

Achaeta unibulba sp. n., a widespread European species (Oligochaeta, Enchytraeidae)

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Abstract. *Achaeta unibulba* sp. n. is described from a variety of terrestrial habitats in Europe. The new species is similar to a group of species around *A. eiseni* Vejdovský, 1878, having bottle-shaped glands (= setal follicles) dorsally and ventrally, the latter being only slightly smaller. Its main distinguishing characters are the fused penial bulbs forming a large roundish body at the ventral midline, the absence of accessory penial glands, the arrangement of clitellum glands, the presence of a large gland at the orifice of the spermathecae, an oesophageal appendage in V without canal leading to pharynx, and the presence of three pairs of preclitellar nephridia. The species occurs in slightly acid to neutral soils. It was found in mineral horizons of mull humus forms as well as in fen peat.

Key words: Oligochaeta, Enchytraeidae, *Achaeta*, new species, Europe.

INTRODUCTION

This species was first found and recognized as new species in the 1970s and then observed at numerous soil monitoring sites (BDF: Bodendauerbeobachtungsfläche) in Germany. Later it was recorded also from Iceland, Denmark, and Hungary and finally found in Estonia in 2004 by participants of the 6th International Symposium on Enchytraeidae (Schmelz et al. 2005). It thus appears

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to be a widespread species in Europe. The intention of the present paper is to describe this well-known species and to give it a valid name. A revision of the most related species will be published elsewhere.

MATERIAL AND METHODS

Living and preserved specimens were examined with interference contrast light microscopy (Leitz Dialux). Specimens were fixed hot (70°C) either in Bouin's fluid or in sublimat–formol–acetic acid after Broch from Reisinger (1925), or they were preserved in 70% ethanol. They were stained with borax–carmine and mounted in Canada balsam or euparal. Some preserved specimens were held in clove oil and were documented photographically and as drawings with the help of a drawing tube. Living animals were recorded on videotape (Zeiss Axioscope 2 microscope).

Achaeta unibulba sp. n. (Figs. 1–4)

Achaeta unibulba sp. n. but not published in Graefe (1973: Figs. 22–26.)

Achaeta unibulba nomen nudum: Mellin (1988), Schulte et al. (1989), Graefe (1993), Fründ & Graefe (1994), Graefe (1998), Graefe et al. (1998), Beylich & Graefe (2002)

The German type material including the holotype is deposited at the Zoological Museum of Hamburg, the other type material is deposited in the author's (K. Dózsa-Farkas) collection at the Department of Systematic Zoology and Ecology, Eötvös Loránd University, Budapest.

Holotype: ZMH OL 13193, stained whole mount.

Type locality: Germany, Schleswig-Holstein, Sachsenwald near Aumühle, damp forest soil, mull, coll. U. Graefe, V 1973.

Paratypes: Germany: ZMH OL 13194a–c, 3 spms, stained whole mounts, from different localities in Schleswig-Holstein: type locality; BDF 14 Meggerdorf, pasture, fen peat, coll. U. Graefe, XI 1994; BDF 25 Kudensee, pasture, fen peat, coll. U. Graefe, VII 1995.

Iceland: P.78.1 (1931) Vestur, grassland, 64°35' N, 21°36' W, coll. T. Christensen, 1999, 3 spms.

Denmark: P.78.2 (1932) Langstrup Mose, North Zealand, coll. B. Christensen and K. Dózsa-Farkas, XI 1999, 1 spm; P.78.3 (1933) Ringelmosen, Kalø, forest, coll. B. Christensen and K. Dózsa-Farkas, VI 2000, 1 spm.

Hungary: P.78.4 (1934) Bükk Mountains, Omassa, Fagus-forest, 48°06'55" N, 20°33'20" E, 410 m, coll. K. Dózsa-Farkas, X 2003, 1 spm; P.78.5 (1935) Zemplén

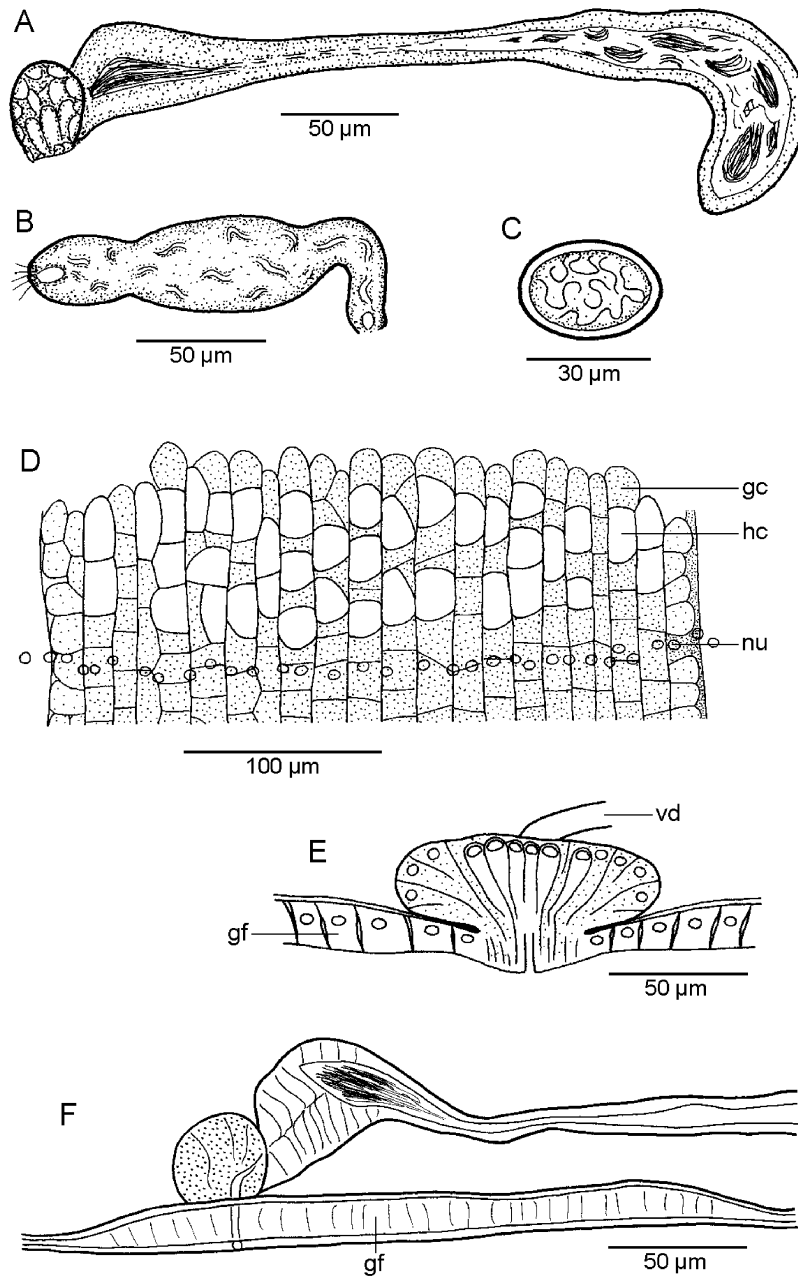


Fig. 1. *Achaeta unibulba* sp. n. A. Spermatheca. B. Preclitellar nephridium. C. Coelomocyte. D. Clitellum, dorsolateral view. E. Penial bulb, lateral view. F. Ectal part of spermatheca with seminal chamber, ectal gland, and glandular field of high epidermal cells, lateral view. A–C are freehand drawings; D–F are made from stained whole mounts with the help of a drawing tube. gc, granular cells of clitellum; gf, glandular field of high epidermal cells; hc, hyaline cells of clitellum; nu, nuclei of ring muscles forming together the lateral line; vd, vas deferens.

Mountains, Mlaha-rét, meadow, 48°24'04" N, 21°24'32" E, 497 m, coll. K. Dózsa-Farkas, V 2003, 2 spms; P.78.6 (1936) Zemplén Mountains, Mlaha-rét, birch-hornbeam forest, 48°24'04" N, 21°24'32" E, 497 m, coll. K. Dózsa-Farkas, V 2003; P.78.7 (1937) Zemplén Mountains, Mlaha-rét, birch-hornbeam forest, 48°24'04" N, 21°24'32" E, 497 m, coll. K. Dózsa-Farkas, V 2003, stained whole mount.

Etymology: The species name refers to the fused penial bulbs.

RESULTS

Description

Length 8–10 mm (viv.), **diameter** 0.2–0.3 mm. **Segment number** 32–40. **Bottle-shaped glands** (= setal follicles) present dorsally from II, ventrally from III. Length of dorsal glands $\frac{1}{3}$ to $\frac{1}{2}$ of body diameter, ventral glands slightly smaller. **Lens-shaped epidermal glands** present only laterally, not conspicuous. **Brain** two times as long as wide, rounded posteriorly. Three pairs of **pharyngeal glands** (= septal glands), all united dorsally and with ventral lobes (Fig. 2). Postseptal (= secondary) pharyngeal glands absent. **Oesophageal appendage** small, present only in V, without mid-dorsal canal to pharynx. Three pairs of **prelitellar nephridia** (Fig. 1B) from 6/7 to 8/9, with large anteseptale and slight constriction at septum. **Coelomocytes** (Fig. 1C) 30–50 μm long, oval or tapering at one side, with small hyaline border and few inner grooves. **Dorsal blood vessel** originating

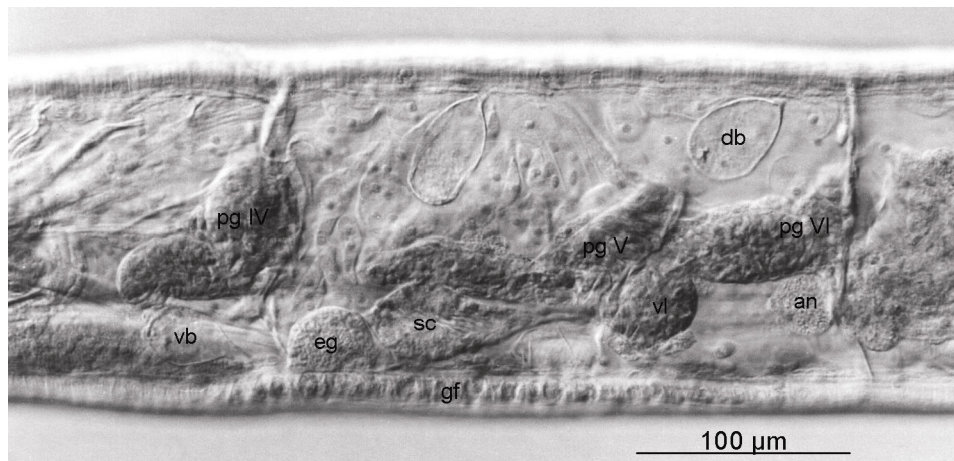


Fig. 2. *Achaeta unibulba* sp. n. Segments IV–VII, lateral view. Photograph from a stained specimen held in clove oil. an, anteseptale of nephridium at 6/7; db, dorsal bottle-shaped gland in VI; eg, ectal gland of spermatheca; gf, glandular field of high epidermal cells; pg, pharyngeal gland of segment IV, V, VI, respectively; sc, seminal chamber of spermatheca; vb, ventral bottle-shaped gland in IV; vl, ventral lobe of pharyngeal gland in VI.

in VII, with pulsating expansions in VII, VI, and V. Blood colourless. **Clitellum** (Fig. 1D) on XII– $\frac{1}{3}$ XIII, dorsally with 60–70 μm wide interruption. Glandular cells arranged in 20–23 transverse rows, but not in longitudinal rows. Dorso-lateral hyaline cells irregularly scattered. Glandular area bounded dorsolaterally by granular cells only. **Testis** in XI, **ovary** in XII, both unpaired at ventral midline. **Seminal vesicle** variable in size or poorly developed. **Sperm funnel** (Fig. 3) large cylindrical (length 220–300 μm), 4–6 times as long as wide, about 1.5 times as long as body diameter. Collar as wide as funnel body, separated from funnel body by a short neck-like constriction. **Vas deferens** very long, ca. 10 μm wide, often coiled into a spiral. **Male pores** in XII, close to each other (ca. 25 μm apart) near ventral midline, surrounded by glands extending into the body cavity, forming a compact mushroom-like **penial bulb** (Fig. 1E). Both penial bulbs fused to a conspicuous roundish body at the ventral midline (Fig. 4). Accessory penial glands absent. A glandular field of high epidermal cells present before and behind male pores, filling the ventral gap of clitellum glands. **Spermatheca** (Figs. 1A, 1F) long, extending to XIII or IX. Ectal openings ventrally at 4/5, surrounded by a glandular field of high epidermal cells reaching backwards to 6/7. Ectal part of spermatheca consisting of seminal chamber and a large round multicellular gland in front of the ectal duct. Seminal chamber with thickened glandular walls and spindle-shaped lumen containing close-packed sperms, arranged almost perpendicular to the ectal duct. Entally the spermathecal duct is narrowing, expanding in VIII into a large thin-walled ampulla filled with sperm.

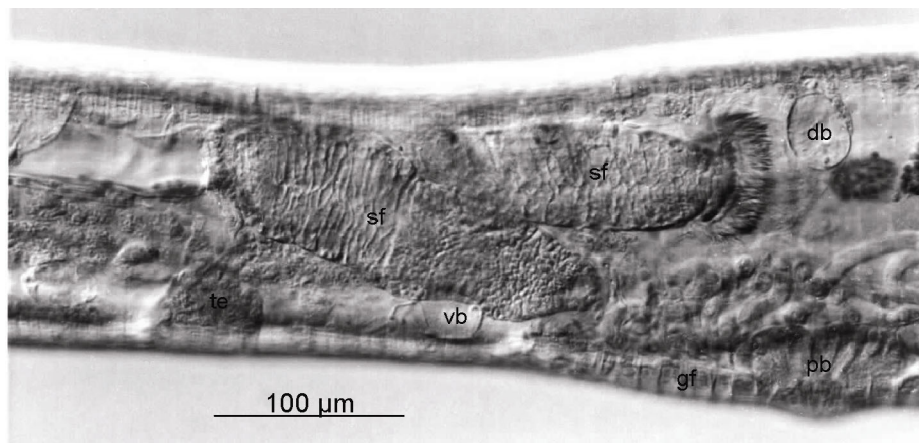


Fig. 3. *Achaeta unibulba* sp. n. Segments X–XII, lateral view. Photograph from a stained specimen held in clove oil. db, dorsal bottle-shaped gland in XII; gf, glandular field of high epidermal cells in the clitellar region; pb, penial bulb; sf, both sperm funnels; te, testis; vb, ventral bottle-shaped gland in XI.



Fig. 4. *Achaeta unibulba* sp. n. The fused penial bulbs in XII, ventral view. Photograph from a stained specimen held in clove oil. All photographs made by U. Graefe using an interference contrast microscope.

Remarks

The first description of the new species in Graefe (1973) was performed as part of an initially planned comprehensive revision of the genus *Achaeta* Vejdovský, 1878. The finishing of this work unfortunately had to be postponed, owing to other obligations of the first author. At present the genus *Achaeta* comprises 40 nominal taxa. A comparison of related taxa is severely hampered by the lack of details in most of the older descriptions. One of the few features reported for all species is the absence or presence and arrangement of bottle-shaped epidermal glands, previously termed setal follicles (cf. Graefe 2002). *Achaeta unibulba* belongs to a group of species having bottle-shaped glands dorsally and ventrally, the ventral glands being only slightly smaller. Other species of this group are *A. eiseni* Vejdovský, 1878, *A. bulbosa* Nielsen & Christensen, 1961, *A. christenseni* Prabhoo, 1966, and *A. seminalis* Kasprzak, 1972 (Vejdovský 1878, Nielsen & Christensen 1961, Prabhoo 1966, Kasprzak 1972). Principal characters that distinguish the

new species from this group are the construction of the penial bulb, the absence of accessory penial glands, the arrangement of clitellum glands, and the presence of a large gland at the orifice of the spermathecae. A feature not described in the older literature is the number of preclitellar nephridia. Most species have two pairs from 6/7 to 7/8. Having three pairs, *A. unibulba* shares this character with *A. bifollicula* Chalupský, 1992, a species with bottle-shaped glands present only dorsally (Chalupský 1992), and a group of small species without bottle-shaped glands, comprising *A. iberica* Graefe, 1989, *A. pannonica* Graefe, 1989, *A. etrusca* Rota, 1995, and *A. petseri* Dózsa-Farkas, 1998 (Graefe 1989, Rota 1995, Dózsa-Farkas et al. 1998).

Occurrence

Found in a large variety of site conditions including forest, grassland, and arable land, in mineral horizons of mull humus forms as well as in organic horizons of fen peat, pH(CaCl₂) 4.2–7.0, moisture conditions (sensu Graefe & Schmelz 1999) fresh to damp.

Germany: 47 localities including Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, North Rhine-Westphalia, Brandenburg.

Iceland: Vestur.

Denmark: Langstrup Mose, North Zealand, and Ringelmosen, Kalø, Jutland.

Hungary: Bükk Mountains, Omassa, and Zemplén Mountains.

Estonia: Võrtsjärv Limnological Station, Suur Munamägi Hill.

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Europas laialt levinud liik *Achaeta unibulba* sp. n. (Oligochaeta, Enchytraeidae)

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Sellel liigil, mida siin on esimest korda vormiliselt kirjeldatud, on erinevalt lähematest sugulastest peniaalsibulikud kõhupoolel osaliselt kokku kasvanud. Teda on varem kohatud Saksamaal, Islandil, Taanis ja Ungaris, nüüd ka Eestis.