

Redescription of two rare species of Monhysterida (Nematoda)

Amelia OCAÑA

*Departamento de Biología Animal, Ecología y Genética, Facultad de Ciencias,
Universidad de Granada, 18071 Granada, España.*

SUMMARY

A nematological study was performed in a total of 38 mineromedicinal springs containing waters of markedly different physico-chemical properties, located throughout the province of Granada, Spain. All monhysterids were identified and two species were found to be a particular interest given their rare appearance in continental aquatic environments. *Eumonhystera barbata* Andrassy, 1981 is characterized by cephalic setae slightly shorter than 1/2 of the head diameter, amphids located approximately one head diameter from the anterior end of the body, and $c' = 8-13$. This species is associated with calcium bicarbonate containing springs. *Monhystrella lepidura* (Andrassy, 1963) Andrassy, 1968 is characterized by lip region no distinguishable from the rest of the head, amphids located 1.2 to 1.6 head diameter from the anterior end, and tail ending in a round-tipped spinneret of variable length (3.5-4.5 μm). This species inhabits highly mineralized waters, rich in chloride, sulfate, and sodium.

RÉSUMÉ

Redescription de deux espèces rares de Monhysterida (Nematoda)

Au cours d'une campagne d'échantillonnage nématologique ayant concerné les eaux de composition très variée de 38 sources minéro-médicinales, réparties dans la province de Grenade (Espagne), deux espèces de Monhystérides peu fréquentes en milieu aquatique continental ont été observées. *Eumonhystera barbata* Andrassy, 1981 est caractérisé par : les soies céphaliques un peu plus courtes que la moitié du diamètre céphalique, les amphides situées à environ un diamètre céphalique de l'extrémité antérieure, $c' = 8-13$. Cette espèce vit dans des eaux bicarbonatées-calciques. *Monhystrella lepidura* (Andrassy, 1963) Andrassy, 1968 est caractérisé par : des lèvres non séparées du reste du corps, les amphides situées à 1,2-1,6 diamètre céphalique de l'extrémité antérieure, la queue est terminée par un débouché des glandes à extrémité arrondie et de longueur variable (3,5-4,5 μm). Cette espèce vit dans les eaux très minéralisées, riches en ions Cl, SO₄ et Na.

Between April 1983 and March 1984 a detailed nematological study was carried out in 38 mineromedicinal springs found throughout the province of Granada, in Spain. Each site was sampled twice each season yielding a total of 128 samples. Nematodes were identified, paying particular attention to the order *Monhysterida*, and we found two rare species : *Eumonhystera barbata* Andrassy, 1981 and *Monhystrella lepidura* (Andrassy, 1963) Andrassy, 1965.

Sediment samples were collected in the field with a small hand shovel. In the laboratory, nematodes were extracted using a modified Baermann's method (Hooper, 1986), fixed in 4 % acetic formaldehyde and mounted with Seinhorst's (1962) modified method in anhydrous glycerine.

Essential ions from each sampled spring were determined in order to characterize the water. Turbidimetry was used for sulfates, and gas volumetry for all other anions (carbonate, etc...). Cations were measured either by flame photometry (Na and K), or by atomic absorption after completely leaching the sediments (Ca, Mg and Fe). Oxygen concentration was determined with Winkler's method, and conductivity, pH and tempera-

ture were measured with conventional mechanical techniques. The springs were classified according to Shchukarev's classification (Saura, 1978), based on those ions making up more than 25 % of the total anion or cation content.

The material was examined under a Zeiss III light microscope equipped with Nomarski's interference system.

Eumonhystera barbata Andrassy, 1981 (Fig. 1)

MEASUREMENTS

Females (n = 25) : L = 0.64 (0.53-0.73) mm SD = 78.94; a = 30.0 (26.1-34.5) SD = 3.4; b = 4.2 (3.9-4.5) SD = 0.4; c = 4.7 (4.1-5.1) SD = 0.5; $c' = 10.2$ (7.9-12.7) SD = 1.7; V = 64.4 (58.5-66.8) % SD = 2.2.

DESCRIPTION

Body curved ventrally, many specimens with characteristic dorsal curvature of the tail. Cuticle with fine

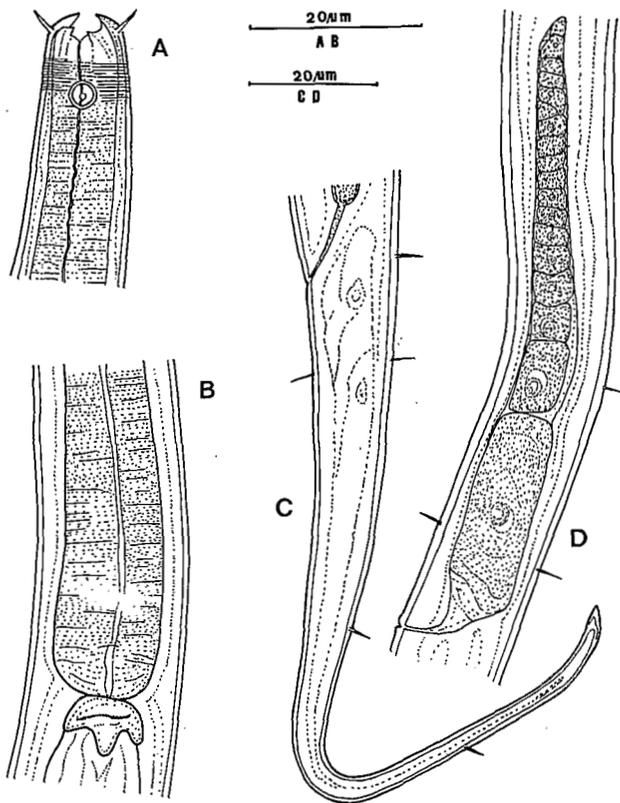


Fig. 1. *Eumonhystera barbata* Andrassy, 1981. Female. A : Anterior end; B : Posterior end of oesophagus, and cardia; C : Tail; D : Reproductive system.

transverse striation (0.75 to 1.0 μm thick at the cardia level). Setae 3-3.5 μm long, scattered along body. Head continuous with the rest of body, with minute papillae and ten well-developed cephalic setae, 3.5 and 4 μm long. Head diameter 8-10 μm , i.e., 2.2-2.6 times cephalic setae length. Stoma 3.5-5 μm long, funnel shaped, slightly cuticularized and with one dorsal and one ventral denticle of approximately the same size at its base. Amphids circular, 3-3.5 μm diameter, located 9-14 μm from the anterior body end (left), and 7-10.5 μm (right). Body diameter at amphid level = 3.2-3.8 amphid diameter. Oesophagus slightly wider at posterior end, equivalent to 1/4 of total body length. A transverse incisure marking the cardia at midpoint; length of cardia : 6.5-7.5 μm . Body diameter at cardia level equivalent to 1.6-2.0 times the head diameter. Nerve ring located at 48-50 % of the oesophageal length. Vulva prominent. Vagina transverse lying obliquely towards body anterior end or perpendicular to long body axis, 1/3 body diam. Postvaginal gland cell absent. Reproductive system variable, 86-137 μm long, i.e. 20-30 % total body length. Tail elongated, gradually tapering through anterior 60 %, nearly cylindrical

through 40 %, equivalent to 1.7-1.8 times vulva-anus distance, 8-13 times anal body diam. Rectum 0.7-1.0 times body diam.

REMARKS

The taxonomic features of our specimens of *E. barbata* collected from springs in the province of Granada, are in complete agreement with the original description, including the dorsal curvature in the tail of many individuals. The most notable differences are in the range of variation in body measurements, which is larger in our material due to the greater number of specimens studied.

ECOLOGY

E. barbata was found in 11 of the 38 springs studied, its density varied from one individual/liter in Monachil spring to, 12 individuals/liter in Orce spring.

The habitat described by Andrassy (1981) for this species consists of filtered water from small pools in a stalagmite containing cave in Hungary, where the water can be assumed to contain large amounts of calcium bicarbonate. The species was also collected by the same author on the banks of a river in Paraguay.

As shown by the data reported for springs in the province of Granada, *E. barbata* is tolerant of high concentrations of sulfates, chlorides, magnesium and sodium, with maximum values of 300 mg/l, 370 mg/l, 154 mg/l and 289 mg/l respectively. It nevertheless prefers calcium bicarbonate containing waters, as suggested by the presence of these ions in all waters in which this species has been found to date.

VOUCHER SPECIMENS

Specimens studied are mounted in slide no. 3256, deposited in the Institut voor Dierkunde, Rijksuniversiteit Gent, Belgium, and in slide nos. 58 and 59 in the author's private collection.

Monhystrella lepidura (Andrassy, 1963)

Andrassy, 1968

(Fig. 2)

MEASUREMENTS

Females (n = 19) : L = 0.41 (0.36-0.55) mm SD = 54.76; a = 25.5 (22.1-31.6) SD = 2.6; b = 5.5 (4.8-6.0) SD = 0.4; c = 4.0 (3.6-5.7) SD = 0.5; c' = 9.3 (7.6-14.4) SD = 1.5; V = 50.3 (48.6-54.9) % SD = 2.0.

DESCRIPTION

Body straight or ventrally curved, tail at times dorsally curved. Cuticle 0.6-0.8 μm thick at oesophagus pos-

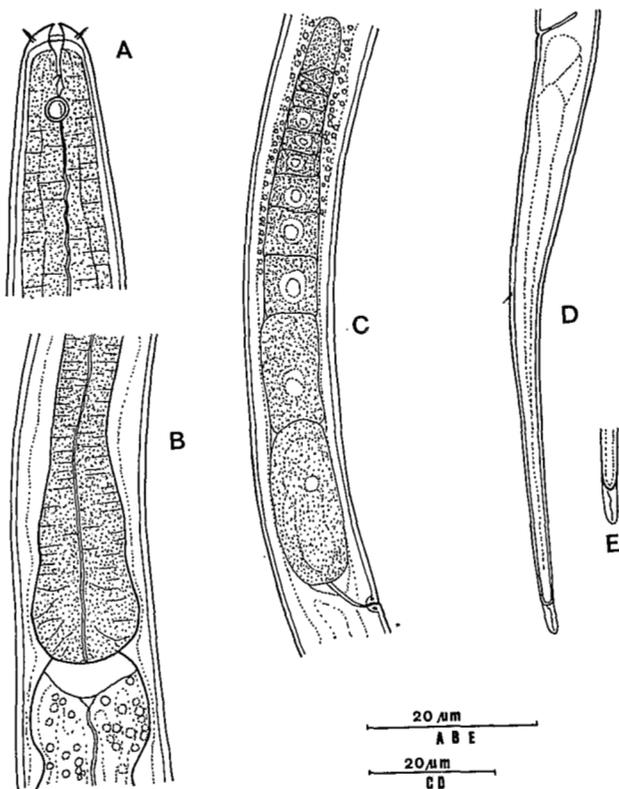


Fig. 2. *Monhystrella lepidura*. (Andrássy, 1963) Andrásy, 1968. Female. A : Anterior end; B : Posterior end of oesophagus, cardia, and beginning of the intestine; C : Reproductive system; D : Tail; E : Detail of the spinneret.

terior end. Lip region not distinguishable from head (1.5 μm high). Head (5.5-7.5 μm diam.) with six setae, 1.5-2 μm long. Head diameter 3.7-4.0 lengths of cephalic setae. Stoma with wider anterior cavity, cylindrical posterior region (6-8.5 μm long). Thin cuticular ring visible between two stoma regions. Second circular ring, behind anterior buccal chamber. Small, visible dorsal denticle at buccal cavity base, 5.5-6 μm from body anterior end. Amphids circular, 2-2.5 μm diameter, located 6.5-9 μm from body anterior end (right), 9-11 μm (left). Body diameter at amphids level = 3.5-4.0 amphid diameter. Oesophagus 68-77.5 μm long, i.e. 1/5 of the total body length. Slightly narrowing bulb-shaped basal portion. Body diam. at oesophagus posterior end 2.0-2.8 times head diam. Nerve ring situated 56.0-59.6 % of total oesophagus dorsal length. Cardia cells joining oesophageal region to intestine. Globular anterior region of intestine = 8-12 μm \times 10-13 μm . Intestinal lumen with abundant chlorophycous algae. Vulva not prominent. Short, anteriorly directed vagina, 1/3-1/4 body diam. Reproductive system 60-98 μm long. One specimen with a single egg

(37.5 \times 10 μm). Conical, elongated tail, cylindrical at posterior (40 %). Rectum 0.6-0.7 times body diam. Tail length equivalent to 1.0-1.2 vulva-anus length; $c' = 7.6-14$; tail ending in round-tipped spinneret 3.5-4.5 μm long.

REMARKS

The characters observed in the specimens found in the province of Granada agree with the original description of *Monhystrella lepidura* by Andrásy (1963). The only outstanding differences worth mentioning in the present study are non-characteristic findings with regard to the cardia, as described by Andrásy (1963, 1965). The cardia, usually separated from the oesophagus and intestine, was not always found separated in the specimens we studied. We also noted the presence of a dorsal denticle proximate to the base of the stoma, and two cuticular rings in the anterior cavity of the stoma. Finally, the spinneret was found to be slightly shorter in the Granada specimens than in those specimens described by Andrásy (1963, 1965) from Hungary, Argentina and Ghana (3.5-4.5 vs 5-6 μm).

ECOLOGY

Monhystrella lepidura was identified in only three springs in the province of Granada, and was common only in the sample from Zújar 2 spring, which contained 33.57 individuals/250 ml, in comparison with 2.5 individuals/250 ml in Malá 3 spring, and 0.14 individuals/250 ml in Galera 5 spring; i. e. one specimen found at this site during the entire campaign.

Among the physico-chemical characteristics of the springs in which the species *Monhystrella lepidura* was found, the following features were found to be the most outstanding : high choride values (1 375 mg/l in Zújar 2), high sulfate values (1 300 mg/l in Zújar 2 and 1 250 mg/l in Galera 5), and high sodium values (1 374 mg/l in Zújar 2). This species is therefore associated with highly mineralized waters where the abovementioned ions are found to be the most common. The physico-chemical characteristics for the habitats in which the species was previously studied, however, remain unknown.

VOUCHER SPECIMENS

Specimens of this species are mounted in preparation no. 3257, deposited in the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium, and in preparations nos. 60 and 61 in the author's private collection.

ACKNOWLEDGEMENTS

I would like to thank my colleagues at the Lopez Neyra Parasitology Institute (Nematology Section) for kindly allowing me to use their microscope equipped with an interference contrast system.

REFERENCES

- ANDRÁSSY, I. (1963). The zoological results of Gy. Topál's collectings in South Argentina. 2. Nematoda. Neue und einige seltene Nematoden-Arten aus Argentinien. *Ann. Hist. nat. Mus. natn. Hung.*, 55 : 243-273.
- ANDRÁSSY, I. (1965). Erd und Süßwasser Nematoden aus Ghana. Klasse Adenophorea (Aphasmidia). *Opusc. zool. Budapest.*, 5 : 127-151.
- ANDRÁSSY, I. (1981). Revision of the order Monhysterida (Nematoda) inhabiting Soil and Inland water. *Opusc. zool. Budapest.*, 17/18 : 13-47.
- HOOPER, H. J. (1986). Extraction of free-living stages from soil. In : Southey, J. F. (Ed.). *Laboratory Methods for Work with Plant and Soil Nematodes*. London, Min. Agric, Fish. & Food : 5-30.
- SAURA, I. (1978). *Aguas minerales de la provincia de Malaga : Estudio hidrologico y posibles aplicaciones terapeuticas*. Tesis Doctorado, Universidad de Granada, 614 p.
- SEINHORST, J. W. (1962). On the killing, fixation and transferring to glycerine of nematodes. *Nematologica*, 8 : 29-32.

Accepté pour publication le 14 septembre 1989.