

## *Spauligodon caymanensis* sp. n. (Nematoda: Pharyngodonidae) from *Anolis conspersus* (Sauria: Polychridae) from Grand Cayman Island, British West Indies

CHARLES R. BURSEY<sup>1</sup> AND STEPHEN R. GOLDBERG<sup>2</sup>

<sup>1</sup> Department of Biology, Pennsylvania State University, Shenango Campus, Sharon, Pennsylvania 16146, e-mail: cxb13@psuvm.psu.edu, and

<sup>2</sup> Department of Biology, Whittier College, Whittier, California 90608

**ABSTRACT:** *Spauligodon caymanensis* sp. n. (Nematoda: Pharyngodonidae), a new oxyurid nematode, discovered in the large intestine of *Anolis conspersus* is described and illustrated. Six of 24 adult specimens of *A. conspersus* collected from Grand Cayman Island harbored a total of 67 specimens of *S. caymanensis* sp. n.; prevalence of infection was 25% (mean intensity 11.2, range 1–29). *Spauligodon caymanensis* sp. n. is distinguished from all other Neotropical species by the possession of oval eggs.

**KEY WORDS:** *Spauligodon caymanensis* sp. n., nematode, *Anolis conspersus*, lizard.

In a recent helminthological survey of Caribbean anoles, 6 specimens of *Anolis conspersus* Garman, 1887, were found to harbor a previously undescribed species of *Spauligodon*. *Anolis conspersus* is known only from the Cayman Islands where it occurs on Grand Cayman Island and Booby Cay (Schwartz and Henderson, 1991). It is probably derived from ancestors that invaded the western Antilles from Central America (Williams, 1969) and is sympatric with the amphibians *Eleutherodactylus planirostris* Cope, 1863, and *Osteopilus septentrionalis* Duméril and Bibron, 1841; the lizards *Anolis sagrei* Duméril and Bibron, 1837, *Aristelliger praesignis* Hallowell, 1857, *Cyclura nubila* Gray, 1831, *Gonatodes albogularis* Duméril and Bibron, 1836, *Leiocephalus carinatus* Gray, 1827, and *Sphaerodactylus argivus* Garman, 1888; and the snakes *Alsophis cantherigerus* Bibron, 1840, *Tretanorhinus variabilis* Duméril and Bibron, 1854, *Tropidophis caymanensis* Battersby, 1938, and *Typhlops caymanensis* Sackett, 1940.

### Materials and Methods

Ten specimens of *Anolis conspersus conspersus* (snout vent length [SVL] = 50.8 ± 8.6 mm, range 30–60 mm) and 14 of *A. c. lewisi* Grant, 1940 (SVL = 54.7 ± 9.5 mm, range 43–66 mm), were collected by hand-held noose on Grand Cayman Island August 1993 and fixed in neutral-buffered 10% formalin. The body cavity was opened by a longitudinal incision from vent to throat, and the gastrointestinal tract was removed by cutting across the anterior esophagus and rectum. The esophagus, stomach, small intestine, and large intestine of each lizard were examined separately. Two specimens of *A. c. conspersus* were found to harbor a total of 40 oxyurid nematodes (prevalence 20%, mean intensity

20, range 11–29) and 4 of *A. c. lewisi* harbored a total of 27 oxyurid nematodes (prevalence 29%, mean intensity 6.8, range 1–22). These nematodes were placed in undiluted glycerol, allowed to clear, examined under a light microscope, and determined to represent a new species, *Spauligodon caymanensis*. Measurements in the text are given in millimeters, unless otherwise noted. All anoles were deposited in the herpetology collection of the Natural History Museum of Los Angeles County: *A. c. conspersus*, LACM 140959–140968; *A. c. lewisi*, LACM 140945–140958.

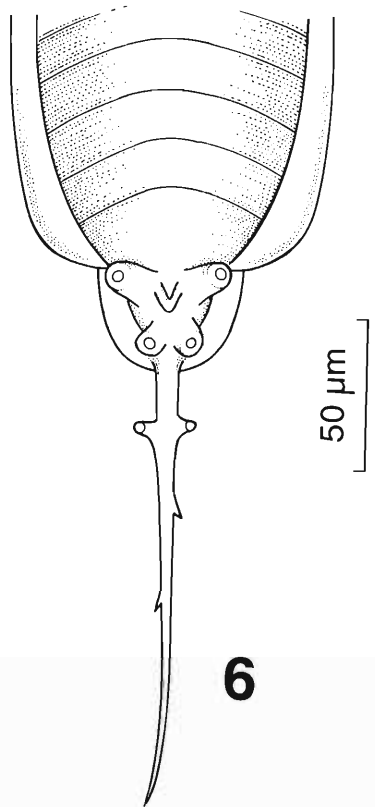
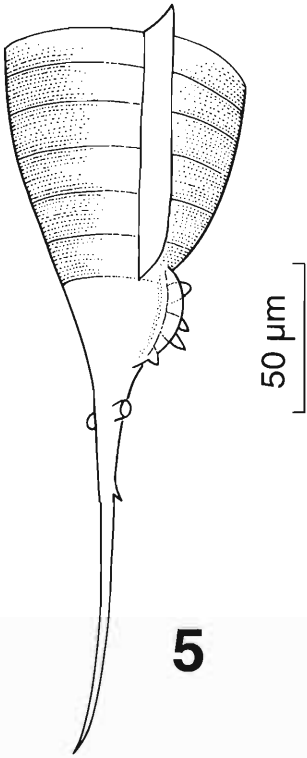
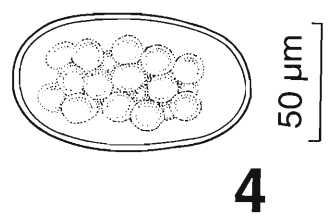
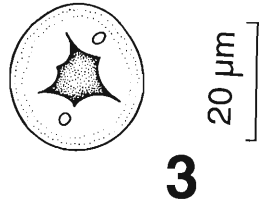
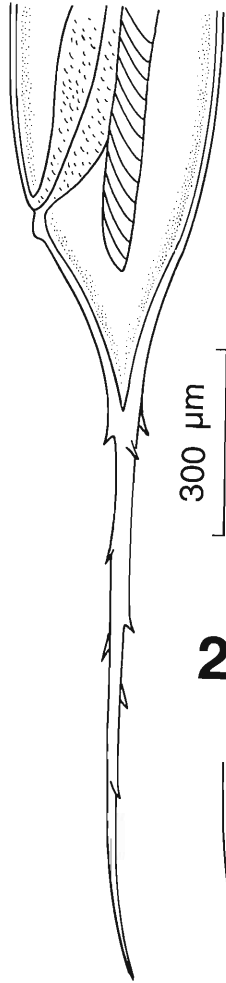
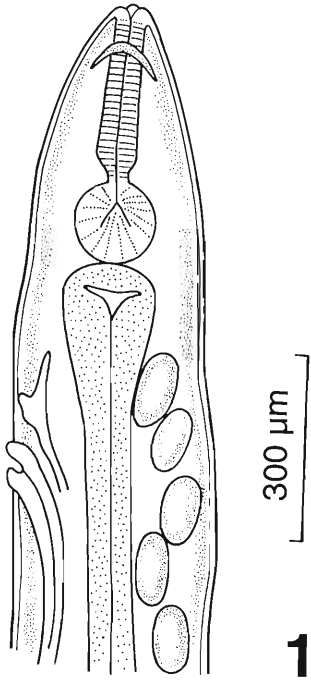
### Results and Discussion

#### *Spauligodon caymanensis* sp. n. (Figs. 1–6)

#### Description

With characters of the genus: specifically, males having caudal alae that do not envelop posterior postcloacal pair of pedunculate papillae; females having vulva in anterior half of body. Nematodes of small size with cylindrical body tapering both anteriorly and posteriorly. Body ending in long, thin tail that supports several cuticular spines. Cuticle transversely striated. Lateral alae present in males and females. Mouth opening is triangular, bounded by 3 lips, each with shallow midline indentation. Esophagus ends in valvulate, subspherical bulb that is separated from esophageal body by small constriction. Excretory pore behind esophageal bulb in males and females.

**MALE** (based on 10 specimens): Small, white, fusiform nematodes tapering both anteriorly and posteriorly; length, 1.36 (1.25–1.43); maximum width, 0.20 (0.18–0.23). Lateral alae, 0.17 (0.014–0.021) wide extending from halfway between nerve ring and lips to anterior border of caudal



alae. Cuticle with striations of approximately 1  $\mu\text{m}$  width; every eighth to tenth striation deepened as an annulus. Mouth bounded by 3 lips, each with shallow midline indentation to produce bilobed appearance. Esophagus (including bulb), 0.224 (0.200–0.228); bulb length, 0.062 (0.057–0.066); bulb width, 0.059 (0.054–0.063). Nerve ring, 0.090 (0.080–0.097); excretory pore, 0.360 (0.332–0.408) from anterior end. Narrow caudal alae present, 0.005 (0.005–0.006) wide by 0.042 (0.040–0.045) long. Three pairs of caudal papillae present; precloacal pair situated on slightly inflated ventral surface of caudal end, first postcloacal pair posteriolaterally directed; second postcloacal pair not enclosed by caudal alae, 0.035 (0.030–0.040) behind first postcloacal pair. Prominent genital cone in midventral line consisting of small, pointed anterior cloacal lip and larger, pointed posterior cloacal lip; spicule absent. Cloacal opening 0.266 (0.242–0.281) from posterior extremity. Filiform tail extends 0.235 (0.204–0.255) beyond second postcloacal papillae; 3 (1–5) cuticular spines.

**FEMALE** (based on 10 gravid specimens): Small, white, nematodes tapering anteriorly and posteriorly; length, 4.30 (3.50–5.10); maximum width, 0.30 (0.27–0.32). Lateral alae, 0.035 (0.030–0.040) wide, extending from level of nerve ring to base of filiform portion of tail. Cuticle with striations of approximately 1–1.5  $\mu\text{m}$  width; every eighth to tenth striation deepened as an annulus. Esophagus (including bulb), 0.330 (0.320–0.348); bulb length, 0.88 (0.086–0.091); bulb width, 0.90 (0.088–0.097). Nerve ring, 0.080 (0.074–0.086); excretory pore, 0.510 (0.460–0.536); vulva, 0.540 (0.536–0.612), from anterior end. Thick-walled muscular ovijector extends posteriorly 0.300 continuing as thin-walled vagina 0.300 joining 2 uteri, one directed anteriorly and the other posteriorly. Ovarian and uterine coils do not extend anteriorly as far as the esophageal bulb. Anus 1.20 (1.05–1.44) from posterior end of body. Filamentous portion of tail 0.92 (0.80–1.05) in length and with 9 (8–11) cuticular spines. Eggs oval, 0.105 (0.099–0.111) by 0.55 (0.048–0.057), no polar adornment; development to morula stage at deposition.

**TYPE SPECIMENS:** Holotype. Male (U.S. National Museum Helminthological Collection,

Beltsville, Maryland, accession No. 83748. Allotype: Female (83749). Paratypes (9 males, 9 females, 83750).

**TYPE HOST:** *Anolis conspersus lewisi* (LACM 140954). Other host, *A. c. conspersus*.

**TYPE LOCALITY:** Grand Cayman Island (19°20'N, 81°15'W)

**ETYMOLOGY:** The specific epithet is derived from the name of the island of occurrence.

### Discussion

The general morphology of *Spauligodon caymanensis* sp. n. allows its assignment to the superfamily Oxyuroidea Railliet, 1916, family Pharyngodonidae Travassos, 1919, which currently contains 21 genera (see Petter and Quentin, 1976). Of these, 3 genera characteristic of reptiles exhibit a vulvar opening in the anterior part of the body just behind the postbulbar excretory pore: *Pharyngodon* Diesing, 1861, *Spauligodon*, Skrjabin, Schikhobalova, and Lagodovskaja, 1960, and *Skrjabinodon*, Inglis, 1968. These genera are separated by the relationship of the caudal alae to the genital papillae: males of the genus *Pharyngodon* have well-developed caudal alae that envelop all genital papillae; in males of the genus *Spauligodon*, the posterior pair of papillae are excluded from envelopment by the caudal alae, and males of the genus *Skrjabinodon* lack caudal alae. The inclusion of the described specimens in the genus *Spauligodon* is based on the position of the vulva and the configuration of the caudal alae.

The genus *Spauligodon* contains 26 species that are separated on the basis of the egg shape, presence or absence of spines on tail filament, and geographical distribution (Table 1). Only 2 other species have been reported to have eggs with rounded ends: *S. tarentolae* Spaul, 1926, and *S. cabreræ* Castaño-Fernández, Zapatero-Ramos, and Solera Ruertas, 1988. These species are geographically isolated from *S. caymanensis* sp. n. Chabaud and Brygoo (1962) suggested that geographical distribution is the most important factor in the speciation of reptilian oxyurids. Tail spines provide a second criterion in separating these 3 species: *S. cabreræ*, male smooth, female spiny; *S. tarentolae*, male smooth, female smooth;

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Figures 1–6. *Spauligodon caymanensis* sp. n. 1. Anterior end of female, lateral view. 2. Posterior end of female, lateral view. 3. En face view. 4. Egg. 5. Posterior end of male, lateral view. 6. Posterior end of male, ventral view.

Table 1. Geographical distribution and selected characters of species of *Spauligodon*.

Biogeographic Realm <i>Spauligodon</i> species	Male characters		Female characters		Reference
	Spicule	Tail	Tail	Egg ends	
Palaearctic Realm					
<i>S. auziensis</i> (Seurat, 1917)	49 $\mu$ m	Smooth	Smooth	Pointed, no knobs	Skrjabin et al., 1960
<i>S. azerbaijanicus</i> Sharpilo, 1974	49 $\mu$ m	Smooth	Spiny	Truncated	Sharpilo, 1974
<i>S. caribonelli</i> Roca and Garcia-Adell, 1988	15-35 $\mu$ m	1-5 spines	6-11 spines	Truncated	Roca and Garcia-Adell, 1988
<i>S. cabrerata</i> Castaño-Fernández, Zapatero-Ramos, and Soleda Puertas, 1988					
<i>S. eremias</i> Markov and Bogdanov, 1961	Absent	Smooth	Spiny	Rounded, no knobs	Castaño-Fernández et al., 1988
<i>S. externatus</i> (Rudolphi, 1819)	Absent	Smooth	Smooth	Truncated	Markov and Bogdanov, 1961
<i>S. laeretae</i> Sharpilo, 1966	Absent	Smooth	Spiny	Truncated	Skrjabin et al., 1960
<i>S. laevicauda</i> (Seurat, 1914)	70 $\mu$ m	Smooth	Smooth	Truncated	Skrjabin et al., 1960
<i>S. parasskiffi</i> Markov and Bogdanov, 1961	Absent	Smooth	Smooth	Truncated	Markov and Bogdanov, 1961
<i>S. paractipenis</i> (Chabaud and Golvan, 1957)					
<i>S. phrynocephali</i> Sharpilo, 1976	Absent	Smooth	Smooth	Truncated	Chabaud and Golvan, 1957
<i>S. pseudoeremias</i> Sharpilo, 1976	Absent	Smooth	Smooth	Truncated	Sharpilo, 1976
<i>S. saxicola</i> Sharpilo, 1961	Absent	Smooth	Smooth	Truncated	Sharpilo, 1961
<i>S. tarantolae</i> (Spaul, 1926)	Absent	Smooth	Smooth	Rounded, no knobs	Spaul, 1926
<i>S. tectipenis</i> (Geddes, 1919)	Absent	Spiny	Smooth	Truncated	Skrjabin et al., 1960
Ethiopian Realm					
<i>S. dimorpha</i> (Chabaud and Brygoo, 1962)					
<i>S. mogani</i> (Fitzsimmons, 1961)	Absent	Smooth	Smooth	Truncated	Chabaud and Brygoo, 1962
Nearctic Realm					
<i>S. californiensis</i> (Read and Amrein, 1953)					
<i>S. giganteus</i> (Read and Amrein, 1953)	Absent	Smooth	9-12 spines	1 truncated, 1 rounded	Read and Amrein, 1953
<i>S. meyeri</i> (Edgerly, 1952)	75-80 $\mu$ m	Smooth	10-11 spines	Pointed, 1 with knob	Read and Amrein, 1953
Neotropical Realm					
<i>S. antillarum</i> Barus and Coy Otero, 1974					
<i>S. caymanensis</i> sp. n.	Absent	3 spines	8-15 spines	1 truncated, 1 pointed with knob	Barus and Coy Otero, 1974
<i>S. cuneis</i> (Read and Amrein, 1953)	Absent	3-5 spines	9-11 spines	Rounded, no knobs	Present study
<i>S. mayatacapani</i> (Vicente and Ibáñez, 1968)	Absent	Smooth	Smooth	Pointed, each knobbed	Read and Amrein, 1953
<i>S. oxylatcabiensis</i> (Chitwood, 1938)	Absent	Smooth	2 spines	Pointed, each knobbed	Vicente and Ibáñez, 1968
<i>S. wiraocochai</i> (Freitas, Vicente, and Ibáñez, 1986)	Absent	Smooth	13-15 spines	Pointed, each knobbed	Chitwood, 1938
	Absent	Smooth	Smooth	Pointed, no knobs	Freitas, et al., 1968

and *S. caymanensis* n. sp., male spiny, female spiny.

Five previously described species are found in the Neotropical Realm: *S. antillarum* Barus and Coy Otero, 1974, *S. cubensis* (Read and Amrein, 1953) Skrjabin, Schikhobalova, and Lagodovskaja, 1960, *S. maytacapaci* (Vicente and Ibáñez, 1968) Barus and Coy Otero, 1974, *S. oxkutzcabiensis* (Chitwood, 1938) Skrjabin, Schikhobalova, and Lagodovskaja, 1960, and *S. viracochai* (Freitas, Vicente, and Ibanez, 1968) Barus and Coy Otero, 1974. *S. caymanensis* sp. n. differs from these 5 species in the possession of oval eggs, i.e., eggs with rounded ends without polar adornments. The other Neotropical species have eggs with pointed or flat ends, and all but *S. viracochai* have polar adornments. Additionally, all males of previously described Neotropical species, with the exception of *S. antillarum*, have smooth tails. These comparisons were based on published descriptions; no type specimens were examined.

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