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A new species of the genus *Diphascon* (Tardigrada) from the Maritime Antarctic

HIERONYMUS DASTYCH and SANDRA J. MCINNES

(With 13 figures)

Abstract

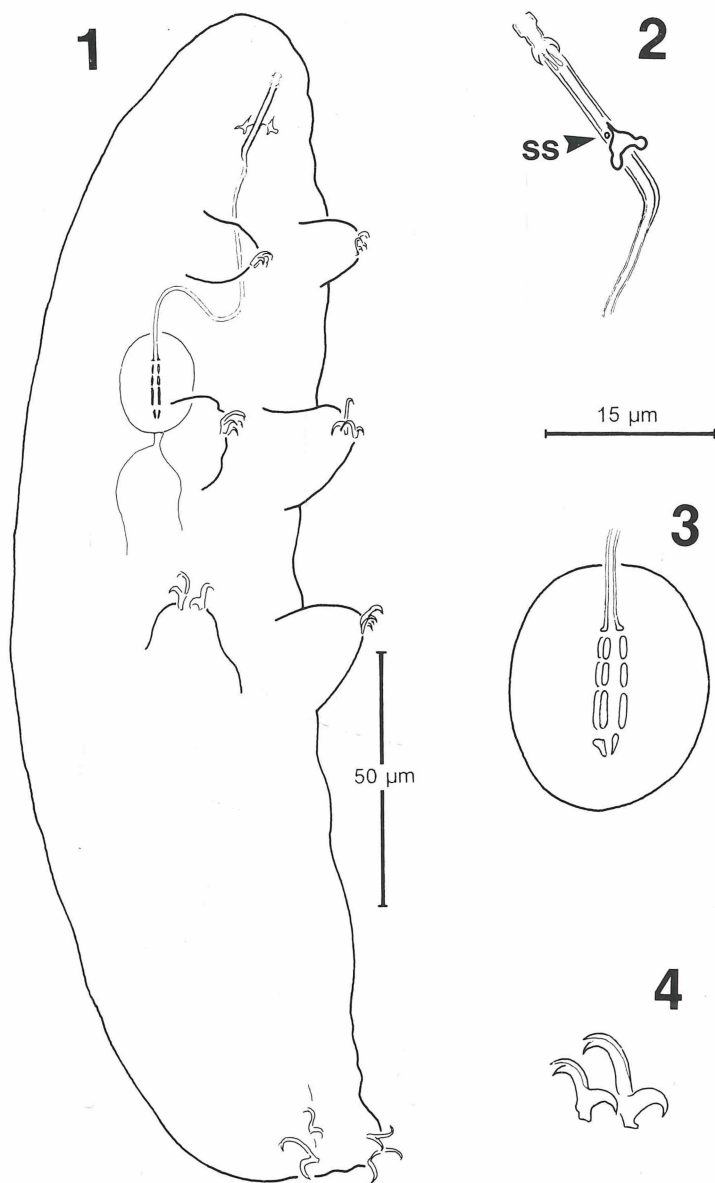
A new semi-terrestrial tardigrade, *Diphascon maucci* sp. n., found in mosses and lichens of the South Orkney Islands (Signy Island, the Maritime Antarctic) is described.

Introduction

The first information on tardigrades of the South Orkney Islands was provided by Murray (1906) who reported six species, including three new to science. Nine taxa not fully identified at the generic or species level were also listed and the origin of that material cited as "the South Orkneys" (*op. cit.*). The main knowledge on tardigrade fauna of this island group comes from studies by Jennings (1976a, b), McInnes and Ellis-Evans (1987, 1990) and McInnes (1995), carried out chiefly on Signy Island. Altogether 21 named species have been reported from that archipelago (McInnes, *op. cit.*), some of which are widely distributed in the Maritime and Continental Antarctic.

A collection of moss and lichen samples from two sites on Signy Island was made, for the further investigation of Tardigrada, by members of the British Antarctic Survey in the austral summer 1994. Among the eight tardigrade species extracted from these samples, and already known from the island [*Oreella minor* Ramazzotti, 1964, *Echiniscus meridionalis* Murray, 1906, *E. jenningsi* Dastych, 1984, *Pseudechiniscus suillus* (Ehrenberg, 1853), *Macrobotus furciger* Murray, 1907, *Hypsibius antarcticus* (Richters, 1904), *Diphascon pingue* (Marcus, 1936) and *D. puniceum* (Jennings, 1976)], were numerous specimens of a new tardigrade in the genus *Diphascon*. The description of this new species is given below.

The measurements have been taken from specimens mounted in Faure's medium. The range of measurements are followed by the holotype and the mean values (\bar{x}) given in parentheses. The latter was calculated for $n = 18$, unless otherwise indicated. Abbreviations used in figures: *a*- pharyngeal apophyse, *mt*- posterior end of mouth tube, *pt*- pharyngeal tube, *s*- septulum, *ss*- stylet support.



Figs 1-4. *Diphascoen maucci* sp. n.: 1- holotype in latero-ventral view; 2- mouth tube, lateral view; 3- pharynx, 4- claws of leg III (Figs 2-4: paratypes).

Description of the species

Diphascon maucci sp. n.
(Figs 1-13)

DIAGNOSIS: Small to median sized, slender and whitish *Diphascon* with smooth cuticle and without eyes. Mouth tube without postero-dorsal apophyse, pharyngeal tube long and thin. Small spheroid pharynx with three macroplacoids, the third being the longest. A large septulum present, microplacoids absent. Claws small, no cuticular bars on legs.

HOLOTYPE: Sex undet., 221µm long, 11 February 1994, coll. M. Edworthy. Deposited at the Zoologisches Museum Hamburg (ZMH, Reg. No. A46/95).

LOCUS TYPICUS: The Maritime Antarctic, South Orkney Islands, Signy Island. Robin Plateau, East Lichen Hill: dry mosses and lichens from non-calcareous cryptogamic fellfield, 11 February 1994, coll. M. Edworthy.

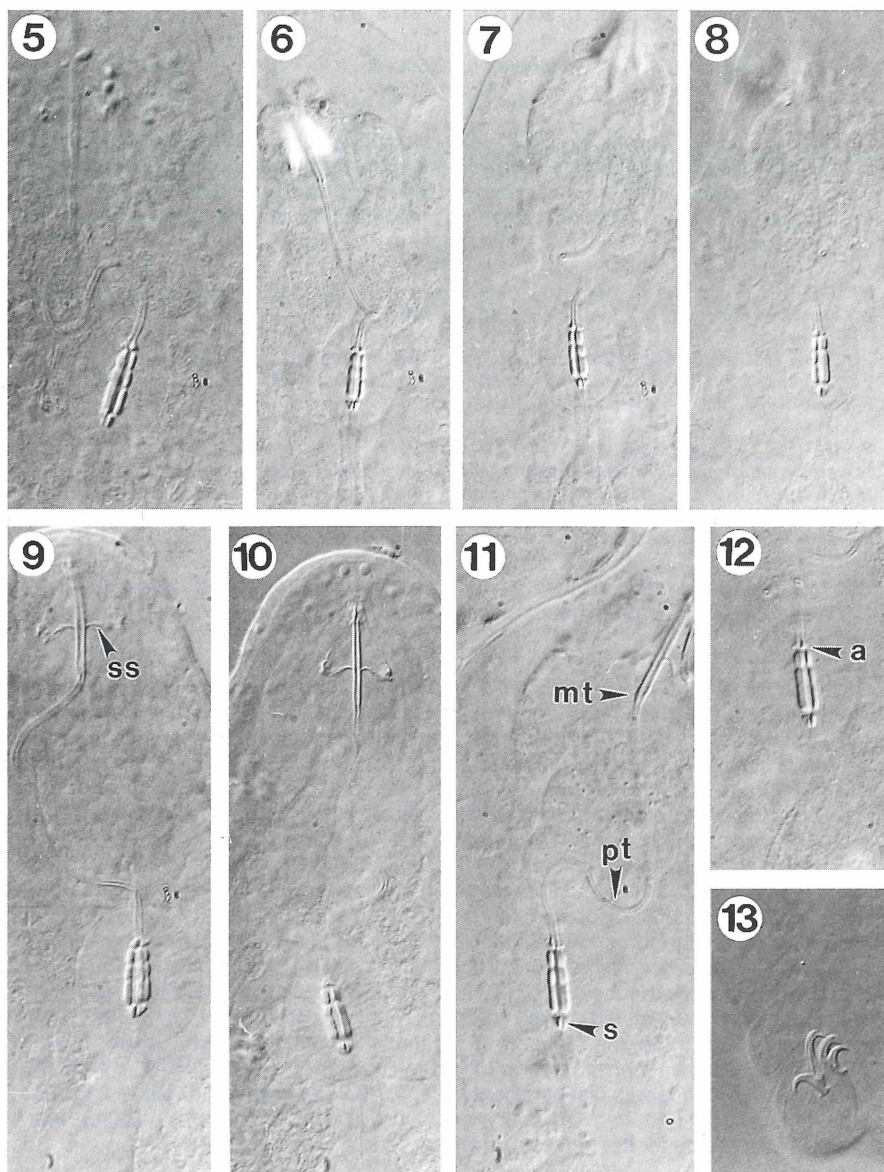
PARATYPES: 26 specimens, data as for holotype (ZMH Reg No. A47/95). Other locality: Signy Is., small tuft of moss (*Andrea regularis* Müll.) from a ridge to the east of Emerald Lake, 27 March 1987, coll. S. J. McInnes, 1 specimen. Three paratypes are deposited in the British Antarctic Survey, Cambridge, one paratype in Pilato's collection (Dipartimento di Biologia Animale, Università di Catania, Italy); the remaining paratypes are housed in ZMH.

ETYMOLOGY: We dedicate the species to our recently deceased colleague, Prof. Dr. Walter Maucci, the prominent authority on tardigrades and a long-year student of these animals.

DESCRIPTION: The body is slender (Fig. 1), transparent-whitish or whitish, without any pigment and 180-251 µm long (holotype 221 µm; \bar{x} = 217 µm). Cuticle smooth, eye-spots absent. Internal organs, excluding cuticular structures, delicately formed, i.e. easily cleared in Faure's preparations, thus poorly visible.

Mouth opening antero-ventral, mouth cavity without internal armature (crests, teeth). Buccal apparatus with a long pharyngeal tube and small pharynx (Figs 1, 5-11). Mouth tube external diameter 1.1-1.4 µm wide (1.4: \bar{x} = 1.3) and 16.3-18.5 µm long (17.6: \bar{x} = 17.7) and without postero-dorsal apophyse (= drop-shaped structure). Stylet supports located approximately in the middle of the mouth tube, hence "*pt* index" for the mouth tube equals 53.9-62.7% (64.2%; \bar{x} = 59.0 %). Pharyngeal tube long and thin, external diameter 0.7-1.0 µm (0.8, \bar{x} = 0.8), in all specimens markedly thinner than the mouth tube (Figs 1, 2, 9-11). In five specimens the pharyngeal tube was not overly convoluted, thus more easily measured, with a range of length between 39-58 µm (58; \bar{x} = 49.5, *n* = 5). In these individuals the pharyngeal tube is 2.3-3.0 times longer than pharynx (2.8 in the holotype). The posterior unit of the pharyngeal tube ends with distinct apophyses, 0.6-0.9 µm in length (0.9; \bar{x} = 0.8). The striated (spiralised) pattern of the pharyngeal tube is poorly formed and has only been clearly observed under the highest magnification in a few specimens.

Pharynx small and spheroid, with three elongated macroplacoids and a relatively large septulum (Figs 1, 3, 5-12). No microplacoids. The pharynx is 17.0-21.0 µm long (21.0; \bar{x} = 18.6) and 12.6-17.0 µm wide (15.3; \bar{x} = 13.8). The overall macroplacoid size increases from first to third, with the first two placoids usually of equal size though sometimes the first is longer than the second or (rarely) the second macroplacoid is longer than the first. The third macroplacoid is distinctly longer. The



Figs 5-13. *Diphascon maucci* sp. n.: 5-11, buccal apparatus and its variability; 12- pharynx, 13- claws of leg IV (Fig 11: holotype; other figs: paratypes).

length of the macroplacoids: I = 1.8-2.5 μm (2.5; \bar{x} = 2.1), II = 1.8-2.3 (2.1; \bar{x} = 2.1), III = 3.2-4.0 μm (3.6; \bar{x} = 3.5). The septulum is frequently the same length as the first or second placoid [1.6-2.1 μm long (1.9; \bar{x} = 1.8)]. The length of the macroplacoid row ranges between 7.5-9.0 μm (9.0; \bar{x} = 8.3). The lateral edges of each macroplacoid, particularly the third, are smooth and without incisions.

The second and the third macroplacoids have been observed to be aberrantly formed in several specimens, where these placoids are fused together and seemingly developed as only one, long structure. In such cases, the border between the placoids is marked only by a poorly visible narrowing. The anomaly usually occurs in the placoid row located on only one side of the pharynx lumen (Figs 8, 10), rarely (three specimens) on both sides. The latter arrangement of the placoids gives an impression of the presence of only two macroplacoids in each placoid row, strongly differentiated in length.

Claws are small, increasing in size posteriorly and closely resembling those in *D. pingue* (Marcus, 1936). Primary branches with distinct accessory spines (Figs 4, 13). The posterior claws on legs IV (primarily external) 6.3-11.0 μm long (9.5; \bar{x} = 9.2). No cuticular bars between the claws or at the base of internal claws I-III. The bases of the claws are smooth, without teeth or spines.

No eggs were found.

Three specimens represent males, having spermatids in testis and paired spermatid ducts.

The new species was found in eight of 50 samples examined, where it co-occurred with *O. minor*, *E. meridionalis*, *M. furciger*, *D. puniceum* and *D. pingue*. In an additional sample, collected near Emerald Lake, it was associated with all the above taxa except *E. meridionalis*, replaced by *E. jenningsi*.

Comments

About 60 species, subspecies and varieties have been described within the genus *Diphascon*, a taxon in need of thorough revision. Only *D. ongulense* (Morikawa, 1962) resembles *D. maucci* sp. n. and the former species was described from East Ongul Island located off the coast of Enderby Land near the Japanese station Syowa in the Continental Antarctic.

The short and at present insufficient description of *D. ongulense* is based on four specimens (Morikawa 1992). This material cannot be traced (Prof. K. Ishikawa, *in litt.*) and must be considered as lost. Thus, it was not possible to compare these two species. Nevertheless, at least two characters highlighted in the original description of *D. ongulense* enable secure separation of *D. maucci* sp. n. from the latter taxon.

Both species have in common a thin pharyngeal tube, distinct pharyngeal apophyses, three macroplacoids, septulum and relatively small claws. In *D. ongulense* no mention is given to the presence of a postero-dorsal apophyse on the mouth tube, an important taxonomic character introduced recently by Pilato (1987). Moreover, the value of "pt index" in this species is unknown. In *D. ongulense*, however, the pharyngeal tube is distinctly shorter as compared to that in *D. maucci*

sp. n. ("about as long as the length of the pharynx" versus 2.3-3.0 times longer than the pharynx, respectively) and the size of the pharynx is distinctly larger, than the pharynx in the new species (comp. Fig. 6 in Morikawa 1962 and Figs 1, 5-11, this paper). To judge from the micrograph in Morikawa (*op. cit.*: Fig. 6), there are also differences in the shape of macroplacoids. Those in *D. ongulense* are more robust, thicker, separated by longer distances and increase in size sequentially from 1st to 3rd, as compared to the thinner, more delicately formed macroplacoids in *D. maucci* sp. n., located more closely and usually 1st + 2nd placoids of equal length. The limited ecological data on these species are also divergent. *D. ongulense* was originally extracted from blue-green algae and diatoms collected in a pond (Morikawa 1962), indicating rather a limnic character, whilst all nine samples of *D. maucci* sp. n. were found in cryptogamic fellfield, a dry terrestrial habitat.

D. ongulense has recently been reported from Italian mountains (Bertolani 1982, Balsamo *et al.* 1987), Northern Russia (Biserov 1991), Southern Argentina (Tierra del Fuego: Rossi & Claps 1989, 1991), as well as the Antarctic, near its *locus typicus* (Utsugi & Ohyama 1989). In our opinion, the records from the Northern Hemisphere refer to *D. recamieri* Richters, 1911, a variable Boreal-mountain species with a Holarctic distribution. The specimens from Terra del Fuego (Rossi & Claps *op. cit.*) are illustrated without a postero-dorsal apophyse on the mouth tube. As this character was not considered and is not clear in the original description of *D. ongulense*, the presence of the latter taxon the South Argentina taxon should be re-confirmed, as there are some doubts as to whether those individuals represent the true *D. ongulense*. However, the new report of *D. ongulense* from Antarctica involves *D. pingue*, as judged from the presence of microplacoids (Utsugi & Ohyama: Fig. 5b).

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Zusammenfassung

Eine neue Tardigradenart, *Diphascon maucci* sp. n. wird aus den antarktischen Moosen und Flechten (Südorkney Inseln: Signy Island) beschrieben. Die neue Art steht *D. ongulense* (Morikawa, 1962) am nächsten, unterscheidet sich aber von dem letzten Taxon durch einen kleineren Schlundkopf und eine viel längere Schlundröhre.

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Authors' addresses:

Dr. H. Dastych, Zoologisches Institut und Zoologisches Museum der Universität Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Bundesrepublik Deutschland; --- S. J. McInnes B.Sc. (Hons), M. Phil., British Antarctic Survey, Natural Environment Research Council, High Cross, Madingley Road, Cambridge CB3 0ET, United Kingdom.

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