# Macrobiotus erminiae, new species of eutardigrade from southern Patagonia and Tierra del Fuego

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(With 4 figures)

#### Abstract

The eutardigrade *Macrobiotus erminiae* sp. n. is described from southern Patagonia and Tierra del Fuego. Though similar to *Macrobiotus snaresensis* Horning et al., 1978 and *Macrobiotus ovostriatus* Pilato and Patanè, 1998, *M. erminiae* sp. n. differs from the former by: the presence of eyes; a wider buccal tube; an anterior band of teeth present in the buccal cavity; the third macroplacoid lying closer to the second; and from the latter by: a wider buccal tube; larger microplacoid; an anterior band of teeth and a posterior crown of triangular teeth present in the buccal cavity; and by eggs that are not areolated, apical portion of processes usually unsculptured, basal portion of processes without a crown of dots.

#### Introduction

Patagonia covers a large area of Southern Chile and Argentina and is bordered by the South Pacific and South Atlantic Oceans. At its southern extremity, the cool temperate region of Tierra del Fuego is heavily influenced by the weather patterns centered on Antarctica (Dudley, 1983; Boelcke *et al.*, 1985). Previous studies on tardigrades from this area included: Ramazzotti (1964), Maucci (1988), Binda and Pilato (1990), Pilato *et al.* (1990), Pilato and Binda (1996). As part of a broader Neotropical/ sub-Antarctic and Antarctic biogeographical study, moss and lichen samples were collected from sites in southern Patagonia and Tierra del Fuego, from which one new tardigrade species is described and discussed.

#### Material and methods

Mosses were collected from five localities in southern Patagonia and Tierra del Fuego (Fig. 1). Seven specimens and 32 eggs (including a few embryonated eggs) were extracted and mounted in polyvinyl lactophenol. For comparison, 3 paratypes and 2 eggs of *Macrobiotus snaresensis* Horning, Schuster & Grigarick, 1978 and few specimens and eggs of *M. cfr. liviae* (see Dastych 1984) were also examined. The holotype, paratypes and other specimens are preserved in the collection of Binda and Pilato (Dipartimento di Biologia Animale, Università di Catania), and some in the Zoologisches Museum Hamburg (ZMH).



Fig. 1. Sample collecting sites (arrows).

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#### Results

#### Macrobiotus erminiae sp. n. (Figs 2, 3)

Material examined:

HOLOTYPE. 555  $\mu m$  long, sex undetermined. Deposited in the Dipartimento di Biologia Animale, Università di Catania, Italy.

LOCUS TYPICUS. Southern Patagonia, San Juan (Punta Arenas), mosses from soil, 15.1.1990, coll. E. Conti. Associated fauna: *Echiniscus bigranulatus* Richters, 1908, *Macrobiotus andinus* Maucci, 1988, *M. punctillus* Pilato *et al.*, 1990.

PARATYPES. The locality data as for holotype; two animals and 26 eggs. One specimen and one embryonate egg deposited in ZMH.

OTHER MATERIAL. Tierra del Fuego: Isla Grande: egg from the outskirts of Bahia Felipe (12.1.1989: moss on soil); specimen from outskirts of Capo San Pablo (January 1988: peatmoss); associated fauna: *Echiniscus merokensis* Richters, 1904, *Macrobiotus ovostriatus* Pilato & Patanè, 1998, *Hypsibius allisoni* Horning et al., 1978; egg from Ushuaia (January 1988: peatmoss at the foot of the Glacier San Martial); associated fauna: *Mixibius saracenus* (Pilato, 1973), *Mixibius fueginus* Pilato & Binda, 1996, *Diphascon greveni* Dastych, 1984. Isla Nueva: 2 specimens and 5 eggs (January 1990: mosses on soil; specimen and egg in ZMH); associated fauna: *Macrobiotus andinus* and *M. punctillus*.

ETYMOLOGY. The name is in honour of Dr. Erminia Conti who kindly collected the samples.

Description of the holotype: body colourless, length 555  $\mu$ m; cuticle smooth without "pearls", eyes present. Buccal tube (Fig. 2a), measured from the medio-dorsal ridge of the buccal armature to the base (proximal extremity) of the pharyngeal apophyses, 66.5  $\mu$ m and 15.9  $\mu$ m wide (pt = 23.9)\*. Mouth terminal and provided with 10 peribuccal lamellae. An anterior band of teeth and a posterior crown of well developed triangular teeth are present in the buccal cavity, with three dorsal and three ventral transversal ridges in the caudal region. The stylet supports are inserted on the buccal tube at 77.3 % of its length (pt = 77.3).

The pharyngeal bulb (66.7  $\mu$ m x 61.7  $\mu$ m wide) has apophyses, three rod-shaped macroplacoids and a microplacoid. The first macroplacoid 11.6  $\mu$ m (*pt* = 17.4), second 9.4  $\mu$ m (*pt* = 14.1), third 10.2  $\mu$ m (*pt* = 15.3), and microplacoid 8.1  $\mu$ m (*pt* = 12.2). Placoid row length, including microplacoid, 44.4  $\mu$ m (*pt* = 66.8); excluding microplacoid 34.6  $\mu$ m (*pt* = 52).

Claws, of *hufelandi* type, short and stout, with accessory points (Fig. 2 b, c). Legs II-III outer claw length (basal peduncle and accessory points included) 17.6  $\mu$ m (*pt* = 26.5); leg IV claw length 2 0.1  $\mu$ m (*pt* = 30.2). Lunulae present, with smooth margin on legs I-III, and with numerous fine teeth in the hind legs. A thickened cuticular band is present, near the lunulae, on the first three pairs of legs.

<sup>\*</sup> The *pt* ratio index is the percent ratio between the length of a structure and the buccal tube length measured as described above (Pilato 1981).



Fig. 2. Macrobiotus erminiae sp. n.: a - bucco-pharyngeal apparatus, b - claws of the third pair of legs; c - claw of the hind legs.

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**Figs 3-4.** *Macrobiotus erminiae* sp. n.: **3** - details of the egg; **4** - *Macrobiotus snaresensis* Horning *et al.*, 1978: bucco-pharyngeal apparatus.

Eggs (Fig. 3) laid free, are spherical with conical processes (8-9 in the optical section). The diameter without processes 52-94  $\mu$ m, with 100-116  $\mu$ m. The processes have a large base with a reticular sculpture. The narrow, tapering tip is usually unsculptured and may be forked or with a lateral secondary point. The base of each process has 8-10 sculptured ridges which radiate out over the surface of the egg. The ridges of adjoining processes do not connect, so the egg is not areolated. The distal extremities of the ridges are slightly enlarged and appear dark when examined under the phase contrast. The processes are 12-24  $\mu$ m long, with a base diameter (ridges excluded) of 16-21  $\mu$ m. Egg shell with a very faint reticular sculpture; this sculpture is more evident near the extremities of the ridges radiating from the bases of the processes.

The paratypes are similar to the holotype both as regards qualitative and quantitative characters (Table 1). As in other species, the *pt* ratios in juveniles are lower than in the adults, and for this reason differences derived from allometric growth should be avoided

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Table 1 - Minimum and maximum dimensions of structures in adults and juveniles of *Macrobiotus erminiae* sp. n and *M. snaresensis* Horning *et al.*,1978 (the number of specimens measured is shown in brackets).

	<i>M. erminiae</i> sp. n.		M. snaresensis	
	adults (5)	juveniles (6*)	adults (6)	juvenile (3**)
body length (µm)	406-620	190	380-488	270-280
buccal tube length (µm)	48.5-74.2	27.4-35.7	51.1-63.4	34.8-38.9
buccal tube width (μm) <i>pt</i>	10.9-16.4 22.1-24.5	5.1-6.7 16.9-19.1	9.0-11.9 16.7-18.3	4.4- 6.9 12.6-18.2
stylet supports <i>pt</i>	77.0-78.3	75.1-78.5	77.2-78.6	76.9-78.4
macroplacoid row + micro- placoid length (μm) <i>pt</i>	31.6-48.8 65.2-66.8	14.6-17.6 48.0-50.6	34.7-44.8 67.7-70.6	20.7-20.8 53.3-54.7
macroplacoid row (µm) <i>pt</i>	23.9-38.1 49.3-52.0	10.7-13.0 36.4-38.8	26.9-36.7 52.5-57.8	15.8-16.3 40.6-43.0
first macroplacoid (μm) <i>pt</i>	8.4-13.1 16.8-18.3	3.6-3.6 (2) 11.9-12.5 (2)	8.1-11.6 15.0-18.3	? ?
second macroplacoid (μm) <i>pt</i>	6.7-10.9 13.8-14.7	3.2-3.3 (2) 10.7-11.1 (2)	5.7- 7.9 11.2-12.5	? ?
third macroplacoid (μm) <i>pt</i>	7.3-12.5 12.8-18.2	3.63-3.7 (2) 12.1-12.5 (2)	12.8-16.0 12.8-16.0	? ?
microplacoid (μm) <i>pt</i>	6.3-9.5 12.1-13.5	3.2-3.3 (2) 10.5-11.0 (2)	5.5-7.3 10.3-11.4	4.2 (1) 10.7 (1)
claws of the first pair of legs (µm) <i>pt</i>	15.6-18.1 24.4-32.2	? ?	13.2-14.5 25.9-27.1	9.2 (1) 23.6 (1)
claws of the second and third pair of legs (µm) <i>pt</i>	14.5-17.6 26.5-35.4	7.6 26.0	14.0-15.1 23.9-28.7	9.2-10.3 23.7-27.2
claws of the fourth pair of legs (µm) <i>pt</i> (*) five specimens in eggs (**) one specimen in egg	17.6-20.1 28.5-30.2	? ?	16.4-18.2 28.6-32.2	9.1- 9.8 23.3-25.9

by comparing specimens of similar body size. Table 1 indicates the range of measurements for both adults and juveniles of the new species and *M. snaresensis*.

The eggs of *M. erminiae* sp. n. are very similar to those of *M. snaresensis* (whose description was not clear) which have a narrower tip of the processes. Adult specimens of *M. erminiae* sp. n. differ from *M. snaresensis* in the following characters: eyes present, anterior band of teeth present in the buccal armature (though almost invisible in juveniles); slightly higher *pt* ratios for the buccal tube width and microplacoid length (Table 1); third macroplacoid lies closer to the second (Figs 2 a, 4), thus the *pt* ratio for the macroplacoid row length is smaller than *M. snaresensis* despite similar macroplacoid lengths.

Specimens, and eggs, cited as *Macrobiotus* cfr. *liviae* (Dastych 1984; p. 397-400; Figs 12-13) were found at South Georgia. No embryonate eggs were collected from this sample, so pre-embryonate and empty eggs with variability were tentatively attributed to the adult specimens. Dr. H. Dastych kindly loaned slides of the South Georgian *M.* cfr. *livae* that, in our opinion, also contained eggs of two different species. The egg figured in 13b (Dastych 1984), appears identical to *M. ovostriatus* (see Pilato & Patanè 1998), though the description of the adult belongs to another species. Re-examining the slide, suggests the other eggs (Dastych, 1984; Fig. 13a) belong to *M. erminiae* sp. n., while the descriptions of bucco-pharyngeal and claw characters of the adult *M. cfr. liviae* (Dastych 1984) also conform to the newly described *M. erminiae* sp. n. We conclude that both *M. erminiae* sp. n. (eggs and adults) and *M. ovostriatus* (eggs only) were represented in the South Georgian samples.

Four characters separate adult *Macrobiotus erminiae* sp. n. from *M. ovostriatus*: 1. wider buccal tube, 2. larger microplacoid, 3. presence of an anterior band of teeth in the buccal cavity, 4. a crown of triangular teeth in the posterior portion. The eggs can be distinguished by *M. erminiae* sp. n. having: 1. conical processes with 8-10 ridges that have slightly enlarged unsculptured apical portion (as opposed to narrow and sculptured apical portions in *M. ovostriatus*), 2. the ridges of adjoining processes are not connected, so the egg shell is not areolated (cf. *M. ovostriatus* where the eggs are areolated, with a basal crown of dots), 3. conical processes with apical portion usually unsculptured (as opposed to narrow and sculptured apical portions in *M. ovostriatus*).

*M. erminiae* sp. n. is present in southern Patagonia, in Tierra del Fuego and in South Georgia.

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