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Estonian Enchytraeidae 4. Sublittoral Enchytraeidae (Annelida, Oligochaeta) in the eastern Baltic Sea

Tarmo Timm

Estonian Institute of Life Sciences, Centre for Limnology, 61117 Rannu, Tartumaa, Estonia; tarmo.timm@emu.ee

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Abstract. Only two enchytraeid species were found to be common and abundant in the sublittoral of the eastern Baltic Sea: a dwarfish form of *Lumbricillus lineatus* and *Marionina naso* n. sp., the latter probably belonging to the cool-water "glacial relics". Results are based on hundreds of samples from zoobenthos surveys made in the last century, covering the whole area. Descriptions of the two species are given. Several more species (*Lumbricillus* cf. *arenarius*, *L. buelowi*, *L.* cf. *pumilio*, *Marionina southerni*, *M. spicula*, and unidentified taxa) were found occasionally and in small numbers only.

Key words: Baltic Sea, Enchytraeidae, *Lumbricillus*, *Marionina*, new species.

INTRODUCTION

In three papers of this series (Dózsa-Farkas et al. 1998, Schmelz et al. 2005, Timm 2007), the Estonian terrestrial and freshwater enchytraeids were surveyed. As a small addition to the last paper, Dr K. Dózsa-Farkas (Budapest) identified two amphibious species, *Cernosvitoviella immota* (Knöllner, 1935) and *C. tatrensis* (Kowalewski, 1917) from the Estonian streams. Two more species, new for science (*Marionina deminuta* Rota, 2012 and *M. mendax* Rota, 2012) were recently found from the Estonian soil (Rota 2012), increasing the total number of nominal species of the Enchytraeidae known in Estonia to 54. This fourth paper is dedicated to the enchytraeids living in the brackish waters adjacent to Estonia, Latvia, and Lithuania.

The Baltic Sea has many lacustrine features (limited connection with the ocean, lack of tides, very low salinity, poor fauna with a large proportion of freshwater organisms). Fresh- and brackish-water periods have alternated during its short history of 13 000 years. There is a gradual decline of salinity, from 8–10‰ in the SW corner to 2–3‰ in the inner parts of the Bothnian Bay and the Gulf of Finland (Järvekülg 1979).

Earlier studies on Enchytraeidae in the Baltic Sea have been limited to the pseudolittoral, i.e. the shore and near-shore shallows (Knöllner 1935; Backlund 1946; Bülow 1955, 1957; Jansson 1961; Nurminen 1965, 1967; Giere 1976; Tynen & Nurminen 1969; Rota et al. 1998; Erséus et al. 1999; Rota & Healy 1999).

In zoobenthos samples from the open Baltic Sea, enchytraeids are usually either not found or ignored. Bagge & Ilus (1973) registered unidentified enchytraeids at 5 stations of 28, located at depths of 38.5–81 m along the western coast of Finland. Ankar & Elmgren (1976) noted them in 3 of 40 zoobenthos samples taken from a depth of 19 m or more in the Askö-Landsort area, Sweden. Both collections are no longer available.

Rich oligochaete material, including Enchytraeidae, was collected by late Dr Arvi Järvekülg during extensive zoobenthos studies in the Baltic Sea region bordering with the former USSR (Fig. 1). These worms were studied by me (Timm 1965, 1970, 1987; Järvekülg 1979). Most Enchytraeidae remained on the family level in these papers; one taxon was erroneously identified as *Marionina spicula* sensu Nielsen & Christensen (1959). Now, many years later, revision of this family in the Baltic Sea benthal is feasible by using additional material and improved taxonomic knowledge.

STUDY AREA, MATERIAL, AND METHODS

The study area includes the eastern part of the Central Baltic together with the Gulf of Riga, Gulf of Finland, and smaller straits and bays in the Estonian Western Archipelago (Fig. 1). Salinity is usually 3–8‰ in the homohaline (mixing) water

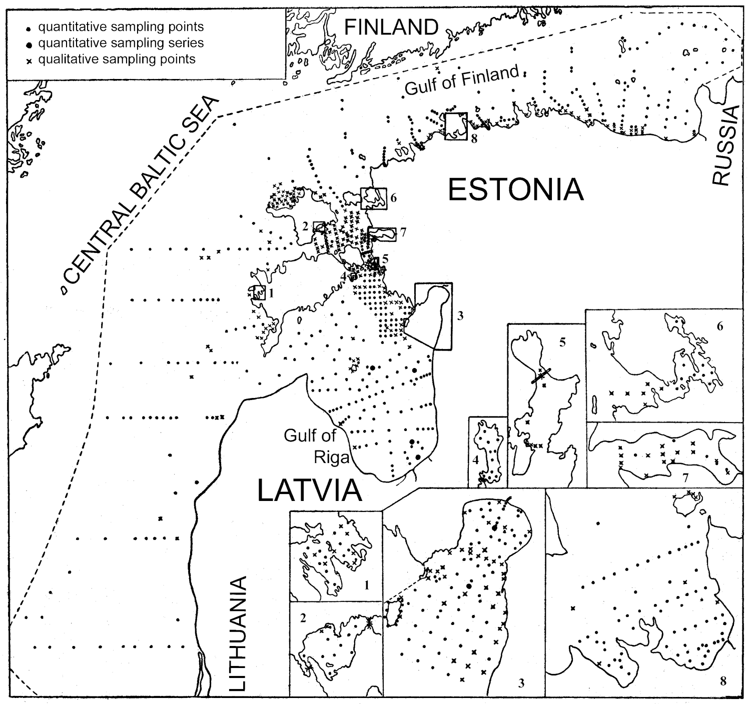

Fig. 1. Location of the sampling points of A. Järvekülg in the Baltic Sea, after Järvekülg (1979).

layer reaching a depth of 50–80 m. The same depth at the bottom is considered the lower limit of the sublittoral zone. There occur different sediments from stones to mud, but sand and clay prevail. Summer water temperatures can be higher than 20 °C in small bays and about 15 °C near the surface in the open sea, but seldom exceed 5 °C in the lower sublittoral. The deepest zone, pseudobathyal, is covered with more saline, periodically anoxic water and is devoid of oligochaetes. The shallowest zone (pseudolittoral) and the bays with very low salinity (1–2‰ or less) usually reveal no enchytraeids.

The bulk of the material was obtained from zoobenthos surveys compiled by Dr Arvi Järvekülg and his team, in the last years including Dr Ado Seire (former institutions: Tallinn Marine Ichthyological Laboratory, renamed as the Estonian Branch of the Baltic Institute of Fisheries and Oceanography; later the Institute of Zoology and Botany, Tartu), on their expeditions during 1959–1981 (Fig. 1). A detailed description of the area and sampling methods is available in a Russian-languague monograph (Järvekülg 1979). Single samples were provided also by Drs J. Lukšenas (Vilnius), O. L. Kačalova and G. Lagzdiņš (Riga), and J. Kotta (Tallinn). Most of the samples were taken with various bottom grabs (Okean-50, and three different modifications of the Petersen sampler), washed on a 0.4 mm mesh sieve, and preserved in ethanol. Occasional qualitative samples were taken with a hand-net on the shallows. No attempts were made at special sampling of enchytraeids on the shore. A total of about 7000 preserved enchytraeid specimens from 457 zoobenthos samples were studied as whole mounts in glycerine or Canada balsam, several specimens also as serial sections. No observations were available on live worms. A few identifications were made or confirmed by Dr Rüdiger M. Schmelz (A Coruña, Spain). The material is deposited in the Centre for Limnology (former Võrtsjärv Limnological Station, VLS), Rannu, Estonia; some paratypes also in the Zoological Institute, St. Petersburg (ZIN); Naturhistoriska Riksmuseet, Stockholm (SMNH); and Zoological Museum, Helsinki (MZH).

Abbreviations used in the Figures

ch – chaeta(e), cl – clitellum, dv – dorsal blood vessel, e – egg, i – intestine, mf – male funnel (sperm funnel), mp – male pore, nc – nerve cord, o – ovary, pb – penial bulb, phg – pharyngeal (septal) gland(s), php – pharyngeal pad, s – spermatheca, sc – spermatocytes, spa – spermathecal ampulla, spd – spermathecal duct, spg – glands at the spermathecal pore, t – testis, vd – vas deferens (sperm duct).

RESULTS

Enchytraeidae formed a common component of the sublittoral zoobenthos (up to depths of 70 m), sometimes as the only representatives of Oligochaeta besides the abundant tubificid species *Heterochaeta costata* Claparède, 1963. Almost the whole enchytraeid material consisted merely of two species: *Lumbricillus lineatus* (Müller, 1774) and *Marionina naso* n. sp. Three more species, *L.* cf. *arenarius*

(Michaelsen, 1889, emend. Knöllner, 1935), *L. buelowi* Nielsen et Christensen, 1959, and *Marionina southerni* (Černosvitov, 1937) were found in high numbers at a single point of Tallinn Bay, on the sublittoral coarse sand (identified by Dr R. M. Schmelz, A Coruña, Spain). Single specimens of *Marionina spicula* (Leuckart, 1847) were found in two similar sublittoral samples, from Tallinn Bay and Kolga Bay (at depths of 17 and 15.5 m, respectively), and one specimen of *Lumbricillus* cf. *pumilio* Stephenson, 1933 from the mud of the shallow water (only 1 m) in Haapsalu Bay. Occasional individuals of possible other species remained unidentified.

Lumbricillus lineatus (Müller, 1774) (Fig. 2)

Lumbricillus lineatus: Nielsen & Christensen 1959, pp. 100–102, figs 109–112; Timm 1999, p. 139, fig. p. 138; 2009, p. 152, fig. p. 153. *Marionina spicula* (Leuckart, 1847) as a misidentification: Timm 1965, pp. 40–41, fig. 2A, B, Г; 1970, p. 69. ?*Marionina spicula*: Järvekülg 1979, p. 91. "*Marionina spicula*" = *Lumbricillus* sp.: Timm 1987, pp. 97–98.

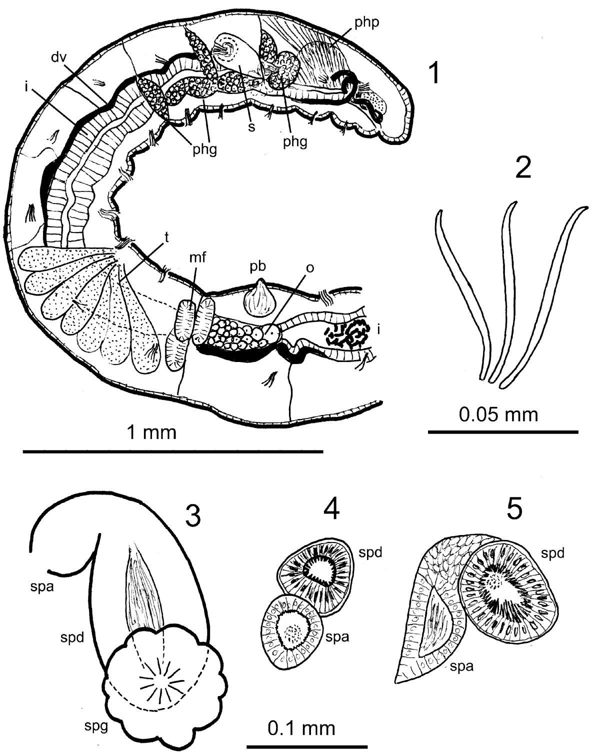

Fig. 2. *Lumbricillus lineatus* (Müller, 1774). 1 – general view of the forebody of a half-mature (yet aclitellate) specimen; 2 – bundle of chaetae; 3 – spermatheca, drawn from a whole mount; 4 and 5 – spermatheca, from two serial sections.

Material. About 1080 specimens in 141 samples. Seventeen mature specimens studied on sections and many others as whole mounts.

Description. Length of mature worms 3–6 mm when preserved, diameter 0.2–0.4 mm, segment number 21–39. Body strongly bent to the ventral side, with short segments and well-expressed intersegmental furrows, especially ventrally (Fig. 2.1). Chaetae sigmoid (Fig. 2.2), mostly 4–6 per bundle in anteclitellar region, 2–4 posteriorly, and lacking in XII; length 30–70 µm (the shortest in II, the longest in tail region). Clitellum in XII–XIII, thick, with dense gland cells located either irregularly or in obscure transversal rows; lacking between the male pores.

No additional glands observed at the nerve cord. Oesophagus covered with chloragogen tissue from VI (or VII); transition to midgut indistinct, in VII–VIII. Pharyngeal (septal) glands on 4/5, 5/6, and 6/7, with well-developed ventral lobes; dorsal junctions either in the first two pairs or in all three (Fig. 2.1). 1–3 pairs of anteclitellar nephridia observed in 7/8–9/10 (or none, in some individuals); postclitellar ones beginning in 13/14 or 14/15; compact postseptale of variable shape and with short duct arising posteriorly. Coelomocytes scarce, flat, oval, 14–20 µm long and 9 µm wide, granulate, with nucleus. Coelothelium in forebody only 2–5 µm thick, but appearing much thicker (up to 21–37 µm) from VI or VII in some individuals. Dorsal blood vessel arising in XIII.

Testes (in testis sacs) bush-like, filling most of X–XI, sometimes reaching VIII–IX or bulging into XII (Fig. 2.1). In some individuals, free clusters of spermatocytes observed even in V–VII. Male funnels usually sausage-shaped, 2.5–3 times longer than wide, erect in the posterior portion of XI, either bent over gut or bulging into XII. Their diameter is 54–102 µm but decreases to 40–70 µm distally; collar thin, with the same diameter or narrower than funnel itself. In some specimens male funnels can be shorter: roundish or oval, but with the same diameter. Vasa deferentia long, 10–16 µm wide (in one small specimen, only 7 µm), beginning as dense spirals but forming then a densely tangled bunch in XII, ciliated over their whole length. Penial bulbs pyriform or saccular, 58–133 µm high and 65–93 µm wide in the longitudinal direction and 35–110 µm in the cross-section. They consist of a medial roundish cluster of gland cells, enclosed in a thin (2–5 µm) muscular sac; a lateral, higher glandular-muscular lobe surrounding funnel-shaped lumen. Vas deferens enters the bulb from the upper side between these two lobes. Lateral lobe is usually partially extruded in preserved specimens, forming a 25–77 µm high knob over body surface and covering male pore from the lateral side.

Several ripe eggs (often two but once only one), in XII–XIII. Egg funnels not observed.

Spermathecae (Fig. 2.3–2.5) in V, bipartite, usually bent at a right angle; the bend can be constricted. The ectal, ascending, portion (duct) is spindle-shaped, up to 110–155 µm long and 30–105 µm wide, with wall consisting of 6–21 µm thick epithelium and thin (1–3 µm) muscular layer. The ental, descending, portion (ampulla) is tubular or sacculate, slightly shorter than the ectal portion (70–114 µm long and 30–70 µm wide), with epithelium of only 5–12 µm, and muscular layer about 1 µm thick. Its ental end joins oesophagus from the lateral, lateroventral, or ventral side. Usually, a large bunch of spermatozoa lies in the spermatheca longitudinally, with heads embedded in wall and tails reaching sometimes oesophagus. The ectal portion of duct tapers gradually up to diameter of 20–40 µm, while both epithelium and muscular layer become thicker (9–23 and 2–12 µm, respectively) at the expense of lumen. Near ectal pore, spermathecal walls are penetrated by numerous high glandular cells forming a dense rosette 50–90 µm in diameter (Fig. 2.3).

Taxonomical remarks. *Lumbricillus lineatus* is a variable complex of different diploid and polyploid forms (Christensen 1980), possibly representing even several biological species (Coates 1995). Most mature specimens studied by me had well-developed testes, long erect (rarely shorter and longitudinal) male funnels, full spermathecae and ripe eggs, manifesting normal sexual reproduction. In one individual, collected at a depth of 6.5 m, only one male duct was present, with a short funnel, a few coils of vas deferens, and small penial bulb not protruding over body surface. Spermathecae were empty in spite of presence of ripe eggs. This may be an example of parthenogenetic reproduction; however, testes were well developed. The comparatively uniform habitat in marine benthal makes the co-existence of several forms of different ploidy and with different ecological preferences, described in canals by Christensen (1980), improbable. The small size, characteristic of the whole sublittoral population, is evidently caused by some kind of ecological stress. A similar nanism (not heritable!) has been observed in a tubificid oligochaete, *Tubifex tubifex*, in the profundal of many eutrophic lakes (Timm 1996b).

Distribution and ecology. Found at depths of 1.2–47 m, mostly at 10–25 m on different kinds of coarse sediments, especially on gravel and sand; at salinities 3.4–8.3‰ (Fig. 3). Both mature specimens and small juveniles are common in the summer months.

There are no documented data about *Lumbricillus lineatus* on the Estonian seashore or in pseudolittoral, except for some specimens collected by myself in 1957 at Orjaku, Hiiumaa Island. However, the species inhabits at least eight more or less polluted streams in North Estonia. It is considerably larger there: 12–18 mm long, consisting of (35)50–58 segments, and with (1–3)4–8 chaetae, measuring 70–110 µm, per bundle (Timm 1999). The internal organs are accordingly larger too but similar to those in sublittoral specimens. Nielsen & Christensen (1959) provide the size and the segment number for seashore individuals of this species, intermediate between the two extreme forms found in Estonia. The specimens sampled by me at Orjaku were also of medium size. Presence of *L. lineatus* both on the seashore and in polluted fresh waters is documented, e.g. by Backlund (1947) and Kasprzak (1986), while no data are available about its sublittoral distribution.

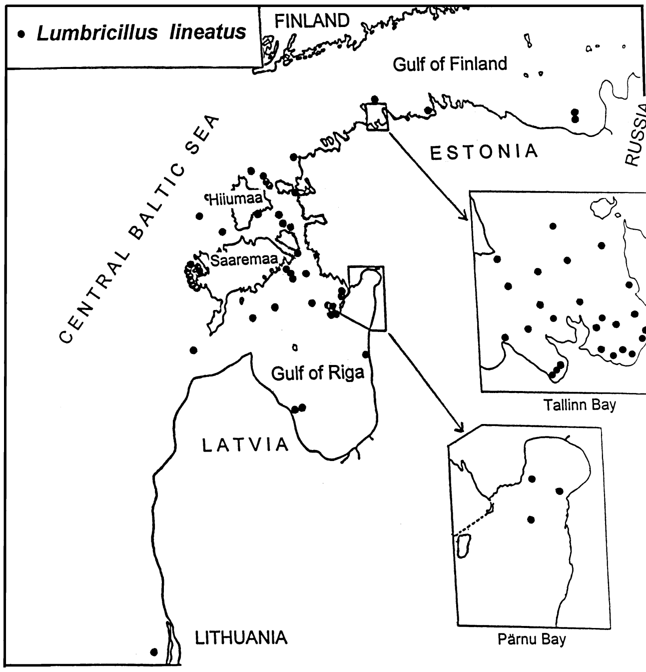

Fig. 3. Finding places of *Lumbricillus lineatus* in the eastern Baltic Sea.

Lumbricillus cf. *arenarius* (Michaelsen, 1889, emend. Knöllner, 1935)

Enchytraeus arenarius: Michaelsen 1889, pp. 12–14, fig. 6. *Enchytraeoides arenarius*: Knöllner 1935, pp. 437–438, figs 7, 8. *Lumbricillus arenarius*: Nielsen & Christensen 1959, pp. 107–108, figs 127, 128. Timm & Vvedenskaya 2006, p. 234, fig. 4e,o.

At least four specimens were collected 23.04.1980 from Tallinn Bay, coarse sand at a depth of 9 m, together with *L. buelowi* and *Marionina southerni* (identification checked by R. M. Schmelz). Bilobed penial bulbs (male glands) seen on cross-sections and whole mounts, a character not described by earlier authors. Identity of the European brackish-water material with the somewhat larger but otherwise similar worms from the freshwater Lake Kuril′skoe in Kamchatka (Timm & Vvedenskaya 2006) would need an additional study.

Lumbricillus buelowi Nielsen et Christensen, 1959

Fridericia bulbosa (Rosa): Bülow 1957, pp. 87–88. *Lumbricillus bülowi*: Nielsen & Christensen 1959, p. 106, figs 121–124, 129.

At least five specimens were collected 23.04.1980 from Tallinn Bay, coarse sand at a depth of 9 m, together with *L.* cf. *arenarius* and *Marionina southerni* (identified by R. M. Schmelz).

Lumbricillus cf. *pumilio* Stephenson, 1933

Lumbricillus pumilio: Stephenson 1933, pp. 902–904, figs 1–3.

One single specimen, 3.3 mm long and with ~25 segments, was collected 12.05.1976 from Haapsalu Bay, black foul-smelling mud with *Potamogeton filiformis* at a depth of 1 m, and studied on longitudinal sections only. It differs from the original description of *L. pumilio* in its relatively larger spermathecae and male funnels, and in the posterior incision of the brain; the ventroneural glands were not seen (observations by R. M. Schmelz).

Marionina southerni (Černosvitov, 1937)

Enchytraeus lobatus: Southern 1909, p. 158. *Fridericia pseudoargentea*: Knöllner 1935, pp. 443–448, figs 14–18. *Pachydrilus southerni*: Černosvitov 1937, p. 293. *Marionina southerni*: Nielsen & Christensen 1959, pp. 112–113, figs 135–137; Schmelz & Collado 2010, p. 100, fig. 39B.

At least nine specimens were collected 23.04.1980 from Tallinn Bay, coarse sand at a depth of 9 m, together with *L. buelowi* and *L.* cf. *arenarius* (identified by R. M. Schmelz).

Marionina spicula (Leuckart, 1847)

Enchytraeus spiculus: Leuckart 1847, p. 146. *Marionina spicula*: Nielsen & Christensen 1959, pp. 115–116, figs 145–148; non Timm 1965, 1970, 1987; Järvekülg 1979.

Two specimens were identified as belonging to *M. spicula* (and confirmed by R. M. Schmelz): one from Tallinn Bay, coarse sand at a depth of 17 m, 16.08.1969; and the other from Kolga Bay (eastward of Tallinn), coarse sand at a depth of 15.5 m, 11.09.1967.

Marionina naso n. sp. (Figs 4–6)

Enchytraeidae gen. sp. No. 1: Timm 1965, pp. 41–44, figs 2Б, Д, Е; 1970, p. 69, fig. 16; Järvekülg 1979, p. 91. *Marionina* sp.: Timm 1987, pp. 98–100; 1999, p. 159, fig. p. 158.

Holotype. VLS, Types-31.1. Cross-sections of sexually mature, clitellate specimen, on two slides. Gulf of Riga, S part near the Lielupe River mouth, depth 16 m, 16.01.1975, collected by G. Lagzdiņš.

Paratypes. VLS, Types-31.2. Sagittal sections of sexually mature specimen. In same sample as the holotype. VLS, Types-31.3. Whole-mounted specimen with incomplete reproductive system. Gulf of Riga, S part near Saulkrasti, depth 20.5 m, 25.10.1965, collected by O. Kačalova. VLS, Types-31.4. Cross-section of sexually mature but aclitellate specimen, on two slides. Baltic Sea proper, W from Ventspils, depth 55 m, fine sand, +1.9 °C, salinity 7.59‰, 8.06.1965, collected by A. Järvekülg. VLS, Types-31.5. Cross-sections of maturing specimen, Gulf of Riga, SW part, depth 24 m, slightly silted coarse sand, +7.15 °C, salinity 6.09‰, 28.06.1967, collected by A. Järvekülg. VLS, Types-31.6. Four whole-mounted immature specimens on common slide, Gulf of Riga, NE part, depth 14.8 m, slightly silted sand, +14.2 °C, salinity 6.29‰, 5.07.1960, collected by

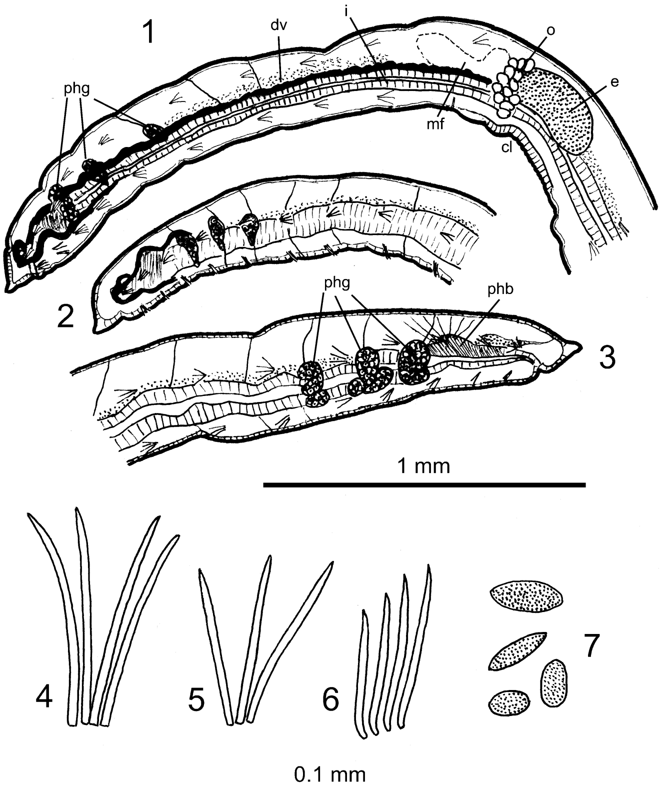

Fig. 4. *Marionina naso* n. sp. 1 – general view of the forebody of a specimen with an incomplete reproductive system (spermathecae and penial bulbs not observed); 2 and 3 – anterior ends of two immature specimens; 4–6 – bundles of chaetae; 7 – coelomocytes.

A. Järvekülg. ZIN, 1/48228. Three immature specimens on common slide, Gulf of Riga, SW part, depth 37.5 m, slightly silted sand, +2.3 °C, salinity 6.28‰, 27.06.1967, collected by A. Järvekülg. SMNH, Types-8360. Four immature specimens on common slide, Gulf of Riga, S part, depth 18 m, fine sand, +7.15 °C, salinity 6.08‰, 28.06.1967, collected by A. Järvekülg. MZH, 107.707. Two immature specimens on common slide, Tallinn Bay, depth 45 m, fine sand, 28.04.1978, collected by A. Järvekülg.

Other material. About 5870 sexually immature specimens in 335 samples, studied mostly as whole mounts.

Etymology. The specific name *naso* is a noun derived from the Latin word *nasus* (nose) and the Roman personal name *Naso*, emphasizing the nose-like prostomium of this worm.

Description. Length 5–11 mm when preserved, maximum thickness 0.20–0.85 mm, segment number 28–37 (but lower in the youngest cohort). The clitellate specimens studied were only 5–6 mm long. Body straight and white, resembling a boon of flax, segments extended; anteclitellar portion tapering; prostomium conical, sharp, often ending with a small knob (Fig. 4.1–4.3). Body surface smooth, intersegmental furrows inconspicuous. Chaetae before clitellum by 3–4(5), backwards by 2–3, straight or slightly bent, tapering, sharp-tipped, 28–84 (most often 40–50) μm long (Fig. 4.4, 4.5). The shortest chaetae in II, the longest in tail region. No difference between ventral and dorsal bundles. In mature, maturing, or post-reproductive specimens, no chaetae in XII. Clitellum in XII–XIII indistinct, more expressed laterally. Male pores in XII as slits covered with a lateral fold of body wall. Spermathecal pores dorsolateral, in 4/5. No traces of possible asexual reproduction with fragmentation were found.

Body wall thin and transparent, both epidermis and longitudinal musculature 7–9 μm thick; in prostomium and clitellum epidermis is thicker. In some specimens, coelothelium appearing as a thick (up to 18 μm) layer in several segments from VII on. Dissepiments 4/5–7/8(9/10) slightly thickened, funnel-shaped. Brain thickening and incised posteriorly. Nerve cord without any associated glands. Mighty pharyngeal pad in III–IV. Oesophagus covered with lush chloragogen tissue from V or VI; transition to intestine indistinct. No intestinal appendages. Pharyngeal (septal) glands on 4/5, 5/6, and 6/7, small, bilobate; at least two anterior pairs (sometimes all three) with dorsal junction. Small portions of glandular tissue present on their ducts. Coelomocytes usually not observed, but numerous in some specimens (Fig. 4.7). One or two pairs of anterior nephridia, in 6/7–8/9, with compact spindle-shaped postseptale (up to 90 μm × 40 μm) tapering into short (35 μm) ectal duct in its posterior end. Dorsal blood vessel arises in XV (sometimes afore?), proceeds forward between intestinal wall and chloragogen layer, and bifurcates between brain and pharynx in peristomium; the branches join forming ventral vessel in IV.

Testes usually not visible but sometimes as thin plates attached to 10/11 and clinging to lateral body wall in XI. Clusters of spermatocytes filling the cavity of XI, may even cause bulging of dissepiment 11/12 into XII. Male funnels in XI sausage-shaped, folded, 25–45 µm broad and at least 150 µm long, with narrow lumen; they too can bulge into XII. Collar represented with a simple distal opening (Fig. 5.1). Vasa deferentia long and winding, 16 µm wide in the anteriormost portion but narrowing further to 7–12 µm; ciliated over their whole length. Penial bulbs ovoid or flattened, clinging to lateral body wall, 70–100 µm high and 45–100 µm broad, consisting of sparse mass of epithelial and muscular tissue enclosed in thin (2 µm) muscular sac (Fig. 5.2, 5.3). Vas deferens enters bulb either from the upper or lateral side. Ectal aperture of bulb's slit-shaped lumen is covered with a lateral fold of body wall.

Ovaries in XII large and lobed. Several yolk-containing eggs in XII can bulge into XIII together with 12/13. Egg funnels not seen.

Spermathecae (Fig. 6) in V. Ectal duct abruptly separated from ampulla, roughly of the same length (not measured); 30–37 µm wide in its proximal portion but slightly tapering distally. Its lumen is only 2–4 µm wide, while the wall consists of granular epithelium with indiscernible cells covered with distinct longitudinal muscle bundles. Duct has no glandular cover but its distal portion is surrounded with a lush rosette of about 50 µm high gland cells attached to spermathecal pore at 4/5. Ampulla not wider than ectal duct when young, but pyriform, 44–48 µm wide and at least 80 µm long when mature and filled with irregularly located sperm bundles; then its wall measures only 2–3 µm. Muscular layer of ampulla very thin, epithelium consists of distinctly visible cells. Posterior end of ampulla tapers into narrow ental duct clinging to oesophagus laterally, in the posterior part of V; its possible discharge in the oesophagus was not seen.

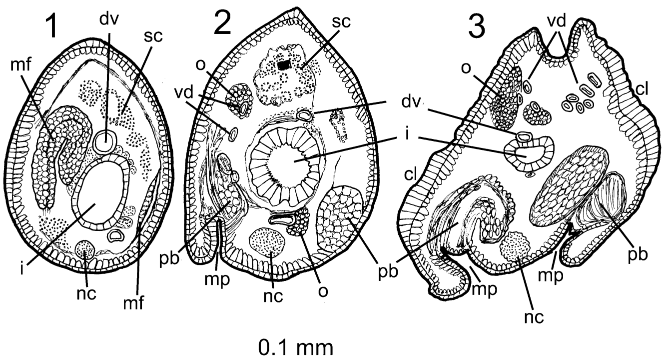

Fig. 5. *Marionina naso* n. sp. Sections of the holotype, with elements of male ducts. 1 – posterior portion of segment XI, with male funnels; 2 and 3 – segment XII, with male pores and penial bulbs.

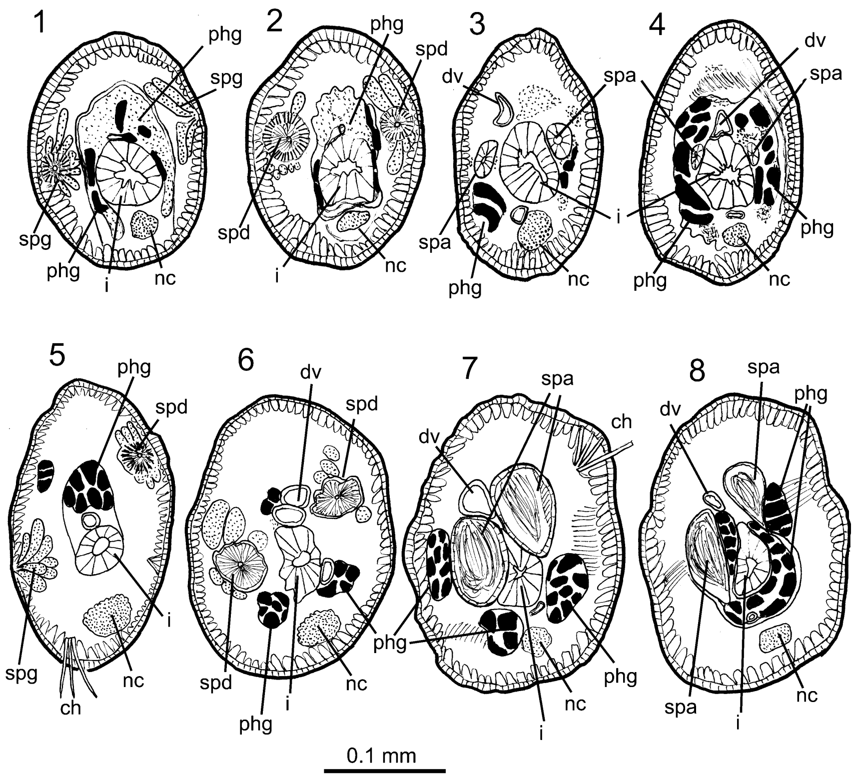

Fig. 6. *Marionina naso* n. sp. Sections of segment V, with spermathecae. 1–4 – a specimen with empty spermathecae; 2–8 – a specimen with filled spermathecae.

Taxonomical remarks. The above-described form is placed tentatively under the poorly defined genus *Marionina* consisting of small enchytraeids without any distinct synapomorphies (Rota et al. 2008). It differs clearly from the genus *Lumbricillus* in having compact testes, and from *Enchytraeus* in lacking oesophageal glands (peptonephridia). The third marine genus occurring in Europe, *Grania*, has never more than one chaeta per bundle. The new species is not identical with any of the about one hundred species listed under *Marionina* by Nakamura (2000), Nozaki & Nakamura (2005), Matamoros et al. (2007), and others. The sole other enchytraeid species known to have a distinctly pointed prostomium are the deep-sea North Atlantic *Grania papillinasus* and *G. torosa* (both described by Rota & Erséus 2003), in which the "nose tip" consists in a small apical papilla probably having sensory function. No special papilla was observed on the tip of prostomium in *M. naso*.

Distribution and ecology. Found at depths of 5–70 m, on different hard sediments (sand, clay, stones) but seldom on mud; at salinities 3.6–9.4‰ (Fig. 7). Lacking in the shallowest and warmest small bays; rare also in shallow straits between the

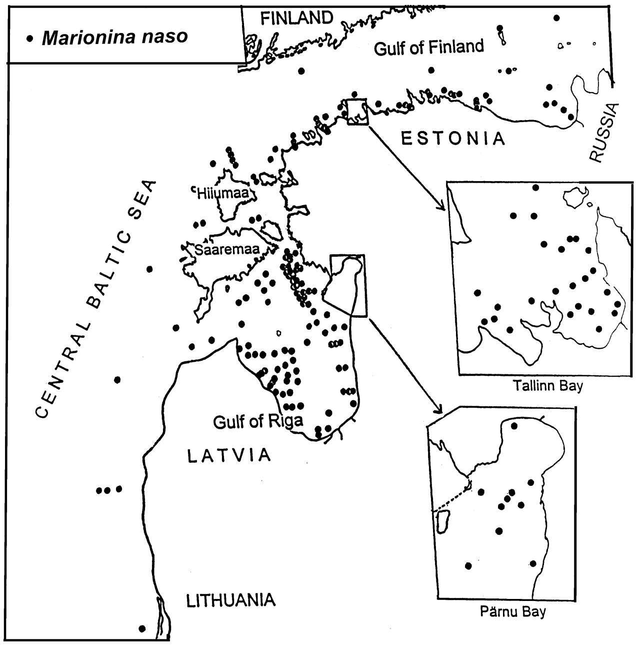

Fig. 7. Finding places of *Marionina naso* in the eastern Baltic Sea.

Estonian islands. In the Gulf of Riga, Gulf of Finland, and in the open Baltic Sea, its abundance can amount to thousands of individuals per 1 m^2 in some places at depths of 30–50 m, where it can be the only representative of Oligochaeta. Sometimes found together with *Lumbricillus lineatus*.

Almost the whole population sampled in April–September was immature, with traces of reproductive system (presence of spermathecal pores, lack of chaetae in XII, rudiments of testes and ovaries) in a few individuals only. Some samples displayed two size classes. Evidently, reproduction takes place in winter, while in summer only post-reproductive and juvenile individuals occur. A mature but aclitellate individual, with empty spermathecae (Fig. 6.1–6.4), was found on 8 June 1965 at Ventspils in the open Baltic Sea, at a depth of 55 m and water temperature of 1.9 °C. Three clitellate specimens occurred only in single samples taken in the southern part of the Gulf of Riga in October 1965 and January 1975 (Figs 4.1, 5.1–5.3, 6.5–6.8).

Preference of deeper, permanently cool waters and apparent reproduction exclusively in winter represent strong evidence for a northern origin of *Marionina naso*. It can belong to the so-called arctic, or glacial, relict complex, better known for several crustaceans and fishes (e.g., *Saduria*, *Mysis*, *Monoporeia*, *Myoxocephalus*). The assemblage has developed in permanently cold estuaries of the Arctic Ocean, filled alternately with fresh and brackish water and dammed up repeatedly by glaciers during the Ice Age, to form an intricate and dynamic network of periglacial lakes. Separate populations of these animals survived in many lakes, but also in the Baltic Sea, isolated from their native Arctic waters by the warmer and euhaline Atlantic Ocean (Järvekülg 1979). Sister populations of the present new species or related species can be sought for in Arctic estuaries or relict lakes.

CONCLUSION

The open Baltic Sea is unsuitable for most of the marine and freshwater enchytraeids, mainly due to its low salinity. Neither the genus *Grania*, distributed in the true marine sublittoral and with lower salinity limit of 11‰ (Rota & Erséus 2003), nor any freshwater or terrestrial enchytraeid taxa present in the depths of several large lakes (Timm 1996a) were found here. The Baltic Sea sublittoral serves as a common habitat for only two abundant species of different origin. The dominating species *Marionina naso* inhabits preferably clayey sediments at depths of 5–70 m. It is not known anywhere else and can belong to the cool-water Arctic relicts. The euryhaline species *Lumbricillus lineatus* (a dwarfish form here), as well as some other, scarce species represent the widely distributed marine littoral assemblage but inhabit here mainly coarse sediments of the sublittoral, even at depths to 47 m.

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Eesti valgeliimuklased (Enchytraeidae) 4. Läänemere idaosa sublitoraali valgeliimuklased (Annelida, Oligochaeta)

Tarmo Timm

Töö põhineb peamiselt Arvi Järvekülje 1959.–1981. aastal Läänemerest kogutud põhjaloomastiku-proovidel. Mere sublitoraalis, kuni 70 m sügavuseni, on tavalised kaks valgeliimuklaste liiki: *Lumbricillus lineatus* (Müller, 1774) väikesekasvulise vormina ja, eriti ohtrasti, *Marionina naso* n. sp. On toodud mõlema kirjeldus. Peale selle on ühes proovis Tallinna lahest leitud *L.* cf. *arenarius*, *L. buelowi* ja *M. southerni*, kahes proovis Tallinna ning Kolga lahest *M. spicula* ja Haapsalu lahest *L.* cf. *pumilio*; üksikuid liigini määramata isendeid ka mujalt. *M. naso* on oletatavasti jääaja relikt, kuna sigib talvel. Sügavamalt kui 70 m (pseudoabüssaalist) väheharjasusse ei leitud.