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Nanohystricidae n. fam., an unusual, plesiomorphic enarthronote mite family endemic to New Zealand (Acari, Oribatida)

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Abstract

Nanohystrix hammerae **n. gen., n. sp.**—proposed on the basis of numerous adults and a few juveniles—is a new oribatid mite of the infraorder Enarthronota that appears to be phylogenetically relictual and endemic to northern New Zealand, in habitats ranging from native shrublands to native and semi-native forests. With an adult body length of 1–1.2 mm, the species is the largest known enarthronote mite outside Lohmanniidae, and it has an unusual combination of plesiomorphic and apomorphic traits. Plesiomorphies include: a well-formed median (naso) eye and pigmented lateral eyes; a bothridial seta with a simple, straight base; a vertically-oriented gnathosoma; a peranal segment; adanal sclerites partially incorporated in notogaster (uncertain polarity); three genu I solenidia and a famulus on tarsus II. Autapomorphies include: five pairs of pale cuticular disks on the notogaster, with unknown function; six pairs of long, erectile notogastral setae, including pair *h2* incorporated in the second transverse scissure along with the *f*-row, and pair *h1* in a third scissure; chelicerae that are unusually broad, creating a flat-faced appearance; legs I that are inferred to have an unusually wide range of motion. Further, it is the only enarthronote species known to have an elongated ovipositor, and one of few to have glassy, luminous notogastral setae. The gastronotum of juveniles lacks transverse scissures, but has isolated sclerites supporting setae, including erectile setae. The large character gaps between *N. hammerae* and other enarthronote taxa justifies proposal of a monotypic new family—Nanohystricidae **n. fam.**—which is tentatively grouped with several other relictual families in the paraphyletic Heterochthonioidea.

Small muscles appear to be involved in the operation of all erectile setae, but seem to be only depressors, with erection effected by hysterosomal distension. Based on gut contents, its food is primarily fungal hyphae and spores, though ingestion of small arthropods also occurs (perhaps by necrophagy). Collections were made by Berlese-funnel samples of litter, by sweeping low vegetation, and (mainly) by pitfall traps; the latter two suggest that adults are surface-active. Tritonymphs were collected by pitfall traps, but earlier juveniles were collected only by Berlese-funnels. Adults are frequently infected with a eugregarine parasite, which can entirely fill the digestive caeca; immature trophozoites were also seen in tritonymphs. Adults also can serve as hosts for dispersal of secondary capilliconidia of the fungal genus *Basidiobolus*.

Key words: Acariformes, oribatid mite, Enarthronota, *Nanohystrix hammerae* **n. sp.**, soil mite, Gregarina, *Basidiobolus*

Introduction

Enarthronota and Palaeosomata—variously ranked as suborders, supercohorts or, most recently, infraorders (Subías 2004; Norton & Behan-Pelletier 2009; Schatz *et al.* 2011)—are traditionally considered the two earliest-derivative major taxa of the acariform mite suborder Oribatida (Grandjean 1969a). Among other plesiomorphic traits, they lack the opisthonotal defensive glands that characterize more highly-derived oribatid mites (including Astigmata). Traditionally, the monophyly of each group has been assumed, usually with Palaeosomata considered basal to Enarthronota (e.g. Haumann 1991; Weigmann 2001), but molecular data can support either group being basal, depending on method of analysis and whether basal Enarthronota are included (Domes *et al.* 2007; Dabert *et al.* 2010; Pepato *et al.* 2010; Pepato & Klimov 2015). Morphological traits can distinguish the groups (see Grandjean 1954a, 1969a for characters), but few can be considered synapomorphies that clearly support their respective monophyly. Some molecular analyses support or are consistent with monophyly of each group (Domes

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