

NEMATODE PARASITES OF BRAZILIAN PELECANIFORMES AND TROGONIFORMES BIRDS: A GENERAL SURVEY WITH NEW RECORDS FOR THE SPECIES

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ABSTRACT. This report deals with the identification of one hundred and seventy-one samples of nematodes recovered from Brazilian birds collected by Lauro Travassos and his staff, between 1921-1960. *Aprocta travassossi* Caballero, 1938, *Aprocta* sp., *Baruscapillaria appendiculata* (Freitas, 1933) Moravec, 1982, *Contracaecum plagiaticum* Lent & Freitas, 1948, *C. spiculigerum* (Rudolphi, 1809) Railliet & Henry, 1912, *Contracaecum* sp., *Cyrnea (C.) semilunaris* (Molin, 1860) Seurat, 1914, *Oxyspirura* sp., *Paronchocerca ibanezi* (Freitas, Vicente & Pinto, 1970) Anderson & Bain, 1976, *Porrocaecum* sp., *Procyrnea* sp., *Skrjabinura spiralis* Gnédina, 1933, *Subulura acutissima* Molin, 1860, *S. bentocruzi* Barreto, 1919, *S. travassossi* Barreto, 1919, *Subulura* sp. and *Tetrameres* sp. were studied. *Contracaecum spiculigerum* and *Aprocta travassossi* are redescribed and referred for the first time in South America. New host records were established for most of the species.

KEY WORDS. Nematodes, Pelecaniformes, Trogoniformes, birds, Brazil

The present investigation reports to helminthological findings related to avian hosts and was scheduled to add new data on morphometrics, of two species as well as new host records and geographical distribution of nematodes found parasitizing Brazilian birds. The results so far obtained further accomplish those previously reported (PINTO *et al.* 1991, 1993, 1994; PINTO & VICENTE 1995; VICENTE *et al.* 1993, 1995 a,b) and deal with nematodes recovered from the brown booby, as well as from cormorants, anhingas and trogons in Brazil (Tab. I).

MATERIAL AND METHODS

One hundred and seventy-one samples recovered between 1921 and 1960 in Brazilian north, southeastern and mid-eastern regions and deposited in the Helminthological Collection of the Oswaldo Cruz Institute (CHIOC) were studied. Speci-

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mens are kept in numbered vials, matched with respective numbered files that contain data on the unidentified samples, regarding host, site of infection, locality of capture, preservative solution, date of necropsy and name of the collector.

The source of samples according to host order and family is: Pelecaniformes, Phalacrocoracidae: 39 from *Phalacrocorax b. brasilianus* (Gmelin, 1789); Anhingidae: 51 from *Anhinga a. anhinga* Linné, 1766; Fregatidae: 1 from *Fregata* sp.; Sulidae: 1 from *Sula l. leucogaster* (Boddaert, 1783); Trogoniformes, Trogonidae: 37 from *Trogon curucui behni* Gould, 1875; 19 from *Trogon c. curucui* Linné, 1766; 1 from *Trogon s. surrucura* Vieillot, 1817; 17 from *Trogon v. viridis* Linné, 1766; 5 from *Trogon* sp.

Table I. Nematodes from Pelecaniformes and Trogoniformes birds in Brazil.

Parasite species	Host species
<i>Aprocta travassossi</i>	<i>Trogon curucui behni</i> Gould, 1875 (T) <i>Trogon curucui curucui</i> Linnaeus, 1766 (T)
<i>Aprocta</i> sp.	<i>Trogon viridis viridis</i> Linnaeus, 1766 (T)
<i>Baruscapillaria appendiculata</i> (Freitas, 1953) Moravec, 1982	<i>Phalacrocorax brasilianus brasilianus</i> (Gmelin, 1789) (P)
<i>Baruscapillaria spiculata</i> (Freitas, 1953) Moravec, 1982	<i>Phalacrocorax brasilianus brasilianus</i> (P)
<i>Capillaria</i> sp.	<i>Anhinga anhinga anhinga</i> Linnaeus, 1766 (P)
<i>Contraaecum granulosum</i> (Scheineider, 1866) Baylis, 1932	<i>Fregata magnificens</i> Matheus, 1914 (P)
<i>Contraaecum multipapillatum</i> (Drasche, 1882) Baylis, 1932	<i>Anhinga anhinga Linnaeus, 1766 (P)</i>
<i>Contraaecum plagiaticum</i> Lent & Freitas, 1948	<i>Sula leucogaster leucogaster</i> (Boddaert, 1783) (P)
<i>Contraaecum spiculigerum</i> (Rudolphi, 1809) Railliet & Henry, 1912	<i>Phalacrocorax brasilianus brasilianus</i> (P)
<i>Contraaecum</i> sp.	<i>Anhinga anhinga anhinga</i> (P) <i>Phalacrocorax brasilianus brasilianus</i> (P) <i>Anhinga anhinga anhinga</i> (P) <i>Fregata</i> sp. (P)
<i>Cymera (Cymera) semilunaris</i> (Molin, 1860) Seurat, 1914	<i>Trogon curucui curucui</i> (T)
<i>Eustrongylides</i> sp.	<i>Phalacrocorax brasilianus brasilianus</i> (P) <i>Anhinga anhinga</i> (P)
<i>Onchocerca</i> sp.	<i>Anhinga anhinga</i> (P)
<i>Oxyspirura</i> sp.	<i>Trogon curucui curucui</i> (T)
<i>Paronchocerca ibanezi</i> (Freitas, Vicente & Pinto, 1970) Anderson & Bain, 1976	<i>Anhinga anhinga</i> (P)
<i>Porrocaecum</i> sp.	<i>Phalacrocorax brasilianus brasilianus</i> (P)
<i>Procymaea</i> sp.	<i>Trogon</i> sp. (T) <i>Trogon viridis viridis</i> (T) <i>Trogon curucui behni</i> (T) <i>Trogon curucui curucui</i> (T)
<i>Skrjabinura spiralis</i> Gnedina, 1933	<i>Trogon curucui behni</i> (T)
<i>Subulura acutissima</i> Molin, 1860	<i>Trogon viridis viridis</i> (T) <i>Trogon curucui curucui</i> (T)
<i>Subulura bentocruzi</i> Barreto, 1919	<i>Trogon curucui behni</i> (T) <i>Trogon viridis viridis</i> (T)
<i>Subulura travassossi</i> Barreto, 1919	<i>Trogon viridis viridis</i> (T)
<i>Subulura</i> sp.	<i>Trogon</i> sp. <i>Trogon viridis viridis</i> (T) <i>Trogon surrucura surrucura</i> Vieillot, 1817 (T) <i>Trogon curucui curucui</i> (T)
<i>Tetrameres</i> sp.	<i>Anhinga anhinga anhinga</i> (P)
<i>Thelazia dacelonis</i> (Breinl, 1913) Travassos, 1918	<i>Trogon melanurus melanurus</i> Swainson, 1838 (T)

*. (P) Pelecaniformes, (T) Trogoniformes.

Nematodes were preserved in Railliet & Henry's solution (0.85% NaCl solution: 93ml; formaldehyde: 5ml; glacial acetic acid: 2ml) and were processed for study as described elsewhere (VICENTE *et al.* 1993).

NHR and NGD indicate New Host Record and New Geographical Distribution, respectively. Classification and common names of hosts follow PINTO (1978), FRISCH (1981) and SICK (1984). Confirmation of the taxonomic status of the nematodes was based on ANDERSON & BAIN (1976, 1982), CHABAUD (1975a,b 1978), HARTWICH (1974). Specific diagnosis was achieved by comparison of the morphometric data actually obtained with those referred in the original descriptions and/or redescriptions, as well as with deposited type specimens whenever available in the CHIOC.

Preparation of "en face" mounts was in accord to the method of ANDERSON (1958). Illustrations were performed with a drawing tube connected to an Olympus light microscope. Measurements are in micrometers unless otherwise indicated.

RESULTS

Aproctoidea, Onchocercidae

Aprocta travassossi Caballero, 1938

Figs 1-4

Redescription. Morphometrics based on seven adult specimens, three males and four females, recovered from *Trogon curucui behni*.

Males (Figs 3,4). Body 7.7-10.4mm long, 290-350 wide. Mouth with circular sclerotized lining, with one pair of papillae in the inner circle and two pairs in the outer. Esophagus 720-840 long. Nerve ring 120-180 from anterior extremity. Excretory pore not observed. Spicules stout, similar, 230-260 long. Gubernaculum absent. Five pairs of caudal papillae: one pair is pre-cloacal, one ad- and three pairs are post-cloacal. Cloacal aperture 90-100 from posterior extremity.

Females (Figs 1,2). Body 20.0-23.8mm long, 510-610 wide. Mouth identical to that observed in males. Esophagus 0.91-1.25mm long. Nerve ring 160-220 from anterior extremity. Excretory pore not observed. Vulva 560-780 from anterior extremity. Ovijector 2.31-2.80mm long. Eggs 36-46 long by 14-25 wide. Rectum 210-270 long.

Anus 75-120 from posterior extremity.

Hosts. *Trogon curucui behni*; common name: blue-crowned trogon ("sucuá-de-coroa-azul") (NHR), *Trogon c. curucui*; (same common names as those of the above referred host) (NHR).

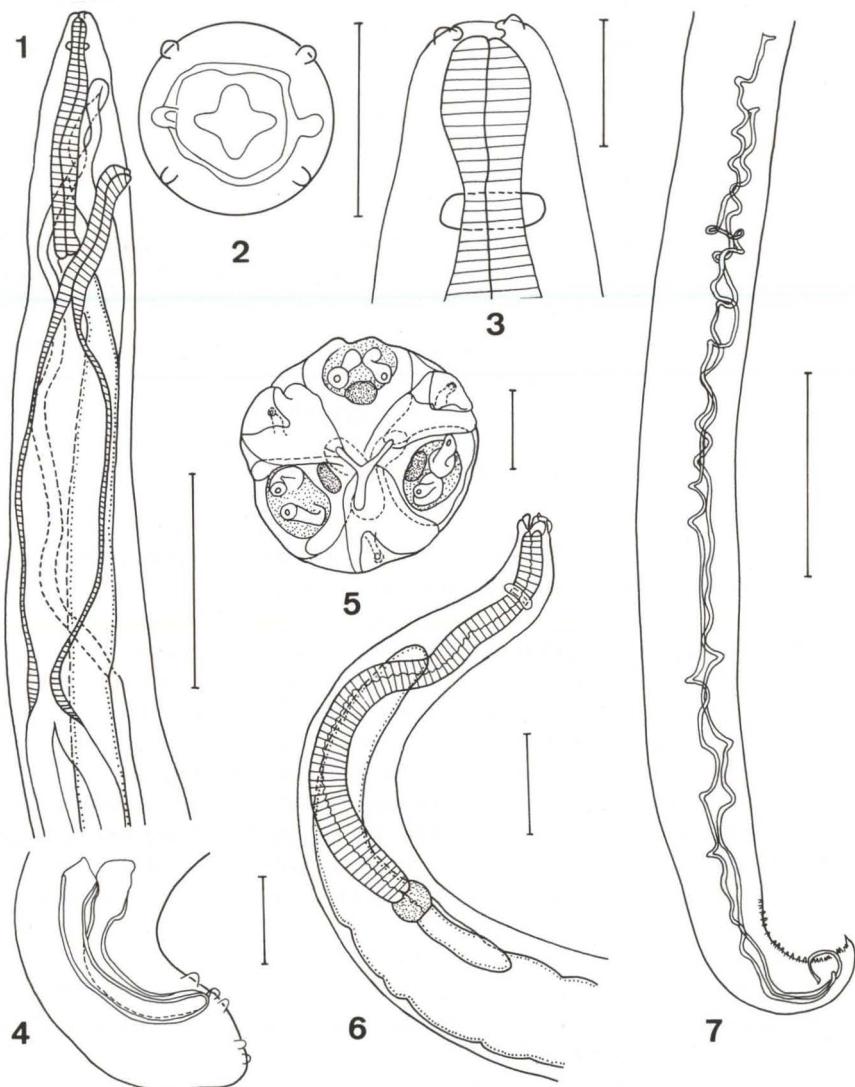
Site of infection. Body cavity.

Locality. Salobra, State of Mato Grosso do Sul, Brazil (NGD)

Specimens studied: CHIOC no. 33,608 a-d, 33,609 a-c (whole mounts), 11,392, 11,524, 11,607, 12,958 (wet material).

Remarks. This species was proposed (CABALLERO 1938) from specimens parasitizing the orbital cavity of the Troganiformes *Curucujus massena* (*sic*) from

Vera Cruz, Mexico and has not been referred ever since. This is the first report of *Aprocta travassossi* in South America.



Figs 1-7. (1-4) *Aprocta travassossi*. (1) Anterior portion of female, lateral view; (2) head of female, "en face" view; (3) anterior extremity of male, lateral view; (4) posterior extremity of male, lateral view. (5-7) *Contracaecum spiculigerum*. (5) Head of female, "en face" view; (6) anterior portion of male, lateral view; (7) posterior portion of male, lateral view. Bars = 0.1mm in figures 1-5; 0.5mm in figure 6; 1.5mm in figure 7).

Ascaridoidea, Anisakidae, Anisakinae

Contracaecum spiculigerum (Rudolphi, 1809) Railliet & Henry, 1912

Figs 5-7

Redescription. Morphometrics based on four adult specimens, two males and two females, recovered from *Phalacrocorax b. brasiliensis*.

Males (Figs 6,7). Body 13.4-14.6mm long, 530-630 wide. Mouth with three prominent lips with a pair of papillae each and three interlabia presenting a papilla each. All papillae are pedunculate. Esophagus 1.96-2.24mm long. The ventriculus, esophageal appendix and the intestinal caecum are 110-150, 210-540 and 1.3-1.4mm long, respectively. Nerve ring 350-370 from anterior extremity. Excretory pore not observed. Spicules slender, similar, 7.8-8.4mm long. Gubernaculum absent. There are about twenty pairs of pre-cloacal and five pairs of post-cloacal caudal papillae. Cloacal aperture 140-150 from posterior extremity.

Females (Fig. 5). Body 27.2-30.0mm long, 0.91-1.02mm wide. Mouth identical to that observed in males. Esophagus 2.6-2.8mm long. The ventriculus, esophageal appendix and the intestinal caecum are 210-280, 770-820 and 1.96mm long, respectively. Nerve ring 490-530 from anterior extremity. Excretory pore not observed. Vulva 7.31mm from anterior end. Eggs 50 long by 40 wide. Anus 300-360 from posterior extremity.

Hosts. *Phalacrocorax b. brasiliensis*; common name: neotropic cormorant ("biguá-miuá") (NHR); *Anhinga a. anhinga*; common name: anhinga ("biguá-tinga, anhinga").

Site of infection. Stomach.

Localities. Barranco Alto and Salobra, State of Mato Grosso do Sul; Porto Cabral, State of São Paulo; Rio de Janeiro, State of Rio de Janeiro, Brazil (NGD).

Specimens studied. CHIOC no. 33610 a-b, 33611 a-h, 33613 a-f (whole mounts); 2910-2913, 2943, 2945, 2951, 2993, 2994, 7029, 7055, 8103, 8117, 8118, 8147, 8148, 8151, 8249, 8334, 8644, 8664, 8705, 8710, 8711, 8713, 8714, 11373, 11401, 11779, 12478, 12539, 12547, 12548, 12766, 13054, 13261, 13262, 13264, 13266, 14541, 14702, 14714, 14717, 14967, 15040, 15043, 15052, 15054, 15055, 15534, 15,536, 15544, 15564, 15567, 15571, 15587, 26437 (wet material).

Remarks. *Contracaecum spiculigerum* was the species of higher prevalence among the concerned hosts, representing 35.08% of the studied samples. Although referred in a wide range of Pelecaniformes from several localities (MOSGOVOY 1953), this is the first report of the species in South America, when a new host record for *C. spiculigerum* is also established.

Trichinelloidea, Trichuridae, Capillariinae

Baruscapillaria appendiculata (Freitas, 1933) Moravec, 1982

Host. *Phalacrocorax b. brasiliensis*

Site of infection. Intestine.

Locality. State of Mato Grosso do Sul, Brazil.

Specimens studied. CHIOC no. 8788 (wet material).

Remarks. *Phalacrocorax b. brasiliensis* is the type host for this species, which was described from material obtained in Rio de Janeiro, State of Rio de Janeiro, Brazil (FREITAS 1933).

Contraeacum plagiaticum Lent & Freitas, 1948

Host. *Sula l. leucogaster*; common name: brown booby ("atobá") (NHR)

Site of infection. Intestine.

Locality. Rio de Janeiro, State of Rio de Janeiro, Brazil.

Specimens studied. CHIOC no. 9530 (wet material).

Remarks. This species has been recently reported and figured in Brazil (VICENTE *et al.* 1995b) and no additional data on *C. plagiaticum* were obtained, except for its occurrence in a new host.

Seuratoidea, Seuratidae, Seuratinae

Skrjabinura spiralis Gnédina, 1933

Host. *Trogon curucui behni* (NHR).

Site of infection. Intestine.

Locality. Salobra, State of Mato Grosso do Sul, Brazil.

Specimens studied. CHIOC no. 13014 (wet material).

Remarks. *Skrjabinura spiralis* has been referred previously in Cuculiformes and Falconiformes hosts, according to PINTO *et al.* (1994).

Subuluroidea, Subuluridae, Subulurinae

Subulura acutissima Molin, 1860

Hosts. *Trogon v. viridis*; common name: black-throated trogon ("surucuá-de-barriga amarela") (NHR), *Trogon curucui behni* (NHR), *Trogon c. curucui* (NHR).

Site of infection. Intestine.

Localities. Barranco Alto, Bodoquena and Salobra, State of Mato Grosso do Sul, Conceição da Barra and Linhares, State of Espírito Santo, Brazil

Specimens studied: CHIOC no. 11216, 11217, 11223, 11224, 11227, 11229, 11236, 11312, 11356, 11391, 11526, 11542, 11553, 11564, 11576, 11577, 11586, 11608, 11701, 11783, 12451, 12460, 12467, 12509, 12957, 13015, 13049, 13288, 13293, 13294, 13457, 14533, 14597, 14858, 14871, 15108, 15109, 15112, 15539, 16955, 20456 (wet material).

Remarks. This species was represented in 24.5% of the studied samples. It has been referred in Brazil parasitizing other hosts than the Trogoniformes, namely the Cuculiformes and Strigiformes (VICENTE *et al.* 1995a).

Subulura bentocruzi Barreto, 1919

Hosts. *Trogon* sp., *Trogon v. viridis* (NHR).

Site of infection. Intestine.

Localities. Angra dos Reis, State of Rio de Janeiro, Cachimbo, State of Pará, Brazil.

Specimens studied. CHIOC no. 5425, 5576, 21560 (wet material).

Remarks. *Subulura bentocruzi* was previously referred in *Trogon* sp. and *Trogon variegatus* Spix, according to BARRETO (1919) and VICENTE *et al.* (1995a) and was found together *S. acutissima* in *Trogon v. viridis*.

Subulura travassossi Barreto, 1919

Host. *Trogon v. viridis* (NHR).

Site of infection. Intestine.

Localities. Angra dos Reis, State of Rio de Janeiro, Conceição da Barra, State of Espírito Santo, Brazil.

Specimens studied. CHIOC no. 6757, 14800, 14812, 14844 (wet material).

Remarks. *Subulura travassossi* was found together the two above referred species in the same host and parasitizes a wide range of birds, distributed in two orders: Caprimulgiformes and Piciformes (VICENTE *et al.* 1995a).

Habronematoidea, Habronematidae, Habronematinae*Cyrnea (Cyrnea) semilunaris* (Molin, 1860) Seurat, 1914

Host. *Trogon c. curucui*.

Site of infection. Intestine.

Locality. Salobra, State of Mato Grosso do Sul, Brazil.

Specimens studies. CHIOC no. 11375 (wet material).

Remarks. There is no remarkable data to state further comments on this species, previously referred in the same host by PINTO & GOMES (1985).

Filarioidea, Onchocercidae, Splendidofilariinae*Paronchocerca ibanezi* (Freitas, Vicente & Pinto, 1970)

Anderson & Bain, 1976

Host. *Anhinga a. anhinga* (NHR).

Site of infection. Brain, stomach, intestine (*sic*).

Localities. Barranco Alto and Salobra, State of Mato Grosso do Sul, Brazil

Specimens studied. CHIOC no. 33612 (whole mount), 8501, 8682, 8685, 8686, 8691, 11417, 14547, 15540, 15563, 15665, 15570 (wet material).

Remarks. This species was proposed as *Nicanoria ibanezi* and included in the also proposed subfamily Nicanoriinae (FREITAS *et al.* 1970). Later, (ANDERSON

& BAIN 1976) synonymized Nicanoriinae with *Splendidofilariinae* Chabaud & Choquet, 1953 and *Nicanoria* Freitas, Vicente & Pinto, 1970 with *Paronchocerca* Peters, 1936. *Paronchocerca ibanezi* only had been reported occurring in its type host, the Picidae *Colaptes campestris* (Vieillot, 1818), common named campo-flicker ("pica-pau-do-campo").

In some samples, the worms were in extremely fragile shape and most of the specimens were damaged. The outermost cuticle appears to have been stripped off or peeled away. In particular this stripping has affected the tail of the males, making the papillae appeared "naked", i.e not within caudal alae. In these cases one can suppose that this stripping or peeling is due to a harsh preservative (possibly acid-based) in which the specimens may have been stored at some time in the past.

For this reason, the following species are presented only in their generic status.

Capillaria sp.

Host. *Anhinga a. anhinga*.

Site of infection. Intestine.

Locality. Rio de Janeiro, State of Rio de Janeiro, Brazil.

Specimen studied. CHIOC no. 7033 (wet material).

Contracaecum sp.

Hosts. *Phalacrocorax b. brasiliensis*, *Anhinga a. anhinga*, *Fregata* sp..

Localities. Barranco Alto and Salobra, State of Mato Grosso do Sul, Porto Esperança, State of São Paulo, Brazil.

Specimens studied. CHIOC no. 8109, 8227, 8637, 8643, 8654, 9536, 10454, 10458, 12550, 15576, 15584 (wet material).

Ascaridoidea, Ascarididae, Toxocarinae

Porroacaecum sp.

Host. *Phalacrocorax b. brasiliensis*.

Site of infection. Stomach.

Locality. Barranco Alto, State of Mato Grosso do Sul, Brazil

Specimens studied: CHIOC no. 15566 (wet material).

Subulura sp.

Hosts. *Trogon* sp., *Trogon v. viridis*, *Trogon s. surrucura*; common name: surucua trogon ("surucuá-de-barriga vermelha"), *Trogon c. curucui*.

Site of infection. Intestine.

Localities. Cachimbo and Cachoeira do Tronco, State of Pará, Salobra, State of Mato Grosso do Sul, Ilha Seca, State of São Paulo, Brazil.

Specimens studied. CHIOC no. 9016, 9020, 11357, 11582, 11633, 12453, 21558 (wet material).

Thelazioidea, Thelaziidae, Thelaziinae***Oxyspirura* sp.**

Host. *Trogon c. curucui*.

Site of infection. Eyes.

Locality. Salobra, State of Mato Grosso do Sul, Brazil.

Specimens studied. CHIOC no. 11374 (wet material).

Habronematoidea, Habronematidae, Habronematinae***Procyrnea* sp.**

Hosts. *Trogon* sp., *Trogon v. viridis*, *Trogon curucui behni*, *Trogon c. curucui*.

Site of infection. Gizzard.

Localities. Cachimbo and Cachoeira do Tronco, State of Pará, Engano, State of Espírito Santo, Bodoquena and Salobra, State of Mato Grosso do Sul, Brazil.

Specimens studied. CHIOC no. 9018, 11700, 12453, 12471, 12956, 13169, 14843, 14869, 16954, 21559, 21685 (wet material).

Habronematoidea, Tetrameridae, Tetramerinae***Tetrameres* sp.**

Host. *Anhinga a. anhinga*

Site of infection. Gizzard.

Locality. Rio de Janeiro, State of Rio de Janeiro, Brazil.

Specimen studied. CHIOC no. 7027 (wet material).

***Aprocta* sp.**

Host. *Trogon v. viridis*.

Site of infection. Body cavity.

Localities. Cachoeira do Tronco, State of Pará, Conceição da Barra, State of Espírito Santo, Salobra, State of Mato Grosso do Sul, Brazil.

Specimens studied. CHIOC no. 9021, 11218, 12452, 14798 (wet material).

Other nematode species referred parasitizing the hosts concerned herein and not found during the present investigation are: *Capillaria spiculata* Freitas, 1933 and *Eustrongylides* sp. in *Phalacrocorax b. brasilianus*; *Contracaecum multipapillatum* (Drashe, 1882) Baylis, 1920, *Eustrongylides* sp. and *Onchocerca* sp. in *Anhinga anhinga*, *Contracaecum granulosum* (Schneider, 1866) Baylis, 1932 in *Fregata magnificens* Matheus, 1914 and *Thelazia dacelonis* (Breinl, 1913) Travassos, 1918 in *Trogon m. melanurus* Swainson, 1838, according to VICENTE *et al.* (1995a).

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Recebido em 24.XI.1995; aceito em 28.XII.1996.