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### *Mopsechiniscus tasmanicus* sp. n., a new semiterrestrial tardigrade

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(With 14 figures)

#### A b s t r a c t

**Mopsechiniscus tasmanicus** sp. n., a new semiterrestrial tardigrade from Tasmanian bryophytes is described. The new species is characterized by the presence of lateral appendages E, subcephalic plates and a unique internal sculpture at the bases of all lateral appendages.

#### I n t r o d u c t i o n

Tardigrade fauna of the Australian Region is very poorly known and there is no information about these animals as far as Tasmania is concerned. Present studies of some bryophytes from that island revealed a new species of the genus **Mopsechiniscus** du Bois-Reymond Marcus, which is here described.

#### M a t e r i a l a n d M e t h o d s

Tardigrades were extracted from bryophytes by the method described in Dastych (1985) and mounted on microslides in Faure's liquid. Observations and measurements were carried out in phase and interference contrast. For comparison, several slides with **Mopsechiniscus imberbis** (Richters, 1907) were loaned from the Natal Museum (Pietermaritzburg, South Africa). The material, not published yet, originated from the following localities in Chile: (1) Temuc District, Villarrica National Park near Pucon, upper level of **Nothofagus** forest on slopes of Villarrica Volcano, mosses from **Nothofagus** trunk, 2 Dec 1987, 68 specimens; (2) Osorno District, Aguas Calientes, Puyehue National Park, lower level of **Nothofagus** forest, mosses from tree trunk, densely shaded, damp site, 5 Dec 1987, 2 specimens; all collected by B. R. Stuckenberg.

Abbreviations used in illustrations (Figs 1-14) are as follow: A- lateral appendage A, cl- claws, cv- clava, E- lateral appendage E, is- internal sculpture of the appendage E base, lp- papilla on leg IV, lu- lumen of the appendage E, pc- papilla cephalica, ps- pseudosegmental plate, s- stylet, sp- subcephalic plate, t- terminal plate.

## D e s c r i p t i o n o f t h e s p e c i e s

### **Mopsechiniscus tasmanicus** sp. n.

(Figs 1-14)

**Diagnosis:** **Mopsechiniscus** with lateral appendages E and subcephalic plates. The bases of all lateral appendages (A, E) with unique internal sculpture.

**Description:** Holotype, male. The body is red, 291  $\mu\text{m}$  long and 124  $\mu\text{m}$  wide (paratype: 250  $\mu\text{m}$  long). Eye spots are dark brown. Dorsal plates are sculptured with small hemispherical hollows located inside the cuticle and up to 2  $\mu\text{m}$  in diameter. In dorsal aspect the hollows more or less resemble roundish dots. The dots are sparsely and irregularly distributed. Similar in shape but much smaller dots occur on external sides of legs. Head plate is faceted, terminal plate has two long incisions (Figs 1, 12). The dorsal plates are well developed, median plates are undivided. In the holotype the anterior edge of pseudosegmental plate has in its middle a small separated area bordering with the third median plate. The area gives an impression of the transversal division of the latter plate (Fig 1). That structure lacks in a paratype. A small lateral plate is present on both sides of the scapular plate and paired segmental plates II and III.

The head segment with mouth opening located ventrally, and has a pair of oval cephalic papillae (Figs 4, 5, 10). Other head appendages are lacking. The papillae are relatively large (13 x 9  $\mu\text{m}$ ) and covered with a tiny and irregular granulation. There is a pair of subcephalic plates below the mouth opening which are also covered with a minute and dense granulation (Figs 4, 5, 10). The diameter of the granula is about 0.3  $\mu\text{m}$ . Similar granulation is developed in the vicinity of genital opening as well. The remaining ventral side of the body has no plates and is smooth. Male genital opening (Fig 6) about 6  $\mu\text{m}$  in diameter.

Buccopharyngeal apparatus large, 97  $\mu\text{m}$  long and with stylets 64  $\mu\text{m}$  in length. Pharynx oval (33 x 30  $\mu\text{m}$ ) and with three elongated placoids (Fig 9). The distal part of buccal tube and stylets supports weakly sclerotized, thus hardly discernible. The well sclerotized part of buccal tube is located inside the pharynx (Fig 9).

There are only two pairs of trunk appendages, i.e. the strikingly long cirri A and E (Figs 1-3). Their length is 310 and 322  $\mu\text{m}$  for cirri A and 286  $\mu\text{m}$  for cirri E. The cirri are usually distinctly longer than the body. The cirri have no cirrophore but their bases are uniquely sculptured (Figs 11, 14). The sculpture is composed of larger and irregularly shaped "thickenings" interspaced with small granules (Fig 14). Tiny and regular granulation occurs above and below the cirrus base. Internally the base has a thin lumen (Fig 13). The cirri are surrounded at their bases by a

transparent cuticular envelope (Fig 13). The appendages, 9  $\mu\text{m}$  wide at their bases, have relatively thick walls. A short, blunt-tipped and wide clava is located in a small cavity (Figs 1, 11). The clava has thick walls and is 12  $\mu\text{m}$  long and 8  $\mu\text{m}$  wide. The surface of the clava is irregularly punctuated, the surface of its cavity is covered with a tiny granulation. The clavae are directed backwards, in the paratype one clava is directed laterally.

No spines or papillae occur on legs I to III. Each leg IV has a sensory papilla (Fig 14). External claws are smooth (Fig 7), internal ones have a thin and sharp spine directed downwards (Fig 8). The claws of the legs IV are 21  $\mu\text{m}$  long. Distal parts of legs and their claws are arranged symmetrically.

Locus typicus: NW Tasmania, Sandy Cape: Wild Wave River area, broad gully slope. **Nothofagus cunninghamii**-**Atherosperma moschatum** forest; from liverwort **Plagiochila strombifolia** around base of **Melaleuca ericifolia**. Collected at 105 m above sea level, 17 Feb 1991, by A. M. Moscal, 2 specimens.

Type repositories: Holotypic male and a paratype (simplex-form, sex indetermined) are deposited in the collection of the Zoologisches Museum, Universität Hamburg (Reg. No. A 17/92).

Remarks: The presence of only cephalic papillae and full reduction of other head appendages (cirri interni, externi) in the genus **Mopsechiniscus** is a unique (apomorphic) character within the whole ancient class of the Heterotardigrada. This distinct genus comprises three species, i.e. **M. imberbis**, **M. granulosus** Mihelcic, 1967 and **M. tasmanicus** sp. n. **M. imberbis** was described from South Georgia Islands and is known from several localities in South America, with its northernmost site in Venezuela (Grigarick et al., 1983). **M. granulosus**, an insufficiently described taxon and possibly synonym of the former species (Kristensen 1987), was reported only by Mihelcic (1967) from Argentinian Andes.

**M. tasmanicus** sp. n. can be readily distinguished from the above two taxa by the presence of cirri E which lack in **M. imberbis** and **M. granulosus**. Moreover, the new species differs from **M. imberbis** by unique sculpture within the appendage bases, different shape of clavae, presence of subcephalic plates and symmetrical arrangement of distal parts of legs. **M. imberbis** has lateral cirri C and D which lack in the new species. The trunk appendages in **M. imberbis** have simple bases, i.e. without any internal thickenings or granulation, the clavae of the species are cone-shaped and slightly bent medially and downwards, the subcephalic plates are lacking and distal parts of legs are provided with a cuticular cusp near the base of the outer external claw. Furthermore, in **M. imberbis** a small cuticular cushion occurs on the inner side of each leg (Kristensen 1987). The two latter structures are lacking in **M. tasmanicus** sp. n.

The locality of **M. tasmanicus** sp. n. considerably extends the range of **Mopsechiniscus**, known hitherto only from South America and adjacent islands. The genus seems to be associated with **Nothofagus** forests (Ramazzotti 1962, Kristensen 1987, this paper also) and that may indicate

its ancient, probable Gondwanan origin. On the other hand, **Mopsechiniscus** represents an advanced stock within the other members of the **Pseudechiniscus**-line of the family Echiniscidae. That is evidenced particularly by its apomorphic reduction of head appendages, except cephalic papillae. Similar but convergent reduction occurs in the vast majority of members of the order Parachela (the class Eutardigrada), where virtually all head appendages are absent. Recently, however, the structures homologue with the heterotardigrade cephalic papillae have been discovered in this order, viz. in the genus **Halobiotus** (Kristensen 1982) and in a newly described hypsibiid genus of the **Diphascon**-complex (Dastych in print). Thus, the presence of the papillae in eutardigrades should be rather considered as an plesiomorphic condition.

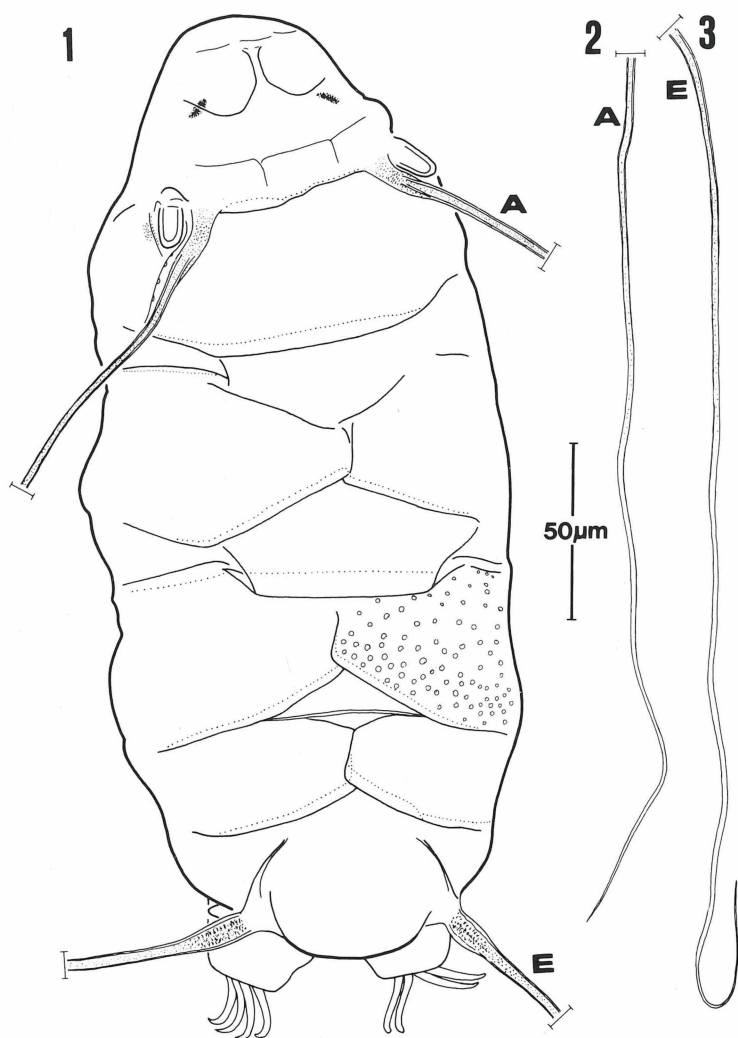
Kristensen (1987) suggested that the dispersal of **Mopsechiniscus** might be limited since the taxon does not tolerate desiccation very well. He found all his investigated animals (**M. imberbis**) dead after only a few months of desiccation (op. cit.). Contrarily, in bryophytes, provided kindly from Chile by Dr. Stuckenberg and stored completely dry in the laboratory for six months, about 1/3 of all extracted specimens of **M. imberbis** returned to active life after being saturated with water for a few hours. This and the present discovery of **Mopsechiniscus** in Tasmania points out poorly known biology and distribution of the genus, rather than its limited dispersal capability.

### A c k k n o w l e d g e m e n t s

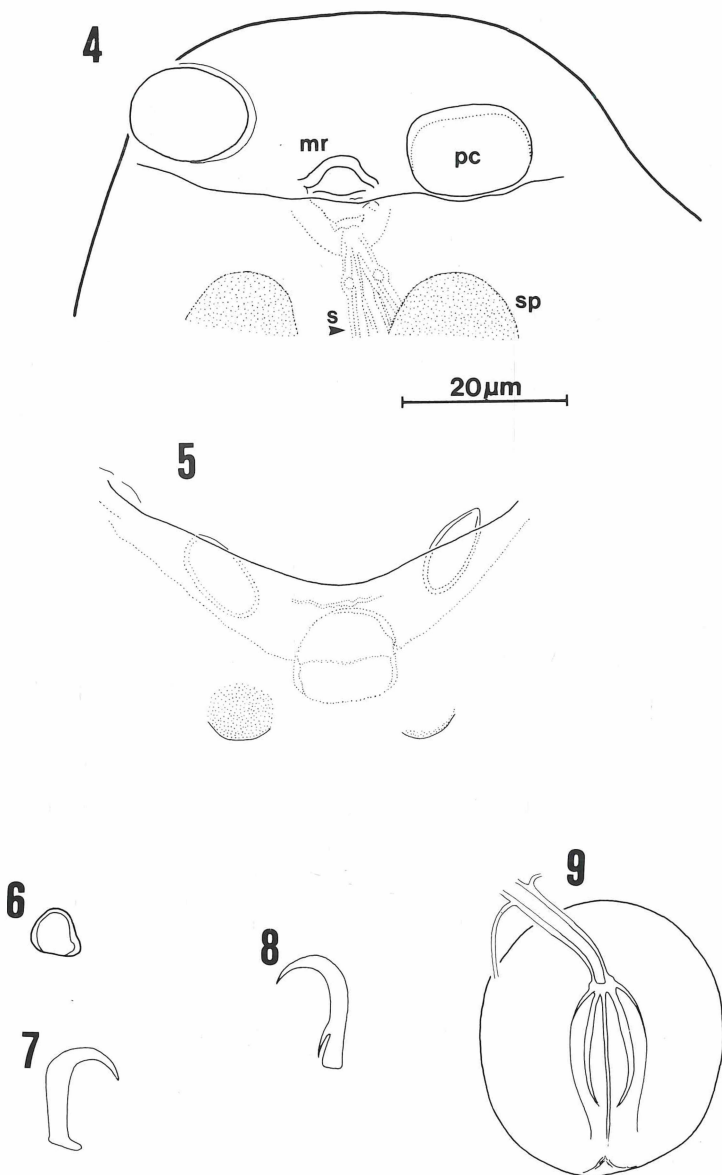
We are grateful to Dr. B. R. Stuckenberg, the Natal Museum (Pietermaritzburg, South Africa) for the loan of Chilean material of **M. imberbis**.

### Z u s a m m e n f a s s u n g

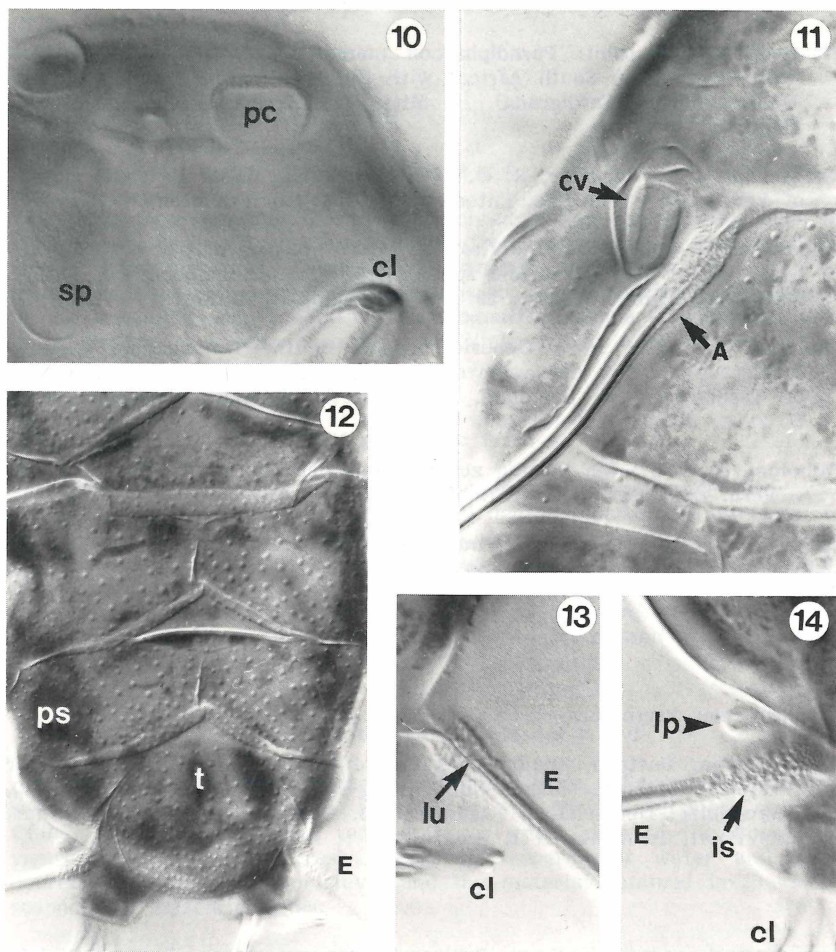
Eine neue Bärtierchen-Art, **Mopsechiniscus tasmanicus** sp. n. wird aus der tasmanischen Lebermoosprobe beschrieben. **M. tasmanicus** sp. n. unterscheidet sich von allen bisher bekannten Arten dieser Gattung durch das Vorhandensein der Lateralanhänge E, der subcephalischen Platten und der unikalen inneren Skulpturen an den Basen aller Lateralanhänge.



Figs 1-3: **Mopsechiniscus tasmanicus** sp. n.: 1 = habitus, dorsal view; 2-3 = lateral appendages A and E (holotype).



Figs 4-9: *Mopsechiniscus tasmanicus* sp. n.: 4-5 = head region, ventral view; 6 = gonopore of male; 7 = external claw of leg I; 8 = internal claw of leg III; 9 = pharynx (Figs 4, 6, 8, 9: holotype).



Figs 10-14: **Mopsechiniscus tasmanicus** sp. n.: 10 = head region, ventral view; 11 = clava and appendage A; 12 = posterior dorsum of the body; 13-14 = lateral appendage E (holotype).

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