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Psammochthoniidae n. fam., a paedomorphic family of oribatid mites (Oribatida: Enarthronota) from sandy soil in Thailand, Brazil and the USA

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Abstract

A new genus and species of enarthronote oribatid mite, *Psammochthonius kethleyi* n. g., n. sp., is described and illustrated based on adult and immature specimens collected from coastal sandy soil in Thailand (Phang-nga), Brazil (São Paulo) and the USA (Mississippi). Analysis shows that it is a member of Hypochthonioidea, but not of any named family, so the monobasic family Psammochthoniidae n. fam. is proposed. Traits that are unique among hypochthonioid mites include an adult body length under 250 µm, a functionally trichoid body form (postpedal flexing), strong lateral displacement of setae in row *e*, which insert on a unique form of transverse scissure, subcapitular stenarthry, leg IV vestiges and a possible precocious genital swelling in the larva, apparent absence of an anal segment, and a highly regressed leg setation. The latter two, and some other traits that were previously unknown in Hypochthonioidea, suggest that Psammochthoniidae represents the first clearly paedomorphic lineage in this diverse superfamily. Like all other known hypochthonioid mites, *P. kethleyi* appears to be thelytokous.

Key words: Acari, Hypochthonioidea, new species, trichoid body form, paedomorphosis, setal regression, coastal forest, thelytoky, parthenogenesis, arenicole

Introduction

The early-derivative oribatid mite infraorder Enarthronota currently encompasses about 600 species distributed among five superfamilies, 12 families and 76 genera (Schatz *et al.* 2011; see Subías 2004 for a somewhat different classification). Most enarthronote mites are relatively small (usually less than 400 µm), soil-litter inhabitants that are recognizable by having a notogaster composed of multiple central plates, arranged in tandem and separated by transverse scissures (Grandjean 1969; Norton & Behan-Pelletier 2009). But plates vary in size and number, and scissures vary in style, such that enarthronotes collectively have the greatest diversity of body form of any oribatid infraorder (Norton 2001; Weigmann 2001).

Many of the higher enarthronote taxa seem phylogenetically relictual, as indicated by their morphological distinctness and low diversity; this is reflected in the fact that eight of the 12 families are monobasic (Schatz *et al.* 2011). Relationships among these taxa remain little-studied, except for the superfamilies Hypochthonioidea (sensu Norton 1984, 2001, 2010) and Protoplophoroidea (sensu Norton *et al.* 1983); for other superfamilies, both morphological and molecular studies (e.g. Pächl *et al.* 2012) have been inconclusive.

For any diverse group of organisms, one can expect to discover new taxa in habitats that have received little previous attention. One such habitat is unincorporated sand, as well as sandy soils low in the organic matter that forms the fundamental resource for typical soil communities. Such arenaceous (psammic) habitats contain a distinctive fauna of mites and collembolans (André & Noti 1993; Russell & Alberti 2010). Our main purpose is to describe and illustrate an unusual new genus and species of Enarthronota, based on specimens of all active instars, that inhabits sandy coastal soils in three extremely distant localities: Thailand (Phang-nga), Brazil (São Paulo), and the USA (Mississippi). After the description, we discuss aspects of its morphology and present arguments for including it in the diverse superfamily Hypochthonioidea, as the paedomorphic new family Psammochthoniidae.