

## Nematodes from rocky grassland in Börzsöny Mountains, Hungary

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**Abstract.** This paper reports on investigations carried out on soil inhabiting nematodes living in andesitic rock regions of Börzsöny Mountains. Seventeen species are listed. *Heterodorus arcuatus* (Thorne, 1939), new to the fauna of Hungary, is described and illustrated in detail.

**Keywords.** Börzsöny Mts., Hungary, Nematoda, species list, new records.

The nematode fauna of Börzsöny Mountains belonging to Transdanubian Middle Range in Hungary has scarcely been studied. In December 2009, the present author collected several soil samples in two andesitic (volcanic rocky) regions, namely in Szürke Hill and Ördög Hill.

### MATERIAL AND METHODS

Nematodes were extracted using the Baermann's funnel method, fixed in FAA, processed to anhydrous glycerine by a slow method, and mounted on permanent slides. Measurements were taken by ocular micrometer, curved structures were measured along the medial line. Morphometrics included de Man's indices and most of the usual measurements. The location of the oesophageal gland nuclei is expressed according to Andrassy (1998). Drawings were made with aid of a drawing tube.

### LIST OF THE COLLECTED SPECIES

The observed seventeen nematode species are as follows.

#### Cephalobidae

*Acrobeles ciliatus* von Linstow, 1877. – Ördög Hill, soil from closed rock grassland.

#### Criconematidae

*Criconemoides informis* (Micoletzky, 1922) Taylor, 1936. – Szürke Hill, soil from closed rock grassland.

#### Monhysteridae

*Geomonhystera villosa* (Bütschli, 1873) Andrassy, 1981. – Ördög Hill, soil from open rock grassland.

#### Plectidae

*Plectus velox* Bastian, 1865. – Szürke Hill, soil from open and closed grasslands. Ördög Hill, soil from open and closed grasslands.

#### Tripylidae

*Tripylina arenicola* (de Man, 1880) Brzeski, 1963. – Szürke Hill, soil from closed and open rock grasslands, Ördög Hill, soil from closed and open rock grasslands.

#### Amphidelidae

*Paramphidelus hortensis* (Andrassy, 1961) Andrassy, 1977. – Ördög Hill, soil from closed rock grassland.

#### Qudsianematidae

*Eudorylaimus bombilectus* Andrassy, 1962. – Szürke Hill, soil from open and closed rock grasslands.

#### Aporcelaimidae

*Aporcelaimellus alius* Andrassy, 2002. – Szürke Hill, soil from open and closed rock grasslands, Ördög Hill, soil from open and closed rock grasslands.

*Aporcelaimellus krygeri* (Ditlevsen, 1928) Heyns, 1965. – Szürke Hill, soil from opened and close rock grasslands, Ördög Hill, soil from open and closed rock grasslands.

*Aporcelaimellus medius* Andrassy, 2002. – Szürke Hill, soil from open and closed rock grasslands, Ördög Hill, soil from closed rock grassland.

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*Aporcelaimellus obtusicaudatus* (Bastian, 1865) Altherr, 1868. – Szürke Hill, soil from open rock grassland.

Qudsianematidae

*Allodorylaimus granuliferus* (Cobb, 1983) Andrassy, 1986. – Szürke Hill, soil from open and closed rock grasslands, Ördög Hill, soil from open and closed rock grasslands.

Paraxonchiidae

*Paraxonchium laetificans* (Andrassy, 1956) Altherr & Loof, 1969. – Szürke Hill, soil from open and closed rock grasslands, Ördög Hill, soil from open and closed rock grasslands.

Mylonchulidae

*Mylonchulus brachyuris* (Bütschli, 1837) Cobb, 1917. – Szürke Hill, soil from open and closed rock grasslands, Ördög Hill, soil from open and closed rock grasslands.

Mononchidae

*Clarkus papillatus* (Bastian, 1865) Jairajpuri, 1970. – Ördög Hill, soil from open grassland.

*Coomansus parvus* (de Man, 1880) Jairajpuri & Khan, 1977. – Ördög Hill, soil from open rock grassland.

Nordiidae

*Heterodorus arcuatus* (Thorne, 1939) Andrassy, 2009. – Szürke Hill, soil from open and closed rock grasslands, Ördög Hill, soil from open and closed rock grasslands.

## DESCRIPTION

One of the nematode species observed in the Börzsöny Mountains proved to be new to the fauna of Hungary. Its detailed description is herewith provided.

### *Heterodorus arcuatus* (Thorne, 1939)

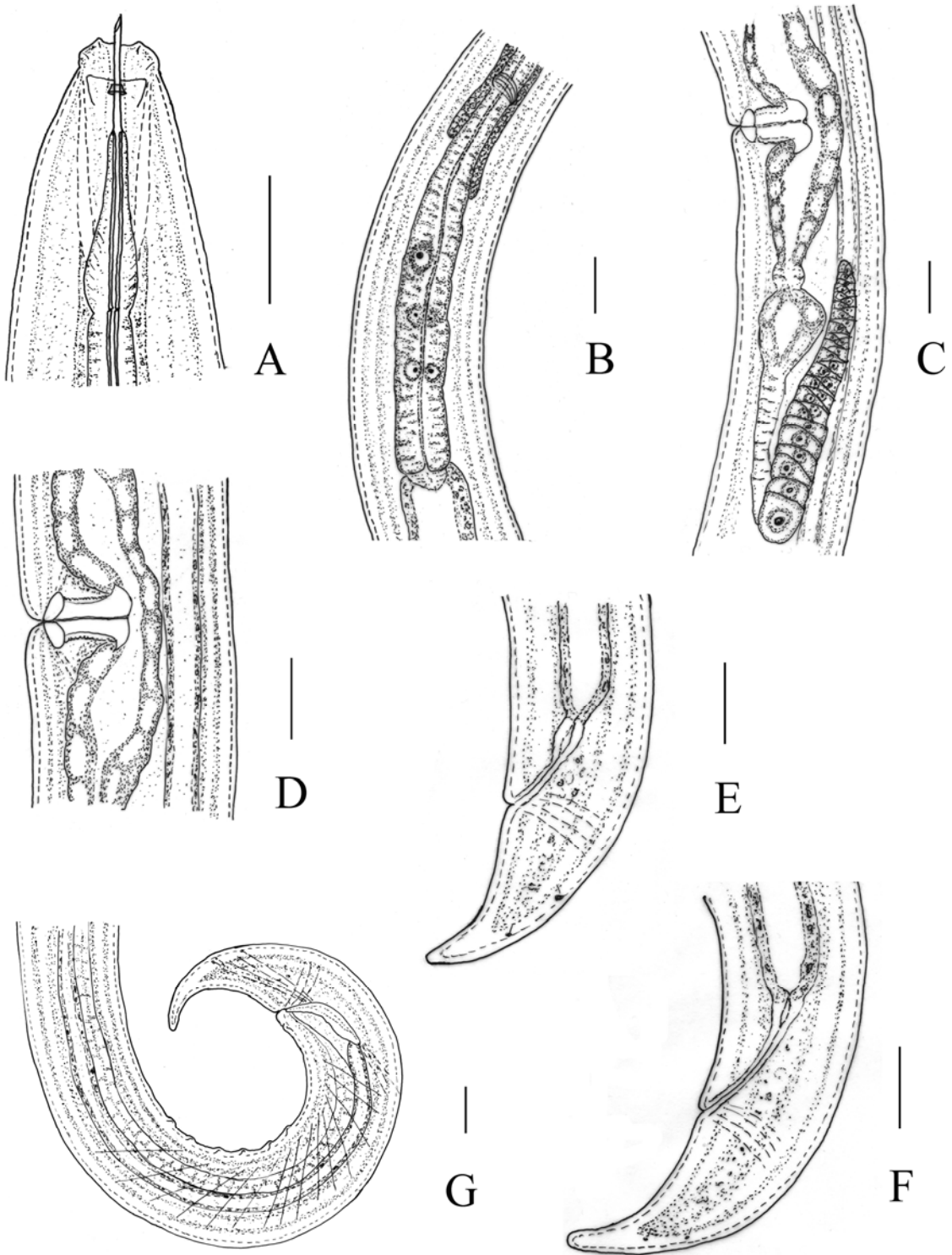
Andrassy, 2009 (Fig. 1 A–F)

*Females* (n = 13): L = 1.16–1.50 mm; a = 23–27; b = 4.7–5.7; c = 23–34; c' = 1.4–1.9; V = 48–55%.

*Males* (n = 8): L = 1.28–1.46 mm; a = 23–27; b = 4.4–5.3; c = 24–27; c' = 1.3–1.8.

*Body* moderately slender, C- or J-shaped (especially male) after fixation. Body cylindrical, tapering. Cuticle 2.5–3.0  $\mu\text{m}$  thick at anterior region, 3.0–4.0  $\mu\text{m}$  at mid-body and 4.5–6.0 at tail. Its outer layer thinner than the inner, with very fine transverse striations. Lateral hypodermal chords about one-fourth of body diameter at mid-body. Lateral pores obscure. Lip region 12–14  $\mu\text{m}$  wide, 2.6–3.0 times as broad as high, rather rounded. Offset by shallow constriction, lips amalgamated. Labial papillae slightly protruding above labial contour. Amphids cup-shaped, opening at level of cephalic constriction and 6.5–7.5  $\mu\text{m}$  wide or occupying slightly more than half of lip region diameter. Cheliostom a truncate cone, with no particular differentiation. Odontostyle thin, straight, with distinct walls and narrow lumen, 17.5–21  $\mu\text{m}$  long, 1.5–1.6 times as long as lip region diameter. Aperture small one-eighth to one-seventh of total length. Odontophore rod-like, lacking of any specialisation, 32–36  $\mu\text{m}$  long, 1.6–1.8 times as long as odontostyle. Guiding ring double, at 14.5–16.0  $\mu\text{m}$  or 1.2–1.3 lip region diameter from anterior end. Pharynx 250–280  $\mu\text{m}$  long, pharyngeal expansion 35–40 % of total oesophagus length. Base of pharyngeal expansion surrounded by faint membrane-like structure. Pharyngeal gland nuclei located as follows: D = 68–71; AS<sub>1</sub> = 27–28; AS<sub>2</sub> = 28–30; PS<sub>1</sub> = 48–52; PS<sub>2</sub> = 51–53. Cardia rounded-conoid, wider than long, 13–16  $\times$  8–11  $\mu\text{m}$ .

*Female.* Female genital system didelphic-amphidelphic, both branches equally and well developed. Vulva transverse with sclerotised lips. Ovaries reflexed, relatively well developed, 64–82  $\mu\text{m}$  (anterior) and 68–89  $\mu\text{m}$  (posterior) long with oocytes arranged in a single row except near the tip. Oviduct joining ovary subterminally, 76–87  $\mu\text{m}$  (anterior) 81–98  $\mu\text{m}$  (posterior) long. Sphincter distinct, located between oviduct and uterus. Uterus 61–76  $\mu\text{m}$  (anterior) 68–79  $\mu\text{m}$  (posterior) long, bipartite. Vagina extending inwards two-fifth of corresponding body diameter, encircled proximally by cuticularization. *Pars proximalis vaginae* 11–12  $\mu\text{m}$  long with almost straight walls, encircled by muscles. *Pars re-*



**Figure 1.** *Heterodorus arcuatus*. A: anterior end; B: posterior pharyngeal region; C: part of female genital organ; D: vulval region; E-F: female posterior end; G: male posterior end. (Scale bars = 20  $\mu$ m)

*fringens vaginae* with two well developed trapezoid clerotised pieces, each measuring  $4 \times 6,5\text{--}7 \mu\text{m}$  high. *Pars distalis vaginae*  $4,5\text{--}5,5 \mu\text{m}$  long. Prerectum  $72\text{--}100 \mu\text{m}$  long, 2.2–3.2 times, rectum  $25\text{--}35 \mu\text{m}$  long, 0.9–1.3 times the anal body diameter long. Uterine eggs measuring  $78 \times 38 \mu\text{m}$ . Anal body width  $25\text{--}34 \mu\text{m}$ . Tail  $48\text{--}58 \mu\text{m}$  or 1.6–2.0 anal body width, long conoid with finely rounded tip. Two pairs of caudal pores at the middle of tail, one subdorsal, another lateral.

*Male.* General morphology similar to female, but with posterior body region more ventrally curved, often G-shaped after fixation because of presence of copulatory muscles. Genital system diorchic, with opposite testes. Spicula  $41\text{--}44 \mu\text{m}$  long, *ca* equal to 1.3–1.6 anal body diameters, dorylaimoid, relatively slender, ventrally curved. Lateral guiding pieces simple, one-fourth as long as spicula. Supplements consisting of the usual adanal pair and six spaced ventromedian ones; posterior supplements anterior to the range of spicula. Tail conical, similar to female,  $44\text{--}50 \mu\text{m}$  long, ventrally curved with finely rounded terminus. Two caudal pores on each side.

*Remarks.* The Hungarian material fits well to the original description by Thorne (1939) and the recent redescription by Guerrero and Peña-Santiago (2007) based on type specimens, although some minor differences have been observed.

Body length of Hungarian individuals can be somewhat shorter than in American specimens ( $L = 1,16\text{--}1,50 \text{ mm}$  vs  $L = 1,5\text{--}1,9 \text{ mm}$ ), rectum shorter ( $25\text{--}35 \mu\text{m}$  vs  $34\text{--}45 \mu\text{m}$ ), odontophore longer ( $32\text{--}36 \mu\text{m}$ , 1.6–1.8 times as long as odon-

tostyle vs  $24\text{--}31 \mu\text{m}$ , 1.3–1.4 times odontostyle length) and tail shorter ( $48\text{--}58 \mu\text{m}$  vs  $62\text{--}80 \mu\text{m}$ ). Andrassy (1958, 1959), Zullini (1970) and Ciobanu *et al.* (2010) reported European specimens with shorter tail ( $49\text{--}62 \mu\text{m}$ ) which fit well to the Hungarian individuals.

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