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NEMATODES OF AMAZONIAN BIRDS, WITH A DESCRIPTION OF *HOAZINSTRONGYLUS AMAZONENSIS* N. GEN. N. SP (TRICHOSTRONGYLIDAE, LIBYOSTRONGYLINAE)

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During recent studies of the parasites of birds from the Amazonian Region, the following nematodes were recovered: Hoazinstrongylus amazonensis *n. gen. n. sp. from* Opisthocomus hoazin *(Muller, 1776);* Ascaridia columbae *(Gmel., 1790) Travassos, 1913, from* Leptotila r. rufaxilla *(Richard & Bernard, 1712) representing a new host record;* Inglisakis ibanezi *Freitas, Vicente & Santos, 1969,* Cyrnea (C.) semilunaris *(Molin, 1860) Seurat, 1914 and* Thelazia digitata *Travassos, 1918. A complete description is restrained to the new genus and new species here proposed. The other known and well described species are listed and accounted.*

Partial results concerning the helminth fauna of the Amazonian Region were previously reported, when cestodes from mammals and reptiles (Pinto & Gomes, 1976), trematodes from mammals and birds (Gomes & Pinto, 1978) and nematodes recovered only from mammalian hosts were studied (Pinto & Gomes, 1980). In this paper, the nematodes from birds are presented.

MATERIAL AND METHODS

Helminths were collected from various species of birds in the Amazon State, Pará State and Amapá Territory of Brazil.

Five hosts were examined: 1 *Crotophaga major* Gmelin, 1788; 1 *Leptotila rufaxilla rufaxilla* (Richard & Bernard, 1712); 4 *Opisthocomus hoazin* (Muller, 1776); 1 *Ramphastos tucanus* Linné, 1758 and 1 *Trogon melanurus melanurus* (Swainson, 1837).

Five species of nematodes were recovered, belonging to the following families: Ascarididae Blanchard, 1849; Heterakidae Railliet & Henry, 1914; Spiruridae Orley, 1885; Thelaziidae Railliet, 1916 and Trichostrongylidae Leiper, 1912. The latter represents a new genus and a new species described herein. The other nematodes are briefly reported.

Parasites for whole mounts were cleared in creosote or phenol solution and some were stained with Mayer's HC1 carmine. Measurements are in mm.

RESULTS

Trichostrongylidae Leiper, 1912.
Libyostrongylinae Durette-Desset & Chabaud, 1977.
Hoazinstrongylus n. gen. (Figs. 1-4).

Morphology: *Hoazinstrongylus* n. gen. Libyostrongylinae: Cuticle with fine transverse striations, no cephalic swelling or longitudinal ridges. Cervical papillae not observed. Buccal capsule feeble, almost indistinct. Female monodelphic, with tail bluntly pointed. Eggs thin walled, oval and morulated *in utero.* Vulva near the posterior end. Bursa with large lateral and small dorsal lobe; ventral rays separated from each other but their tips, fairly close together, meeting at their distal ends. Anterior and medio-lateral rays apposed, except for their tips, which are slightly divergent; postero-lateral ray diverges considerably from medio-lateral. Externo-dorsal ray large and arises from or near base of dorsal ray; dorsal ray reduced, with pair of lateral branches at about one half of its length; distal portion of dorsal ray bifurcates twice to terminate in four equal digitations. Spicules short, stout, equal and complex. Gubernaculum present; prebursal papillae present.

Differential diagnosis: The new genus proposed herein, is characterized by the absence of "synlophe" in both sexes. Males with very reduced dorsal ray. Branches of distal extremity of dorsal ray with equal length. Spicules equal, complex and stout. Females monodelphic. Ovejector with well developed muscles at the vulvar region. Parasites in proventriculus and gizzard of birds Opisthocomidae.

Type: *Hoazinstrongylus amazonensis* sp. n.
Hoazinstrongylus amazonensis n. sp. n. gen.
Host: *Opisthocomus hoazin* (Muller, 1776) (Hoatzin).

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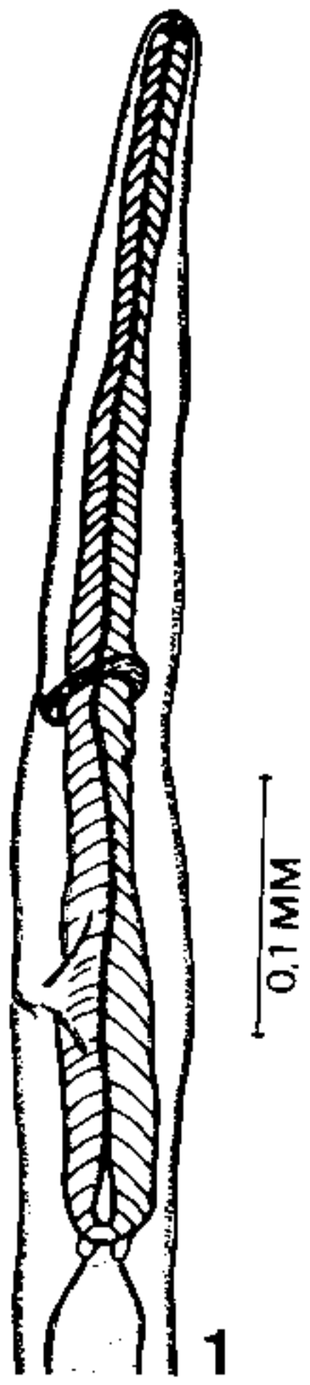
Habitat: Proventriculus and gizzard.
Locality: Ilha do Careiro, Paraná de Cambixa, Amazon State, Brazil.
Holotype: Oswaldo Cruz Institute Helm. Coll. no. 32.024-a.
Paratypes: nos. 32.024 b-e; 32.025 a-b; 32.026 a-d.

Morphology: the following description is based on three mature males and five mature females.

General: Libyostrongylinae Durette-Desset & Chabaud, 1977; *Hoazinstrongylus* n. gen.

Male: (Figs. 1-2) Body 4.80-6.07 long, maximum width 0.09-0.11. Nerve ring 0.22-0.23 from anterior extremity. Oesophagus 0.38-0.45 long by 0.03 wide. Excretory pore 0.33 from anterior extremity. Bursa with large lateral and small dorsal lobe. Pre-bursal papillae 0.030-0.033 from bursa. Ventral and lateral rays provided with common stem. Ventro-ventral ray quite large and bent upward, latero-ventral ray closely apposed to antero-lateral ray, for about two thirds of its length; its posterior third curves forwards so that its tip approaches that of the ventro-ventral ray; its proximal two thirds thick, distal third thin. Antero and medio-lateral rays apposed except for their tips, slightly divergent. Postero-lateral ray as thick as other lateral rays; proximally it is apposed to medio lateral, diverging distally. Dorsal ray very reduced and thin 0.04-0.07 long; has two short branches which curve away from it at about its half; its posterior



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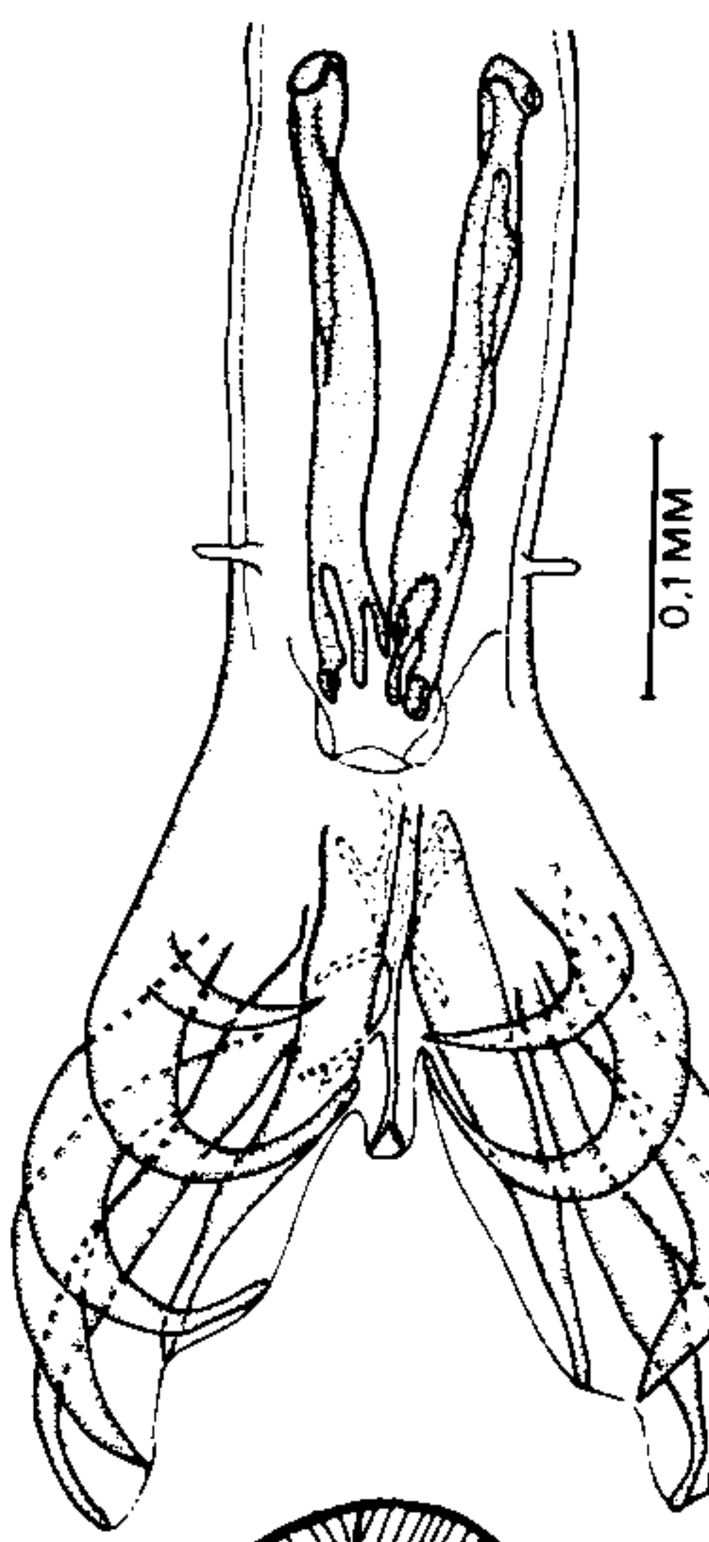

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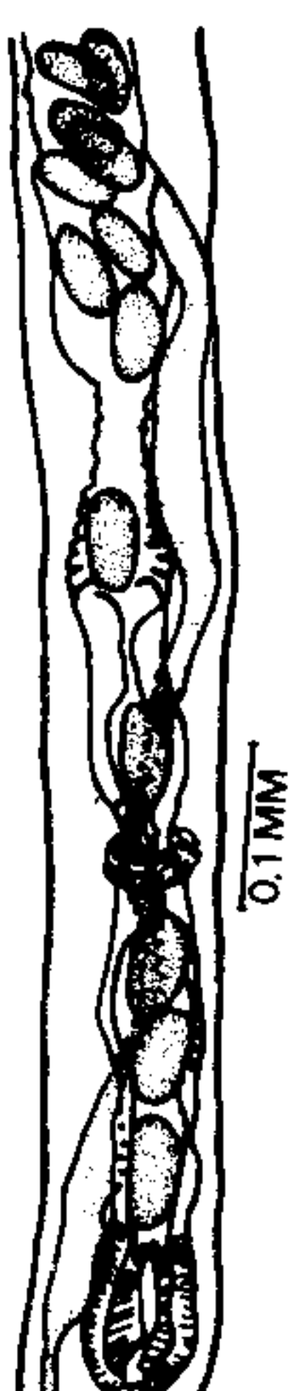

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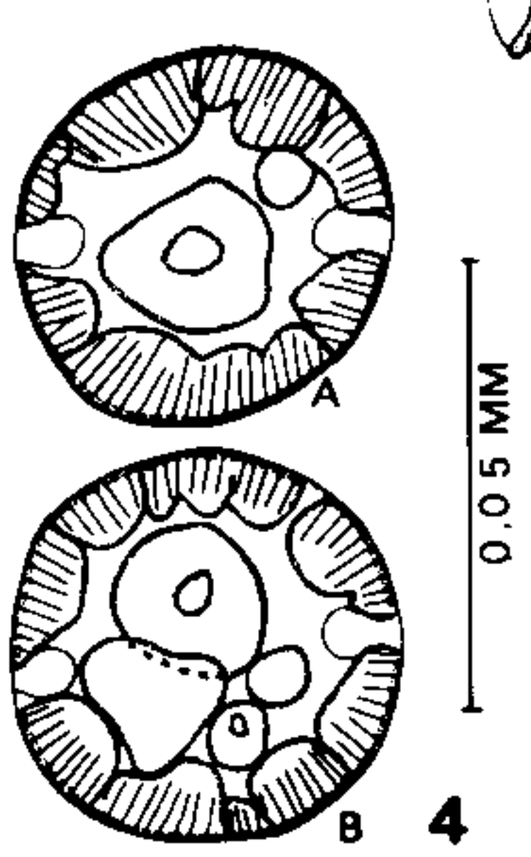

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Figs. 1-4: *Hoazinstrongylus amazonensis* n. gen. n. sp. 1: anterior of male, lateral view; 2: posterior of male, holotype, ventral view; 3: posterior of female, lateral view; 4: cross sections of female – A: anterior portion of the body; B: middle region of the body.

portion split and each branch again sub-divides to form two thin, short, parallel and equal digitations. Externo-dorsal rays straight, arising from base of dorsal ray; have same thickness as dorsal rays. Spicules dark brown, similar and complex 0.22-0.23 long by 0.01-0.02 wide, thick at their middle portion; each has a delicate spike at its tip. Genital cone small, flattened with two rays, 0.030 wide at its base and 0.035 long. Gubernaculum represented by an indistinct sclerotized structure about 0.035 long.

Female: (Figs. 3-4) Body length 5.65-8.40, maximum width 0.09-0.13. Nerve ring 0.21-0.28 from anterior extremity. Oesophagus 0.41-0.48 long by 0.03-0.04 wide. Excretory pore 0.38 from anterior extremity. Monodelphic. Ovejector including sphincter 0.31-0.41 long. Eggs in ovejector 0.045-0.056 by 0.018-0.026. Vulvar aperture 0.18-0.26 from the posterior end, protected by a cuticular projection or flap which forms with the body surphace a deep concavity in lateral view. Tail 0.05-0.06 long, bluntly pointed. Anus 0.075-0.16 from posterior extremity.

DISCUSSION

According to Durette-Desset & Chabaud (1977) the evolutionary pattern of the fixation apparatus (synlophe) seems to be the most reliable criteria for identifying the nematodes Trichostrongyloidea. Taking into consideration the evolution of different characters, including the absence of the "synlophe", *Hoazinstrongylus* n. gen. is here proposed under Libyostrongylinae Durette-Desset & Chabaud, 1977.

At present, the subfamily contains the following genera: *Libiostrongylus* Lane, 1923, *Obeliscoides* Graybill, 1924, *Pseudostertagia* Orloff, 1933, *Paralibyostrongylus* Ortlepp, 1939, *Pararhabdonema* Kreis, 1945 and *Cnizostrongylus* Chabaud, Durette-Desset & Houin, 1967.

These genera are grouped considering the function of some morphological features, to which a pre-determined range is attributed, according to the degree of evolution of each character (Table I).

TABLE I

Morphological indicators of the genera under Libyostrongylinae (after Durette-Desset & Chabaud, 1977)

	BC	CV	NF	D	S	DR	Total
Libyostrongylus	1	1	1	1	1	1	6
Obeliscoides	1	1	1	2	2.5	3	10.5
Pseudostertagia	2	1	1	1	3	2	10*
Paralibyostrongylus	1	1	1	1	1	2	7*
Pararhabdonema	2	1	1	1	3	2	10
Cnizostrongylus	1	1	1	1	1	2	7*
Hoazinstrongylus n.g.	1	1	1	1	1	3	8

BC, buccal capsule: BC1, present; BC2, absent. CV, cephalic vesicle: CV1, absent; CV2, present. NF, neodont formation: NF1, absent; NF2, present. D, deiridis: D1, weakly developed; D2, strongly developed. S, "synlophe": S1, absent; S2, forming cuticular crests; S2, forming cuticular ridges inserted on hypodermis. DR, dorsal ray: DR1, long, DR2, medium sized; DR3, reduced.

* Identical values do not indicate generic equality.

Hoazinstrongylus amazonensis n. gen. n. sp. is compared to the type species of the most closely related genera, *Libyostrongylus douglassi* (Cobbold, 1881) Lane, 1923 and *Paralibyostrongylus vondwei* Ortlepp, 1939. These genera are compared in Table II.

TABLE II

Generic characterization of *Hoazinstrongylus* n.g.

	Hoazinstrongylus n.g.	*Libyostrongylus* Lane, 1923	*Paralibyostrongylus* Ortlepp, 1939
Dorsal ray	Reduced	Very long	Medium sized to long
Lateral branches of dorsal ray	At 1/2 of total length	At 1/2 of total length	At 1/3 of total from distal end
Length of branches of distal extremity of dorsal ray	Equal	Unequal	Unequal
Uterus	Monodelphic	Didelphic	Didelphic
Hosts	Birds (Opisthocomidae)	Birds (Struthionidae) Mammals	Mammals

Ascarididae Blanchard, 1849.
Ascaridia columbae (Gmel., 1790) Travassos, 1913.
Host: *Leptotila r. rufaxilla* (Richard & Bernard, 1712) (Gray-fronted Dove).
Habitat: Small intestine.
Locality: Porto Terezinha, Amapari River, Serra do Navio, Amapá Territory, Brazil.
Deposited: OCI Helm. Col. no. 32.030.

Remarks: This species falls into a group with those of the genus having spicules with wide membranes, according to Kung (1949) who studied a large collection of avian species of *Ascaridia*. A single available male specimen was easily identified as *A. columbae*, considering the character mentioned above and size of spicules, despite the variation regarding the position and number of caudal papillae of the male. This, and the fact that the species varies greatly in size, were also observed by Baylis & Daubney (1922). This is a new host record for *A. columbae*, previously reported from several species of pigeons and doves from Asia, Australia, Europe, North and South America.

Heterakidae Railliet & Henry, 1914.
Inglisakis ibanezi Freitas, Vicente & Santos, 1969.
Host: *Opisthocomus hoazin* (Muller, 1766) (Hoatzin).
Habitat: Large intestine, trachea.
Locality: Careiro Island, Paraná do Cambixa, Amazon River, Brazil.
Deposited: OCI Helm. Coll. no. 32.027 a-c.

Remarks: This is the type and only species under the genus and was described from the same host captured very near from the locality reported here. Freitas, Vicente & Santos, (1969) studying a great number of whole mounts, proposed *Inglisakis*, considering the short caudal alae not encircling the preanal ventral sucker and the reduced number of papillae when compared to *Heterakis* Dujardin, 1845 the most closely related genus.

Spiruridae Orley, 1885.
Cyrnea (C.) semilunaris (Molin, 1860) Seurat, 1914.
Host: *Trogon m. melanurus* Swainson, 1837 (Black-tailed Trogon).
Habitat: Proventriculus, small and large intestine.
Locality: Serra do Navio, Picada do Cinturinha, Amapá Territory, Brazil.
Deposited: OCI Helm. Coll. no. 32.028 a-c.
Host: *Crotophaga major* Gmelin, 1788 (Greater Ani).
Habitat: Gizzard.
Locality: Utinga, Belém, Pará State, Brazil.
Deposited: OCI Helm. Coll. no. 32.029.

Remarks: This species originally described as *Spiroptera lanceolata* Molin, 1860, recovered from Brazilian *Trogon collaris* (= *Trogon curucui curucui* [Linné, 1766]) and *Trogon melanurus* Swainson, 1837, was considered by Drasche (1822) identical to *Spiroptera semilunaris* Molin, 1860 from *Crotophaga major* Gmelin 1788 also from Brazil, and this was rectified by Seurat (1914), when *Cyrnea* was proposed. In 1945, Lent, Freitas & Proença, redescribing this species, added excellent original figures, based on material recovered from the stomach of *Piaya cayana macroura* (Gambel, 1849) captured in Paraguay. Chabaud (1958) divided the genus in two subgenera: *Procyrnea* and *Cyrnea*, including *C. semilunaris* in the latter, of which the type species is *Cyrnea (C.) eurycerca* Seurat, 1914. *Cyrnea (C.) semilunaris* recovered from the gizzard of Brazilian and Paraguayan *Guira guira* (Gmelin, 1788) was redescribed by Rodrigues & Rodrigues (1981).

Thelaziidae Railliet, 1916.
Thelazia digitata Travassos, 1918.
Host: *Ramphastos tucanus* Linné, 1758 (Red-billed Toucan).
Habitat: Eye.
Locality: Km 47, Manaus-Itaocara Road, Amazonas State, Brazil.
Deposited: OCI Helm. Coll. no. 32.031.

Remarks: A single female worm was the basis for the preposition this species recovered from the eyes of a Brazilian *Ramphastos* sp. Travassos (1918) also divided *Thelazia* Bosc, 1819 in two subgenera *Thelazia* and *Thelaziella* considering the dimensions and shape of the spicules. In a preliminary revision of 22 species of *Thelazia*, in birds, Anderson & Diaz-Ungria (1959) give a modern description of *T. digitata*, since Travassos, 1918. The species, redescribed and figured was considered identical to *T. anodorhynchi* Strachan, 1957 in Brazilian *Anodorhynghus hyacinthinus* (Lathan, 1790). The redescription was based on worms recovered from *Ramphastos v. vittelinus* Lichtenstein, 1823, from Coura River, Bolivar State, Venezuela. Several studied specimens of *T. digitata* collected in *Ramphastos t. tucanus* Linné, 1758. *Cyanocorax v. violaceus* Du Bus, 1847, *Phloeoceaster m. melanoleucus* (Gmelin, 1788), *Ara macao* (Linné, 1758) all from Venezuela and *Anodorhynchus hyacinthinus* from Brazil were listed. In the present paper, the available material of *T. digitata* consisted of a single female specimen identified as that described and figured by Travassos (1918) and those of Strachan (1957) and Anderson & Diaz-Ungria (1959), considering their similar dimensions and morphology.

RESUMO

Durante recentes estudos dos parasitas de aves capturadas na Região Amazônica, foram identificadas as seguintes espécies de nematóides: *Hoazinstrongylus amazonensis* n. gen. n. sp., de *Opisthocomus hoazin* (Muller, 1776), *Ascaridia columbae* (Gmel., 1790) Travassos, 1913, de *Leptotila r. rufaxilla* (Richard & Bernard, 1712) que se constitui em novo hospedeiro para a espécie, *Inglisakis ibanezi* Freitas, Vicente & Santos, 1969, *Cyrnea (C.) semilunaris* (Molin, 1860) Seurat, 1914 e *Thelazia digitata* Travassos, 1918.

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