaimid genera while *Pseudosteineria* is evidently close to *Daptonema* and related genera.

Two *Pseudosteineria* species were recently found in the White Sea, one of them was previously reported from some Arctic localities and the other is new to science. Redescription and description of these species, together with an amended generic diagnosis, annotated species list and a key for species identification of *Pseudosteineria* are presented.

## *Pseudosteineria* Wieser, 1956

*Pseudosteineria* Wieser 1956: 88; Fadeeva 1986: 3–4.

Xyalidae. Body spindle-shaped. Cuticle distinctly annulated. Lateral differentiation may be present as lateral fields. 12 setae in one cephalic crown (6 anterior cephalic setae + 4 posterior cephalic setae + 2 additional lateral setae). Subcephalic setae very long and arranged in eight groups at some distance posterior to the cephalic setae, about on the level of amphids. In each group several subcephalic setae arranged in a short longitudinal row where the setae gradu-

ally increase in length posteriorly. Other somatic setae usually short, scarce, and irregularly distributed along the body. Amphid rounded, just before, just behind or at the level of subcephalic setae. Buccal cavity (esophastom) conoid. Copulatory apparatus variable in shape. Tail consists of proximal conical and slender cylindrical distal parts; tail tip slightly inflated and provided with long terminal setae.

**Type species.** *Pseudosteineria antefrens* (Wieser 1956). All hitherto known species are marine.

## ANNOTATED LIST OF THE *PSEUDOSTEINERIA* SPECIES

There are now ten valid species *Pseudosteineria* (Gerlach et Riemann 1973; Fadeeva 1986; Tchesunov 1990):

*P. antefrens* (Wieser, 1956)

Wieser 1956: 90–91, fig. 242a–g [*Theristus* (*Pseudosteineria*) *antefrens*], Chilean coast.

*P. anticipans* (Wieser, 1956)

Wieser 1956: 90, fig. 241a–d [*Theristus* (*Pseudosteineria*) *anticipans*], Chilean coast. Redescriptions: Wieser 1959, Pacific coast of North America (Puget-Sound); Pastor de Ward 1985, Santa-Cruz coast (Argentina) — these specimens differ significantly from the original diagnosis, hence their conspecificity may be doubtful.

*P. coronata* (Gerlach, 1955)

Gerlach 1955: 293–294, Abb. 26a–e (*Theristus coronatus*), Pacific coast of Central America (Salvador); Wieser 1959: 88 [*Theristus* (*Pseudosteineria*) *metacoronatus*] — secondary homonym *Theristus coronatus* (Stekhoven, 1950), syn. *Metadesmolaimus coronatus* Stekhoven, 1950).

*P. horrida* (Steiner, 1916)

Steiner 1916: 643–645, fig. 40a–c (*Monhystera horrida*), Barents Sea. Ditlevsen 1928: 239–241, figs 49–51 (*Monhystera horrida*), Greenland. Galtsova 1976: 217, fig. 29 [*Theristus (Pseudosteineria) horridus*], White Sea. Tchesunov 1990b: 15–17, figs 2, 5 (part.), table, White Sea, ultrastructural details.

*P. inaequispiculata* (Platonova, 1971)

Platonova 1971: 103, fig. 24 (*Theristus inaequispiculatus*), Possjet Bay of the Japan Sea; Gerlach and Riemann 1973: 174 (*Pseudosteineria i.*); Fadeeva 1986: 6–9, figs 2–4, Kijevka Bight of the Japan Sea.

*P. paramirabilis* (Gerlach, 1955)

Gerlach 1955: 294–296, Abb. 27a–e (*Steineria p.*), Pacific coast of Central America (Salvador); Tchesunov 1990a: 18 (*Pseudosteineria p.*).

*P. pavo* (Gerlach, 1957)

Gerlach 1957: 456–458, Abb. 16a–c (*Steineria pavo*), Brazil coast; Fadeeva 1986: 4 (*Pseudosteineria p.*).

*P. pulchra* (Mawson, 1957)

Mawson 1957: 103–105, figs 13–16 (*Steineria p.*), Australian coast; Fadeeva 1986: 5 (*Pseudosteineria p.*).

*P. sagittispiculata* Fadeeva, 1986

Fadeeva 1986: 5–6, fig. 1, Japan Sea.

*P. scopae* (Gerlach, 1956)

Gerlach 1956: 217, Taf. 29, Fig. i–l (*Steineria scopae*), Brazil coast; Pastor de Ward 1985: 128, Fig. 13a–i, Santa Cruz coast, Argentina.

*P. ventropapillata* Tchesunov sp. nov.

## KEY FOR IDENTIFICATION OF SPECIES OF

*PSEUDOSTEINERIA*

- 1 (10) Amphid anterior to or at the anterior level of eight groups of long subcephalic setae
- 2 (3) Male possess a number of preanal midventral supplementary papillae . . . . . *P. ventropapillata*
- 3 (2) No preanal papillae in males
- 4 (5) Two small hillocks (papillae?) on ventral side of the tail in males . . . . . *P. antefrens*
- 5 (4) Males do not possess either preanal or postanal papillae or hillocks
- 6 (7) Spicules broad, with prominent knobs; gubernaculum complicated, with a small dorsal apophysis . . . . . *P. anticipans*
- 7 (6) Spicules slender, with weakly developed knobs; dorsal apophysis of the gubernaculum lacking or weakly developed
- 8 (9) Body length 1480 µm (male); cephalic setae up to 12–13 µm; spicules 56 µm long . . . . . *P. pavo*
- 9 (8) Body length 1060–1370 µm; cephalic setae up to 14–16 µm; spicules 32–39 µm long (arch) . . . . . *P. sagittispiculata*
- 10 (1) Amphid posterior to or at the posterior level of eight groups of subcephalic setae. If amphids not distinctly visible the subcephalic setae situated very close to the cephalic setae

- 11 (12) Somatic setae located from the nerve ring to the anus very long, up to three body diameters . . . . . *P. paramirabilis*
- 12 (11) Somatic setae small, usually shorter than half body diameter
- 13 (14) Amphids not visible, probably because of indistinct cuticular margin . . . . . *P. coronata*
- 14 (13) Amphids clearly discernible, round or oval
- 15 (16) Spicules solid, hard, unequal in length; gubernaculum devoid of an apophysis . . . . . *P. inaequispiculata*
- 16 (15) Spicules slender and equal; gubernaculum with a more or less clear dorsal apophysis
- 17 (18) Gubernaculum with a prominent dorsocaudal apophysis . . . . . *P. scopae*
- 18 (17) Gubernaculum apophysis dorsal and relatively short
- 19 (20) Three midventral papilloid supplementary organs anterior to the anus in males . . . . . *P. pulchra*
- 20 (19) No preanal supplementary papillae in males . . . . . *P. horrida*

*Pseudosteineria horrida* (Steiner, 1916)

(Fig. 1)

**Material.** Two males and two females, glycerol slides.

**Locality.** White Sea, Kandalaksha Bay, Karela Shore, southern coast of Kindo Peninsula, lower tidal zone, poorly sorted sand. July, 1983.

**Description.** Body elongated spindle-shaped. Males: L = 1409–1558 µm; a = 20.8–25.3; b = 4.62–4.90; c = 8.28. Females: L = 1422–1685 µm; a = 20.8–25.2; b = 4.55–4.76; c = 7.63–7.82; V = 64.2–66.5%. In males, body diameter at the level of cephalic setae 16–16.5 µm, nerve ring 41 µm, cardia 49–50 µm, midbody 61.5–70.0 µm, anus 41–42 µm. The same measurements in females respectively 17.5–18.5 µm, 46.5 µm, 60–80 µm, 67.0–68.5 µm, 38.5–41.0 µm.

Cuticle distinctly annulated. Discernible lateral fields extended from the level of posterior end of the pharynx to the anterior portion of the tail.

Mouth opening surrounded by six lips. Labial region set off. Labial sensilla as tiny setae. Anterior and posterior cephalic setae consisted of three segments progressively diminishing in length and thickness from basal to distal segments. The longer anterior cephalic setae 10 µm in males and 7.5–10.5 µm in females.

Prominent subcephalic setae arranged in eight short longitudinal rows just behind the cephalic setae. Each row contains 3–4 setae increasing in length gradually from the anterior to the posterior setae. The length of subcephalic setae in a male from the front backwards are 25 µm, 36 µm and 58 µm, in females respectively 24–26 µm, 38–41 µm, 58–67 µm. Short somatic setae scattered along the body being more numerous in the pharyngeal area and scarcer posterior to the nerve ring.

Amphids situated behind the crown of subcephalic setae. Amphidial fovea encircled with a thin but distinct continuous cuticular margin. Amphids in males transversely oval and noticeably bigger than those in females,

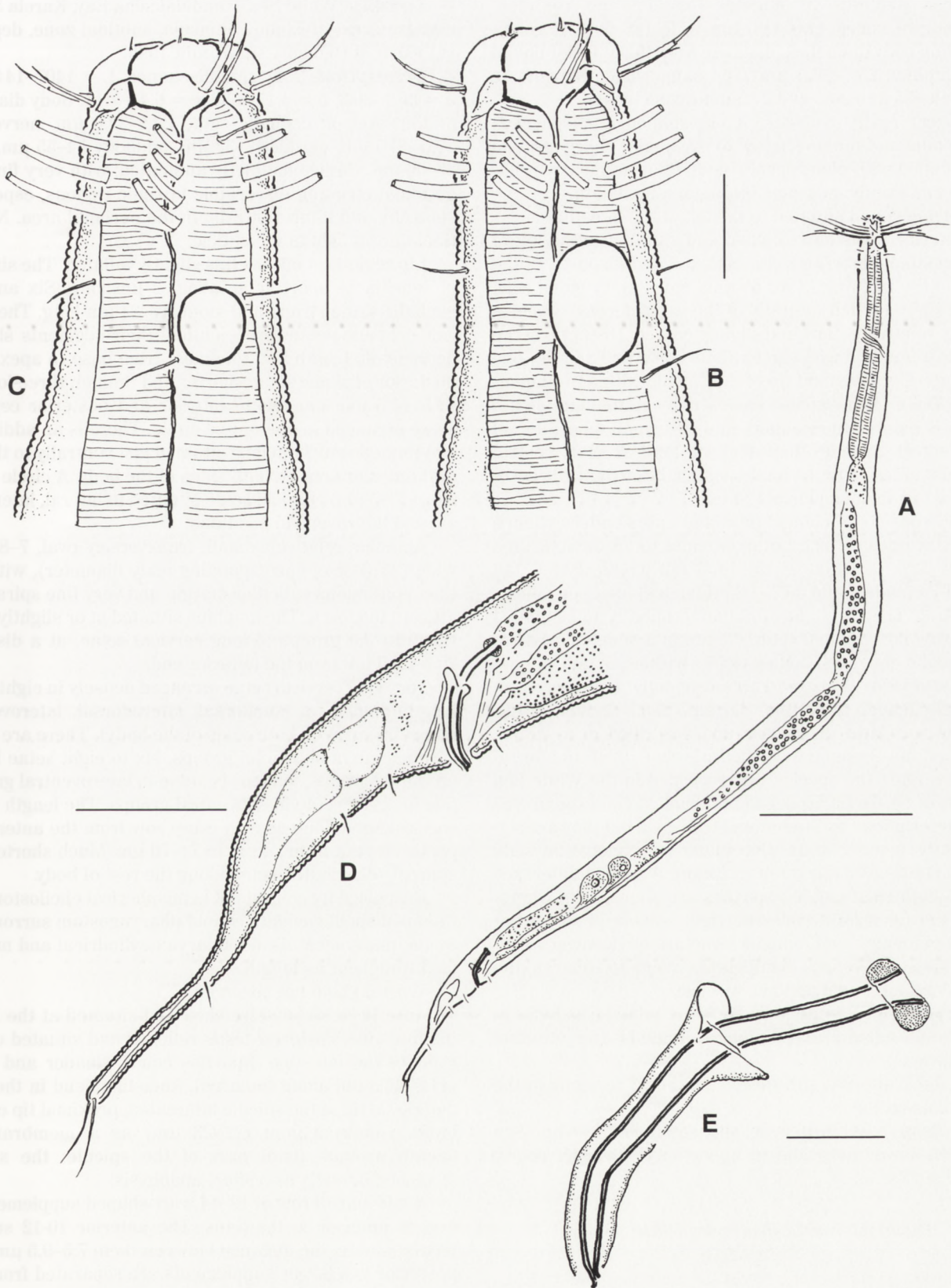


Figure 1. *Pseudosteineria horrida* (Steiner 1916). A: male, entire; B: male cephalic end; C: female cephalic end; D: male tail; E: male spicule. Scale bars: A – 200  $\mu$ m; B, C, E – 10  $\mu$ m; D – 50  $\mu$ m.

whereas amphids of females smaller and rounded. Amphids of males 11.0–11.5  $\mu\text{m}$  wide (48–50% of corresponding body diameter), distance from the anterior end to the amphids 25.0–26.5  $\mu\text{m}$ . The same measurements in a female 6.5  $\mu\text{m}$ , 26% and 27.5  $\mu\text{m}$  respectively.

Buccal cavity consists of cup-shaped hemispherical cheilostom and funnel-shaped to pyramidal pharyngostom surrounded with pharyngeal tissue. Pharynx nearly cylindrical and evenly muscular throughout its length.

Female gonad situated to the left of the intestine.

Anterior testis outstretched and situated to the left of the intestine; posterior testis reflexed and disposed to the right of the intestine. Two distinct ejaculatory gland cells to the right and left laterally of the vas deferens. Spicules strong, relatively short and slightly curved. Distal tip of the spicule bifurcated with one tooth terminal and another one bent laterally. Proximal tip of the spicule with a prominent knob. Distal half spicule enclosed by a tubular sheath which is enlarged proximally into two small lobes, dorsal and ventral. Spicules 45.0–47.5  $\mu\text{m}$  long. A short ventral seta just anterior to the anal opening; lateroventral row of short setae on each side of the tail.

Tail consists of conical proximal and slender cylindrical distal portion. The latter is equal to 26–33% (males) and 24–32% (females) of the total tail length. Entire tail 4.60–4.73 (males) and 4.77–5.22 (females) anal body diameters long. The tail slightly inflated terminally and supplied with two long terminal setae (33  $\mu\text{m}$  in a male). There are two caudal gland cell bodies visible within the tail.

**Discussion.** *P. horrida* was originally described from a single female from the Barents Sea (Steiner 1916). A male was later discovered and described in a sample taken on the Greenland coast (Ditlevsen 1928). In several decades after, the species was recorded in the White Sea (Galtsova 1976). Our specimens (females) correspond well with descriptions by Steiner and Galtsova, but they are significantly smaller than Greenland specimens in body length (1409–1658  $\mu\text{m}$  versus 2.2 mm). A second difference is that both right and left spicules are about equal whereas in the Greenland male the right spicule is somewhat shorter in length and simpler structurally. However I consider these differences insufficient enough to separate the Greenland form as a distinct species.

**Geography.** Barents Sea, West Greenland coast, possibly New England and Falkland Islands (no suitable descriptions).

In the White Sea the species is known to occur in the Kandalaksha Bay.

**Ecology.** Sublittoral zone, silty sands. In the White Sea from the lower intertidal to upper subtidal zone, poorly sorted sands.

*Pseudosteineria ventropapillata* sp. nov.

(Figs 2, 3)

**Material.** Three males (one holotype and two paratypes) in glycerol slides deposited at the Zoological Museum of Moscow State University, Moscow.

**Locality.** White Sea, Kandalakscha Bay, Karela Shore, northern coast of Kindo Peninsula, subtidal zone, depth 20 m, poorly sorted silty sand. July, 1996.

**Description.** Body spindle-shaped. L = 1407–1449  $\mu\text{m}$ ; a = 26.1–26.3; b = 4.17–4.32; c = 6.44–7.14. Body diameter at the level of: cephalic setae 20.5–22.0  $\mu\text{m}$ , nerve ring 37.5–43.5  $\mu\text{m}$ , cardia 47–52  $\mu\text{m}$ , midbody 54–55  $\mu\text{m}$ , anus 36–40  $\mu\text{m}$ . Cuticle distinctly annulated; with very fine longitudinal striation discernible in some regions, especially ventrally and lateroventrally in the perianal area. No distinct lateral field in the cuticle.

Lip region set off. Six lips slightly inflated. The six labial sensilla as short setae about 2  $\mu\text{m}$  long. Six anterior cephalic setae strong and stout, 17–21  $\mu\text{m}$  long. The anterior cephalic setae three-jointed, their segments sharply decrease in length and thickness from base to apex. Four posterior cephalic setae shorter and thinner, three-jointed, 13.5–14.5  $\mu\text{m}$  long. Both anterior and posterior cephalic setae arranged in one united circle. There is an additional two-jointed seta 7  $\mu\text{m}$  long situated just ventrally to the lateral anterior seta on both sides of the body. A circle of six short (4–5  $\mu\text{m}$ ) cervical setae situated in lateral, laterodorsal and lateroventral positions.

Amphids relatively small, transversely oval, 7–8.5  $\mu\text{m}$  wide (25–31% of corresponding body diameter), with distinct continuous cuticular margin and very fine spiral striation in the fovea. The amphids situated at or slightly anteriorly to the groups of long cervical setae, at a distance 20.5–24.0  $\mu\text{m}$  from the anterior end.

Very long cervical setae arranged densely in eight short longitudinal rows (subdorsal, laterodorsal, lateroventral and subventral on both sides of the body). There are six to seven setae in subdorsal groups, six to eight setae in laterodorsal groups, four to six setae in lateroventral groups, five to seven setae in subventral groups. The length of the cervical setae increases in every row from the anterior to posterior seta from 24  $\mu\text{m}$  to 71–76  $\mu\text{m}$ . Much shorter and sparsely distributed setae along the rest of body.

Buccal cavity consists of hemispherical cheilostom and funnel-shaped, elongate conoid pharyngostom surrounded by the pharyngeal tissue. Pharynx cylindrical and muscular throughout its length.

Ventral gland not observed.

Anterior testis outstretched and situated at the left of the intestine. Posterior testis reflexed and situated on the right of the intestine. Spicules equal, slender and short (41.5–43.0  $\mu\text{m}$  along the arch), knee-like bend in the middle. Distal tip of the spicule bifurcated, proximal tip cephalated. Gubernaculum (22–23  $\mu\text{m}$ ) as a membranous sheath around distal part of the spicule; the sheath stretched dorsally as a short apophysis.

A midventral row of 12–14 wart-shaped supplementary organs anterior to the anus. The anterior 10–12 supplements minute, the distance between them 7.5–9.5  $\mu\text{m}$ . The posterior two larger supplements are separated from one another. The anterior large supplement is situated at the distance 25  $\mu\text{m}$  from the posterior minute supplement; the posterior large supplement is even bigger than the anterior.

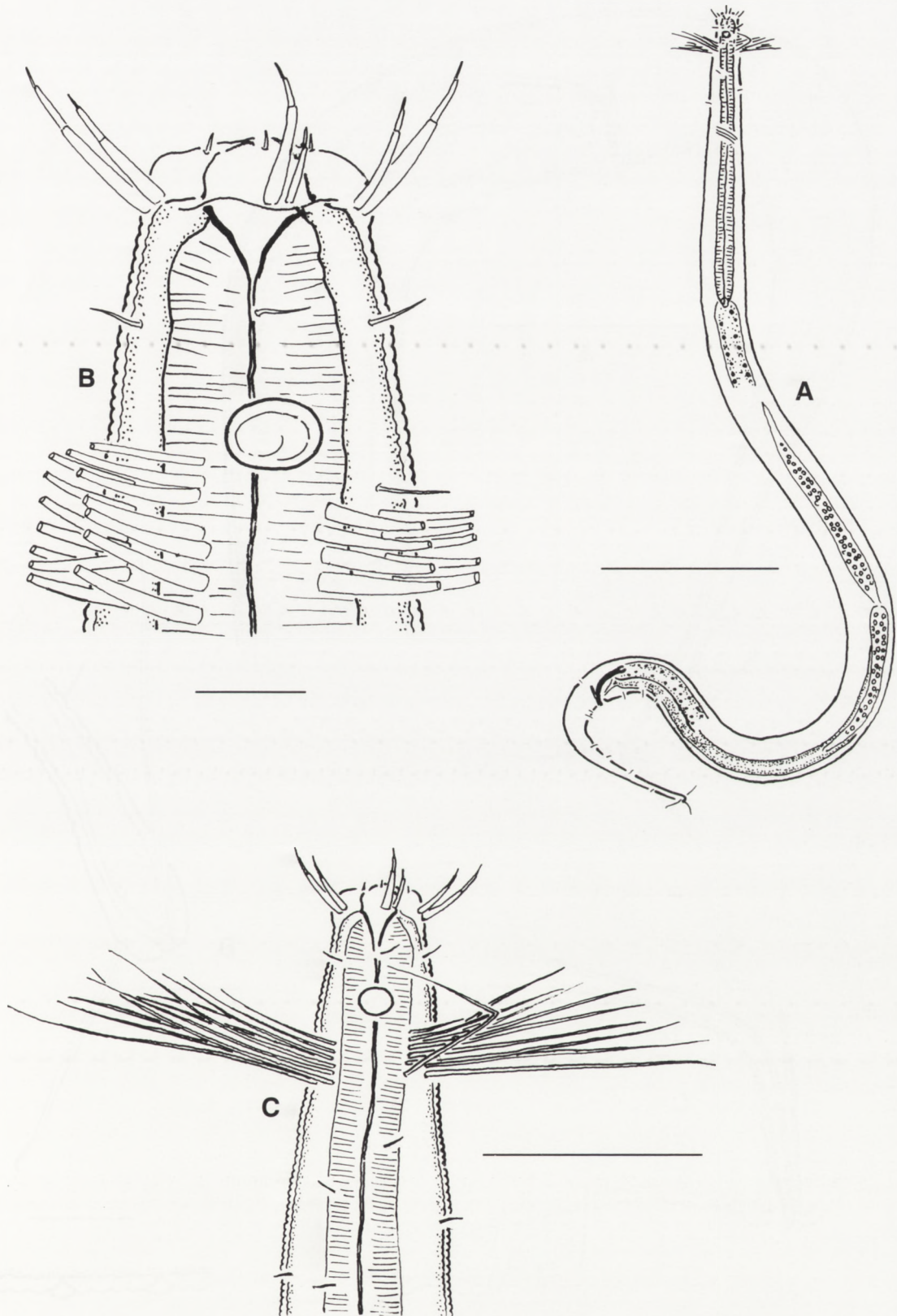


Figure 2. *Pseudosteineria ventropapillata* sp. nov., male holotype. A – entire view; B – cephalic end; C – anterior body. Scale bars: A – 200  $\mu$ m; B – 10  $\mu$ m; C – 50  $\mu$ m.

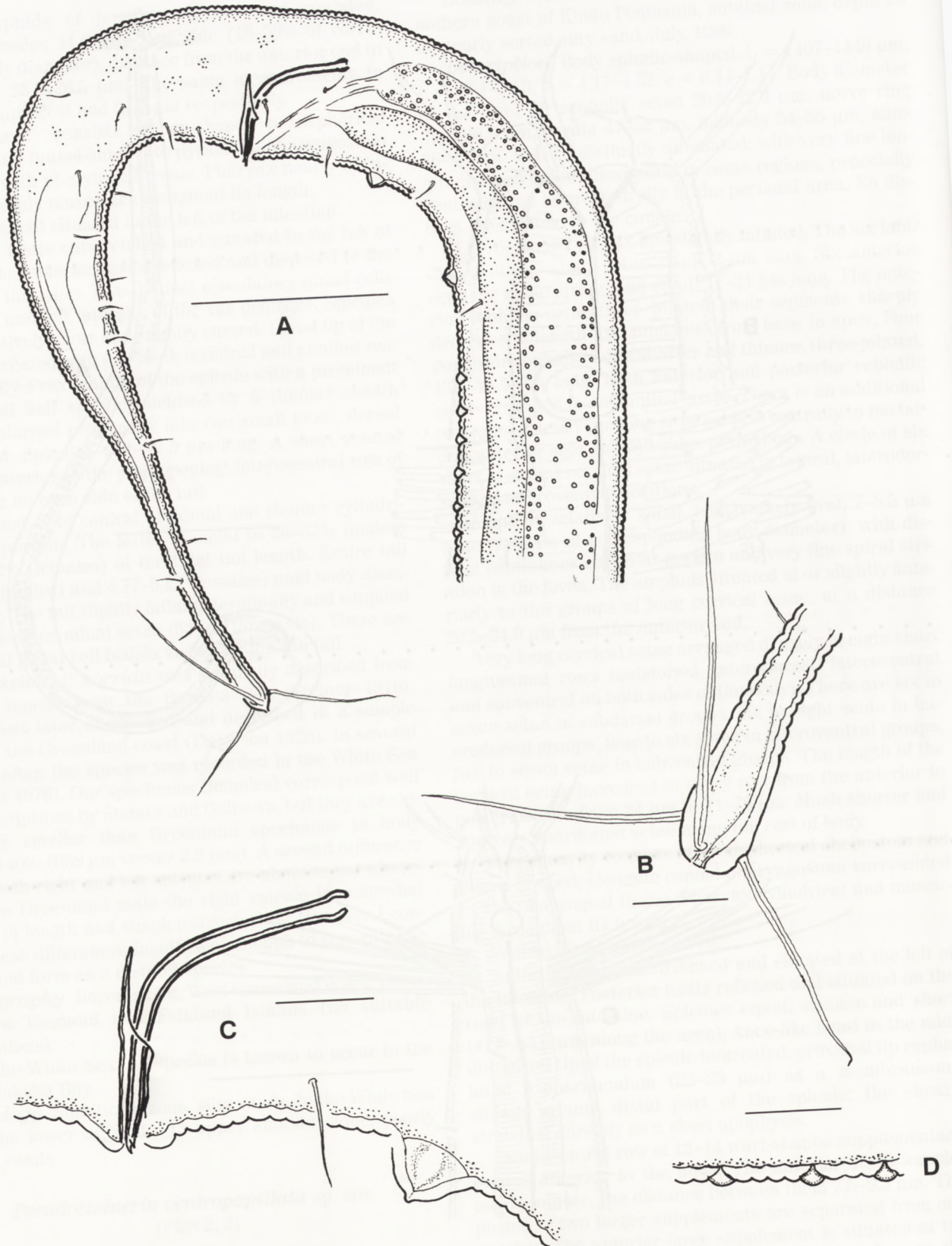


Figure 3. *Pseudosteimeria ventropapillata* sp. nov., male holotype. A - posterior body; B - tail tip; C - spicule and the posterior large supplementary organ; D - anterior small supplementary organs. Scale bars: A - 50  $\mu$ m; B, C, D - 10  $\mu$ m

or one and situated at the distance 36  $\mu\text{m}$  from the anterior large supplement and 35  $\mu\text{m}$  from the anus.

Tail consists of proximal conical and distal slender cylindrical portions. Overall tail length 5.45–6.16 anal body diameters, with distal cylindrical portion 33–37.6% of the total tail length. Numerous somatic setae located lateroventrally and to lesser extent ventrally and dorsolaterally. Terminal tail tip slightly inflated and carries three long (37  $\mu\text{m}$ ) and three tiny (in one paratype) terminal setae.

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