

A New Bronchial Parasitic Nematode, *Vogeloides* (Nematoda: Pneumospiruridae) from Bat *Nyctimene cephalotes* (Pallas, 1767) (Mammalia: Chiroptera) from Sulawesi, Indonesia

Endang Purwaningsih^{1*}, Kartika Dewi¹, Gloria Animalesto¹

¹Museum Zoologicum Bogoriense, Zoology Division, Research Center for Biology-LIPI, Widyasatwaloka Building, Jl. Raya Jakarta-Bogor Km 46, Cibinong-Indonesia

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*Corresponding author: Endang Purwaningsih

Abstract

Original Research Article

Vogeloides morowaliensis n.sp. is described from *Nyctimene cephalotes*, an endemic bat of Sulawesi and Maluku region. To date, the genus consists of seven valid species. This new species can be distinguished from other congeners in the differences of number and pattern of caudal papillae and the length of the esophagus. The seven former *Vogeloides* species occurred in the host of carnivores (monggose, genette, and cat) and macaque. While *V. morowaliensis* was obtained from Sulawesi bat, so this study added the new host record for *Vogeloides*.

Keywords: New species, *Vogeloides morowaliensis*, *Nyctimene cephalotes*, nematoda, Sulawesi.

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INTRODUCTION

As a key island in the region east of Wallace's line, Sulawesi has an extremely high degree of endemism amongst the fauna, particularly mammals that shows affinities with those of both Indomalayan and Australasian biogeographical realms [1]. *Nyctimene cephalotes* (Mammalia: Pteropodidae) is restricted to Sulawesi and the Maluku region [2]. During a survey of faunal Biodiversity in Morowali, Central Sulawesi, Indonesia in 1994, some individual nematodes were collected from bats, *Nyctimene cephalotes*. We identified those nematodes belonging to the genus *Vogeloides* of family Pneumospiruridae that occurs in the lung or bronchi many species of mammals [3, 4]. In the depth of my knowledge *Vogeloides* have never been reported from bat hosts. In this paper, we presented the new species of *Vogeloides* described from bats in Sulawesi.

MATERIALS AND METHODS

Materials for study were collected from *Nyctimene cephalotes*, and brought by collector to the laboratory in 70 % alcohol preservation. The worms were examined under a compound Olympus BH-2 series microscope with a drawing tube and A JEOL IT-200 scanning electron microscope (SEM) at an accelerating voltage of 5 kV. For Light microscope observation, the nematodes were clear in glyciren-

alcohol for several days, and for scanning electron microscope observation the nematode were fixed in glutaraldehyde and cacodylate bufer, dehydrated in alcohol concentration series beginning from 50% to absolute, dried with vacuum drier, mounted in spesimen stub. Before observed by SEM, nematodes were coated with gold using Ion Coater for 5 minute. Figures were made by tracing the photograph in Adobe Illustrator Programme. Measurement were given in micrometer (μm) unless otherwise stated as the mean follow by the range in parentheses.

RESULTS

Vogeloides morowaliensis n.sp. were recovered from nine *Nyctimene cephalotes* in Sulawesi with the prevalence 12–36.

Description

Vogeloides morowaliensis n.sp.

General: Body small, delicated, longitudinal cuticle striae present at the surface of body (Figs. 1B, 1C). Anterior tip with 6 fleshy lips, anterior end projecting to the buccal capsule, lateral lips larger than other lips with amphid near base of lips, four large sub-lateral papillae present, sub-median lips attenuated to anterior end, with papillae on those anterior tip (Fig-1 A). Buccal cavity small. Nerve ring and excretory pore at anterior extremity, deirids small, conical with thin setae,

located between nerve ring and excretory pore (Fig 2B). Esophagus club shaped, consist of shorter anterior part and longer posterior part with thick musculature (presented 1/29 of body length). Intestine smaller than esophagus at the beginning (Fig. 2 A).

Male (n=7): Body length 12.388 (10.150– 16.085), maximum width 366 (300–395), head width 47 (40–48). Nerve ring, deirid, and excretory pores 120 (104–140), 152 (125– 193), and 194 (135–260) from anterior end, respectively. Deirid conical with thin setae (Fig. 2 B). Esophagus length 423 (335– 480). Gubernaculum two, dissimilar, left gubernaculum 55 long and 14 wide, boat shaped; right gubernaculum 36 long and 21 wide, almost triangular (Fig. 2G). Spicule short, banana shaped, more curved in distal end than proximal, widened posteriorly, tapered at distal end (Fig. 2 F), 254 (230 – 283) long. Caudal papillae sessile, 2 pairs preanal, 1 pair adanal, 5 pairs postanal (2 ventral, 3 subventral in group near the tip of tail). Tail bluntly rounded end with very thin mucron at the tip, bent dorsally (Fig.2 C), 52 (45– 60) length.

Female (n=14): Body length 13.243 (10.355–16.670), maximum width 439 (380–510), head width 55 (50–

60). Nerve ring, deirid, and excretory pores 123 (100–131), 131 (114–160), and 172 (158–180) from anterior end, respectively. Esophagus length 468 (490–560). Vulva 158 (97–168) from posterior end. Tail bluntly rounded end with very thin mucron at the tip, bent dorsally (Fig. 2 D), 52 (42–60) long. Egg rounded, thick shelled, embryonated (Fig. 2 E), 43 (38–45) x 32 (28–33).

Type host: *Nyctimene cephalotes* (Pallas, 1767) (Mammalia: Chiroptera)

Type locality: Morowali, Central Sulawesi, Indonesia

Site of infection: Bronchi

Type specimens: Holotype male, allotype female (MZBNa 839); paratypes 6 males and 13 females (MZBNa 840).

Date of collection: 1994

Etymology: The species is named after the locality where the host was collected.

Table-1: *Vogeloides* spp. with the host, locality, and references

No	Nematode species	Host species	Locality	References
1	<i>V. ascaroides</i> (V Linstow, 1897),	<i>Cynopithecus muna</i> (Muna macaque)	Africa	Dougherti, 1943
2	<i>V. oesophageus</i> (Gerichter, 1948),	<i>Herpestes ichneumon</i> (Egyptian mongoose)	Palestine	Gerichter, 1948
3	<i>V. cynopithecii</i> (Vogel, 1928)	<i>Cynopithecus maurus</i> (Sulawesi macaque)	Sulawesi, Indonesia	Vogel, 1928
4	<i>V. chabaudi</i> (Sing and Pande, 1956)	<i>Herpestes mungo</i> (Banded mongoose)	India	Sing & Pande, 1956
5	<i>V. congolense</i> (Vuylsteke, 1956)	<i>Genetta genetta</i> (Common genet)	Congo	Biocca and Chabaud, 1963
6	<i>V. ramanujaharii</i> Alvar, Lalitha & Senevirathna, 1958	<i>Felis catus</i> (Domestic cat)	Madras, India	Joseph, 1964
7	<i>V. lerouxi</i> Biocca & Chabaud, 1963	<i>Viverricula indica</i> (Small Indian civet)	Madagascar	Biocca & Chabaud, 1963
8	<i>V. morowaliensis</i> n.sp	<i>Nyctimene cephalotes</i> (Pallas's tube-nosed fruit bat)	Sulawesi, Indonesia	This study

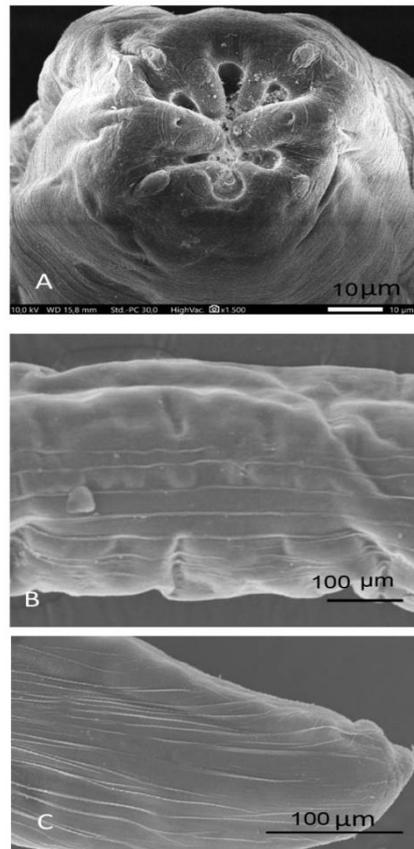


Figure 1: A) Tip of anterior end, en face view, B) Longitudinal striae at the mid-body, lateral view. C) Longitudinal striae at the posterior end, lateral view
 Scale bars: A = 10 µm; B, C = 100 µm

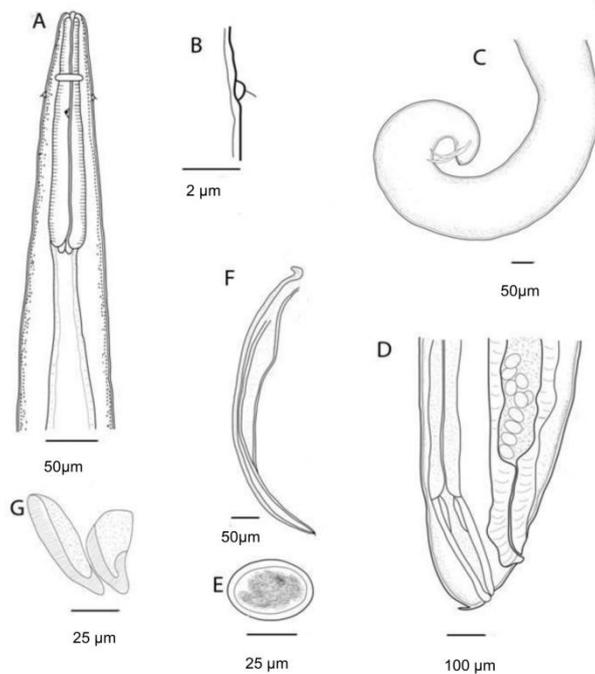


Figure 2: A) Anterior end of male, ventral view. B) Deirid, ventral view. C) Posterior end of male, lateral view. D) Posterior end of female, lateral view. E) Egg. F) Spicule lateral view. G) Gubernaculum.
 Scale bars: A, C, F = 50µm; B= 2 µm; D = 100 µm; E, G = 25 µm

REMARKS

Vogeloides morowaliensis falls to the family Pneumospiruridae because it has six lips and double gubernaculum [3]. This new species belongs to the genus *Vogeloides* because it possesses a cephalic structure of the oesophagea type, an oesophagus divided into a narrow anterior and wide posterior [4]. A total of seven species of *Vogeloides* have been recorded world wide i.e., *V. ascaroides* (V Linstow, 1897), *V. oesophagea* (Gerichter, 1948), *V. cynopithecii* (Vogel, 1928), *V. chabaudi* (Sing and Pande, 1956), *V. congolense* (Vuylsteke, 1956), *V. ramanujaharii* Alvar, Lalitha and Senevirathna, 1958, *V. lerouxi* Biocca and Chabaud, 1963. This new species differs with *V. ascaroides*, *V. chabaudi*, *V. cynopithecii*, *V. ramanujaharii* in the number of caudal papillae (2 pairs preanal, 1 pair adanal, 5 pairs postanal vs. 8 preanal, 11 postanal ; 1 pair pre anal, 1 pair adanal, 1 unpaired in front of cloacal opening, 7 pairs postanal; 1 pair preanal, 1 pair adanal, 3 pairs postanal; pre anal caudal papillae 4-7, post-anal 4; 2 pairs preanal and 2 pairs postanal; 2 pairs preanal and 2 pairs postanal in *V. ascaroides*, *V. oesophagea*, *V. chabaudi*, *V. cynopithecii*, *V. ramanujaharii*, respectively) [5-9]. Furthermore, this new species also can be distinguished with four species congeners namely *V. ascaroides*, *V. chabaudi*, *V. cynopithecii*, *V. congolense* in the length of esophagus (1/29 vs. 1/13, 1/6, 1/10, and 1/5 of body length, respectively) [5, 7, 8, 10]. Furthermore, it differs from *V. lerouxi* in the number of gubernaculum (2 vs. 1), same vs. different position of deirid between male and female [10]). Except mentioned above, this new species can be distinguished to *V. oesophagea* in position of deirid (located between nerve ring and excretory pore vs. in front of excretory pore), unequal vs. equal gubernaculum [11]. It also differs from *V. chabaudi* in the distance between vulva-anus same with that anus to posterior end [7]. Those differences are justifying to the designation to a new species *Vogeloides morowaliensis* found in bats, *Nyctimene cephalotes* from Sulawesi, Indonesia.

DISCUSSION

Three new species of *Metathelazia*, namely *M. multipapillata*, *M. capsulata*, and *M. oesophagea* were described by Gerichter [10]. However, Dougherty [5] considered that those three *Metathelazia* species should be placed in different genera because they have vary in cephalic characters, stoma, and labia. Then, he separated the three species of *Metathelazia* into three genera, i.e., *Metathelazia*, *Vogeloides*, and *Pneumospiruridae*. *Metathelazia* was characterized by no labia, *Pneumospiruridae* with small labia, and *Vogeloides* with six well-developed labia. Later, Warthim and Chabaud [4] observed the cephalic structure on Pneumospiruridae by using SEM. They grouped Pneumospiruridae into two genera; *Vogeloides* and *Metathelazia*, while *Pneumospiruridae* was considered as the synonym of *Metathelazia*. Then, Chabaud (1975) established *Pneumospira* and

Metathelazia are different genera. So currently, the family of Pneumospiruridae is composed of three genera; *Metathelazia*, *Vogeloides*, and *Pneumospiruridae* [3]. The genus *Pneumospiruridae* possesses a well-sclerotized buccal capsule that separated it from two other genera. The genera *Vogeloides* and *Metathelazia* are differentiated solely on the features of lips; *Vogeloides* has 6 well-developed lips, while the lips of *Metathelazia* are barely discernible [12].

According to Vogel [8], the habitat of most *Vogeloides* in the host is in the secondary and tertiary bronchus. This nematode also inhabit the main bronchus but only in a littel number, however, eggs are numerous in this organ. There is no report that *Vogeloides* parasit found in lung or trachea. To date, seven species of *Vogeloides* have been established [4]. *V. ascaroides* as a type species was obtained in *Circophitecus muna* and *C. maurus* from Africa, later *V. cynopithecii* from *C. maurus* in Sulawesi (formerly Celebes), Indonesia [13, 14], *V. oesophagea* from *Herpestes ichneumon* in Palestine [11], *V. chabaudi* from *Herpestes mungo* in India [7], *V. congolense* from genetete in Congo [10], *V. ramanujaharii* in *Felis catus* from India [9], and *V. lerouxi* from *Viverricula indica* Madagascar [10]. After the description of the latest new species, there is no recent publication of *Vogeloides*. This new species is designated as the eighth species belong to the genus *Vogeloides*.

As mentioned above, the distribution of to the genus *Vogeloides* in three realms; Asia (four species), Africa (three species), and Madagascar (one species). The species found in Asia and Africa have two gubernaculum, while *V. lerouxi* from Madagascar has single gubernaculum [10]. The species of *Vogeloides* occurred in the host of carnivores (monggose, genetete, and cat), macaque, and bat (this study) (Tabel-1). It seemed that the species of *Vogeloides* easily adapt to various species of mammals.

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