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Gonofilaria rudnicki gen. et sp. n. (Nematoda: Filarioidea) from Malaysian Lizards

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ABSTRACT: Gonofilaria rudnicki gen. n., sp. n. (Nematoda: Filarioidea) is described from the Malaysian lizards, Gonocephalus borneensis and Acanthosaura armata. The worm belongs in the subfamily Oswaldofilariniae and is characterized by its stout appearance, markedly divided esophagus, and posterior vulva. A single immature female worm was recovered from the Malayan giant frog, Rana macrodon. Microfilariae are unsheathed and appear in the peripheral blood.

During routine blood collections for arbovirus studies in Selangor State, West Malaysia, microfilariae were found circulating in the peripheral blood of several specimens of the lizards Acanthosaura armata (no common name) and Gonocephalus borneensis (anglehead lizard). Adult worms were later recovered from the subcutaneous tissues of both species, principally in the thoracic and abdominal regions. Only one or two worms were obtainable from most of the hosts autopsied and a gravid worm in only one instance. A single nongravid female worm was also recovered from Rana macrodon (Malayan giant frog).

The species is named in honor of Dr. A.
Rudnick, G. W. Hooper Foundation, University of California, San Francisco, who collected the original specimens.

Materials and Methods

Lizards were anesthetized with chloroform, and blood was collected via cardiac puncture. Semi-thick films, made thin enough so that the nuclei of the host's red blood cells did not obscure the microfilariae, were stained with dilute Giemsa after air-drying.

Adult worms could easily be seen and collected when the skin was peeled away from the carcass. They were killed and preserved in 70% alcohol and 5% glycerin. The worms were studied in pure glycerin.

Measurements and drawings were made with the aid of a camera lucida and ocular micrometer. All measurements are in millimeters unless otherwise noted, with averages in parentheses.

Description

Gonofilaria gen. n.

narrow anterior muscular portion and a longer wider posterior glandular portion. Vulva in posterior part of body. Tail in both sexes short and bluntly rounded. Male with numerous papillae encircling anus and four to seven caudal papillae near tip of tail. Spicules short, similar, unequal. Microfilariae unsheathed, found in peripheral blood. Parasites of lizards and frogs. Type species *Gonocephaloides rudnicki* sp. n.

**Gonocephaloides rudnicki** sp. n.

With characters of the genus (description based on four males and three adult females, only one of which was gravid):

**MALE:** Body length 23–28 (25); greatest width 0.510–0.875 (0.718). Muscular esophagus 0.262–0.292 (0.272) long, glandular esophagus 2.2–3.0 (2.5). Nerve ring just anterior to muscular-glandular junction. Caudal papillae sessile, consisting of 21 or 22 perianal papillae arranged circumferentially around anus, and four to seven postanal papillae near tip of tail. Spicules short, stout, and similar; length of left spicule 0.300–0.320 (0.310), right spicule 0.220–0.260 (0.240). Tail 0.330–0.390 (0.365) long; posterior extremity usually coiled 1½ times.

**FEMALE:** Body length 49–55.5 (52); maximum width 1.25–1.46 (1.37). Length muscular esophagus 0.285–0.325 (0.310), glandular portion 2.26–3.64 (2.70). Vulva 1.80–3.85 (3.10) from posterior end. Muscular vagina approximately 1.5 long, dividing into two uterine branches that run anteriorly. Anus 0.206–0.364 (0.307) from posterior end of body.

**Microfilariae:** Found circulating in blood. Head blunt. Cephalic space short. Last six body nuclei in single row extending to tip of tail. Body nuclei few in region of Innenkörper. Length Innenkörper 6–10 µ. Total length 0.148–0.167 (0.156). Fixed points expressed as percentages of mean body length: nerve ring, 19.2%; excretory pore, 24.4%; beginning of Innenkörper, 37.2%; G1, 67.3%; R2, 77.0%; R3 and R4, 83.5%; anal pore, 89.8%.

**Type host:** *Gonocephalus borneensis*.

**Location:** Subcutaneous tissue.

**Additional hosts:** *Acanthosaura armata* and *Rana macrodon*, both from type locality.

**Type locality:** Tanjong Rabok, Kuala Langat Forest Preserve, Selangor, West Malaysia.

**Specimens:** Holotype (male) USNM Helm. Coll. No. 72625, Paratypes 72626.

**Discussion**

The production of microfilaroid embryos and the position of the vulva in the posterior portion of the body place this worm in the family *Oncocercidae* (Leiper, 1911) Chabaud and Anderson, 1959, and the subfamily *Oswaldofilariniae* Chabaud and Choquet, 1953. Four genera have been described in the subfamily *Oswaldofilariniae* (Chabaud et al., 1959; Yamaguti, 1961). *Conspiculum* Pandit, Pandit, and Iyer, 1929, has a longitudinally striated cuticle, equal spicules, and several pairs of large subventral caudal papillae in the male. *Piratuba* Freitas and Lent, 1947, also has a longitudinally striated cuticle; however, in the male, there are 10 or 11 pairs of caudal papillae. *Oswaldofilaria* Travassos, 1933, has seven pairs of caudal papillae. Both *Conspiculum* and *Piratuba* have an equatorial vulva and in the genus *Oswaldofilaria* the vulva is anterior to midbody. *Solafilaria* Chabaud, Anderson, and Brygoo, 1959, has a posterior vulva; however, other characters such as the two longitudinal lateral bands, markedly unequal spicules, thick spicular sheath, and tubercles on the tail of the male differentiate it from *Gonocephaloides*. Because it lacks affinity with existing members of the subfamily *Oswaldofilariniae*, I propose *Gonocephaloides* as a new genus.

According to Dunn and Ramachandran (1969) records of filarial parasites in Southeast Asian reptiles and amphibians are few. Two species of the genus *Icosiella* have been reported from amphibians in Vietnam, Singapore, and Malaysia, and *Hastospiculum macrophas* from the monitor lizard is the only species recorded from reptiles in the region.

Since no extensive surveys were made, the host and geographic range of *G. rudnicki* are unknown. The parasite was found fairly often in the two species of lizards (*Acanthosaura armata* and *Gonocephalus borneensis*) in the Tanjong Rabok peat swamp forest, but in only one frog (*Rana macrodon*), and the single specimen recovered from it was an immature female. Whether frogs are a suitable host to maintain this parasite is unknown.
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Helminth Fauna of Nicaragua. V. Cardiofilaria stepheni sp. n. (Onchocercidae) and Other Nematodes of Birds

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ABSTRACT: Eight species of nematodes are reported from birds, all new records for Nicaragua. Cardiofilaria stepheni sp. n., from Cymbalaimus lineatus, has spicules 90 to 95 and 118 to 122 μ long. It differs from C. andersoni and C. chabaudi in possessing a well-defined preesophageal ring, and in having more caudal papillae.

This is the fifth of a series of reports based on a collection of helminth parasites of vertebrates made by the second author at the Agricultural Experiment Station, El Recreo, Zelaya, Nicaragua, on the Rio Escondido. Previous papers were published by Neiland (1955, 1961) and Schmidt and Neiland (1966, 1971). One hundred and sixty-seven birds representing 84 genera and 35 families were examined in June and July 1954. Data on the bird hosts were published by Howell (1957).

Specimens were fixed in hot alcohol and cleared by glycerin–alcohol dehydration. All measurements are in microns unless otherwise stated.

Eight species of nematodes could be identified (Table 1). All are new records for Nicaragua, and most are new host records. One new species is described herein.

Cardiofilaria stepheni sp. n. (Figs. 1–6)

Two males and five females found in the mesenteries of the liver, gizzard, and intestine of a fasciated antshrike, Cymbalaimus lineatus, represent a new species and form the basis of the following description. The species is named in honor of Stephen Schmidt, who has made many contributions to the laboratory of the senior author.

Description

Medium-sized worms, rounded at both ends, widest at about middle. Cuticle smooth, lacking bosses or conspicuous striae. Mouth (Fig. 1) round or dorsoventrally elongated. Peribuccal ring absent. Four papillae in outer circle, four in inner circle. Amphidial pores conspicuous. Alae absent. Buccal capsule