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Hexapodibius boothi sp. n., a new species
of semi-terrestrial tardigrade
from the Maritime Antarctic

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(With 4 figures)

A b s t r a c t

Hexapodibius boothi sp.n., a new species of semi-terrestrial tardigrade from fellfield mineral soil material at the Dundee Island (in the Maritime Antarctic) is described.

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

During a review of tardigrades from the maritime Antarctic the authors have studied several slide collections, including one held by the British Museum (Natural History) in London. Part of the collection contained the material on which a paper on Antarctic tardigrades by Usher & Dastych (1987) had been based. Three specimens previously identified as *Hexapodibius* sp. (op. cit.), were found on reexamination to represent a new species. The description of this new species is provided below.

The type material is deposited at the British Museum (Natural History), (BMNH) and the Zoologisches Museum, Hamburg (ZMH). The measurements given are those of the holotype, unless otherwise indicated.

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

Hexapodibius boothi sp. n.

(Figs 1-4)

HOLOTYPE: sex undet., 249 μ m long, BMNH (No. 1994. 3. 15. 1-2), 2 March, coll. R. G. Booth.

TYPE LOCALITY: The Maritime Antarctic, Dundee Island (Welchness Point: 63° 29' S + 56° 13' W) (off the northern tip of the Antarctic Peninsula). In a sample from fellfield mineral soil material.

Paratypes: two specimens, sex undet., locality data as for the holotype. One paratype in BMNH (No. as above), another in ZMH (No. A3/94).

DIAGNOSIS: A median sized *Hexapodibius* with distinct eyes. Claws on legs I to III only, have elongated main branches. Pharynx with three short macroplacoids; no microplacoids. The third macroplacoid with distinct incision.

DESCRIPTION: Body whitish, holotype 249 μm long (paratypes: 364 and 488 μm). The cuticle is smooth. Eye-dots distinct, composed of many dark-brown pigment granules. Mouth opening antero-ventral and surrounded by six barely discernible lobes, which are more obvious in only one specimen. Mouth cavity without granulation or ridges. Mouth tube 53 μm long and 5 μm wide. The distance between the anterior edge of the stylet sheaths and stylet supports is 40 μm long, thus the "pt index" (Pilato, 1981) of 75%. The mouth tube has buccal lamina. The pharynx elongated (44 x 35 μm), with distinct apophyses (2 μm long) and three short macroplacoids (Figs 1, 2). The macroplacoid row is 16 μm long. Microplacoids are absent. The third macroplacoid has a distinct incision in its latero-posterior part. The distance between macroplacoids II and III is longer than between macroplacoids I and II. The first two macroplacoids are connected a short cuticular bar, giving the general impression of the presence of only one, longer macroplacoid with deep lateral incisions in its middle (Fig. 2). That connection (bar) is absent between macroplacoids II and III. The macroplacoids are: I= 2.4, II= 3.4, III= 4.6 μm , long.

Claws are small, present only on legs I to III in the "2121" formula (Figs 1, 3, 4). The external claws are slightly larger than the internal ones. The claw size increases slightly from I to III. Accessory spines are tiny, thin and barely discernible (Figs 3, 4). The primary branches are relatively long, thick, bluntly pointed and with an indistinct internal sculpture. Secondary branches are also bluntly pointed but short. No lunules. The claw branches are joined near the base of the claw, a quarter to a third of the claw height (Figs 3, 4). The external claws are: I= 9.0, II= 10.0, III= 10.3 μm , long. "Pt index" for the external claw II= 19%.

Eggs were not found.

ETYMOLOGY: The species is named in honour of Dr. Roger G. Booth (The Commonwealth Institute of Entomology, The Natural History Museum, London) who collected the material.

C o m m e n t s

The species composition within the genus *Hexapodibius* is a subject of controversy that, to some degree, also includes the status of the family Calohypsiidae, where this genus belongs (for details: Maucci 1981, 1989, Pilato 1982, 1989, Pilato & Beasley 1987, Ramazzotii & Maucci 1983 and Schuster et al. 1980). Most members of the Calohypsiidae are characterized by different degrees of leg and claw reduction, caused by unknown selective factors. The genus *Hexapodibius* (sensu Pilato 1989) comprises *H. micronyx* Pilato, 1969, *H. bindae* Pilato, 1982, *H. pseudomiconyx* Robotti, 1972 and *H. degenerans* Biserov, 1990.

The new species described in this paper resembles most closely *H. pseudomicronyx*, but can be distinguished from the latter taxon by the larger claws (9 μm or more, compared with 6 μm or less in *H. pseudomicronyx*), and the distinct incision in the latero-posterior part of the third macroplacoid. The incision is absent in *H. pseudomicronyx* and all other members of the genus. Moreover, the insertion of stylet supports is more caudal in *H. boothi* sp. n. (pt index = 75%) compared with *H. pseudomicronyx* (pt index = 69%). The macroplacoid row of *H. boothi* sp. n. is also relatively longer and, compared with a syntype of the latter species, located "normally", i.e., approximately in the middle of the pharynx, but is placed more posteriorly in *H. pseudomicronyx*.

The smaller claws of *H. micronyx* and *H. bindae* (up to 5 μm in length) and their shape readily distinguish these species from *H. boothi* sp. n. In both former taxa the primary branches of the claws were short and joined with the secondary branches at approximately the middle of the claw length, as opposed to the fusion of the branches just at the base of the claw in both the new species and *H. pseudomicronyx*.

The claws of *H. boothi* sp. n. are also similar in their form and size to the claws on legs I to III of *Parhexapodibius castri* (Ramazzotti, 1964), described from the Chilean mountains, also *P. lagrecai* (Binda & Pilato, 1969) and *P. ramazzotti* Manicardi & Bertolani, 1967, reported from Europe. The resemblance was to the longer primary claw branches that are joined with the secondary branches just at the base of the claw. Nevertheless, the members of *Parhexapodibius* still retain claws on legs IV, although strongly reduced or in a rudimentary form, compared to the lack of such structures in the more derived genus *Hexapodibius*. Both taxa also have similarly shaped buccal apparatus (Ramazzotti 1964). These conditions suggest the existence of at least two phyletic lineages within the *Hexapodibius*. It is therefore possible, that the new species (if the above resemblance reflects a close relationship) evolved from a form related to the present *P. castri* by full suppression of claws IV and the reduction in the claw size on legs I to III.

It should be noted that a distinct trend in claw reductions has also been reported recently in other tardigrade families, i.e. the Macrobiotidae and Hypsibiidae (for review: Dastych & Alberti 1990). Of particular taxonomic interest is the recent description of *H. degenerans* from Russia (Biserov 1990). This species differs strikingly from other *Hexapodibius* taxa by the type and number of placoids. Consequently, it is possible that the taxon really belongs to the family Macrobiotidae, and not the Calohypsibiidae. If this is true, then *H. degenerans* would represent a new undescribed "hexapodibial" genus within the Macrobiotidae, i.e. a form with completely reduced claws on legs IV. Another taxon in the Macrobiotidae with strongly reduced claws, particularly on legs IV, has recently been redescribed by Dastych & Alberti 1990. The species, *Macrobiotus xerophilus* (Dastych, 1978), represents approximately the same (but convergently achieved) level of the claw reduction as that characterised by *Parhexapodibius* of the Calohypsibiidae. In the future a new supraspecific taxon should be erected for this species. However, the "hexapodibial" form, with claws absent on leg IV, is still unknown within the Macrobiotidae.

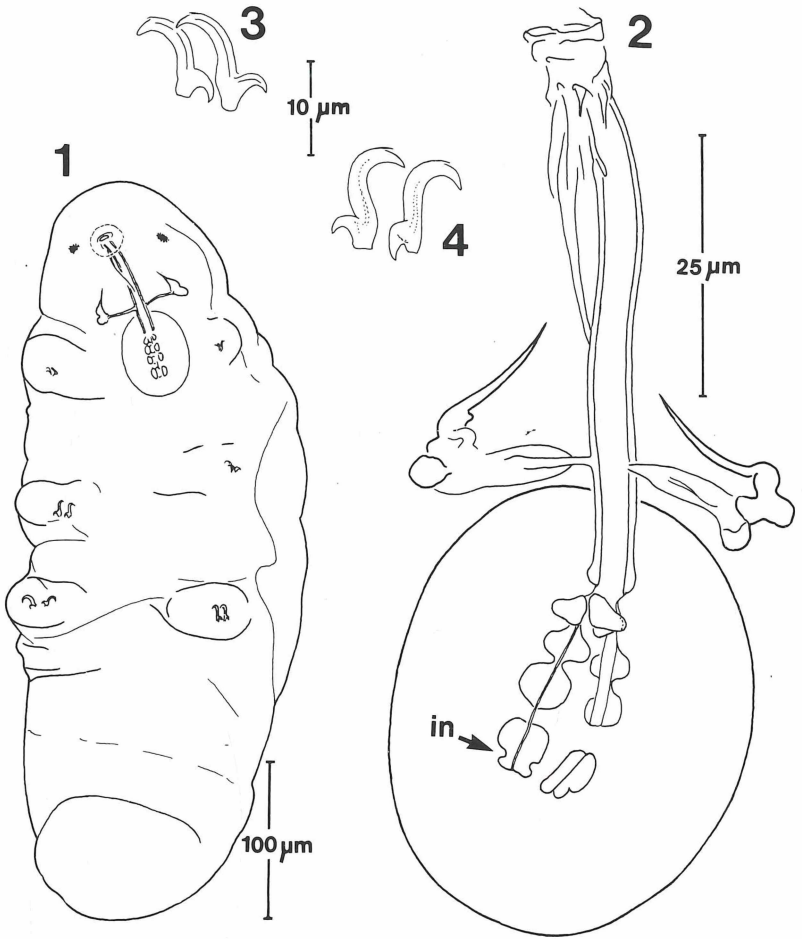
H. boothi was collected by an extraction method more frequently used for mites and springtails (Usher & Booth 1984) and which is not particularly efficient for tardigrades. Nevertheless, the tardigrade fauna extracted from a fellfield mineral soil with no macro vegetation was relatively rich. Terrestrial Antarctic tardigrades have more commonly been collected and reported from bryophytes, and the presence of a tardigrade fauna which included a *Hexapodibius* (the first report for this genus from the southern hemisphere) in a coarse mineral soil demonstrates our fragmentary knowledge of this Antarctic habitat. Fellfield mineral soil environments, which are also sometimes referred to as "chalikosystem" (Janetschek 1967), are a major component of ice and snow free regions of Antarctica and clearly knowledge of its tardigrade fauna is extremely limited. Consequently, studies of such ecosystems, with respect to tardigrade fauna, are urgently required.

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

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

Eine neue Bärtierchen-Art, *Hexapodibius boothi* sp. n., wird aus dem antarktischen Kies (Dundee Insel, Antarktische Halbinsel) beschrieben. Die neue Art unterscheidet sich von anderen dieser Gattung (a) durch das Vorhandensein einer Einkerbung auf dem dritten Makroplakoid und (b) durch größere Krallen, welche sich auch durch längere Hauptäste auszeichnen.



Figs 1-4: *Hexapodibius boothi* sp. n.: 1- whole animal in ventral view, paratype; 2- buccal apparatus, dorso-lateral view (holotype; in= incision); 3- claws of II pair of legs, ventral view (holotype); 4- claws of III pair of legs, ventral view (paratype).

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