



Some observations on *Trissonchulus benepapillosus* (Schulz, 1935) (Nematoda: Ironidae)

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Abstract: A large population of *Trissonchulus benepapillosus* (Schulz, 1935) has been collected from Polish coast. In this study additional information about morphology and morphometric data are provided. Drawings and SEM photographs are also included.

Key words: Nematoda, morphology, morphometrics, SEM, Poland

INTRODUCTION

The genus *Trissonchulus* Cobb, 1920 includes 14 species of marine nematodes. Platonova and Mokievsky (1994), in their review of the family Ironidae, gave an emended diagnosis of *Trissonchulus* as well as brief descriptions and identification key to 11 species belonging to this genus. Since then, three more species have been added: *T. dubius* Orselli & Vinciguerra, 1997, *T. provulvatus* Orselli & Vinciguerra, 1997, *T. lichenii* Nasira & Turpeenniemi, 2002.

Trissonchulus benepapillosus (Schulz, 1935) is one of widely distributed species in this genus. It often occurs in littoral sands. Hitherto it was reported from the coasts of Baltic, North, Mediterranean, and Arabian Seas as well as of Indian, Atlantic and Pacific Oceans (Gerlach & Riemann 1974, Blome 1982, Southey 1992, Nasira & Turpeenniemi 2002).

The original description of *T. benepapillosus*, based on two females, was rather incomplete. The knowledge of the morphology of this species was subsequently expanded by Schulz (1938), Gerlach (1954), Wieser (1959), Hopper (1961), Van Der Heiden (1974) and Bussau (1990). The large population of *T. benepapillosus*, collected from Polish coast, enabled the presentation of some additional data concerning morphology of this species, especially external structures shown in SEM photographs.

MATERIAL AND METHODS

The nematodes were extracted from sand collected near Górkki Wschodnie (Sobieszewo Island, October 2007, leg. A. Stroiński) by decantation and sieving method with final separation on extraction sieves with filters, fixed in hot 4% formaldehyde. Specimens were processed to pure glycerine by evaporation method and mounted on permanent slides in glycerine with paraffin as a support for the cover slide. For SEM studies some specimens were fixed in 2.5% solution of glutaraldehyde, dehydrated in graded ethanol series (50–100%) and finally in pure acetone, critical point dried in liquid CO₂, coated with gold-palladium mixture and examined in a Hitachi S-3400N SEM at an accelerating voltage of 25 kV.

Table 1. Morphometric data of *Trisonechulus benepapillosus* (Schulz, 1935); symbols of indices – see Andrassy 2005; mean \pm standard deviation, with range in parentheses.

Character	Population	Poland (Baltic coasts)	Germany (Baltic, Kiel Bay) Schulz 1935	Germany (North Sea, Amrum) Schulz 1938	Germany and Denmark (Baltic coasts) Bussau 1990	Portugal (Esposende) Gerlach 1954	USA: Washington State (Pacific Ocean, Puget Sound) Weiser 1959	USA: Alabama (Atlantic Ocean, Gulf of Mexico) Hopper 1961		
n		48 ♀♀	2 ♀♀	1 ♂	1 ♂	1 ♂	♀♀	♂♂	1 ♀	2 ♂♂
L (mm)		2.65±0.31 (2.07–3.53)	2.60±0.25 (2.18–3.24)	2.20; 3.09	2.74	2.14	2.49	2.63	2.32	1.87; 2.00
a		47.9±4.7 (37.5–59.1)	51.1±4.9 (35.3–59.5)	32.7; 31.2	46.3	27.0	35.6	37.6	46.7	35.7; 44.6
b		7.5±0.6 (6.3–8.8)	7.3±0.5 (6.5–8.4)	7.6; 6.1	7.3	6.4	8.3	8.7	9.4	6.9; 7.4
c		27.3±2.5 (21.6–33.1)	28.7±2.0 (25.2–32.4)	29.0; 20.1	30.8	23.8	27.7	33.0	30.9	28.8; 30.0
c'		2.4±0.2 (1.8–2.8)	2.3±0.1 (1.9–2.5)	–	–	1.7	–	–	–	–
v		55.2±1.5 (52.3–59.9)	–	–	–	–	55.0	–	57.6	–
G1		13.9±2.2 (8.7–19.3)	–	–	–	–	–	–	–	–
G2		14.0±2.6 (9.2–24.5)	–	–	–	–	–	–	–	–
Buccal cavity length (µm)		57.5±2.1 (53.0–63.0)	56.3±1.6 (52.0–59.0)	–	63	60	–	60	–	55–60
Buccal cavity width (µm)		10.7±1.0 (8.0–13.0)	10.6±0.6 (10.0–12.0)	–	–	–	–	–	–	–
Length of teeth		6.2±0.5 (5.0–8.0)	6.3±0.5 (6.0–7.0)	–	–	–	–	–	–	–
width of plates of denticles (µm)		7.5±0.8 (6.0–9.0)	7.6±0.8 (6.0–9.0)	–	–	–	–	–	–	–
Nerve ring from anterior end (µm)		162.9±12.7 (145.0–190.0)	169.4±12.6 (140.0–186.0)	–	–	–	–	–	–	–
Pharynx length (µm)		355.1±24.9 (310.0–415.0)	354.8±26.4 (300.0–395.0)	410; 370	418.2	332	–	–	200	–
Lip region height (µm)		11.3±0.8 (9.0–13.0)	11.4±0.7 (10.0–12.0)	–	–	–	–	–	–	–
Lip region width (µm)		27.4±1.3 (24.0–30.0)	26.6±0.8 (25.0–28.0)	–	–	–	–	–	–	–
Body width at pharynx base (µm)		51.1±4.0 (40.0–63.0)	48.2±2.3 (44.0–54.0)	–	73.8	69	–	62	–	45–50
Maximum body width (µm)		55.5±4.7 (48.0–70.0)	51.0±4.0 (46.0–67.0)	–	92.2	78	–	–	–	–
Anal body width (µm)		41.1±3.0 (37.0–55.0)	40.3±1.9 (36.0–44.0)	–	49.2	54	–	48	–	33–35
Vagina length (µm)		18.8±2.0 (16.0–24.0)	–	–	–	–	–	–	–	–
Rectum/cloaca length (µm)		39.5±3.8 (32.0–46.0)	48.8±3.7 (44.0–55.0)	–	–	–	–	–	–	–
Spiculus length (µm)		–	43.2±2.3 (40.0–47.0)	–	47	53	–	50	–	40; 43
Tail length (µm)		97.6±9.4 (73.0–113.0)	90.8±6.7 (78.0–105.0)	108; 108	86.1	90	–	84	–	75
Spinneret length (µm)		3.5±0.5 (2.0–5.0)	3.7±0.5 (3.0–5.0)	–	–	–	–	–	–	–

DESCRIPTION

***Trissonchulus benepapillosus* (Schulz, 1935)**

(Figs 1–15)

Syringolaimus benepapillosus Schulz, 1935: 449.*Dolicholaimus benepapillatus* (sic!): Schneider 1939: 35*Trissonchulus benepapillosus*: Gerlach and Riemann 1974: 439**Morphometric data.** See Table 1.

Body long, when heat relaxed straight anteriorly and curved ventrad posteriorly. Cuticle 2.4 (2.0–3.5) μm thick. Labial region set off by distinct groove. Lip region consists of three lobed lips (Fig. 9). On the top of each lip two small, papilliform sensillae. Near the base of lip region ten conical and relatively long [3.2 (3.0–4.0) μm] cephalic sensillae are situated, arranged in one circle and subequal in length. Four of them are almost by half thinner than the remaining six. Amphid cup-shaped, its slit-like opening is located just behind the cephalic groove (Fig. 11). Amphidial aperture, 10.8 (8.0–14.0) μm wide, occupying 33–54% of the corresponding body diameter [46.3 (33.3–53.8)% in males and 40.0 (27.6–48.0)% in females]. At each side of body occurs a row of four or five cervical papillae arising from a ring-like depression (Figs 11, 12, 13). First of them is situated always near the base of amphid about 16 (12–19) μm from the anterior end of body; the next cervical papillae at the distance of 42.3 (35–52) μm , 64.8 (51–75) μm , 85.8 (68–100) μm and 134.9 (107–156) μm from anterior end of body. Among studied males three of them have additional papilla 155 (137–177) μm from anterior end of body. Stoma armed with four large, hook-shaped, forwardly directed teeth and numerous minute denticles (Fig. 10). Each from two ventro-lateral and two dorsal teeth are movably connected with a sclerotised plate. Vento-lateral teeth are more robust than dorsal ones. In resting position the apices of the teeth lie close to one another. At the level of teeth three denticular plates are present. Each of them is adorned with several rows of minute denticles. Pharynx cylindrical, widened at stoma region. Excretory pore not observed. Nerve ring lying slightly above of the middle of pharynx [46 (43–50%)]. Cardia well developed.

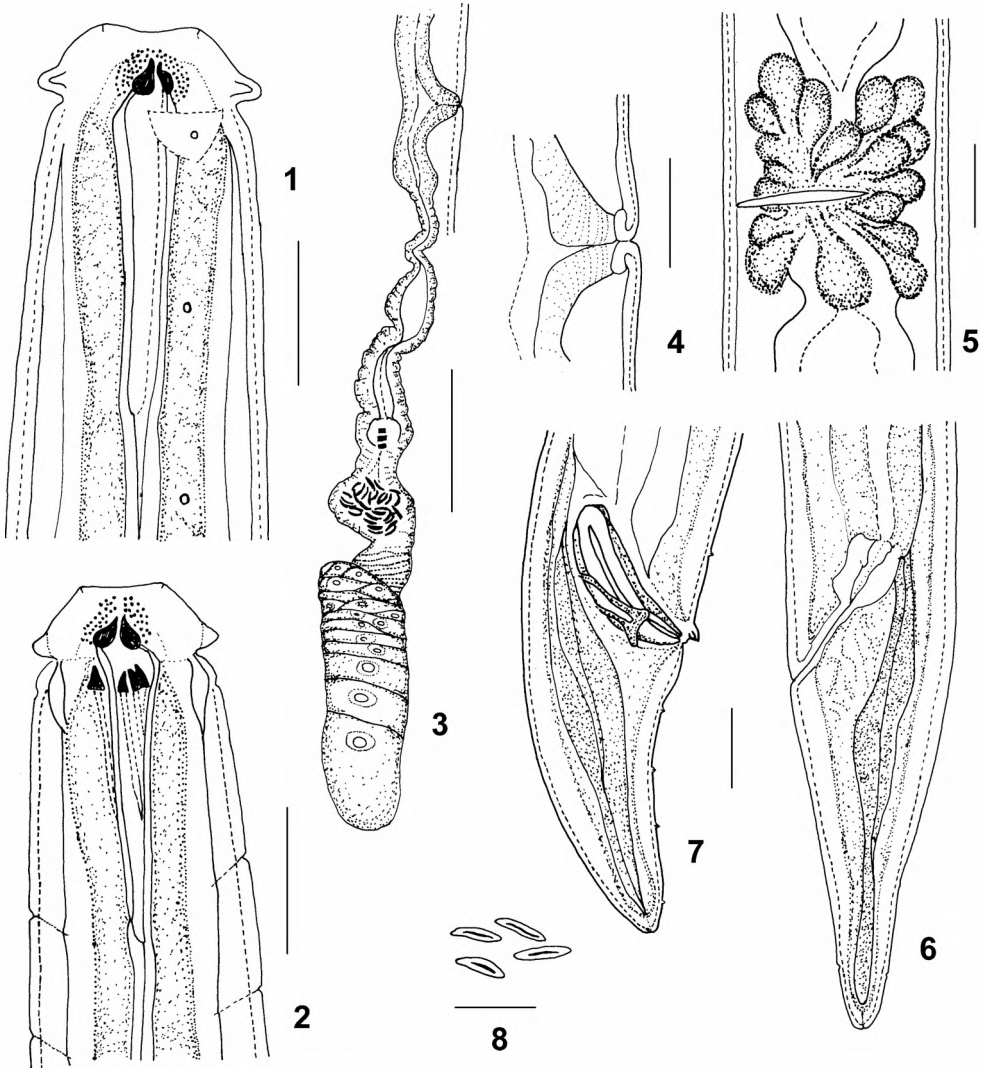
Tail conical with blunt terminus. There are some sexual differences in tail shape (Figs 6, 7, 14, 15). In female tail is almost straight and more elongated, in male it is shorter, slightly curved ventrally with more rounded terminal part. Caudal glands are visible only in few specimens: 4 females and 1 male; these saclike glands are situated at the distance of 218 (154–281) μm , 312 (224–405) μm and 359 (267–421) μm from anus. Terminal spinneret is thin and short.

Female. Reproductive system didelphic, amphidelphic, ovary branches symmetrical and reflexed. Ovaries well developed (Fig. 3). Oviduct usually filled with spermatozoa. Between oviduct and uterus is very well developed sphincter. Uterus with thick walls, in the shape of relatively long and often curled tube. Vagina V shaped with well developed musculature (Fig. 4). Pars proximalis vaginae wide and short. Pars refringens vaginae without sclerotizations. Pars distalis vaginae relatively long, thick walled. Vulva in form of narrow transverse slit occupying more than half of corresponding body diameter (Fig. 5). Two groups (9+9) of well developed, rounded cells present in the vulval region. No eggs were observed in female reproductive system. Rectum straight, almost equal to anal body diameter. Tail with four pairs of small papillae lying in two circles, each consisting of one pair of subdorsal and one pair of subventral papillae: first circle lies 8–13 μm , second 42–48 μm from the tail end.

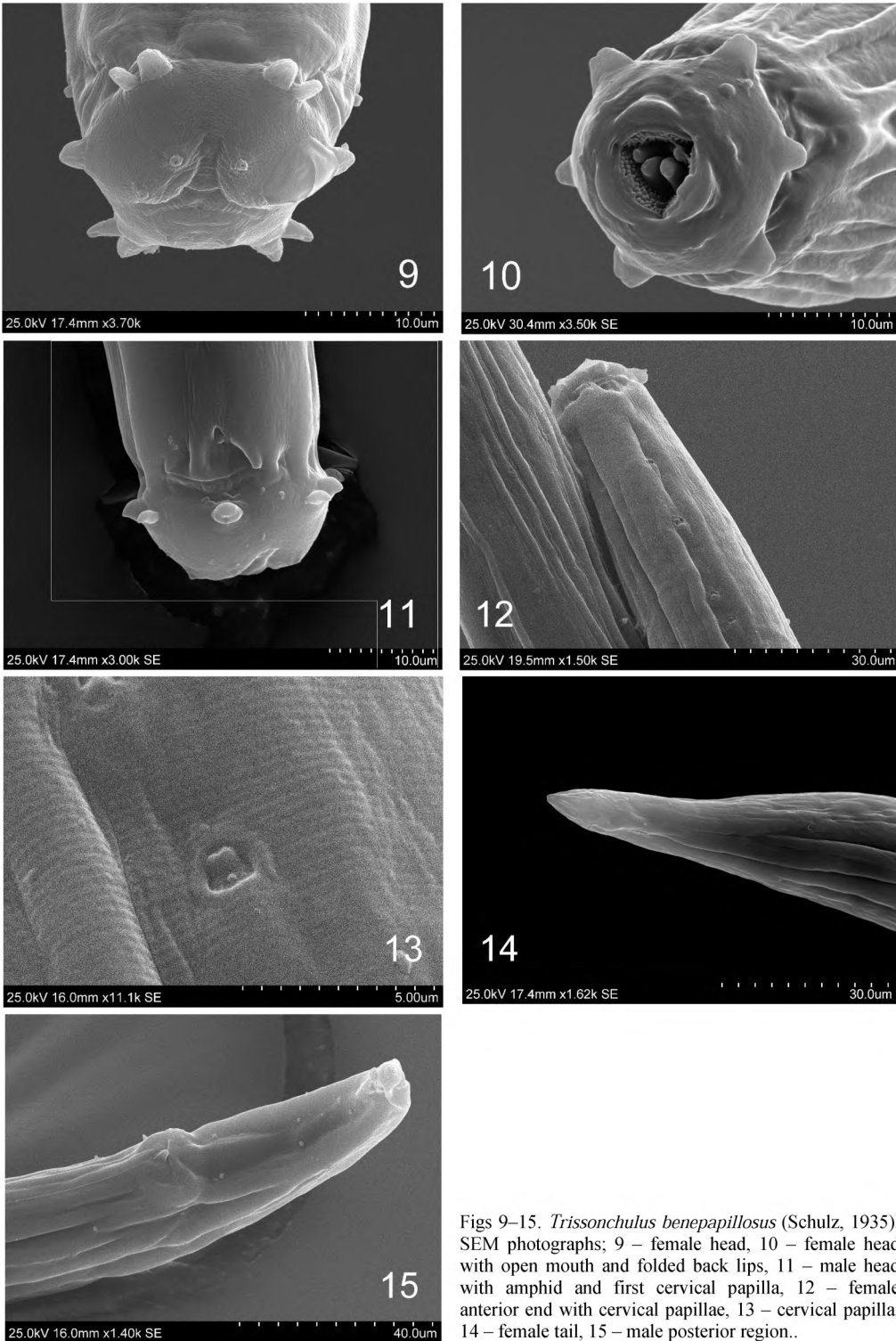
Male. Reproductive system diorchic. Testes opposed, relatively long, anterior testis distinctly longer than posterior. Spermatozoa relatively long (16–18 μm), fusiform (Fig. 8).

Spicules paired, very wide, conical, moderately curved ventrally; with broadly rounded and narrow proximal part and bifurcate end (Fig. 7). Gubernaculum weakly sclerotized, 22.9 (20.0–26.0) μm long. Caudal region with several pairs of small papillae; anterior cloacal lip, with large elongated papilla in medioventral position (Figs 7, 15). Four or five pairs of precloacal papillae are irregularly arranged in two subventral rows and distributed at the distance from 10 to 203 μm from anus. Tail provided with six to nine pairs of caudal papillae: three or four pairs of subventral, one or two pairs of subdorsal and two or three pairs of sublateral.

Juvenile. Similar to adults. Secondary teeth present (Fig. 2).



Figs 1–8. *Trissonchulus benepapillosus* (Schulz, 1935). 1 – female anterior end, lateral view; 2 – juvenile anterior end, ventral view; 3 – posterior branch of female reproductive system; 4 – female vagina; 5 – vulva region; 6 – female tail; 7 – male posterior region; 8 – spermatozoa. (Scale bars: 1, 2, 4–8 = 20 μm , 3 = 50 μm).



Figs 9–15. *Trissonchulus benepapillosus* (Schulz, 1935), SEM photographs; 9 – female head, 10 – female head with open mouth and folded back lips, 11 – male head with amphid and first cervical papilla, 12 – female anterior end with cervical papillae, 13 – cervical papilla, 14 – female tail, 15 – male posterior region..

Remarks. Polish specimens are generally similar to those from Germany, Denmark, Portugal and USA, however some morphometric differences have been noted (Table 1). They differ slightly from females of Schulz (1935) in more anterior position of vulva; from male reported by Schulz (1938) in more slender body; from specimen collected by Gerlach (1954) in slender body and shorter spicules. They are also somewhat different from specimens described by Wieser (1959) by having thinner cuticle, narrower amphid and shorter spicules. In comparison with those described by Hopper (1961) Polish specimens have slightly longer: body, pharynx, and males tail.

T. benepapillosus was originally described as having the stoma armed with three large teeth: one dorsal and two ventrosublateral. Wieser's (1959) description added the information that the walls of anterior part of stoma are covered by rows of tiny denticles. The next important information about stoma armature was given by Van Der Heiden (1974), who studied the anterior feeding apparatus of Ironidae. He mentioned that the stoma of *T. benepapillosus* is armed with four large teeth: two dorsal and two ventrosublateral. His illustration (Fig. 4 aa) does not show clearly a break between the bases of these dorsal teeth. This character is apparently difficult to observe. Describing *T. benepapillosus* from Germany and Denmark, Bussau (1990) interpreted these two dorsal teeth as one tooth bifid at tip. However, his illustration (Abb. 4B) of the juvenile stoma shows clearly that dorsal replacement teeth are formed as separate cones. The same shape and number of dorsal replacement teeth have been observed in juvenile specimens from Poland (Fig. 2).

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STRESZCZENIE

[Observacje *Trissonchulus benepapillosus* (Schulz, 1935) (Nematoda: Ironidae)]

W pracy zamieszczono opis morskiego nicienia *Trissonchulus benepapillosus* (Schulz, 1935), którego okazy zebrano z pobraża Wyspy Sobieszewskiej w okolicach Górek Wschodnich. Analizowany materiał pochodził z licznej populacji co pozwoliło na uzupełnienie informacji dotyczących morfologii i morfometrii tego gatunku. Opis uzupełniono fotografiami skaningowymi.

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