

## A new species of the genus *Echiniscus* (Tardigrada) from New Zealand

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(With 8 figures)

### Abstract

A new tardigrade species of the genus *Echiniscus* from New Zealand is described. The occurrence of the taxon was originally published by Horning *et al.* (1978) under the name *E. bigranulatus* Richters, 1908.

### Introduction

First information on New Zealand tardigrades (or water bears) goes back to Richters (1908a) who described a new species from North Island, *Echiniscus novaezeelandiae* (now *Pseudechiniscus*), reported *Macrobotus hufelandi* Schultze, 1834 from there and recorded *Echiniscus gladiator* Murray, 1905 (= *Hypechiniscus*) from South Island. This author mentioned also two unidentified species of *Macrobotus* and one of *Echiniscus*. Murray (1910) described two new species and reported 19 others from New Zealand. Martin & Yeates (1975) recorded *M. liviae* Ramazzotti, 1962 (det. D. S. Horning). Almost at the same time, Grigarick *et al.* (1973) and Toftner *et al.* (1975) analysed the morphology of eggs of some tardigrade species, including three taxa from the region. Horning *et al.* (1978) provided a comprehensive survey of tardigrades from New Zealand, when they also described 12 new taxa and reported 42 other species and subspecies. Nelson & Horning (1979) supplemented the above survey with a list of 21 species found in the vicinity of Kaikoura on South Island. Horning & Schuster (1983) redescribed one of their earlier taxa (reported then as *Pseudechiniscus lateromamillatus* Ramazzotti, 1964: see Horning *et al.* 1978) and split the species into three new ones.

Recently Pilato (1996) redescribed *Isohypsibius wilsoni* Horning *et al.*, 1978 and separated two additional new species from its type series. Moreover, Pilato & Binda (1996) discerned five different species within the material identified by Horning *et al.* (1978) as *Macrobotus liviae* Ramazzotti, 1962, with two taxa of *Macrobotus* as new ones. Later, Pilato & Binda (1997) described another new species (*Hypsibius*) from that collection and verified some other identifications. However, Pilato & Binda (1997) did not record whether all the specimens had already been identified by Horning *et al.* (1978) and, if so, under which names they were when originally published by the latter authors.

While recently examining some microscope slides from the tardigrade collection of Horning *et al.* (1978), several specimens were found which had been identified by these authors as *Echiniscus bigranulatus* Richters, 1908. However, the examination showed that these specimens are not *E. bigranulatus* but represent a new species. Its description is given below. The material was kindly loaned to the author by Dr. R. L. Palma of the Museum of New Zealand Te Papa Tongarewa (MONZ), Wellington.

Unless otherwise indicated, the measurements given are those of the holotype. Abbreviations used in Figs 2-6: *A*- appendage *A*, *c*- mouth cone, *ce*- external cirrus, *hp*- head papilla, *mp*- IIIrd median plate, *np*- neck plate, *sb*- subcephalic plates, *sp*- shoulder plate, *tp*- terminal plate.

## Description

*Echiniscus palmae* sp. n. (Figs 1-8)  
*Echiniscus bigranulatus*; Horning *et al.* 1978  
 (p. 191, Figs. 7-9, 161); McInnes 1994 (in part).

**DIAGNOSIS.** Median sized *Echiniscus* with long head cirri, relatively short lateral appendages *A* and characteristic large hemispherical knobs on dorsal plates, the knobs being irregularly and sparsely distributed. Under the surface of dorsal plates also occurs tiny and dense granulation. External claws smooth, internal ones with a spur.

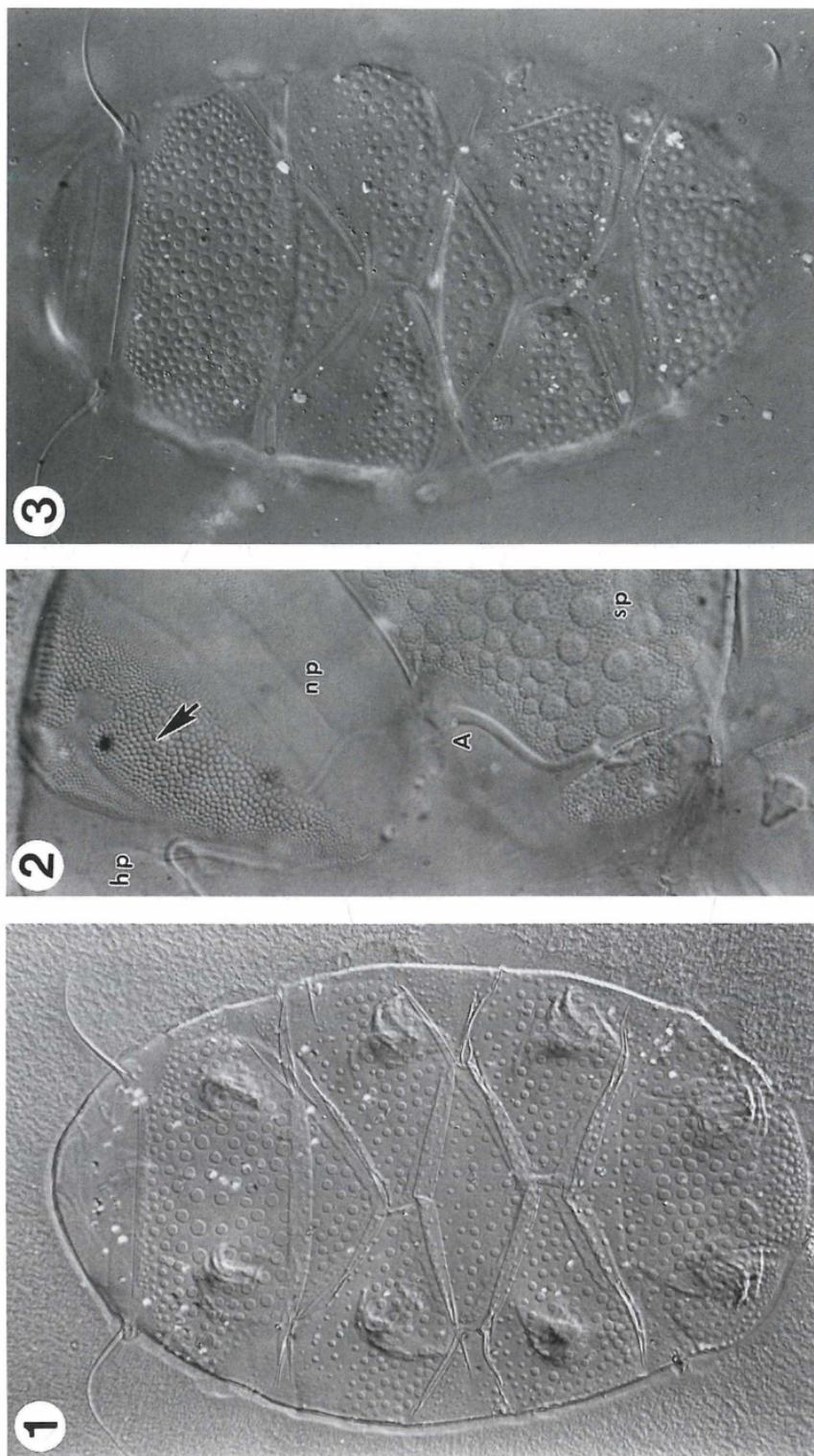
**HOLOTYPE.** Female, 286 µm long; deposited in the Museum of New Zealand (MONZ), Wellington.

**LOCUS TYPICUS.** New Zealand, South Island. Arthurs Pass National Park, Pegleg Flat, from "*Dicranoloma robustum* (probably), on *Hoheria* sp. ", 18 May 1970, coll. D. S. Horning, sample No. 163.

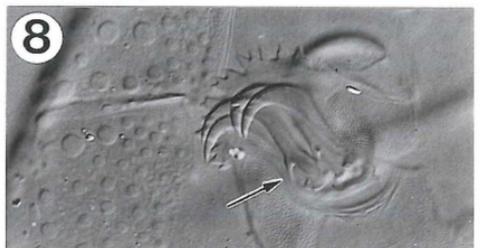
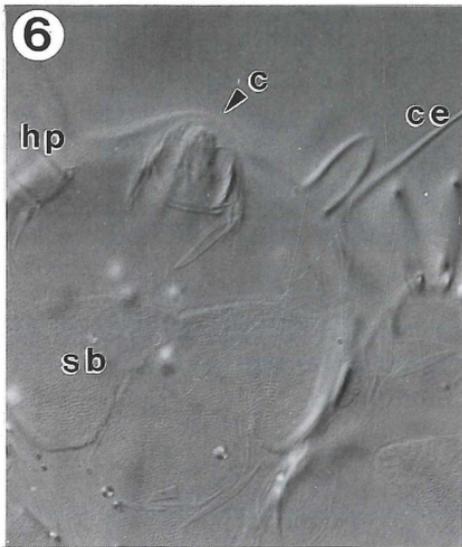
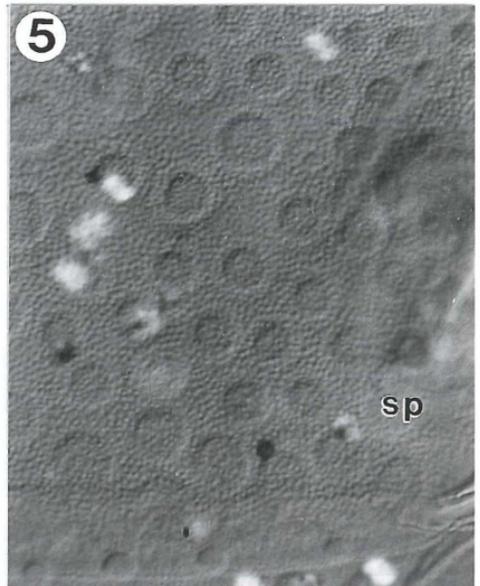
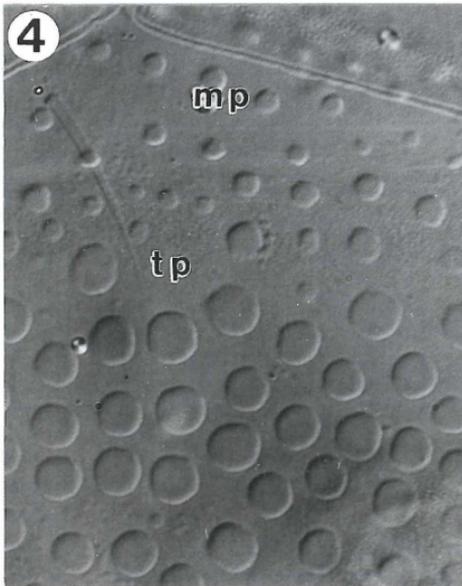
**PARATYPES.** Altogether 18 specimens (4 females, 4 males, 10 individuals with undet. sex) mounted on 18 slides, all from New Zealand, South Island. **Paratypes No. 1-5**, data as for holotype; paratype **No. 6**, as above, from *Leptostomum inclinans* on *Hoheria* sp. (sample No. 164); paratype **No. 7**, as above, from *Calyptogon mnioides* on *Hoheria* sp. (sample No. 170); paratype **No. 8**, Westland National Park, Franz Josef Valley, 29 Mar 1970, coll. D. S. Horning, from *Camptochaete arbuscula* on *Podocarpus hallii* (sample No. 58); paratypes **No. 9-10**, Abel Tasman National Park, Canaan Road terminus, from *Lobaria adscripta* on live *Nothofagus*, 9 Apr 1971, coll. D. S. Horning (sample No. 525); paratype **No. 11**, as above, from foliose lichens on live tree trunk (sample No. 526); paratypes **No. 12-13**, Mt Aspiring National Park, Haast Pass, 21 Oct 1970, coll. D. S. Horning, from mixed cryptogams on *Nothofagus* sp. (sample No. 381); paratype **No. 14**, as above (sample No. 382), from *Pseudocyphellaria colensoni* on twigs of *Nothofagus* sp.; paratype **No. 15**, as above, from *Pseudocyphellaria homeophylla* on live tree trunk (sample No. 377); paratypes **No. 16-17**, Banks Peninsula, Coopers Knobs, from *Hypnum cupressiforme* and *Metzgeria decipiens* on *Dacrydium cupressinum*, 9 Apr 1970, coll. D. S. Horning (sample No. 87); paratype **No. 18**, Lake Monowai, hepatics and *Sticta* sp. on *Nothofagus* sp., sample No. 586, coll. J. L. Burnip.

The paratype No. 1 is deposited in the Zoologisches Museum Hamburg (ZMH Reg. No. A39/97); the remaining ones are housed at the MONZ, Wellington.

**ETYMOLOGY.** The new species has been dedicated to Dr. Ricardo L. Palma, a curator of insects at the MONZ, Wellington.



Figs 1-3. *Echiniscus palmai* sp. n.: 1 - whole animal, dorsal view (holotype, ♀); 2 - anterior part of the body, lateral view; 3 - male, dorsal view (All interference contrast. See text for abbreviations).



Figs 4-8. *Echiniscus palmae* sp. n.: 4 - granulation (knobs) on IIIrd median- and terminal plate; 5 - tiny granulation under the cuticular surface, shoulder plate; 6 - head region and subcephalic plates, ventral view; 7 and 8 - claws III and IV, respectively (arrow: spur on internal claw).

**DESCRIPTION.** The body length lies between 180-297  $\mu\text{m}$  (holotype: 286  $\mu\text{m}$ ), that of females being greater (211- 297  $\mu\text{m}$ ) than males (194-257  $\mu\text{m}$ ). The body colour of living animals is unknown (red?), as it was not reported by Horning et al. (1978); in the slide preparations (Hoyer's medium) the specimens are grey-yellowish. The black eye-dots are lacking.

Dorsal plates well developed, except for the third, median one, which is poorly marked. Ventral plates absent, except for a pair of subcephalic plates, which are well marked in males (Fig. 6). The neck plate clearly visible. The terminal plate with two medium sized incisions but without faceting.

The ornamentation of dorsal plates consists of large, nearly circular, hemispherical knobs (domes), up to 5.5  $\mu\text{m}$  (usually 2.5-3.5  $\mu\text{m}$ ) in diameter. Smaller such knobs occur also laterally in areas between the segmental plates. The knobs are irregularly distributed and are located either relatively far from each other in larger specimens (usually females: Fig. 1, 4) or more closely in smaller individuals, including males (Fig. 2). The distance between individual knobs is at times several times larger than the knob diameter, though usually much less. Under the surface of dorsal plates occur tiny and dense granules (Fig. 5), which are irregularly shaped and about 0.5  $\mu\text{m}$  in diameter. The neck plate shows a similar granulation (Fig. 2). The head plate is covered with granules somehow similar in shape, but smaller in size, to those of *E. blumi* (Fig. 2, arrow). This ornamentation occurs also on spine fringes. Ventral side with tiny granules (0.3-0.5  $\mu\text{m}$  in diameter), closely and regularly distributed.

The head segment with long cirri. In the holotype the external cirri are 41  $\mu\text{m}$  long (range: 25-41  $\mu\text{m}$ ), the internal cirri with 23  $\mu\text{m}$  (16-32  $\mu\text{m}$ ) being shorter. Head papilla (= papilla cephalica, = secondary clava) 6.3  $\mu\text{m}$  long (6.3-13.0  $\mu\text{m}$ ), in males larger. The papilla is distinctly shifted towards the external cirrus and located almost at its base (Fig. 6). The lateral appendage A 86  $\mu\text{m}$  long (32-75  $\mu\text{m}$ ), being 26-35% of the body length. Clava (= primary clava) median sized, 7  $\mu\text{m}$ . Other appendages are lacking.

The mouth tube has weakly sclerotized stylet supports.

Legs I with a small spine-like sensory organ (5.5  $\mu\text{m}$  in length) and legs IV with small sensory papilla (5.5  $\mu\text{m}$ ). The spine fringes (Fig. 8) composed of 10 and 11 irregularly shaped, sharp spines each (range 6-16). Claws are medium sized, the external ones smooth, the internal claws with a small, downwards directed spine (spur). This spur is smaller and more closely located to the base on claws I to III; on claws IV it is larger and more distant from the base (Figs 7, 8: arrows). Claws IV in the holotype are 21  $\mu\text{m}$  long (12-22  $\mu\text{m}$ ).

## Comments

*Echiniscus palmae* sp. n. is well characterized by the sculpture of its dorsal plates. The usually large, distinctly raised and circular knobs (domes) on the plates and particularly their sparse and irregular distribution, distinguish the new species from all taxa of the very specious genus *Echiniscus*. Such ornamentation pattern has not been reported for the genus until now, but seems, for example, to be the rule in *Mopsechi-*

*niscus*. In the latter genus however, the knobs are much smaller and even more sparsely distributed.

*E. bigranulatus*, a taxon described by Richters (1908b) from the Argentinian part of Tierra del Fuego (Ushuaia), differs from the new species mainly in the type of ornamentation of its dorsal plates. The plates in both taxa are "doubly granulated", i.e. with two kinds of microstructures. However, the pattern of this granulation is decidedly different in *E. palmai* sp. n. In *E. bigranulatus* small and irregularly shaped holes which are sparsely and irregularly distributed occur on the surface of dorsal plates; in the new species large circular domes (knobs) are present on the plates instead of holes. The tiny and closely spaced granules under the plates' surface are both more spherical and regularly distributed in *E. bigranulatus* than in *E. palmai* sp. n., where they are less regular in shape, size and distribution. Both taxa differ also in the length of the appendages A which are shorter and thinner in the new species and in the head cirri which are distinctly longer in *E. palmai* sp. n.

The plate ornamentation in smaller specimens of *E. palmai* sp. n., with their more regularly distributed and closely set knobs (Fig. 3), resemble somehow that of *E. reticulatus* Murray, 1905, another species with a "doubled granulation". In the latter taxon, however, the domes (knobs) are hardly raised (almost flat) and most are of similar, large size. Moreover, they there are closely located and the space between them is more strongly sclerotized and without tiny granulation, when compared to *E. palmai* sp. n. The tiny granulation in *E. reticulatus* is visible only within the knobs, when the microscope is focused on the upper part of the knobs. Furthermore, *E. reticulatus* also has a different type of the head granulation (similar to that on the dorsal plates but smaller and not of *blumi*-type as that in *E. palmai* sp. n.), longer appendages A, a more distinctly marked median plate III and generally larger and fewer teeth in the spine fringe. Also in *E. reticulatus* the spurs on internal claws I to III are not so closely located to the base of the claw and not so steeply directed downwards as they are in the new species.

### Acknowledgements

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### Zusammenfassung

Eine neue Tardigradenart, *Echiniscus palmai* sp. n. von neuseeländischen Bryophyten wird beschrieben. Charakteristisch für die neue Art ist ihre dorsale Skulptur, die aus ziemlich großen kutikularen und halbkugeligen Verdickungen besteht, die meistens weit voneinander entfernt sind. Die Beschreibung von *E. palmai* sp. n. basiert auf dem Material, das ursprünglich unter dem Namen *Echiniscus bigranulatus* Richters, 1908 publiziert worden ist (vgl. Horning *et al.* 1978).

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