

Revision of the order Monhysterida (Nematoda) Inhabiting Soil and Inland Waters

By

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Abstract. In this study a new system of the non-marine — freshwater, inland saline water and soil inhabiting — members of the nematode order Monhysterida is presented. The old genera are redefined, whilst three genera are newly established. *Eumonhystera* n. gen. is characterized by the position of the amphids and vulva, and by comparatively short spicules; its type is *E. vulgaris* (DE MAN, 1880) n. comb. *Anguimonhystera* n. gen. is unique because of its long and extremely slender body; its type is *A. stadleri* (GOFFART, 1950) n. comb. *Geomonhystera* n. gen. includes terrestrial species and is characterized by the vulva lying far back and by the structure of the rectum; its type is *G. villosa* (BÜTSCHLI, 1873) n. comb.

Altogether 64 non-marine species of the order Monhysterida are regarded as valid, and their list and synonyms are enumerated. Besides, keys to the genera and species, as well as the geographical data of the continental members of the Monhysterida are given. Finally, three species are described as new to science, viz. *Eumonhystera altherri*, *E. barbata* and *E. hungarica* n. spp, and a number of new combinations are proposed.

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While several papers on marine genera and species of the nematode order Monhysterida have been published hitherto, publications dealing with continental (non-marine) members of the same group are rather poor in number. After the classic descriptions of BASTIAN (1865), BÜTSCHLI (1873, 1874), DE MAN (1876, 1880, 1881, 1884), COBB (1893, 1906), and DADAY (1899, 1903, 1905), so to say the only researchers to publish considerable new data to the morphology and taxonomy of the freshwater and soil inhabiting Monhysteridae were MEYL (1953, 1954, 1955, 1957), JUGET (1969) and ANDRÁSSY (1962, 1968, 1977).

The first classification of the continental species was proposed by MICOLETZKY (1922) who listed in his book 32 non-marine species and varieties in the genus *Monhystera*. Afterwards, he was the first to compile a key to determining the species of that genus. Besides him, solely SCHNEIDER (1939) compiled another key to *Monhystera* species, however, his paper contained only the species occurring in Germany (Central Europe). MEYL (1961) enumerated the European species of the family Monhysteridae (31 species), whilst GOODEY (1963) gave a list of 62 species or varieties in the genus *Monhystera*, 2 species in *Monhystrella* and 2 species in *Hofmaenneria* known over the world to that time. Finally ANDRÁSSY published a list of each species in the genera *Monhystrella* (1968; 10 species and subspecies) and in *Theristus* (1977; 5 species).

Besides the work quoted above, two further publications are worthwhile to mention. One is the paper of WIESER (1956) in which an enumeration of the marine and non-marine species of *Monhystera* (31 species in all) can be found, as well as a key to the species group of the genus. The other paper is the check list of GERLACH and RIEMANN (1973). Summing up the distribution data of all aquatic Nematoda, the latter authors listed every marine and inland species of the family Monhysteridae as follows: 297 species and subspecies in *Theristus*, 297 species and subspecies in *Monhystera*, 12 species and subspecies in *Monhystrella* and 3 species in *Hofmaenneria*.

Last but not least it should be mentioned that in some recent papers (1977, 1978) LORENZEN revised the system of the superfamily Monhysteroidea, namely from a phylogenetical point of view. Among others, he pointed out that the genera *Theristus* and *Monhystera* were not so close one another as to validity as supposed previously. On the contrary, they do have some primary morphological differences (in the structure of the cuticle and in the position of the genital organs) that give good reason for distinguishing them even on family level (Xyalidae and Monhysteridae, respectively).

In this paper, I propose a new systematization of the limnic, inland saline and terrestrial — in short, non-marine — species of the order Monhysterida. I give redefinitions of the genera, descriptions of new genera, lists and synonyms of the species, keys to contribute to the determination of these nematodes, as well as the geographical distribution data of the continental members of the order Monhysterida. In my appraisal, the number of non-marine species of the genera is as follows:

<i>Theristus</i>	6 species
<i>Daptonema</i>	2 species
<i>Monhystera</i>	7 species
<i>Eumonhystera</i>	24 species
<i>Anguimonhystera</i>	3 species

<i>Geomonhystera</i>	5 species
<i>Monhystrella</i>	13 species
<i>Sinanema</i>	1 species
<i>Hofmaenneria</i>	3 species
<hr/>	
Altogether	64 species

Order: **MONHYSTERIDA** DE CONINCK & SCHUURMANS STEKHOVEN, 1933

Torquentia. Cuticle smooth or transversely annulated, without punctation. Cephalic setae 4, 4+6 or more. Amphids circular or subspiral, only exceptionally spiral. Mouth cavity generally quite small, funnel-shaped, occasionally wider, mostly without distinct sclerotization. Denticles, if present, generally very small. Oesophagus cylindrical, only rarely swollen proximally, without a true bulb. Cardial glands present. Female gonad outstretched; almost in every case single, prodelphic. Testes one or two; male genital papillae simple, or completely absent.

Predominantly aquatic species, marine or limnic, only a few per cent of them inhabit soil biotopes. The non-marine forms belong to two superfamilies of the suborder Monhysterina DE CONINCK & SCHUURMANS STEKHOVEN, 1933.

Key to the superfamilies

- 1 Mouth cavity comparatively wide with sclerotized walls, vestibule longitudinally striated b) **Sphaerolaimoidea** (p. 37)
- Mouth cavity small and narrow, not or only hardly sclerotized, vestibule not striated. a) **Monhysteroidea** (p. 15)

a) Superfamily: **MONHYSTEROIDEA** DE MAN, 1876

Monhysterida. Cuticle smooth or annulated. Mostly 10 (6+4) cephalic setae. Stoma simple, funnel-shaped, small, generally not sclerotized at all. Denticles, if present, minucious, hardly recognizable. Vestibule smooth.

The continental species belong to two families.

Key to the families

- 1 Cuticle smooth, without any annulation; testis single; both female and male gonads lying on the right of the intestine 2. **Monhysteridae** (p. 19)
- Cuticle with fine but distinct annulation; testes mostly two; anterior testis and ovary lying on the left of the intestine. 1. **Xyalidae** (p. 15)

1. Family: **Xyalidae** CHITWOOD, 1951

Monhysteroidea. Generally small animals. Cuticle finely but conspicuously annulated, with thin setae. Basic number of cephalic setae 4, but further supplementary setae may also occur. Amphids circular, rarely – especially in marine species – spiral. Eye spots (ocelli) may be present. Stoma narrow, funnel-shaped,

without sclerotized teeth, at best with some very small denticles. Oesophagus almost cylindrical. Ovary one, testes mostly two; the anterior testis and ovary lying on the left, the posterior testis on the right of the intestine. Postvulval sac of uterus only rarely present. Spicules frequently surrounded by the slipper-shaped gubernaculum. No preanal supplements or papillae. Tails similar in both sexes, elongate-conical or filiform, with glands (generally 3 in number) and terminal spinneret. Females and males equally common in general.

Primarily marine nematodes but two genera of the subfamily Xyalinae CHITWOOD, 1951 contain also freshwater species.

Key to the genera

- 1 Tail with a pair of terminal setae; vulva at $3/4$ of body length.
2. **Daptonema** (p. 18)
- Tail without terminal setae; vulva at $2/3$ of body length.
1. **Theristus** (p. 16)

1. Genus: *Theristus* BASTIAN, 1865

Syn. *Monhystera* (*Theristus* BASTIAN, 1865) MICOLETZKY, 1922; *Tachyhodites* BASTIAN, 1865; *Penzancia* DE MAN, 1889; *Theristus* (*Penzancia* DE MAN, 1889) WIESER, 1956; *Metadesmolaimus* SCHUURMANS STEKHOVEN, 1935.

Xyalidae. Body of freshwater species 0.6 to 1.7 mm long. Cuticle finely but distinctly annulated, with thin submedial setae. Head not or only slightly offset, with 10 or 12 setae. Ocelli occasionally present. Mouth cavity small and narrow, without conspicuous denticles. Vulva at $2/3$ of body length. Testes one or two. Spicules usually arched, sometimes very long, often as long as anal diameter of body. Gubernaculum slipper-shaped, with or without a caudal extension. Terminal setae on tail not present.

Numerous species belong to this genus, they are, however, marine for the most part. A few species occur in brackish or fresh water, especially in interstitial habitats.

Type species: *Theristus acer* BASTIAN, 1865 — a marine species.

The following six freshwater species belong to the genus:

Th. agilis (DE MAN, 1880) FILIPJEV, 1918

Syn. *Monhystera agilis* DE MAN, 1880

Theristus (*Penzancia*) *agilis* (DE MAN, 1880) FILIPJEV, 1918

Monhystera labiata DADAY, 1903

Monhystera macrocephala RAHM, 1924

Theristus heteroscanicus WIESER in BRINCK, DAHL & WIESER, 1955

Theristus scanicus apud GERLACH, 1953, 1965; RIEMANN, 1966

Th. athesinus ANDRÁSSY, 1962

Syn. *Theristus* (*Penzancia*) *athesinus* ANDRÁSSY, 1962 (RIEMANN, 1966)

Th. kaszabi ANDRÁSSY, 1977

Th. ruffoi ANDRÁSSY, 1959

Syn. *Theristus* (*Penzancia*) *ruffoi* ANDRÁSSY, 1959 (RIEMANN, 1966)

Th. vesentinae ANDRÁSSY, 1962

Syn. *Theristus (Penzancia) vesentinae* ANDRÁSSY, 1962 (RIEMANN, 1966)

Th. wegelinae ANDRÁSSY, 1962

Syn. *Theristus (Penzancia) wegelinae* ANDRÁSSY, 1962 (RIEMANN, 1966)

The further species similarly belong to the genus *Theristus*, they are, however, poorly defined, hence must be regarded as species inquirendae:

Th. helveticus (STEINER, 1914) n. comb.

Syn. *Monhystera helvetica* STEINER, 1914

Th. lingi (HOEPLI & CHU, 1932) ANDRÁSSY, 1960

Syn. *Microlaimoides lingi* HOEPLI & CHU, 1932

Th. parasiticus (PENSO, 1938) n. comb.

Syn. *Monhystera parasitica* PENSO, 1938

Key to the limnic species

- 1 Tail very long, 14–15 times as long as anal body diameter; body to 0.7 mm long. — ♀: L = 0.66–0.70 mm; a = 35–36; b = 4.6–4.8; c = 3.9–4.0; V = 65–66%. ♂ unknown. (Mongolia; in wet moss.) . . . **kaszabi** ANDRÁSSY
- Tail shorter, 6–9 times as long as anal body diameter; body longer than 0.8 mm (generally longer than 1 mm). 2
- 2 Gubernaculum very long as compared to spicules, spicules surrounded by the gubernaculum to 2/3 of their length; body shorter than 1 mm. — ♀: L = 0.8–0.9 mm; a = 41–45; b = 4.5–4.8; c = 7.0–7.7; V = 61–64%. ♂: L = 0.8–0.9 mm; a = 47–55; b = 4.5–4.9; c = 6.4–7.8. (Italy and Switzerland; in groundwater biotopes and in Lake Léman.) **vesentinae** ANDRÁSSY
- Gubernaculum shorter, spicules surrounded by the gubernaculum less than to 1/2 of their length; body longer than 1 mm 3
- 3 Spicules distinctly longer than two anal body diameters; amphids 1.6–1.9 head diameters behind anterior end. — ♀: L = 1.0–1.2 mm; a = 37–46; b = 4.4–5.1; c = 7.5–10; V = 60–63%. ♂: L = 1.1–1.2 mm; a = 43–50; b = 5.0–5.2; c = 7.4–8.0. (Italy; in groundwater.) . . **ruffoi** ANDRÁSSY
- Spicules at most twice as long as anal body diameter, but generally shorter; amphids 1.1–1.5 head diameters behind anterior end. 4
- 4 Cephalic setae about 10 μ m long. — ♀: L = 1.2–1.6 mm; a = 31–45; b = 5–7; c = 7–9; V = 60–64%. ♂: L = 1.0–1.5 mm; a = 40–50; b = 5–7; c = 7–10. (Holland, Germany, Denmark, Austria, Switzerland, Czechoslovakia, Poland, Rumania, Italy, Norway, Sweden, Soviet Union; Zaire; Japan, Hainan; USA, Chile; in freshwater and brackish biotopes, and in wet soil.) **agilis** (DE MAN)
- Cephalic setae about 20 μ m long. 5
- 5 Gubernaculum proximally with short, hook-like apophysis; male tail rapidly narrowing just behind cloacal opening. — ♀: L = 1.5–1.7 mm; a = 34–42;

b = 5.0–5.3; c = 8.4–10; V = 65–66%. ♂: L = 1.7–1.8 mm; a = 47–60; b = 5.2–5.6; c = 8.8–9.2. (Germany; in groundwater.)

wegelinae ANDRÁSSY

– Gubernaculum proximally without apophysis; male tail not narrowing rapidly behind cloacal opening. – ♀: L = 1.2–1.5 mm; a = 37–42; b = 4.8–5.0; c = 7.8–8.2; V = 60–64%. ♂: L = 1.4–1.5 mm; a = 48–56; b = 4.8–5.1; c = 6.9–7.2. (Italy and Germany; in groundwater.)

athesinus ANDRÁSSY

2. Genus: *Daptonema* COBB, 1920

Syn. *Theristus* (*Daptonema*, COBB, 1920) WIESER, 1956; *Allomonhystera* MICOLETZKY, 1923; *Tubolaimus* ALLGÉN, 1929; *Theristus* (*Mesotheristus* WIESER, 1956); *Mesotheristus* (WIESER, 1956) CHITWOOD & MURPHY, 1964.

Xyalidae. Relatively big animals (1.2–2 mm) with massive body. Cuticle finely annulated and supplied with several thin setae. Head region slightly offset, number of cephalic setae 12. Amphids circular. Ocelli not present. Stoma insignificant, narrow, walls not sclerotized. Oesophagus practically cylindrical. Vulva far back, at 3/4 of body length. Spicules comparatively short, almost rectangular. Gubernaculum caudally extended. Tail terminus with a pair of setae.

Marine nematodes, only two species inhabit freshwater biotopes.

Type species: *Daptonema fissidens* Cobb, 1920 – a marine species.

Freshwater species:

D. *dubium* (BÜTSCHLI, 1873) LORENZEN, 1977

Syn. *Monhystera dubia* BÜTSCHLI, 1873

Monhystera (*Theristus*) *dubia* BÜTSCHLI, 1873 (MICOLETZKY, 1922)

Theristus dubius (BÜTSCHLI, 1873) MICOLETZKY, 1925

Mesotheristus dubius (BÜTSCHLI, 1873) HOPPER, 1969

Monhystera setosa BÜTSCHLI, 1874

Monhystera (*Theristus*) *setosa* BÜTSCHLI, 1874 (DE MAN, 1907)

Theristus setosus (BÜTSCHLI, 1874) MICOLETZKY, 1925

Theristus (*Mesotheristus*) *setosus* (BÜTSCHLI, 1874) MICOLETZKY, 1925 (Wieser, 1956)

Mesotheristus setosus (BÜTSCHLI, 1874) DE CONINCK, 1965

Daptonema setosum (BÜTSCHLI, 1874) LORENZEN, 1977

Theristus setosus izhoricus FILIPJEV, 1930

Theristus setosus gerlachi MEYL, 1955

Monhystera gracillima COBB, 1893

Theristus gracillimus (COBB, 1893) WIESER, 1956

Monhystera crassissima DITLEVSEN, 1911

Monhystera crassoides MICOLETZKY, 1913

Monhystera sentiens COBB, 1914

Monhystera pseudosetosa STEINER, 1919

Allomonhystera tripapillata MICOLETZKY, 1923

Theristus hirtus GERLACH, 1951

D. *subsetosum* (SCHNEIDER, 1943) n. comb.

Syn. *Theristus subsetosus* SCHNEIDER, 1943

Key to the limnic species

- 1 Amphids small, only 1/6 as wide as corresponding body diameter, as far from anterior end as 1/2 head diameter; cephalic setae shorter than 50% of head width. — ♀: L = 1.6–2.0 mm; a = 13–16; b = 2.9–3.7; c = 6.3–8.0; V = 70–75%. ♂ unknown. (Yugoslavia: Ohrid Lake, in a depth of 35–100 m.) **subsetosum** (SCHNEIDER)
- Amphids 1/4 as wide as corresponding body diameter, about as far from anterior end as one head diameter; cephalic setae longer than those of the preceding species, 60–70% of head width. — ♀: L = 1.2–2.0 mm; a = 20–25; b = 4–6; c = 6–8; V = 68–75%. ♂: L = 1.1–1.5 mm; a = 20–30; b = 4–6; c = 6–8. (Germany, Austria, Switzerland, Hungary, Denmark, Yugoslavia, Spain, France, Iceland, Norway, Sweden, Finland, Soviet Union; Canada, USA, Nicaragua; Australia; in standing and running water, brackish biotopes and on coasts of lower salt content.) **dubium** (BÜTSCHLI)

2. Family: **Monhysteridae** DE MAN, 1876

Monhysteroidea. Mostly small animals. Cuticle smooth, without any striation, usually with thin submedial setae. Cephalic setae 6, 10 or, rarely, 12, only exceptionally absent. Amphids circular, at different distance from anterior body end. Ocelli occasionally present. Mouth cavity quite narrow, rarely somewhat expanded, not sclerotized. Denticles absent or extremely fine, hardly recognizable. Oesophagus muscular, almost cylindrical. Female and male gonads always unpaired and outstretched (reflexed in a single genus only), both of them lying on the right of intestine. Posterior uterine sac rarely present. Gubernaculum often with caudal extension. Preanal supplements or papillae absent. Tails of both sexes long, with spinneret. Males much less common than females.

Although a great part of the Monhysteridae live in the sea, numerous species may occur also in limnic and terrestrial habitats. The continental species can be ordered in six genera of the subfamily *Monhysterinae* DE MAN, 1876.

Key to the continental genera

- 1 Female gonad reflexed; anterior part of stoma with small denticles 6. **Sinanema** (p. 37)
- Female gonad outstretched; denticles, if present, lying in posterior part of stoma 2
- 2 Vulva in mid-body, gonad very short; oesophagus with bulb-like proximal swelling; cuticle without setae; tail spinneret usually very long 5. **Monhystrella** (p. 34)
- Vulva posterior, gonad long; oesophagus not bulb-like proximally; cuticle with setae; tail spinneret short 3
- 3 Body long, 1.5–2.4 mm, extremely slender (a to 100). 3. **Anguimonhystera** (p. 29)
- Body shorter and never so slender 4

- 4 Vulva far back, at 80% of body length, near to the anus; rectum heavily muscular and 2–3 times as long as anal body diameter 4. **Geomonhystera** (p. 30)
- Vulva not so far back, generally at about 2/3 of body length, far from the anus; rectum thin, not muscular, usually as long as anal body diameter. . . 5
- 5 Spicules extremely long, mostly 3–4 times as long as anal body diameter; amphids quite near the anterior end of body (their distance from that is shorter than one head diameter). 1. **Monhystera** (p. 20)
- Spicules always shorter than two anal body diameters; amphids at least one head diameter from anterior end of body, but in most of cases further back. . . 2. **Eumonhystera** (p. 23)

1. Genus: *Monhystera* Bastian, 1865

Monhysteridae. Cuticle smooth, with submedial setae. Body of the continental species 0.5 to 1.5 mm long. Body cavity packed with fine bio-crystals. Head wide, not offset. Cephalic setae relatively short, not longer than 50% of head diameter. Amphids circular, fairly large, near the anterior body end, i. e. their distance from anterior end is not longer than one head diameter. Ocelli mostly (always?) present. Denticles, if present, minute. Position of vulva varying between 54 to 75% of body length. Spicules extremely long and slender, at least twice, usually 3–4 times, maximally 7 times as long as anal body diameter. Gubernaculum short, with or without caudal apophysis. Tail always shorter than the distance between vulva and anus, terminal spinneret short.

Exclusively aquatic species.

Type species: *Monhystera stagnalis* BASTIAN, 1865.

The genus contains seven continental species:

- M. africana** ANDRÁSSY, 1964
Syn. *Monhystera pseudomacrura* KHERA, 1971
- M. lemani** JUGET, 1969
- M. paludicola** DE MAN, 1881
Syn. *Monhystera rivularis* BASTIAN, 1865
Monhystera annulifera DADAY, 1905
- M. paramacramphis** Meyl, 1954
Syn. *Monhystera stagnalis salina* PAETZOLD, 1958
Monhystera stagnalis parasalina GERLACH & RIEMANN, 1973
- M. stagnalis** BASTIAN, 1865
Syn. *Monhystera ocellata* LINSTOW, 1876
Monhystera oculata LINSTOW, 1878
Monhystera psammophila JUGET, 1969
- M. uncispiculata** GAGARIN, 1979
- M. wangi** WU & HOEPELI, 1929
Syn. *Monhystera macramphis* FILIPJEV, 1930
Monhystera izhorica FILIPJEV, 1930
Monhystera somereni ALLGÉN, 1952

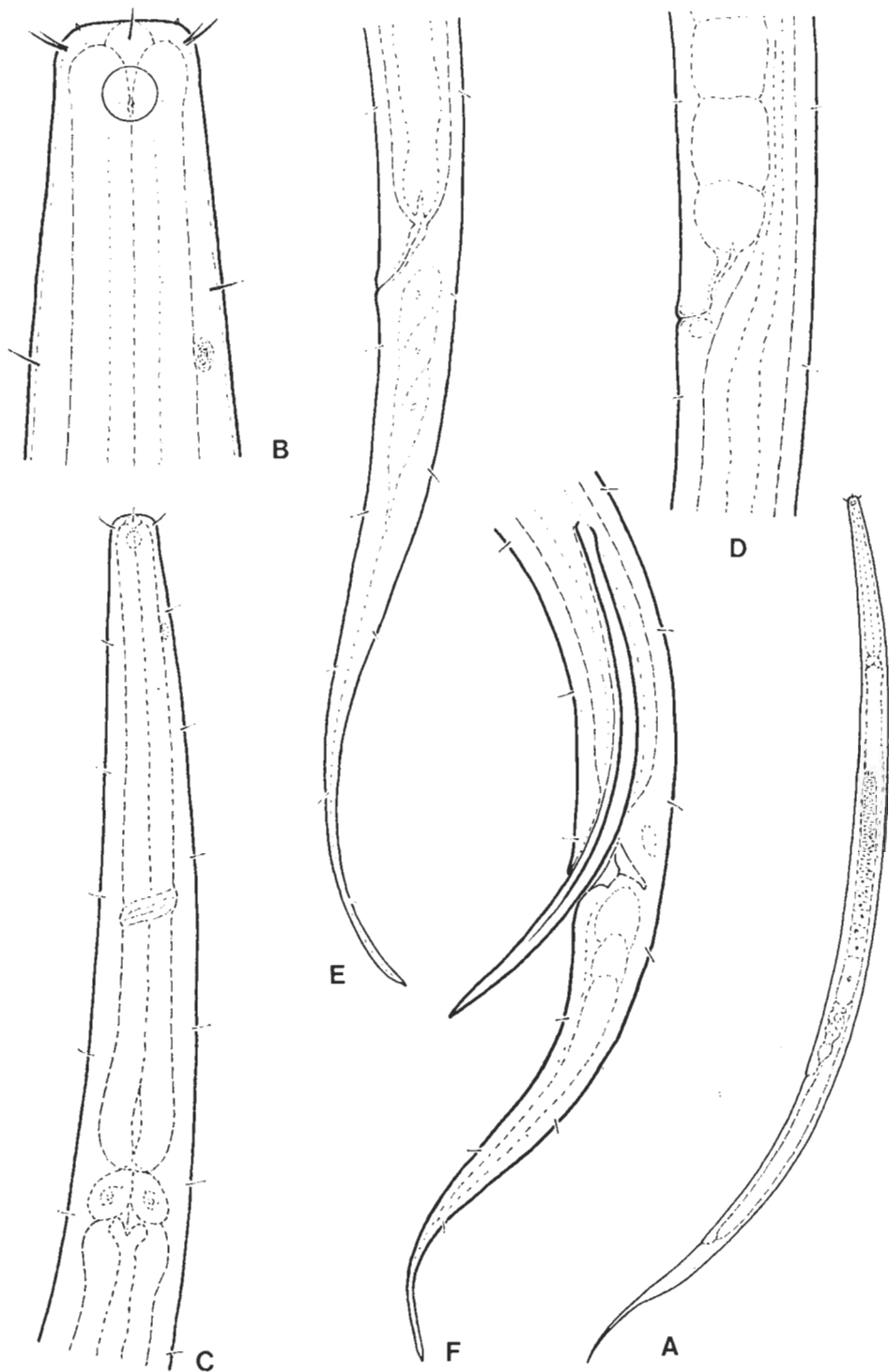


Fig. 1. *Monhystera paludicola* DE MAN, 1881 from Dinnyés, Lake Velence, Hungary — a representative of the genus *Monhystera*. A: entire female ($\times 130$); B: anterior end ($\times 1600$); C: oesophageal region ($\times 550$); D: vulvar region ($\times 550$); E: tail of female ($\times 550$); F: tail of male ($\times 550$)

Key to the continental species

- 1 Spicules longer than 70 μm (to 160 μm) 2
 - Spicules 50 μm long or shorter 6
- 2 Viviparous animals. - ♀: L = 0.9–1.4 mm; a = 16–26; b = 6.2–8.1; c = 5.9–6.4; V = 67–75%. ♂: 0.8–1.1 mm; a = 25–35; b = 5.1–6.6; c = 6–8. (Holland, Germany, Austria, Switzerland, Hungary, Czechoslovakia, Rumania, Bulgaria, France, Portugal, Italy, Poland, Denmark, Great Britain, Spitsbergen, Soviet Union; Columbia; always in fresh-water biotopes.)
stagnalis BASTIAN
 - Oviparous animals **3**
- 3 Spicules 100–160 μm long, almost as long as tail 4
 - Spicules 70–90 μm long, conspicuously shorter than tail. 5
- 4 Spicules hook-like distally; body relatively stout (a = 24–26). - ♀: L = 0.94–1.0 mm; a = 25–26; b = 5.4–5.6; c = 6.2–6.4; V = 64–65%. ♂: L = 0.89–0.90 mm; a = 24–26; b = 5.8–6.0; c = 6.0–6.2. (Soviet Union; in aquatic habitats.) **uncispiculata** GAGARIN
 - Spicules simple, not hook-like distally; body more slender (a = 27–35). - ♀: L = 0.9–1.2 mm; a = 27–35; b = 5.5–6.5; c = 5.5–7.0; V = 60–66%. ♂: L = 0.8–1.1 mm; a = 27–35; b = 5.4–6.2; c = 6–7. (Holland, Belgium, Germany, Austria, Switzerland, Hungary, Czechoslovakia, Rumania, Bulgaria, Spain, France, Yugoslavia, Italy, Poland, Denmark, Sweden, Finland, Soviet Union; India, Japan; Kenya, Mauretania, South-West Africa; Surinam, Columbia, Paraguay, Mexico; in different freshwater habitats and wet soil, besides in bays of low salt content. (Fig. 1 A–F)..... **paludicola** DE MAN
- 5 Tail comparatively short and stout, 5–6 times as long as anal body diameter; vulva at 2/3 of body length. - ♀: L = 0.9–1.5 mm; a = 20–30; b = 4.4–6.1; c = 6.0–8.3; V = 66–70%. ♂: L = 0.8–1.3 mm; a = 22–35; b = 4.8–5.8; c = 6.8–8.8. (Switzerland, in the Lake Léman.) **lemanii** JUGET
 - Tail slender, 10–14 times as long as anal body diameter; vulva before 2/3 of body length. - ♀: L = 1.0–1.2 mm; a = 25–38; b = 5.9–7.2; c = 4.5–6.5; V = 58–63%. ♂: L = 0.9–1.2 mm; a = 30–40; b = 6.0–6.2; c = 6.2–6.3. (Soviet Union, India, East Africa; limnic.) **africana** ANDRÁSSY
- 6 Body 0.5–0.7 mm long; spicules about 30 μm long. - ♀: L = 0.5–0.7 mm; a = 27–32; b = 5–6; c = 6.3–6.6; V = 61–63%. ♂: L = 0.5–0.6 mm; a = 27–36; b = 4.0–5.2; c = 6.3–8.2. (Germany and South Africa; in salt biotopes.) **paramacramphis** MEYER
 - Body 0.9–1.5 mm long; spicules 40–50 μm long. - ♀: L = 0.9–1.5 mm; a = 23–38; b = 5–7; c = 5.0–6.6; V = 54–62%. ♂: L = 0.9–1.5 mm; a = 26–35; b = 5–6; c = 5–7. (Germany, Austria, Switzerland, Hungary, Czechoslovakia, France, Italy, Poland, Soviet Union; China; Egypt, Ivory Coast, Kenya, Mauretania; Paraguay; both in small pools and big lakes, furthermore in bays and continental salt lakes.) **wangi** WU & HOEPLI

2. Genus: *Eumonhystera* n. gen.

Monhysteridae. Body small, 0.35 to 1.0 mm, moderately slender. Head wide, mostly not offset, cephalic setae 10, various in length. Amphids circular, at least one head diameter behind anterior body contour. Ocelli often present in aquatic species. Rectum weak, non-muscular. Vulva generally at 2/3 of body length. Spicules comparatively short, i.e. always shorter than double width of anal body region. Gubernaculum with or without extension. Tail as long as or longer than the distance between vulva and anus (shorter only exceptionally), straight or ventrally curved. Spinneret moderately long.

A rich genus with several marine, limicolous and terricolous species. Lively animals, feeding on algae or detritus.

Type species: *Monhystera vulgaris* DE MAN, 1880 = *Eumonhystera vulgaris* (DE MAN, 1880) n. comb.

The following 24 species have been observed in continental habitats:

E. alpina (Filipjev, 1918) n. comb.

Syn. *Monhystera alpina* FILIPJEV, 1918

Monhystera demani HOFMÄNNER & MENZEL, 1914, nec REUVILLE, 1903

E. altherri n. sp.

Syn. *Monhystera* sp. apud ALTHERR, 1976

E. andrassyi (BÍRÓ, 1969) n. comb.

Syn. *Monhystera andrassyi* BÍRÓ, 1969

E. barbata n. sp.

E. dispar (BASTIAN, 1865) n. comb.

Syn. *Monhystera dispar* BASTIAN, 1865

Monhystera crassa BÜTSCHLI, 1873

E. filiformis (BASTIAN, 1865) n. comb.

Syn. *Monhystera filiformis* BASTIAN, 1865

E. gracilior (JOHNSTON, 1938) n. comb.

Syn. *Monhystera gracilior* JOHNSTON, 1938

Monhystera gracillima DE MAN, 1921, nec COBB, 1893

Monhystera paragracillima GOODEY, 1963

E. hungarica n. sp.

E. islandica (DE CONINCK, 1943) n. comb.

Syn. *Monhystera islandica* DE CONINCK, 1943

E. longicaudatula (GERLACH & RIEMANN, 1973) n. comb.

Syn. *Monhystera longicaudatula* GERLACH & RIEMANN, 1973

Monhystera filiformis longicaudata STEFANSKI, 1924, nec BASTIAN, 1865

Monhystera vulgaris lemani JUGET, 1969

Monhystera vulgaris paralemani GERLACH & RIEMANN, 1973

Monhystera stefanski ANDRÁSSY, 1977

- E. multisetosa** (MEYL, 1955) n. comb.
Syn. *Monhystera multisetosa* MEYL, 1955
- E. mwerazii** (MEYL, 1957) n. comb.
Syn. *Monhystera mwerazii* MEYL, 1957
- E. papuana** (DADAY, 1899) n. comb.
Syn. *Monhystera papuana* DADAY, 1899
- E. parasimilis** (ALLGÉN, 1926) n. comb.
Syn. *Monhystera parasimilis* ALLGÉN, 1926
- E. parasimplex** (DE CONINCK, 1943) n. comb.
Syn. *Monhystera parasimplex* DE CONINCK, 1943
- E. pratensis** (COBB, 1893) n. comb.
Syn. *Monhystera pratensis* COBB, 1893
- E. pseudobulbosa** (DADAY, 1896) n. comb.
Syn. *Monhystera pseudobulbosa* DADAY, 1896
Monhystera multisetosa hallensis PAETZOLD, 1958
Monhystera hallensis PAETZOLD, 1958
- E. rustica** (BÜTSCHLI, 1873) n. comb.
Syn. *Monhystera rustica* BÜTSCHLI, 1873
Monhystera subrustica COBB, 1906
- E. similis** (BÜTSCHLI, 1873) n. comb.
Syn. *Monhystera similis* BÜTSCHLI, 1873
Monhystera similis arenicola JUGET, 1969
Monhystera filiformis pseudobulbosa WU & HOEPLI, 1929
Monhystera filiformis pseudoparbulbosa GERLACH & RIEMANN, 1973
Monhystera anomala SCHNEIDER, 1937
- E. simplex** (DE MAN, 1880) n. comb.
Syn. *Monhystera simplex* DE MAN, 1880
- E. subfiliformis** (COBB, 1918) n. comb.
Syn. *Monhystera subfiliformis* COBB, 1918
- E. suecica** (ALLGÉN, 1926) n. comb.
Syn. *Monhystera suecica* ALLGÉN, 1926
- E. tatica** (DADAY, 1896) n. comb.
Syn. *Monhystera tatica* DADAY, 1896
- E. vulgaris** (DE MAN, 1880) n. comb.
Syn. *Monhystera vulgaris* DE MAN, 1880
Monhystera parvella FILIPJEV, 1931
Monhystera filiformis intermedia JUGET, 1969, nec BÜTSCHLI, 1873
Monhystera filiformis intermediella GERLACH & RIEMANN, 1973

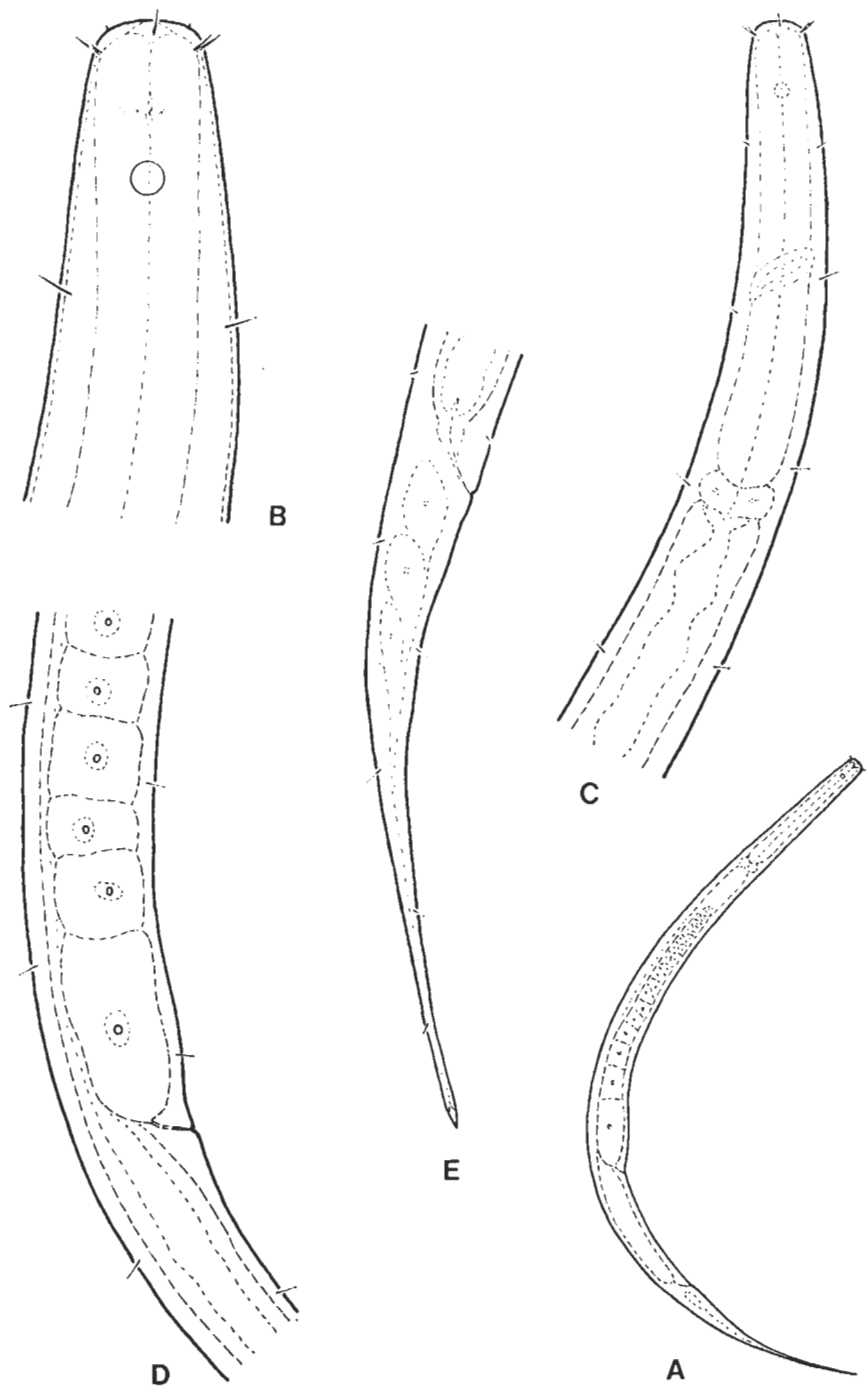


Fig. 2. *Eumonhystera vulgaris* (DE MAN, 1880) n. comb. from Miskolctapolca, Hungary – a representative of the genus *Eumonhystera*. A: entire female ($\times 250$); B: anterior end ($\times 1600$); C: oesophageal region ($\times 800$); D: vulvar region ($\times 800$); E: tail of female ($\times 800$)

The following limnic species probably belong to the genus *Eumonhystera*; their descriptions are, however, very meagre (species inquirendae):

Monhystera dadayi GOODEY, 1963

Syn. *Prismatolaimus macrurus* DADAY, 1899

Monhystera frequens DE CILLIS, 1917

Monhystera fuelleborni DADAY, 1908

Monhystera longicaudata BASTIAN, 1865

Monhystera propinqua DADAY, 1905

Key to the non-marine species

- 1 Amphids two head diameters behind anterior body end or further back (to 4 head diameters) 2
- Amphids distinctly closer to anterior body end (closer than two head diameters) 9

- 2 Distance between vulva and anus conspicuously longer than tail 3
- Distance between vulva and anus shorter than tail 4

- 3 Cephalic setae very short, only 1/5 head diameter long; tail stout and short, 6 times as long as anal body diameter. – ♀: L = 0.36 mm; a = 24–26; b = 5.2–6.3; c = 6.0–6.2; V = 57–59%. ♂: L = 0.38 mm; a = 29; b = 5.2; c = 7.7. (Iceland; in brackish soil.) **islandica** (DE CONINCK)
- Cephalic setae nearly as long as 1/2 of head diameter; tail more slender, 8–9 times as long as anal body diameter. – ♀: L = 0.46 mm; a = 24; b = 4.6; c = 5.3; V = 57%. ♂ unknown. (Iceland and North Sea; in brackish biotopes.) **parasimplex** (DE CONINCK)

- 4 Cephalic setae almost as long as head diameter; amphids far back, 3–3.5 head diameters behind anterior body end, 1/3 as wide as neck. – ♀: L = 0.35–0.50 mm; a = 35–45; b = 4–5; c = 3.5–4.0; V = 54–57%. ♂ unknown. (Holland, Germany, Switzerland, Austria, Hungary, France, Bulgaria, Poland, Great Britain, Soviet Union; in soil, rarely in water.) **simplex** (DE MAN)
- Cephalic setae shorter: in general not longer than 1/2 of head diameter; amphids only rarely as far back as in the previous species 5

- 5 Tail twice as long as the distance between vulva and anus 6
- Tail at least one and a half times as long as the distance between vulva and anus 7

- 6 Body to 3/4 mm long. – ♀: L = 0.62–0.75 mm; a = 35–41; b = 4.0–5.2; c = 4.0–4.3; V = 61–63%. ♂ unknown. (New Guinea and Java; in swamps) **papuaana** (DADAY)

- Body shorter: to 0.4 mm. - ♀: L = 0.33–0.38 mm; a = 40–43; b = 4.7–5.3; c = 3.7–3.8; V = 61–62%. ♂ unknown. (Hungary; in wet moss.) (Fig. 5A–F) **hungarica** n. sp.
- 7 Cephalic setae very short, only 1/5–1/6 of head diameter or shorter, hardly discernible; amphids small, 1/5–1/6 as wide as corresponding body width, 2–2.5 (type form) or 3–3.5 (subsp. *arenicola*) head diameters from anterior body end, respectively. - ♀: L = 0.4–0.6 mm; a = 20–30; b = 4.0–5.5; c = 3.8–5.0; V = 57–65%. ♂: L = 0.4–0.6 mm; a = 24–32; b = 4.5–5.7; c = 4.5–5.5. (Hollad, Germany, Switzerland, Austria, Hungary, Czechoslovakia, France, Italy, Bulgaria, Poland, Denmark, Finland, Soviet Union; Nepal, Mongolia; Tanganyika, South Africa; in various water habitats and in the soil, too.) **similis** (BÜTSCHLI)
- Cephalic setae well visible, 1/3 of head diameter; amphids 1/3 as wide as corresponding body width. 8
- 8 Body shorter than 0.5 mm; head somewhat widened; amphids more than two head diameters from anterior margin of body. - ♀: L = 0.38–0.45 mm; a = 30–34; b = 4.0–4.7; c = 3.8–4.5; V = 55–62%. ♂ unknown. (Germany, Austria, Hungary; in freshwater and salt biotopes.) **pseudobulbosa** (DADAY)
- Body longer than 0.5 mm; head not widened at all; amphids hardly two head diameters from anterior margin of body. - ♀: L = 0.6–0.8 mm; a = 25–33; b = 4.8–6.4; c = 4.0–5.5; V = 58–66%. ♂: L = 0.6–0.7 mm; a = 26–30; b = 5.5–6.5; c = 5–6. (Holland, Belgium, Germany, Austria, Switzerland, Hungary, Czechoslovakia, Rumania, Bulgaria, Yugoslavia, Spain, France, Italy, Poland, Denmark, Sweden, Finland, Iceland, Spitsbergen, Great Britain, Soviet Union; Mongolia, China, Hainan, Japan, Sumatra, Java; Madeira, Canary Islands, Kenya, Zaire, Annobon; USA, Cuba; Australia, Fiji Islands, Macquarie Islands; mostly aquatic, in very different water habitats, but also in the soil.) **filiformis** (BASTIAN)*
- 9 Tail as long as or longer than the distance between vulva and anus 10
- Tail distinctly shorter than distance between vulva and anus 20
- 10 Tail twice as long as vulva-anus distance or longer. (Species difficult to distinguish.) 11
- Tail shorter than the double length of vulva-anus distance 15
- 11 Tail longer than 1/4 of body length; body slender (a = 30–55) 12
- Tail 1/4 of body length or shorter; body not so slender (a = 25–30) 13
- 12 Amphids one head diameter from anterior body margin; vulva in the mid-body; cephalic setae short, 1/4–1/5 of head width. - ♀: L = 0.9 mm; a = 55; b = 5; c = 3; V = 50%. ♂ unknown. (Holland; in dune soil. Rather incompletely described.) **gracilior** (JOHNSTON)
- Amphids 1.5–1.7 head diameters from anterior body margin; vulva behind the middle of body; cephalic setae almost 1/3 of head width. - ♀: L = 0.4–0.7 mm; a = 30–46; b = 4.2–5.0; c = 2.9–3.8; V = 55–64%. ♂ un-

*See also under 16.

known. (Poland, Switzerland, Austria and Mongolia; aquatic.)
longicaudatula (GERLACH & RIEMANN)

13 Larger species, about 3/4 mm. — ♀: L = 0.7 mm; a = 30; b = 4.9; c = 4; V = 63%. ♂ unknown. (USA; aquatic.) **subfiliformis** (COBB)
— Smaller species, under 1/2 mm 14

14 Amphids larger than 1/3 of corresponding body width; vulva in 2/3 of body length. — ♀: L = 0.37 mm; a = ?; b = 4; c = 4.4; V = 65%. ♂ unknown. (Czechoslovakia, in lakes.) **tatrica** (DADAY)
— Amphids only 1/5–1/6 of corresponding body width; vulva near to the middle of body. — ♀: L = 0.4 mm; a = 23; b = 5; c = 4; V = 55%. ♂ unknown. (Germany, Switzerland, Australia, Fiji Islands; aquatic.)
rustica (BÜTSCHLI)

15 Amphids 1.6–1.8 (rarely 2) head diameters from anterior body margin . . . 16
— Amphids 1–1.5 head diameters from anterior body margin. 17

16 Spicules unusually thick, their widest part occupying more than 1/3 of anal body diameter; somatic setae almost 1/2 of body width. — ♀: L = 0.4–0.5 mm; a = 21–25; b = 4.7–6.2; c = 4.4–4.8; V = 63–67%. ♂: L = 0.5–0.6 mm; a = 25–27; b = 5.7–5.9; c = 5.3–5.4. (Hungary, in Lake Balaton.) **andrassyi** (BÍRÓ)
— Spicules more slender, their widest part occupying at most 1/4 of anal body diameter; somatic setae short, 1/4–1/5 of body width. — Measurements and distribution see under item 8. **filiformis** (BASTIAN)

17 Cephalic setae relatively long, more than 1/3 of head diameter 18
— Cephalic setae short, 1/4 of head diameter. — ♀: L = 0.4–0.7 mm; a = 20–30; b = 5.5–6.3; c = 4.0–5.5; V = 58–65%. ♂ unknown. (Holland, Belgium, Germany, Switzerland, Austria, Hungary, Czechoslovakia, Rumania, Yugoslavia, Spain, France, Italy, San Marino, Poland, Bulgaria, Denmark, Great Britain, Sweden, Spitsbergen, Jan Mayen, Soviet Union; Vietnam, Java, Sumatra; Ethiopia, Morocco, Tunisia, Mauretania, South Africa; USA, Canada, Venezuela, Peru; Australia, Macquarie Islands; Antarctica; both in aquatic and terrestrial habitats.) (Fig. 2 A–E) **vulgaris** (DE MAN)

18 Tail 10–12 times as long as anal body diameter and 1.7–2 times as long as vulva-anus distance, respectively; amphids one head diameter from anterior body end. — ♀: L = 0.57–0.62 mm; a = 28–35; b = 4.0–4.4; c = 4.0–4.4; V = 62–65%. ♂ unknown. (Hungary and Paraguay; in wet soil.) (Fig. 6 A–G) **barbata** n. sp.
— Tail 7–8 times as long as anal body diameter and 1–1.4 times as long as vulva-anus distance, respectively; amphids more than one head diameter from anterior body end 19

19 Vulva before 2/3 of body length; amphids 40% of corresponding body width. — ♀: L = 0.4–0.5 mm; a = 23–33; b = 4.8–5.5; c = 4.3–4.8; V = 58%. ♂: L = 0.4 mm; a = 23–31; b = 5.3–5.7; c = 4.3–4.8. (Germany and Soviet Union; in salt biotopes.) **multisetosa** (MEYL)
— Vulva in or behind 2/3 of body length; amphids 30% of corresponding body width. — ♀: L = 0.5–0.6 mm; a = 24–31; b = 4.0–4.3; c = 5.0–5.3;

- V = 67–68%. ♂ unknown. (Rumania and Tanzania; aquatic and terrestrial.) **mwerazii** (MEYL)
- 20 Ocelli present, 3 head diameters from anterior body end, red in colour. – ♀: L = 0.7–1.0 mm; a = 33–42; b = 4.5–5.7; c = 5.0–5.5; V = 60%. ♂: L = 0.7–0.9 mm; a = 30–35; b = 4.5–5.3; c = 4.7–5.8. (Switzerland; aquatic.) **alpina** (FILIPJEV)
- 21 Body much smaller than 1 mm (to 3/4 mm) 22
– Body 1 mm long or longer 23
- 22 Amphids as wide as 1/3 of corresponding body width, 0.7–1 head diameter from anterior body margin. – ♀: L = 0.4–0.6 mm; a = 20–26; b = 4.7–5.9; c = 4.5–5.8; V = 54–60%. ♂: L = 0.4–0.5 mm; a = 23–27; b = 5.4–6.2; c = 5.3–5.8. (Italy and Hungary; in hot springs.) **gerlachi** (MEYL)
- Amphids as wide as 1/6–1/7 of corresponding body width, 1–1.6 head diameters from anterior body end. – ♀: L = 0.5–0.8 mm; a = 20–24; b = 4.8–5.8; c = 5.5–7.0; V = 60–67%. ♂ unknown. (Holland, Germany, Switzerland, Austria, Hungary, Czechoslovakia, Rumania, Bulgaria, Yugoslavia, Spain, France, Italy, Poland, Great Britain, Denmark, Soviet Union; Sumatra, Java; Tunisia; Canada, USA; both in aquatic and terrestrial habitats.) **dispar** (BASTIAN)
- 23 Distance between vulva and anus twice as long as tail. 24
– Distance between vulva and anus one and a half times as long as tail 25
- 24 Cephalic setae half as long as head diameter. – ♀: L = 1.0 mm; a = 26; b = 4.5; c = 8.3; V = 60%. ♂ unknown. (Australia; in soil.) **pratensis** (COBB)
- Cephalic setae 1/4 as long as head diameter. – ♀: L = 1.3 mm; a = 21; b = 4.1; c = 9.1; V = 68%. ♂ unknown. (Austria; aquatic.) **altherrii** n. sp.*
- 25 Tail terminus swollen; amphids one head diameter from anterior end of body. – ♀: L = 1.0 mm; a = 33; b = 5; c = 7.4; V = 65%. ♂ unknown. (Sweden, in Lake Wetter.) **suecica** (ALLGÉN)
- Tail terminus pointed; amphids 1.5 head diameters from anterior end of body. – ♀ (juv.): L = 0.9 mm; a = 30; b = 4; c = 7.5; V = 67%. ♂ unknown. (Sweden, in Lake Wetter.) **parasimilis** (ALLGÉN)

3. Genus: *Anguimonhystera* n. gen.

Monhysteridae. Long (1.4–2.4) and extremely slender animals. Head wide, rounded, not offset; cephalic setae comparatively long. Amphids circular, at least one head diameter behind anterior body end. Ocelli not present. Mouth cavity narrow, funnel-shaped, without any denticles. Vulva far behind middle of body; ovary straight. Spicules short, gubernaculum slipper-shaped. Tail long, without terminal setae.

*Syn. *Monhystera* sp. apud ALTHERR, 1976.

This new genus is proposed for three species described by GOFFART from wells. It is close to genus *Eumonhystera*, its species are, however, much longer and slender, and have longer cephalic setae.

Type species: *Monhystera stadleri* GOFFART, 1950 = *Anquimonhystera stadleri* (GOFFART, 1950) n. comb.

Three species:

A. ampliceps (GOFFART, 1950) n. comb.

Syn. *Monhystera ampliceps* GOFFART, 1950

A. stadleri (GOFFART, 1950) n. comb.

Syn. *Monhystera stadleri* GOFFART, 1950

A. tenuissima (GOFFART, 1950) n. comb.

Syn. *Monhystera tenuissima* GOFFART, 1950

Key to the species

- 1 Body relatively not too slender, a about 50. — ♀: L = 1.4 — 1.8 mm; a = 43 — 50; b = 4.8 — 5.0; c = 6.1 — 6.5; V = 60 — 63%. ♂: L = 1.4 — 1.8 mm; a = 43 — 50; b = 4.8 — 5.0; c = 7.8 — 8.0. (Germany; in groundwater.)
stadleri (GOFFART)
- Body very slender, a = 70 — 100 2
- 2 Amphids large, 1/2 corresponding diameter wide or wider, 1.5 head diameters behind anterior body end. — ♀ unknown. ♂: L = 2.4 mm; a = 75; b = 6; c = 8. (Germany; in groundwater.) **ampliceps** (GOFFART)
- Amphids much smaller, 1/4 — 1/5 corresponding diameter wide, 2 head diameters behind anterior body end. — ♀: L = 1.5 — 1.8 mm; a = 90 — 100; b = 6.0 — 3.3; c = 4.7 — 5.2; V = 80% (62% in one specimen). ♂ unknown. (Germany; in groundwater. Listed also from the Soviet Union, namely from Uzbekistan, but this datum has yet to be confirmed.) .. **tenuissima** (GOFFART)

4. Genus: *Geomonhystera* n. gen.

Monhysteridae. Body length between 0.6 and 1.2 mm. Cuticle smooth but in the inner level often finely striated. Somatic setae numerous. Labial papillae setiform, cephalic setae articulate, fairly strong, 10 in number. Ocelli not present. Mouth cavity similar to that of other monhysterids, sometimes with some very small thickenings (denticles). Rectum strikingly thick, heavily muscular, longer than in other members of the family. Vulva far back, at 80% of the body length, quite near to the anal opening. Spicules slightly curved, gubernaculum short, simple. Tail relatively short and stout, hardly tapering posteriorly, manyfold as long as the vulva-anus distance. Tail spinneret short.

Contrasted with the other genera of the family, the species of *Geomonhystera* are definitely terrestrial nematodes. They occur especially often in moss and under bark. Under unfavourable circumstances they drop off to anabiotic sleep.

Type species: *Monhystera villosa* BÜTSCHLI, 1873 = *Geomonhystera villosa* (BÜTSCHLI, 1873) n. comb.

Five species:

G. aenariensis (MEYL, 1953) n. comb.

Syn. *Monhystera aenariensis* MEYL, 1953

G. australis (COBB, 1893) n. comb.

Syn. *Monhystera australis* COBB, 1893

Monhystera villosa steineri MICOLETZKY, 1922

Monhystera villosa apud TIMM, 1971

G. pervaga (ARGO & HEYNS, 1973) n. comb.

Syn. *Monhystera pervaga* ARGO & HEYNS, 1973

G. tripyloides (ANDRÁSSY, 1968) n. comb.

Syn. *Monhystera tripyloides* ANDRÁSSY, 1968

G. villosa (BÜTSCHLI, 1873) n. comb.

Syn. *Monhystera villosa* BÜTSCHLI, 1873

Monhystera insignis COBB, 1893

Monhystera impetuosa COBB, 1904

Monhystera mali FUCHS, 1938

Monhystera paravillosa MEYL, 1954

Key to the species

- 1 Vulva-anus distance 2 to 3 times longer than anal body diameter 2
- Vulva-anus distance not or only slightly longer than anal body diameter . . . 4
- 2 Cuticle finely annulated; amphids maximum one head diameter from anterior end. - ♀: L = 0.65–0.86 mm; a = 24–45; b = 4.5–5.5; c = 6.4–7.4; V = 79–84%. ♂ unknown. (South- and South-East Africa; terrestrial.)
pervaga (ARGO & HEYNS)
- Cuticle smooth, only subcuticle occasionally striated; amphids more than one head diameter from anterior end. 3
- 3 Amphids slightly but perceptibly oval, 1.5–2 head diameters from anterior end, 1/3 of corresponding diameter in width; body strongly curved ventrally; cuticle, especially in the female, with several somatic setae. - ♀ L = 0.6–1.0 mm; a = 30–42; b = 4.6–5.6; c = 6–8; V = 76–82%. ♂: L = 0.7–1.0 mm; a = 4.8–6.0; c = 7–8. (Holland, Belgium, Germany, Switzerland, Austria, Hungary, Czechoslovakia, Rumania, Bulgaria, Yugoslavia, France, Italy, Poland, Denmark, Spitsbergen, Soviet Union; Vietnam; Zaire; Canada, USA, Mexico, Brazil, Chile; Australia; Antarctic; very frequent in moss, but also in other terrestrial habitats.) (Figs. 3 A–D and 4 A–B)
villosa (BÜTSCHLI)
- Amphids regularly circular, 1.2–1.5 head diameters from anterior end, 1/4 of corresponding diameter in width; body hardly curved ventrally; somatic setae scattered. - ♀: L = 0.6–1.2 mm; a = 34–46; b = 4.3–5.4; c = 6–11; V = 78–85%. ♂: L = 1.0–1.4 mm; a = 43–71; b = 4.5–5.7; c = 7.4–9.8. (Hungary, Australia and Antarctic; distributed probably similarly world-wide as its sister species, *G. villosa*; terrestrial.) **australis** (COBB)

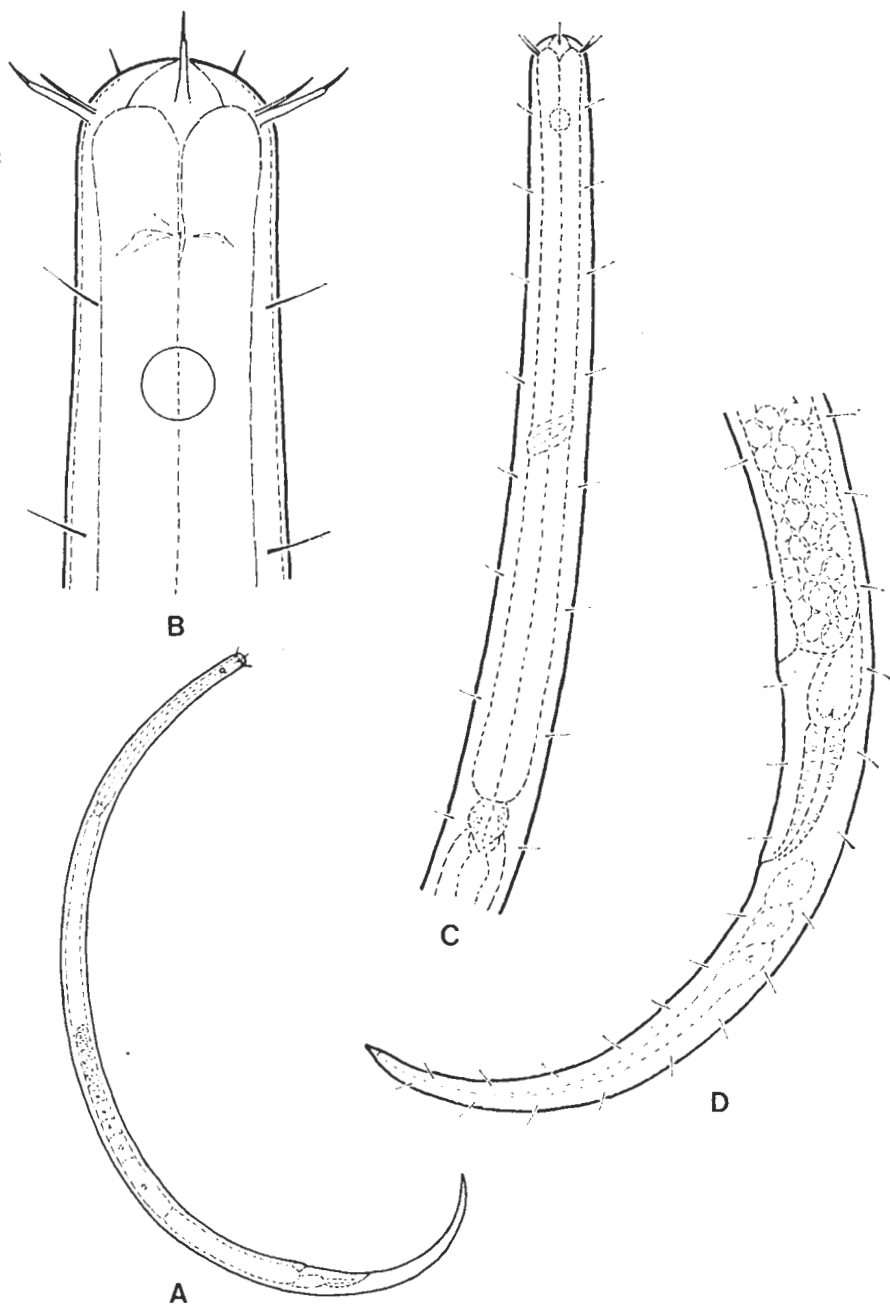


Fig. 3. *Geomonhystera villosa* (BÜTSCHLI, 1873) n. comb. from Mt. Vértes, Hungary — a representative of the genus *Geomonhystera*. A: entire female (x 160); B: anterior end; C: oesophageal region (x 570); D: vulvo-anal region (x 570)

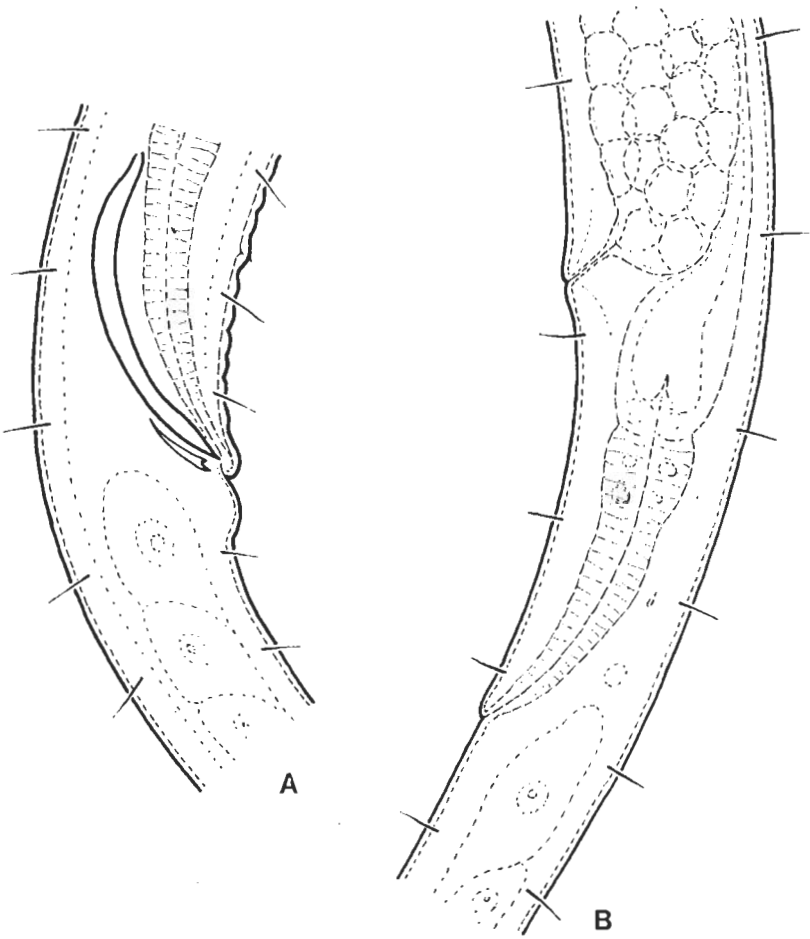


Fig. 4. *Geomonhystera villosa* (BÜTSCHLI, 1873) n. comb. from Mt. Vértes, Hungary. A: cloacal region of male ($\times 1200$); B: vulvo-anal region of female ($\times 1200$; note the long and muscular rectum)

- 4 Vagina consisting of a narrow and a broad, anchor-shaped portion; amphids circular, 1.5–1.7 head diameters from anterior body end. — ♀: L = 0.9–1.0 mm; a = 32–38; b = 5.4–5.6; c = 8.2–8.5; V = 84–85%. ♂ unknown. (Italy and Paraguay; in moss and detritus.) **triplyoides** (ANDRÁSSY)
- Vagina short and simple; amphids oval, 1–1.2 head diameters from anterior body end. — ♀: L = 0.6–0.8 mm; a = 23–40; b = 4.0–4.6; c = 6.6–8.7; V = 80–84%. ♂ unknown. (Italy and Soviet Union; terrestrial but also in hot springs.) **aenariensis** (MEYL)

5. Genus: *Monhystrella* COBB, 1918

Syn. *Monhystera* (*Monhystrella* COBB, 1918) STEINER, 1920; *Terschellingia* (*Monhystrella* COBB, 1918) MICOLETZKY, 1922.

Monhysteridae. Small nematodes, exceptionally longer than 0.5 mm (to 0.7 mm). Cuticle smooth, without somatic setae. Cephalic setae short, labial papillae minute. Amphids at least two head diameters behind anterior body end, but usually further far back. Mouth cavity narrow but conspicuous, tube or funnel-shaped, with a very small tooth on its ground. Ocelli not present. Proximal portion of esophagus generally bulb-like swollen, beginning of intestine globe-like. Vulva on the mid-body. Female gonads short, ovaries consisting of only a few cells. Males rare. Spicules comparatively short. Tail of both sexes long, fili-form; terminal spinneret unusually long and slender.

In fresh- and inland saline waters, rarely in wet soil; one species occurring in the sea.

Type species: *Monhystrella plectoides* COBB, 1918.

Fourteen valid species can be ordered in the genus *Monhystrella*:

M. gracilis KHERA, 1966

M. hastata ANDRÁSSY, 1968

Syn. *Monhystrella altherri* JUGET, 1969

M. iranica SCHIEMER, 1965

Syn. *Monhystrella marina iranica* SCHIEMER, 1965

M. lepidura (ANDRÁSSY, 1963) ANDRÁSSY, 1968

Syn. *Monhystera lepidura* ANDRÁSSY, 1965

M. longistoma (KHERA, 1970) n. comb.

Syn. *Monhystera longistoma* KHERA, 1970

M. macrura (DE MAN, 1880) n. comb.

Syn. *Monhystera macrura* DE MAN, 1880

Monhystera vulgaris macrura DE MAN, 1880

M. mysoriensis MOORTHY, 1938

M. paramacrura (MEYL, 1953) ANDRÁSSY, 1968

Syn. *Monhystera paramacrura* MEYL, 1953

M. parelegantula (DE CONINCK, 1943) n. comb.

Syn. *Monhystera parelegantula* DE CONINCK, 1943

M. plectoides Cobb, 1918

Syn. *Monhystera* (*Monhystrella*) *plectoides* (COBB, 1918) STEINER, 1920
Terschellingia (*Monhystrella*) *plectoides* (COBB, 1918) MICOLETZKY,
1922
Monhystera filiformis fukiensis HOEPLI & CHU, 1932

M. salina (MEYL, 1954) n. comb.

Syn. *Monhystera filiformis salina* MEYL, 1954
Monhystera salina MEYL, 1954

M. stewarti (KHERA, 1970) n. comb.

Syn. *Monhystera stewarti* KHERA, 1970

M. thermophila (MEYL, 1953) n. comb.

Syn. *Monhystera thermophila* MEYL, 1953

Besides the continental species listed above there also exist a marine species:

M. marina TIMM, 1964

The systematic position of the following species is uncertain:

Monhystrella bulbifera (DE MAN, 1880) SCHNEIDER, 1939—Syn. *Monhystera bulbifera* DE MAN, 1880; *Monhystera* (*Monhystrella*) *bulbifera* DE MAN, 1880 (STEINER, 1920); *Terschellingia* (*Monhystrella*) *bulbifera* (DE MAN, 1880) MICOLETZKY, 1922. — Holland, Germany, Switzerland, Ireland, Soviet Union.

Monhystrella godeti (STEINER, 1920) TIMM, 1964 — Syn. *Monhystera* (*Monhystrella*) *godeti* STEINER, 1920; *Terschellingia* (*Monhystrella*) *godeti* (STEINER, 1920) MICOLETZKY, 1922. — Peru.

Monhystera spiralis WU & HOEPLI, 1929. — China. Maybe this species is identical with *Monhystrella salina*.

Key to the continental species

- 1 Amphids far back, 4–5 head diameters from anterior body end. 2
– Amphids not so far back, 2–3 head diameters from anterior body end. 3
- 2 Amphids relatively large, almost 1/3 of corresponding diameter in width; head narrow, not set off, cephalic setae only 1/5 head diameter long. — ♀: L = 0.36 mm; a = 29; b = 5.6; c = 2.9; V = 47%. ♂ unknown. (Iceland; in brackish water.) **parelegantula** (DE CONINCK)
– Amphids very small, only 1/6–1/7 of corresponding diameter in width; head hat-like swollen, wider than neck, cephalic setae almost 1/2 head diameter long. — ♀: L = 0.35–0.42 mm; a = 31–34; b = 6.3–6.5; c = 2.5–2.9; V = 42–44%. ♂ unknown. (India; in standing water.) **stewarti** (KHERA)
- 3 Cephalic setae nearly half as long as head diameter. 4
– Cephalic setae as long as 1/4 head diameter 6
- 4 Amphids 1/3 corresponding diameter wide; tail more than twice as long as the vulva-anus distance. — ♀: L = 0.37–0.47 mm; a = 27–37; b = 5.3–6.4; c = 2.2–2.6; V = 40–44%. ♂ unknown. (Italy, Czechoslovakia; in hot springs.) **thermophila** (MEYL)

- Amphids 1/5–1/6 corresponding diameter wide; tail one and a half times as long as the vulva-anus distance or shorter 5
- 5 Tail one and a half times as long as the vulva-anus distance; body slender (a about 40). – ♀: L = 0.38–0.44 mm; a = 37–42; b = 5.4–5.7; c = 3.5–4.0; V = 52–54%. ♂ unknown. (India; aquatic.) **gracilis** KHERA
- Tail and vulva-anus distance about equal in length; body not so slender (a to 30). – ♀: L = 0.4–0.5 mm; a = 24–30; b = 5.3–5.6; c = 4.0–4.3; V = 47–50%. ♂ unknown. (India; in standing water.) **longistoma** (KHERA)
- 6 Head cap-like set off; amphids almost 1/3 corresponding diameter wide 7
- Head not or unobconspicuously set off; amphids 1/4 corresponding diameter wide or smaller 8
- 7 A larger species (0.6–0.7 mm) with very long tail; egg about 40 μ m long, more than three times longer than the corresponding body diameter; body rapidly narrowing anteriorly. – ♀: L = 0.56–0.70 mm; a = 30–45; b = 5–6; c = 2.5–3.3; V = 46–49%. ♂: L = 0.7 mm; a = 45; b = 5–6; c = 2.5–3.0. (Holland, Belgium, Germany, Switzerland, Hungary, Czechoslovakia, France, Soviet Union; Tunisia; Canada; terrestrial and aquatic.) **macrura** (DE MAN)
- A smaller species (0.3–0.5 mm) with comparatively shorter tail; egg 20–35 μ m long, 2.5–3 times longer than the corresponding body diameter; body slightly narrowing anteriorly. – ♀: L = 0.30–0.47 mm; a = 25–35; b = 5.0–5.6; c = 3.0–3.9; V = 47–52%. ♂: L = 0.45–0.50 mm; a = 28–35; b = 4.8–5.3; c = 5.3–6.3. (Hungary, Italy; Mongolia; Mauritania, West Sahara; aquatic, also in hot springs.) **paramacrura** (MEYL)
- 8 Amphids 1.5–2 head diameters behind anterior body end. 9
- Amphids distinctly more than 2 head diameters behind anterior body end . . 11
- 9 Tail 16–20 times as long as anal body diameter. – ♀: L = 0.43 mm; a = 32; b = 5.9; c = 2.8; V = 44%. ♂ unknown. (France, USA, Venezuela; aquatic.) **plectoides** COBB
- Tail 9–10 times as long as anal body diameter* 10
- 10 Head slightly set off; tail spinneret 7–10 μ m long. – ♀: L = 0.43–0.57 mm; a = 23–33; b = 6.0–6.2; c = 3.3–4.0; V = 48–52%. ♂ unknown. (Iran; in inland saline water.) **iranica** SCHIEMER
- Head not set off; tail spinneret 5–6 μ m long. – ♀: L = 0.53–0.58 mm; a = 24–27; b = 5.3–6.0; c = 3.6–4.2; V = 50–53%. ♂ unknown. (Argentina and Ghana; aquatic.) **lepidura** (ANDRÁSSY)
- 11 Tail spinneret unusually long, 10–13 μ m, sharply pointed. – ♀: L = 0.35–0.44 mm; a = 26–36; b = 5.0–5.5; c = 2.5–4.0; V = 42–50%. ♂ unknown. (Switzerland and Paraguay; aquatic.) **hastata** ANDRÁSSY
- Tail spinneret shorter and terminally rounded. – ♀: L = 0.36–0.46 mm; a = 37–38; b = 5.5–5.7; c = 3.2–3.7; V = 48–51%. ♂: L = 0.47 mm; a = 37; b = 5.4; c = 3.2. (Germany; in saline waters.) **salina** (MEYL)

**Monohystrilla mysoriensis* MOORTHY, 1938 (India; from the stomach of a fresh-water fish) belongs to this group but the length of its tail spinneret is unfortunately unknown.

6. Genus: *Sinanema* ANDRÁSSY, 1960

Monhysteridae. Small animals, about 0.5 mm. Cuticle smooth. Cephalic setae 10 in number. Amphids small, circular. Mouth cavity funnel-shaped, with small denticles in the anterior part. Oesophagus bulb-like swollen proximally and connected by three cardial glands. Female gonad comparatively long, ovary reflexed. Tail long, slightly swollen on the tip. Spinneret short. Male not known.

The taxonomic position of this genus is rather uncertain. As to general organization it seems to belong to the family Monhysteridae, by the reflexed ovary, however, it distinguishes from all other representatives of this group.

Type and single species: *Monhystrella ginlingensis* HOEPLI & CHU, 1932 = *Sinanema ginlingense* (HOEPLI & CHU, 1932) ANDRÁSSY, 1960.

— Cephalic setae $1/3$ head diameter long; amphids at the posterior end of mouth cavity; tail 10–12 times as long as anal body diameter and twice as long as vulva-anus distance, respectively. — ♀: L = 0.4–0.6 mm; a = 25–38; b = 5.3–6.6; c = 2.2–4.2; vulva somewhat behind the mid-body. ♂ unknown. (China and Taiwan; in hot springs.) . . **ginlingense** (HOEPLI & CHU)

b) Superfamily: SPHAEROLAIMOIDEA FILIPJEV, 1918

Monhysterida. Cuticle transversely annulated. Mostly 10 (6 + 4) cephalic setae. Mouth cavity short but wide, barrel-shaped, in vestibule longitudinally striated.

Predominantly marine forms; the freshwater species belong to the following family.

1. Family: **Sphaerolaimidae** FILIPJEV, 1918

Sphaerolaimoidea, with characteristics of the superfamily. One subfamily, **Sphaerolaiminae** FILIPJEV, 1918, with five genera, of which four contain marine species only.

1. Genus: *Hofmaenneria* SCHNEIDER, 1940

Sphaerolaimidae. Body length between 0.4 and 1.2 mm. Cuticle finely annulated. Head not set off, fairly wide, with 10 setae. Amphids showing genital dimorphism: that of male essentially larger than that of female, far behind the mouth cavity, circular in form. Mouth cavity maximum as long as head diameter, wide, barrel-shaped with cuticularized walls. Behind the stoma some very small denticles can be found in the lumen of oesophagus. Oesophagus cylindrical or uniformly tapering posteriorly. Cardial glands globular. Female gonad one, outstretched. Spicules slender, gubernaculum small. Preanal copulatory organs not present. Tail long, with a small terminal pore.

Limnic or brackish species.

Type species: *Cylindrolaimus brachystoma* HOFMÄNNER in HOFMÄNNER & MENZEL, 1914 = *Hofmaenneria brachystoma* (HOFMÄNNER in HOFMÄNNER & MENZEL, 1914) SCHNEIDER, 1940.

Three freshwater species belong to the genus:

H. brachystoma (HOFMÄNNER in HOFMÄNNER & MENZEL, 1914) SCHNEIDER, 1940
Syn. *Cylindrolaimus brachystoma* HOFMÄNNER in HOFMÄNNER & MENZEL, 1914

Desmolaimus brachystoma (HOFMÄNNER in HOFMÄNNER & MENZEL, 1914) MICOLETZKY, 1925

Desmolaimus thienemanni MICOLETZKY, 1922

H. hazanensis MULVEY, 1969

H. niddensis (SKWARRA, 1921) SCHNEIDER, 1940

Syn. *Cylindrolaimus niddensis* SKWARRA, 1921

Key to the species

- 1 Tail 15 times as long as anal body diameter, conoid on its terminus. — ♀:
L = 0.37–0.46 mm; a = 46–55; b = 4.2–4.4; c = 4.0–4.6; V = 59–60%. ♂ unknown. (Canada, Arctic region; terrestrial.) . . . **hazanensis** MULVEY
– Tail 7–10 times as long as anal body diameter, rounded on its terminus . . . 2
- 2 Mouth cavity 11–12 μ m long, nearly as long as head diameter, distinctly longer than wide; cephalic setae of female 1/3 head diameter long. — ♀:
L = 0.45–0.90 mm; a = 30–40; b = 4.3–7.8; c = 5.8–7.5; V = 60–67%. ♂: L = 0.5–0.7 mm; a = 37–41; b = 5; c = 5–6. (Switzerland, Germany, Austria, Yugoslavia, Denmark, Sweden, Soviet Union; especially in lakes.) **brachystoma** (HOFMÄNNER & MENZEL)
– Mouth cavity 6–8 μ m long, shorter than head diameter, and distinctly wider than long; cephalic setae of female nearly as long as head diameter. — ♀:
L = 1.0–1.2 mm; a = 35–41; b = 5.3–6.0; c = 4.8–6.1; V = 61–64%. ♂: L = 1.1–1.2 mm; a = 44–51; b = 5.2–5.5; c = 5.8–6.3. (Germany, Yugoslavia, Soviet Union; in ground- and brackish water.) **niddensis** (SKWARRA)

Eumonhystera hungarica n. sp.

(Fig. 5 A–F)

Type population, ♀: L = 0.36–0.38 mm; a = 40–43; b = 4.7–5.2; c = 3.7–3.8; V = 61–62%.

Cuticle exceedingly thin, with very fine setae measuring 1/4–1/5 body diameter. Head continuous with neck contour, 5–5.5 μ m wide; body at proximal end of oesophagus 2.2–2.4 times as wide as head. Cephalic setae 10 in number, very short, often hardly visible, about 1/4–1/5 as long as corresponding head diameter. Amphids circular, 1/4 corresponding diameter wide or a little wider, 2 to 2.2 head diameters behind anterior body end. Stoma not cuticularized, funnel-shaped, with a minuscule denticle in its basal part.

Oesophagus about 1/5 of entire body length, cylindrical in the most part, slightly swollen proximally. Cardial glands plum-shaped. Rectum shorter than anal body diameter.

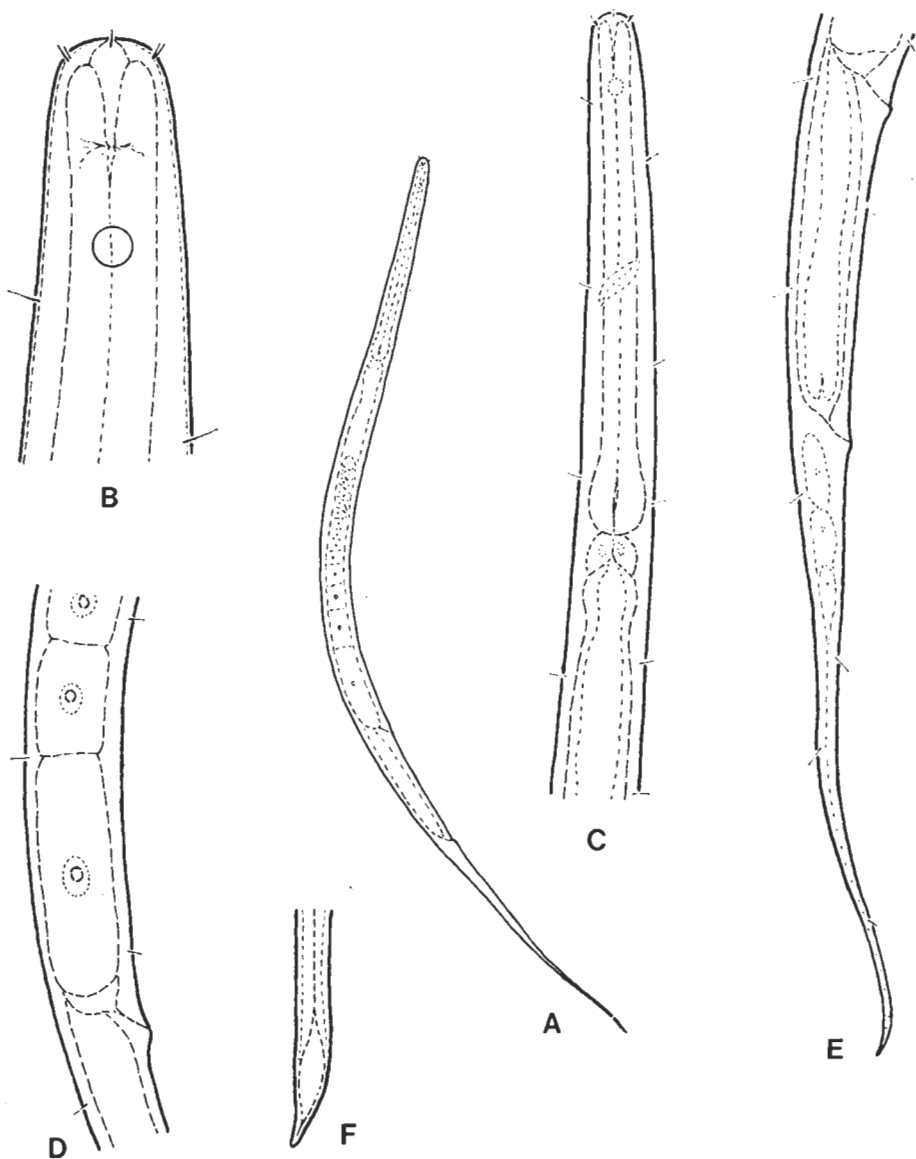


Fig. 5. *Eumonhystera hungarica* n. sp. from the type locality. *A*: entire female ($\times 350$); *B*: anterior end ($\times 2500$); *C*: oesophageal region ($\times 800$); *D*: vulvar region ($\times 800$); *E*: posterior end of female ($\times 800$); *F*: tip of tail ($\times 800$)

Vagina oblique, somewhat shorter than half diameter of body. Gonad 30% of body length.

Tail uniformly tapering, 1.9–2.2 times as long as vulva–anus distance, and 11–13 times longer than anal body diameter. Spinneret beak-like, short, slightly bent dorsally.

Male unknown.

A small and slender species of the genus *Eumonhystera*, with short cephalic setae, circular amphids located two head widths behind anterior end, short vagina, comparatively short gonad and long, filiform tail. In the small body, short setae, long tail and location of amphids, it resembles the species *Eumonhystera anomala* (SCHNEIDER, 1937) n. comb., its body is, however, slender ($a = 20-28$ in *anomala*) and the tail longer (7–9 times as long as anal body diameter and only 1.5 times as long as vulva–anus distance, respectively, in *anomala*).

H o l o t y p e (♀) on the slide Nr. H–0036; p a r a t y p e s (3 ♀) on the same slide preserved in the collection of the author.

T y p e l o c a l i t y a n d h a b i t a t: Veresgyház in Hungary, wet moss from a stone wall, March 1951.

Eumonhystera barbata n. sp.

(Fig. 6 A–G)

Type population, ♀: $L = 0.57-0.62$ mm; $a = 30-35$; $b = 4.1-4.4$; $c = 4.0-4.4$; $V = 62-65\%$.

Paraguayan population, ♀: $L = 0.52-0.58$ mm; $a = 28-30$; $b = 4.2-4.3$; $c = 4.3-4.4$; $V = 62-64\%$.

Cuticle very thin, with short scattered setae. Head continuous with neck contour; 9–10 μ m wide; body at proximal end of oesophagus 1.6–1.8 times as wide as head. Cephalic setae 10 in number, relatively well developed; the longer of them are nearly 1/2 corresponding diameter long. Amphids circular, somewhat wider than 1/4 body diameter at the same level, located 8–9 μ m – about one head diameter – behind anterior end. Stoma funnel-shaped but narrow, not cuticularized, showing an exceedingly small denticle in its basal part.

Oesophagus slightly swollen proximally, 1/4 of entire body length or a little shorter. Cardial glands conspicuous. Rectum somewhat shorter than anal body diameter. Intestine often green, packed with algae.

Vagina oblique, shorter than corresponding body diameter. Gonad comparatively short, 20% of total body length.

Tail uniformly tapering in its anterior half, and almost cylindrical in the distal portion; in almost every case sharply curved dorsally. It is 1.7–1.8 times as long as the distance between vulva and anus, and 10–12 times as long as anal body diameter, respectively. Spinneret short, beak-like.

Male unknown.

A relatively slender species of middle length, with broad head, long cephalic setae, circular amphids located one head diameter behind anterior end, cylindrical oesophagus, short gonad, and long tail bent strongly dorsally. In its general appearance and the long cephalic setae, *Eumonhystera barbata* n. sp. is closest to *E. filiformis* (BASTIAN, 1865) n. comb., but the amphids are nearer the anterior

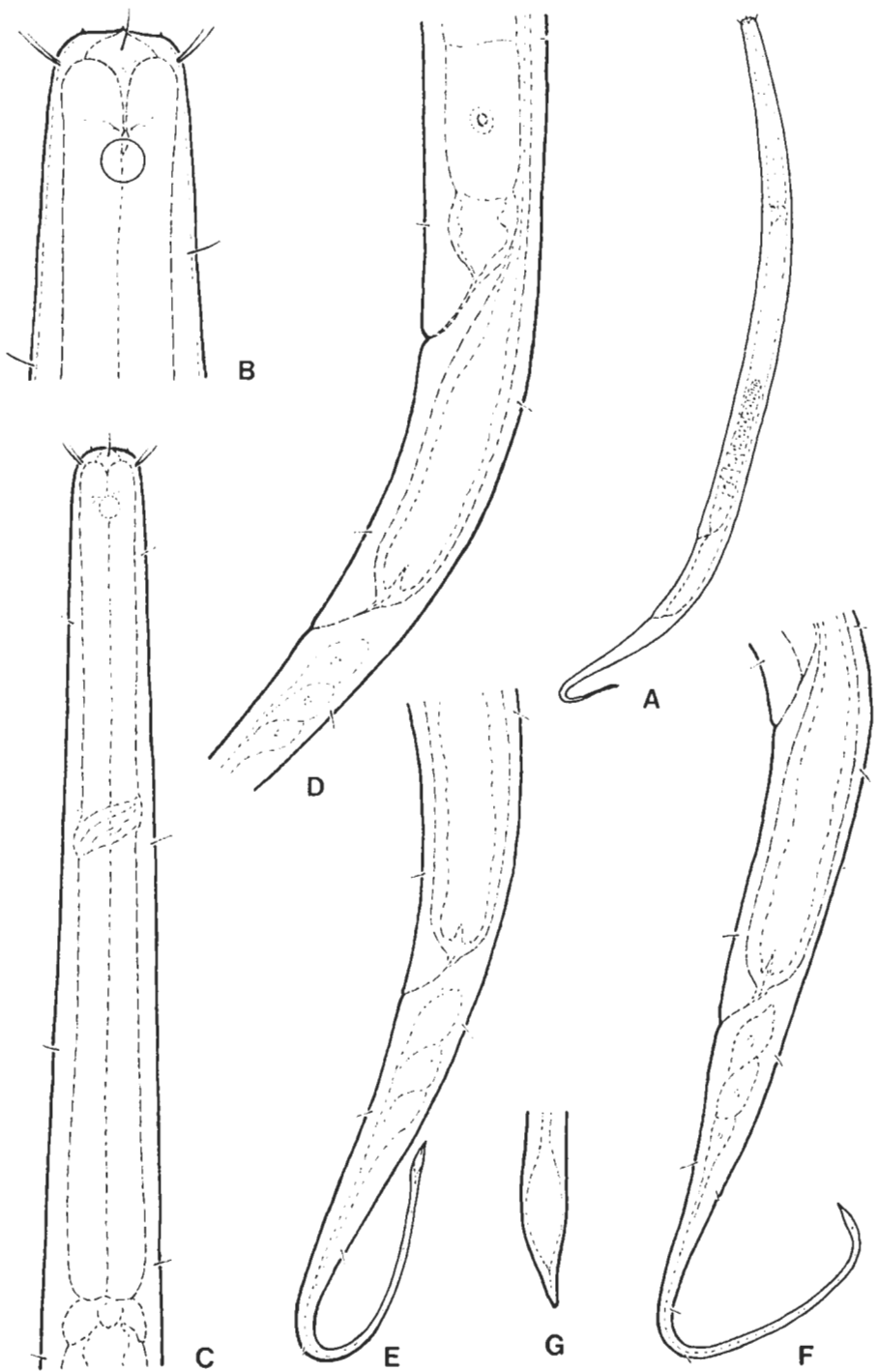


Fig. 6. *Eumonhystera barbata* n. sp. from the type locality. A: entire female ($\times 250$); B: anterior end ($\times 1600$); C: oesophageal region ($\times 800$); D: vulvo-anal region ($\times 800$); E - F: tails of females ($\times 800$); G: tip of tail

body end, the gonad is shorter, the tail curved characteristically, and the post-vaginal cell, which is so characteristic for *E. filiformis*, is completely absent here.

H o l o t y p e (♀) on the slide Nr. H-0514; **p a r a t y p e s** on the slides Nr. H-0514 (3 ♀) and H-0515 (2 ♀, 1 juv.).

T y p e l o c a l i t y and **h a b i t a t**: Baradla Cave in Hungary, water filtrated from a small pool on stalagmites, December 1959.

F u r t h e r l o c a l i t y: Bank of Acaray River in Paraguay, grass roots, January 1967.

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