

***Macrobotus trunovae* sp.n., a new species of tardigrade from Russia**

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ABSTRACT: Biserov cited the new species *Macrobotus trunovae* sp.n. in a paper of 1996 before publishing its description and, unfortunately, he died prematurely. The description of the new species is finished here. *M. trunovae* sp.n. belongs to the *Macrobotus hufelandi* group and differs from most species of the group for the large body size and, overall, for some characters of the egg which have processes very close to one another, and the egg shell with dots sometimes forming a very irregular reticular design.

KEY WORDS: Tardigrada, *Macrobotus trunovae* sp.n., Russia.

***Macrobotus trunovae* sp.n. — новый вид тихоходок из России**

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РЕЗЮМЕ: Бисеров в своей работе 1996 г. впервые упомянул о новом виде тихоходки *Macrobotus trunovae* sp.n., но, к сожалению, не успел описать этот вид подробно. В этой работе мы заканчиваем описание, начатое Бисеровым. *M. trunovae* sp.n. принадлежит к группе *Macrobotus hufelandi* и отличается от большинства видов группы большими размерами тела, а так же некоторыми характерными особенностями скорлупы яиц, которая несет нерегулярный сетчатый орнамент.

КЛЮЧЕВЫЕ СЛОВА: Тихоходки, *Macrobotus trunovae* sp.n., Россия.

Introduction

In a paper on tardigrades from Russia, Biserov (1996: 235) recorded the species *Macrobotus trunovae*, but unfortunately he died before his time and before publishing the description of that species. In his collection, today deposited in the Museo Civico di Storia Naturale of Verona (Italy), Biserov designed the

holotype and the paratypes; one paratype is also present in the collection of Binda and Pilato (Museum of the Department of Animal Biology “Marcello La Greca”, University of Catania) but the species is not described. We noted this anomalous situation and took opportune to eliminate the problem. The colleague Natalia Biserova, requested of notices, kindly sent us a manuscript of her husband where the species is par-

tially described without figures and measurements. We obtained on loan the holotype and some paratypes from the above mentioned Museum of Verona and we are now able to describe the species. According to the International Code of Zoological Nomenclature (1999) "as a *nomen nudum* fails to qualify as a formal scientific name a later author may publish a real scientific name that is identical in spelling. If the same author publishes a name first as a *nomen nudum* and later accompanied by a valid description, the date of publication of the latter, valid, description becomes the taxon's date of establishment". We name the here described species *Macrobiotus trunovae* sp.n.

Material and methods

Body length was measured from the anterior margin to the end of the body, excluding the hind legs. Rigid cuticular structures have been measured, but only if they were undamaged and their orientation was suitable. The *pt* index has been considered; it is the percent ratio between the length of a structure and the length of the buccal tube, i.e. excluding the mouth (Pilato 1981); this index was taken into consideration in the comparisons of metric characters.

By comparisons, we examined the holotype of: *M. persimilis* Binda & Pilato, 1972; *M. santoroii* Pilato & D'Urso 1976; *M. sapiens* Binda & Pilato, 1984; *M. hyperboreus* Biserov, 1990; *M. punctillus* Pilato, Binda & Azzaro, 1990; *M. iharosi* Pilato, Binda & Catanzaro, 1991; *M. humilis* Binda & Pilato, 2001; *M. polonicus* Pilato, Kaczmarek, Michalczyk & Lisi, 2003; *M. almadae* Fontoura, Pilato & Lisi, 2008; *M. modestus* Pilato & Lisi, 2009; *M. martini* Bartels, Pilato, Lisi & Nelson, 2009; paratypes of: *M. rawsoni* Horning, Schuster & Grigarick, 1978; *M. andinus* Maucci, 1988; *M. patagonicus* Maucci, 1988; *M. diversus* Biserov, 1990; *M. personatus* Biserov, 1990; *M. terminalis* Bertolani & Rebecchi, 1993; *M. sandrae* Bertolani & Rebecchi, 1993; *M. macrocalix* Bertolani & Rebecchi 1993; *M. madagasus* Maucci, 1993; *M. seychellensis* Biserov, 1994; *M. biserovi* Bertolani, Guidi & Rebecchi,

1995; *M. serratus* Bertolani, Guidi & Rebecchi, 1995; and specimens of: *M. hufelandi* Schultze, 1834 from Germany; *M. anderssoni* Richters, 1908; *M. hibiscus* de Barros 1942 and *M. lissotomus* Durante Pasa & Maucci, 1979. The comparisons were also based on the original descriptions.

Results

Macrobiotus trunovae sp.n.

Figs. 1–2.

LOCUS TYPICUS. Mednyi Island (Commander Islands), Russia.

MATERIAL FOUND. 17 female specimens and 14 eggs from 4 samples of an aggregation of mosses and lichens collected by Julia Trunova (August 1985).

MATERIAL EXAMINED. holotype and 10 paratypes.

Holotype, slide N. 1163 (2), and paratypes, slides N. 1163 (3), 991 (1), 992, 992 (2) and 992 (3) are deposited in the Collection of Biserov (Museo Civico di Storia Naturale di Verona, Italy). One paratype (slide N. 5298) in the Collection of Binda & Pilato (Museum of the Department of Animal Biology "Marcello La Greca", University of Catania, Italy).

SPECIFIC DIAGNOSIS. Large species of the *hufelandi* group; cuticle smooth with small circular and elliptical pores and fine granulation on the leg. Eye spots present. Buccal armature with ten peribuccal lamellae, an anterior band of fine teeth, a posterior band of more visible teeth, three dorsal and three ventral transverse ridges. Pharynx bulb with two rod-shaped macroplacoids and microplacoid. Large eggs with many smooth trunco-conical processes with a clearly indented terminal disc. The processes are very close to each other and the small areas between them have dots sometimes forming an irregular reticular design.

DESCRIPTION OF THE HOLOTYPE. The holotype is a female 639 μm long, colourless; the eye spots are present. The cuticle is smooth with small circular and elliptical pores; a fine granulation is present on the legs. Mouth terminal with ten peribuccal lamellae, an anterior band of extremely small teeth, a posterior band of well visible teeth (the caudal of which are more developed), and three dorsal and three ventral transverse ridges. Buccal tube, rigid (Fig. 1a), 71 μm long and 11.4 μm wide (*pt* =

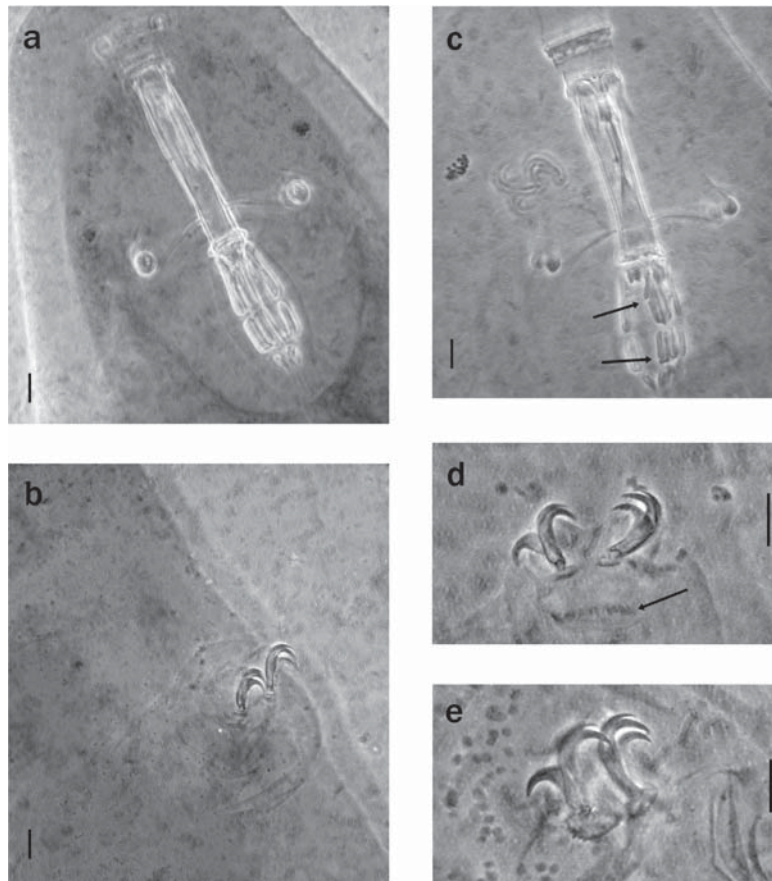


Fig. 1. *Macrobiotus trunovae* sp.n.

A — bucco-pharyngeal apparatus of the holotype; B — claws of the second pair of legs (holotype); C — bucco-pharyngeal apparatus of a paratype. The central narrowing of the first macroplacoid and the preterminal narrowing of the second macroplacoid are visible (arrows); D — claws of the second pair of legs (paratype). The arrow indicates the cuticular bar near the lunules; E — claws of the fourth pair of legs (paratype). The marginal indentation of the lunules is visible. Scale bar 10 μ m.

Рис. 1. *Macrobiotus trunovae* sp.n.

A — буккальный аппарат, голотип; B — коготки второй пары ног, голотип; C — буккальный аппарат, паратип. Центральное сужение первой макропластинки и претерминальное сужение второй макропластинки указаны стрелками; D — коготки второй пары ног, партип. Стрелкой указана кутикулярная пластинка, расположенная рядом с лункой коготка; E — коготки второй четвертой пары ног, партип. Маргинальная выемка указана стрелкой. Масштаб 10 μ m.

16.1). Stylet supports inserted on the buccal tube at 82.4 % of its length ($pt = 82.4$). Pharyngeal bulb (68 μ m x 62 μ m) with apophyses, two rod-shaped macrolacoids and a well developed microplacoid (Fig. 1a,c). The first macroplacoid, with a central constriction, is 22.3 μ m long ($pt = 31.4$), the second, with a pre-terminal constriction, 14.5 μ m ($pt = 20.4$), the micropla-

coid 7.9 μ m ($pt = 11.1$); the entire placoid row is 47.4 μ m long ($pt = 66.8$), the macroplacoid row 36.7 μ m ($pt = 51.7$).

The claws, well developed, are of *hufelandi* type with evident accessory points on the main branches (Fig. 1b,d,e). The external claws are 17.9 μ m long ($pt = 25.2$) and 18.2 μ m ($pt = 25.6$) on the second and third pairs of legs respective-

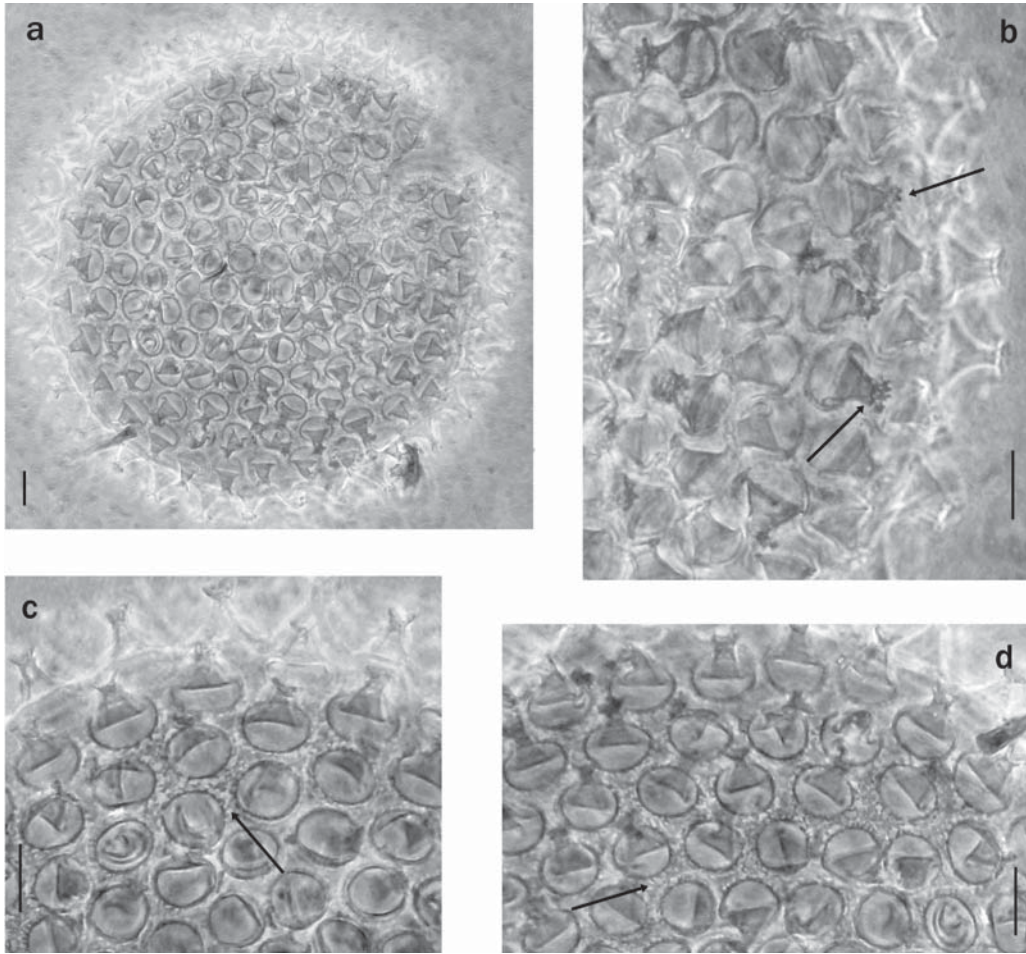


Fig. 2. *Macrobiotus trunovae* sp.n.

A — egg; B — details of the egg, the arrows indicate the indentation of the terminal disc of processes; C — details of the egg shell design, dots of various shape and size are visible (arrow); D — details of the egg shell design, sometimes an irregular reticular design is visible (arrow). Scale bar 10 μ m.

Рис. 2. *Macrobiotus trunovae* sp.n.

A — яйцо, общий вид; B — детали строения яйца, стрелками указаны терминальные диски выростов скорлупы; C — детали орнамента оболочки яйца: точки разного размера и формы указаны стрелкой; D — детали орнамента оболочки яйца: нерегулярная структура орнамента указана стрелкой. Масштаб 10 μ m.

ly. The internal claws on the same pairs of legs are 16.5 μ m long ($pt = 23.2$) and 17.4 μ m ($pt = 24.5$) respectively. The posterior and the anterior claws on the fourth pair of legs are 20.5 μ m ($pt = 28.9$) and 18.4 μ m ($pt = 25.9$) respectively. Lunules present, smaller and smooth on the first three pairs of legs, larger and finely indented on the hind legs (Fig. 1e). A cuticular bar is present

near the lunules on the first three pairs of legs (Fig. 1d).

The eggs, laid freely, are spherical and with many trunco-conical processes with an indented terminal disc (Fig. 2a,b).

We were able to measure only one egg. The diameter is 134.3 μ m excluding the processes, 152.5 μ m including them. The processes,

Table 1. Measurements and *pt* value of some structures of the holotype and three paratypes of *Macrobotus trunovae* sp.n.
Таблица. 1. Промеры некоторых основных параметров у голотипа и трех паратипов *Macrobotus trunovae* sp.n.

| | paratype | paratype | paratype | holotype |
|-------------------------------------|----------|----------|----------|----------|
| Body length (µm) | 437 | 600 | 630 | 639 |
| Buccal tube length (µm) | 56.6 | 68.2 | 68.9 | 71.0 |
| Buccal tube width (µm) | 8.9 | 11.9 | 11.7 | 11.4 |
| Buccal tube width <i>pt</i> | 15.7 | 17.4 | 17.0 | 16.1 |
| Stylet supports <i>pt</i> | 82.0 | 81.6 | 81.7 | 82.4 |
| Placoid row length (µm) | 33.9 | 43.6 | 43.6 | 47.4 |
| Placoid row length <i>pt</i> | 59.9 | 63.9 | 63.3 | 66.8 |
| Macrolacoid row length (µm) | 27.4 | 36.3 | 34.5 | 36.7 |
| Macrolacoid row length <i>pt</i> | 48.4 | 53.2 | 50.1 | 51.7 |
| First macrolacoid length (µm) | 15.7 | 21.1 | 19.5 | 22.3 |
| First macrolacoid length <i>pt</i> | 27.7 | 30.9 | 28.3 | 31.4 |
| Second macrolacoid length (µm) | 9.8 | 13.8 | 12.9 | 14.5 |
| Second macrolacoid length <i>pt</i> | 17.3 | 20.2 | 18.7 | 20.4 |
| Microplacoid length (µm) | 5.5 | 7.0 | 7.3 | 7.9 |
| Microplacoid length <i>pt</i> | 9.7 | 10.3 | 10.6 | 11.1 |
| External claw II length (µm) | 14.5 | 17.6 | 17.6 | 17.9 |
| External claw II length <i>pt</i> | 25.6 | 25.8 | 25.5 | 25.2 |
| Internal claw II length (µm) | 13.0 | 15.4 | 16.1 | 16.5 |
| Internal claw II length <i>pt</i> | 23.0 | 22.6 | 23.4 | 23.2 |
| External claw III length (µm) | 14.5 | 17.6 | 17.6 | 18.2 |
| External claw III length <i>pt</i> | 25.6 | 25.8 | 25.5 | 25.6 |
| Internal claw III length (µm) | 13.3 | 15.5 | 16.1 | 17.4 |
| Internal claw III length <i>pt</i> | 23.5 | 22.7 | 23.4 | 24.5 |
| Anterior claw IV length (µm) | 14.5 | 17.9 | 17.8 | 18.4 |
| Anterior claw IV length <i>pt</i> | 25.6 | 26.2 | 25.8 | 25.9 |
| Posterior claw IV length (µm) | 15.8 | 20.0 | 20.1 | 20.5 |
| Posterior claw IV length <i>pt</i> | 27.9 | 29.3 | 29.2 | 28.9 |

smooth, are 32 around the circumference and 160 into the hemisphere. Each process is up to 10.9 µm high, the basal diameter 9.1–9.9 µm, the terminal disc diameter 4.3–5.4 µm. The processes are very close to each other (Fig. 2a) and the small areas of egg shell between them have dots various in shape and size (Fig. 2c) sometimes forming a very irregular reticular design (Fig. 2d).

REMARKS. The paratypes are similar to the holotype in both qualitative and metric characters (the measurements of some structures of

the holotype and three paratypes are indicated in Table 1).

DIFFERENTIAL DIAGNOSIS. *Macrobotus trunovae* sp.n. differs from the other species of the *hufelandi* group (Ramazzotti, Maucci, 1983; Biserov, 1990; Bertolani, Rebecchi, 1993) in the larger body size and, overall, in some characters of the eggs: the large dimensions of the egg, and of the egg processes, and the very small distance between the processes. The most similar species is *M. hyperboreus*, but the new species differs from it for the above mentioned

characters, and also in having eye spots, lunules IV indented, processes with terminal disc having more evident teeth, egg shell with an irregular reticular design.

Macrobotus trunovae sp.n. differs from *M. macrocalix* (an other large species of the *hufelandi* group) in having egg processes with indented terminal disc clearly smaller than the process base, and for the egg shell design.

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