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Musserakis sulawesiensis gen. et sp. n. (Nematoda: Heterakidae) collected from *Echiothrix centrosa* (Rodentia: Muridae), an old endemic rat of Sulawesi, Indonesia

HIDEO HASEGAWA[1], KARTIKA DEWI[2] & MITSUHIKO ASAKAWA[3]

[1]*Department of Biology, Faculty of Medicine, Oita University, 1-1 Idaigaoka, Hasama, Yufu, Oita 879-5593, Japan. E-mail: hasegawa@oita-u.ac.jp*

[2]*Zoology Division, Museum Zoologicum Bogoriense, RC Biology-LIPI, Jl. Raya Jakarta-Bogor, Km. 46, Cibinong, West Java, 16911, Indonesia. E-mail: kartika_mzb@yahoo.co.id*

[3]*Department of Pathobiology (Wild Animal Medical Centre), School of Veterinary Medicine, Rakuno Gakuen University, Ebetsu, Hokkaido, 069-8501, Japan. E-mail: askam@rakuno.ac.jp*

Abstract

Musserakis sulawesiensis **gen. et sp. n.** (Nematoda: Heterakidae) is described from the large-bodied shrew rat, *Echiothrix centrosa*, one of the old endemic rats of Sulawesi, Indonesia. *Musserakis* is readily distinguished from other heterakid genera by having non-recurrent and non-anastomosing cephalic cordons, by lacking papillae between papillae groups around precloacal sucker and cloacal aperture and by lacking teeth in the pharyngeal portion. The spicules are equal but with marked dimorphism among individuals. Heterakids collected from other old endemic murids examined, i.e., *Crunomys celebensis*, *Tateomys macrocercus* and *Tateomys rhinogradoides*, and the new endemic rats of Sulawesi, were *Heterakis spumosa* Schneider, 1866, a cosmopolitan nematode of various murids. It is suggested that *M. sulawesiensis* is specific to *Echiothrix*.

Key words: *Musserakis* **gen. et sp. nov.**, Heterakidae, Nematoda, *Echiothrix*, old endemic murids, Sulawesi, Indonesia, zoogeography

Introduction

Sulawesi Island, Indonesia, is in a famous transitional area from Oriental to Australian bioregions. Numerous species of endemic murines reside on this island. They have been classified as new endemic and old endemic groups. Some helminthological studies have been done on the new endemic murines, while no study has been made for the old endemic species. Recently, we had an opportunity to examine carcasses of five species of old endemic rats belonging to four genera borrowed from the American Museum of Natural History (AMNH), New York, U.S.A. Nematodes belonging to Heterakidae were found from all of the species examined. Among them, the heterakid from one murine species was revealed to represent a new species of an unknown genus as described herein. A biogeographical discussion is made on this species and *Heterakis spumosa* Schneider, 1866, which was found from the other old endemic rats and new endemic rats of Sulawesi.

Material and methods

The old endemic rats of Sulawesi were collected by Dr. Guy G. Musser, and the carcasses were fixed in 10% formalin and preserved in 95% ethanol at AMNH. The cecum and large intestine were cut open and washed with running tap water on a fine sieve. The residues left on the sieve were transferred to petri dish and examined under stereomicroscope with transillumination. Nematodes found were stored in 70% ethanol, cleared in glycerol-ethanol solution by evaporation of ethanol, and mounted on glass slide with 50% glycerol aqueous solution. They were

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host for *Heterakis gallinarum* (Schrank, 1788) and *H. spumosa* (cf. Anderson, 2000). Saitoh *et al.* (1993) found natural infection of earthworms, *Pheretima hilgendorfi*, with heterakid larvae, which developed to adults to be identified as *H. spumosa* when given to Wister strain brown rats, *Rattus norvegicus*. They also fed earthworms, *Eisenia foetida*, with larvated eggs of *H. spumosa* and demonstrated that the larvae invaded the epithelium of digestive tract. Moreover, they observed higher infectivity of the larvae from the earthworms than the larvated eggs (Saitoh *et al.*, 1993). It is interesting that *E. centrosa* is an aggressive earthworm predator (Musser & Durden, 2014). If *M. sulawesiensis* also utilizes earthworms as paratenic host, this feeding habit of *E. centrosa* may be advantageous for transmission of the nematode. Although *T. macrocercus* and *T. rhinogradoides* also prey on small earthworms exclusively (Musser, 1982), their heterakids found in this study differed from *M. sulawesiensis*. Further study is necessary to determine the source of infection of the heterakids in Sulawesi forests.

The variations in the spicule shape found in *M. sulawesiensis* are of special interest. The spicules of thick type are presumed to function in copulation because protrusion was often observed. Meanwhile, the role of the thin type spicules in mating remains unknown because protrusion was not observed. It is noteworthy that the longitudinally-striated and distally winding nature of the thin type spicules resembles the feature of the spicules of *H. spumosa* (Hall, 1916, cited in Skrjabin *et al.*, 1961). Although the spicules are more or less stout in most of the heterakids, a few species have been known to possess whip-like or thin spicules, e.g. *Heterakis skrjabini* Cram, 1927, *Haroldakis multidentata* (Baylis, 1944), and *Meteterakis varani* (Maplestone, 1931) besides *H. spumosa* (Skrjabin *et al.*, 1961; Inglis, 1991a). However, no report is found on dimorphism/polymorphism in the spicule morphology of heterakids.

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