



## New species of *Monodontocerus* (Collembola: Tomoceridae) from southern China with diagnostic notes on the genus and introduction of new taxonomic characters

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### Abstract

Three new species of *Monodontocerus* are described from caves in southern China: *M. absens* **sp. nov.** is characterized by its cephalic chaetotaxy and the absence of chaetae from the tenaculum; *M. mulunensis* **sp. nov.** is characterized by a combination of characters including chaetotaxy, foot complex and furca; *M. trigrandis* **sp. nov.** is different from other species in the formula of dental spines and the reduction of the unguual teeth. A key to the species of *Monodontocerus* is provided. Potential diagnostic characters for this genus are proposed. Troglomorphy and interspecific variability are discussed. Pseudopores and the dorsal disto-lateral chaeta on the manubrium are introduced as new taxonomic characters for Tomocerinae.

**Key words:** cave, taxonomy, interspecific variability, identification key, new characters

### Introduction

In 1955, Yosii described a new genus and species, *Monodontocerus modificatus*, in the subfamily Tomocerinae, characterized by the presence of only one basal tooth on the mucro, rather than two as in most other tomocerids. *Monodontocerus* is so far known only from eastern Asia, with two cave species (*M. modificatus* from Japan and *M. odongnyeoensis* Park & Lee, 1995 from South Korea) and one edaphic species (*M. leqingensis* Sun & Liang, 2009 from eastern China). In the present paper, three new species of *Monodontocerus* are described from three caves in the Guangxi Zhuang Autonomous Region and Guizhou Province, China. All six species of *Monodontocerus* are similar in the shape and formula of dental spines, the number of tibiotarsal spine-like chaetae and the general pattern of body chaetotaxy, but can be distinguished by the relative length of the antennae, the dorsal chaetotaxy of the head, details of the body chaetotaxy, the shape of the tenent hair, the number of teeth on the claws and the number of teeth on mucro.

Unlike some genera (e. g. *Tomocerus* Nicolet, 1842; *Pogonognathellus* Paclt, 1944; *Tomocerina* Yosii, 1955), *Monodontocerus* has seldom been discussed in the literature. Christiansen (1964) considered the generic character of *Monodontocerus*, i. e. the single basal mucronal tooth, of specific value but unworkable at the generic level, a point of view reappraised below. The present study suggests that other characters may be of diagnostic value for the genus: the shape and formula of dental spines, the number and location of inner tibiotarsal spine-like chaetae, the distribution of dorsal scales on the manubrium and the elongation of basal teeth on maxillary lamella 5.

Detailed morphological examination of the new species as well as of several other tomocerids from different genera brought to light two new morphological characters on the manubrium potentially useful for the taxonomy of Tomocerinae: the size of a dorso-lateral distal chaeta and the number of elements in the dorsal file of pseudopores newly discovered on this organ.

maximum number for Tomoceridae, and do not exhibit a distinct elongation of appendages. However, all of our new species have pointed tenent hairs, which is shared by most other troglobitic Entomobryomorpha (Lukic *et al.*, 2010), and thus may be a troglomorphic adaptation. In addition, the reduction in pigmentation and size of eye patch are also related to subterranean habitats. Unlike other Tomoceridae genera present in China, most *Monodontocerus* (five out of six) are cave dwellers that could be in the early stages of adaptation to cave life. They are also limited to southern China lowlands where the family is poorly represented, in contrast with northern China where other Tomoceridae are among the dominant Collembola in ecosystems, without any collected from caves.

**Interspecific variation of characters.** Although some classical characters for specific identification among Tomocerinae (e. g., dental spines, tibiotarsal inner chaetae) appear to be stable in *Monodontocerus*, others exhibit interspecific differences as listed below (Table 2).

In *M. absens* **sp. nov.** the interocular macrochaetae have a 2, 1, 2 pattern, while in other species the pattern is 2, 3. The postocular and posterior macrochaetae are closer to each other in *M. absens* **sp. nov.** and *M. mulunensis* **sp. nov.** and farther apart in other species. The arrangement of the post-marginal chaetae varies as well, especially in their presence (*M. odongnyeoensis*, *M. mulunensis* **sp. nov.**) or absence (*M. modificatus*, *M. absens* **sp. nov.**) in the medial region of the posterior cephalic margin (character unknown in *M. leqingensis* and *M. trigrandis* **sp. nov.**).

Body chaetotaxy was studied in each species except *M. leqingensis*. The tergal chaetotaxy from Th. II to Abd. II is rather stable among *Monodontocerus*, except in *M. modificatus* where a notable reduction of macrochaetae occurs on Th. II and Th. III (Yosii, 1956); in *M. trigrandis* **sp. nov.** the three middle macrochaetae on Th. II are arranged in a triangular pattern. Chaetotaxy is more variable on more posterior segments. On Abd. III, the posterior row has either three (*M. modificatus*, *M. mulunensis* **sp. nov.**) or four (other species) macrochaetae; Abd. IV has either one (*M. modificatus*, *M. mulunensis* **sp. nov.**) or two anterior macrochaetae and posterior row is either with three (*M. modificatus*) or two (other species) macrochaetae. Abd. V can have two (*M. modificatus*), three (*M. odongnyeoensis*) or four (other species) macrochaetae.

**Manubrial characters.** Potential diagnostic characters typically found on the manubrium in Tomoceridae include its length relative to the dens, shape and number of lateral chaetae, number and components of the dorsal chaetal stripes of chaetae, and the presence or absence of dorsal scales. In our study two new characters have been found to be potentially useful. The size of the chaeta located at the dorsal disto-lateral corner of manubrium shows considerable variation. In *Tomocerus kinoshitai*, *Tomocerus similis* and *Tomocerus baudoti* it is a minute microchaeta, in *Tritomurus veles* it is as long as the the chaetal stripe macrochaeta, and in *Tritomurus falcifer*, *Tomocerus ocreatus*, *Tomocerus jilinensis*, *Pogonognathellus flavescens* and *Monodontocerus modificatus* it is equal to or slightly smaller than a moderate mesochaeta in the stripe.

The other character is a file of pseudopores external to the chaetae stripe. These pseudopores are 3 in *Tomocerus baudoti*, 11 in *Tritomurus veles*, 12–16 in *Tomocerus ocreatus* and 22–25 in *Monodontocerus modificatus*; in *Pogonognathellus flavescens* they are located more closely to the chaetae stripe and number about 10. The interspecific variation is larger than the intraspecific one, and therefore, this character may be useful in generic differentiation.

## Acknowledgments

Thanks are given to Youbang Li who provided us with the specimens of Mulun, to Mingyi Tian who provided us with the specimens of Sanhe and to the Mulun NR staff who organized the field trips in the reserve. Sampling in Guangxi were part of the World Bank GEF-financed project "Guangxi integrated forestry development and conservation", and facilitated by Jin Liu, Anthony Whitten and the Biodiversity Office of the Guangxi Forestry Bureau. The China Scholarship Council provided a grant to the first author for studying at MNHN, Paris. The project was also supported by the National Natural Sciences Foundation of China (31101622) granted to Dr. Feng Zhang.

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