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Checklist of the nematode parasites of wild birds of Argentina

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Abstract: A commented checklist of the nematodes parasites of Argentinean wild birds is presented. This is the first compilation of parasitological papers about nematodes of Argentinean birds published between 1873 and November 2019. This review includes information about 64 nematode nominal species and 13 taxa identified at generic level, belonging to five orders, 16 superfamilies, 20 families, and 44 genera. Five species were considered *incertae sedis*, because they were described based only on larval stages, and one species was maintained as species *inquirenda*. The highest number of taxa of nematodes was recorded in the family Acuariidae with 20 nominal species and two taxa identified at generic level, followed by Anisakidae with eight nominal species and one taxon identified at generic level, and Tetrameridae with eight nominal species and two taxa identified at generic level. Of the 1042 species of birds reported in Argentina, only 65 (6.24%) were reported as hosts of adult nematodes. The families of birds with the highest number of reported taxa were Tinamidae (12 nematode taxa), Laridae (11), Anatidae (8) and Phalacrocoracidae (7). The present review provides data on hosts, geographical distribution, sites of infection, location of material deposited in Helminthological Collections, references, and taxonomic comments. A host/parasite list is also provided.

Keywords: Aves - Helminths - Nematoda.

INTRODUCTION

Argentina possesses a high diversity of birds with 1033 native species and 9 introduced (Roesler & González Táboas, 2016). Nematodes are an important group of parasites in birds and their taxonomy, phylogeny, zoogeography, and ecology still requires study (Zhang *et al.*, 2012). Particularly, in Argentina the literature on the nematode parasites of birds is scattered and the studies have focused mainly on taxonomy. The first reports of nematodes parasitizing Argentinean birds was carried out by the English parasitologist, Thomas Spencer Cobbold, who studied filariae found by Charles Darwin parasitizing the greater rhea from Bahía Blanca, Buenos Aires Province during his travel through South America between 1831 and 1836 (Cobbold, 1873, 1886). The next contribution was made by a German naturalist established in Argentina, Carlos Berg, who reported filariae in an egg of greater rhea (Berg, 1896). The next report was also carried out by a foreign scientist, Corrado Parona, who described some species of helminths from fishes, birds and mammals from material that was sent to him by

Carlos Berg for identification, among them, five species of nematodes from wild birds were reported (Parona, 1900). Between 1918 and 1928, several works on microfilariae found in bloodstream of wild birds were published by local scientists, among the most outstanding works are the publications of the physician and bacteriologist Salvador Mazza, who was the main researcher working on Chagas-Mazza disease in Argentina (Biglieri, 1918; Mazza *et al.*, 1927; Mazza & Franke, 1928). Between 1943 and 1975, fifteen papers were published on Nematoda of wild birds. Most of them were carried out by the veterinarians Juan José Boero and Jorge Eugenio Led (Boero & Led, 1968, 1971; Boero *et al.*, 1968; Boero *et al.*, 1972a, b). In this period the publications made by the European biologist Jacobus H. Schuurmans Stekhoven – who studied the nematodes of wild vertebrates of Argentina, Chile, and Paraguay during his stay in Argentina in the 50s – are particularly remarkable. He published an extensive work in which he described seven new species of nematodes parasitizing birds from northern Argentina and nine new geographical records (Schuurmans Stekhoven, 1951). During the following 20 years (1976-1995) only one

contribution was published (Zeiss & Seigmur, 1981). From 1996, the number of publications carried out by Argentinean scientists increased, published by several groups of parasitologists mostly from the University of La Plata (Buenos Aires Province) and Puerto Madryn (Chubut Province) and mainly dedicated to nematodes of birds related to aquatic environments.

The aim of this paper was to compile and summarize all the published reports about adult nematodes of wild birds from Argentina based on original records.

MATERIALS AND METHODS

This checklist was prepared on the basis of data published from 1873 to November 2019. Species reported in theses, dissertations, and scientific meetings were not listed because they represent informal publications. However, two proceedings of scientific meetings are mentioned in the comments, given that some species were originally described in these proceedings and were subsequently considered valid by other authors in formal publications. For the construction of this list only wild birds were included, domestic birds were not taken into account. Each taxonomic category of Nematoda is presented in alphabetical order. Each record contains information on the species or generic name, taxonomic authority, host(s), site of infection (SI), localities (Lo) (particular locality, Province and geographical coordinates when reported in the original paper were converted to WGS 84 decimal degrees), number of lots and collection acronym when material was deposited, and bibliographical references (numbers in superscript refer to the corresponding reference). The classification for nematodes follows the Keys to the Nematode Parasite of Vertebrates of Anderson *et al.* (2009) and Gibbons (2010), except for *Tetrameres* and *Microtetrameres* (Tetrameridae) which are considered as separate genera. The taxonomy of birds follows AVIBASE (Lepage, 2019), where also the taxonomic authorities of the bird taxa can be found. Acronyms used for the Biological Collections are: CHIOC (Coleção Helminológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brazil); CH–N–FML (Colección Helminológica de la Fundación Miguel Lillo, Tucumán Province, Argentina); CNP–Par (Collection of the Centro Nacional Patagónico, Puerto Madryn, Argentina); IPCAS Helm. Coll (Helminthological Collection of the Institute of Parasitology, Biology Centre of the Czech Academy of Sciences, České Budějovice, Czech Republic); MLP–He, sometimes as CHMLP in the original papers (Colección Helminológica del Museo de La Plata, Buenos Aires Province, Argentina); USNM (United States National Museum, National Museum of Natural History, Washington, U.S.A.), also cited with a previous acronym USNPC (United States National Parasite Collection); NHMUK (The Natural History Museum, London, U.K.), sometimes as BMNH (British Museum of Natural History) in the original papers; MNHN (Muséum

National d'Histoire Naturelle, Nematodes collection, Paris, France); MACN–pa (colección de parasitología, Museo Argentino de Ciencias Naturales “Bernadino Rivadavia”, Buenos Aires, Argentina).

RESULTS

At present, 71 papers have been published on some aspects of nematodes infecting Argentinean wild birds – most of them are related to taxonomic aspects, distribution, and host-parasite associations – while a few dealt with the pathological effects caused by nematodes in birds. The checklist from the available literature on nematodes parasites of wild birds in Argentina comprises records on 64 nematode nominal species and 13 taxa identified at generic level, belonging to five orders, 16 superfamilies, 20 families and 44 genera associated with 13 species of Pelecaniformes; eight species of Charadriiformes and Passeriformes; six species of Strigiformes; five species of Anseriformes; four species of Tinamiformes; three species of Falconiformes, Podicipediformes and Psittaciformes; two species of Accipitriformes, Piciformes, Rheiformes and Sphenisciformes; and one species of Coraciiformes, Gruiformes, Phoenicopteriformes and Procellariiformes.

Parasite-Host List

Phylum Nematoda
Class Adenophorea
Order Enoplida
Superfamily Dioctophymatoidea
Family Dioctophymidae
Genus *Eustrongylides* Jägerskiöld, 1909
***Eustrongylides tubifex* (Nitzsch in Rudolphi, 1819)**

Host: *Podiceps major*. **SI:** proventriculus. **Lo:** Moreno Lake (-41.0667, -71.55), Río Negro Province.
Reference: Brugni & Viozzi (2003).

Superfamily Trichinelloidea
Family Trichuridae
Genus *Capillaria* Zeder, 1800
***Capillaria* sp.**

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** San Carlos de Bariloche (-41.05, -75.4167), Río Negro Province. **Reference:** Kreiter & Semenas (1997).

Host: *Nothura maculosa nigroguttata*. **SI:** not reported. **Lo:** Buenos Aires Province. **Reference:** Boero *et al.* (1968).

Genus *Eucoleus* Dujardin, 1845
***Eucoleus penidoi* (Freitas & Almeida, 1935)**

Host: *Nothura maculosa*. **SI:** muscular stomach. **Lo:** Maipú, Buenos Aires Province. **Reference:** Kaseta

(1973). **Comment:** cited as *Capillaria penidoi* Freitas & Almeida, 1935. The genus *Eucoleus* was considered synonymous of *Capillaria* by Anderson *et al.* (2009), although both genera are so far considered valid (Moravec, 2001; Gibbons, 2010).

Eucoleus sp.

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** Chubut Province. **Reference:** Díaz *et al.* (2011a). **Comment:** immature adult specimens.

Genus *Ornithocapillaria* Baruš & Sergeeva, 1990 *Ornithocapillaria ovopunctata* (Linstow, 1873)

Host: *Sturnus vulgaris*. **SI:** intestine. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6736. **Reference:** Valente *et al.* (2014).

Genus *Pterothominx* Freitas, 1959 *Pterothominx exilis* (Dujardin, 1845)

Host: *Sturnus vulgaris*. **SI:** intestine. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6735. **Reference:** Valente *et al.* (2014).

Class Secernentea Order Ascaridida Superfamily Ascaridoidea Family Anisakidae

Genus *Contracaecum* Railliet & Henry, 1912 *Contracaecum australe* Garbin *et al.*, 2011

Host: *Phalacrocorax brasilianus*. **SI:** stomach. **Lo:** Piedras Moras Reservoir (-32.1667, -64.2833), urban Lake Villa Dalcar (-33.1; -64.36667), Pampean Lagoon (-34.7667, -63.6333) and Río Cuarto (-33.1167, -64.3) Córdoba Province. **References:** Biolé *et al.* (2012). **Comment:** adults and third and fourth stage larvae.

Host: *Phalacrocorax gaimardi*. **SI:** stomach. **Lo:** Isla del Rey (-47.7667, -66.05), Cañadón del Puerto (-47.75, -66) and Isla Elena (-47.75, -65.9333), Puerto Deseado, Santa Cruz Province. **Material deposited:** MLP–He 6758. **Reference:** Garbin *et al.* (2014). **Comment:** adults and third and fourth stage larvae.

Contracaecum chubutensis Garbin, Díaz, Cremonte & Navone, 2008

Host: *Phalacrocorax atriceps*. **SI:** stomach. **Lo:** Bahía Bustamante (-45.1833, -66.50)^{1, 2} and Puerto Madryn (-42.7833, -65.0333)¹, Chubut Province. **Material**

deposited: MLP–He 5748, 5749, 5750¹. **References:** Garbin *et al.* (2008¹, 2011²).

Contracaecum microcephalum (Rudolphi, 1809)

Host: *Ardea alba egretta* (cited as *Casmerodius albus egretta*). **SI:** esophagus, stomach and small intestine. **Lo:** Leales, Tucumán Province¹; La Plata Zoological Garden, Buenos Aires Province². **Material deposited:** CH–N–FML 1817¹. **References:** Schuurmans Stekhoven (1951)¹; Boero *et al.* (1972a)².

Host: *Ardea cocoi*. **SI:** esophagus, stomach and small intestine. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero *et al.* (1972a).

Host: *Nycticorax nycticorax*. **SI:** esophagus, stomach and small intestine. **Lo:** Uribelarra¹ and La Plata Zoological Garden, La Plata², Buenos Aires Province. **References:** Boero & Led (1971)¹; Boero *et al.* (1972a)².

Contracaecum mirounga Nikolskiy, 1974

Host: *Spheniscus magellanicus*. **SI:** proventriculus. **Lo:** Península Valdés (-42.0667 to -42.8833, -63.63 to -64.50), Chubut Province. **Material deposited:** MLP–He 7464. **Reference:** Garbin *et al.* (2019a).

Contracaecum multipapillatum (Drasche, 1882)

Hosts: *Ardea alba* Linnaeus¹; *Ardea alba egretta* (cited as *Egretta alba egretta*)². **SI:** esophagus and stomach. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833)¹ and Mar Chiquita coastal Lagoon (-37.7667, -57.45)², Buenos Aires Province. **Material deposited:** MACN–pa 385²; MLP–He 4598¹. **References:** Labriola & Suriano (1996)²; Navone *et al.* (2000)¹.

Host: *Bubulcus ibis ibis*. **SI:** esophagus and stomach. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833), Buenos Aires Province. **Material deposited:** MACN–pa 385. **Reference:** Labriola & Suriano (1996).

Host: *Egretta thula thula*. **SI:** esophagus and stomach. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833), Buenos Aires Province. **Material deposited:** MACN–pa 385. **Reference:** Labriola & Suriano (1996). **Comment:** Labriola & Suriano (1996) described *Contracaecum philomultipapillatum*, later this species was synonymized with *C. multipapillatum* by Navone *et al.* (2000).

Contracaecum ovale (Linstow, 1907)

Host: *Rollandia rolland*. **SI:** stomach. **Lo:** Mar Chiquita Lagoon (-37.7667, -57.45) and Chascomús Lagoon

(-35.6667, -58.00), Buenos Aires Province. **Material deposited:** MLP–He 6313. **Reference:** Galeano & Tanzola (2012).

Contracaecum pelagicum
(Johnston & Mawson, 1942)

Host: *Eudyptes chrysocome* (cited as *E. crestatus*). **SI:** intestine. **Lo:** not reported. **Reference:** Boero *et al.* (1972b). **Comment:** cited as *Contracaecum spheniscus* Boero & Led, 1970.

Host: *Spheniscus magellanicus*^{1, 2, 3}. **SI:** intestine¹, stomach^{2, 3}. **Lo:** not reported¹, Península Valdés (-42.06667 to -42.8833, -63.63 to -64.5), Chubut Province^{2, 3}; and Mar del Plata (-38.0833, -57.6333), Buenos Aires Province². **Material deposited:** MLP–He 5591^{2, 3}. **References:** Boero *et al.* (1972b)¹; Garbin *et al.* (2007)²; Díaz *et al.* (2010)³. **Comment:** cited as *C. spheniscus* by Boero *et al.* (1972b).

Host: *Thalassarche melanophris* (cited as *Diomedea m.*). **SI:** stomach. **Lo:** Península Valdés (-42.0667 to -42.88333, -63.633 to -64.50), Chubut Province. **Material deposited:** MLP–He 5591. **Reference:** Garbin *et al.* (2007).

Comment: *Contracaecum spheniscus* was described in the proceedings of a congress in 1970, based only on male specimen found in the proventriculus of *S. magellanicus* from the La Plata Zoological Garden. Boero *et al.* (1972b) considered it valid, and reported males and females parasitizing penguins. Finally, Garbin *et al.* (2019a) synonymized *C. spheniscus* with *C. pelagicum*.

***Contracaecum travassosi* Gutiérrez, 1943**

Host: *Phalacrocorax albiventer*. **SI:** stomach. **Lo:** San José lighthouse, Chubut Province. **Material deposited:** CHIOC (number not provided). **Reference:** Gutiérrez (1943).

***Contracaecum* sp.**

Host: *Fulica leucoptera*. **SI:** intestine. **Lo:** Trelew, Chubut Province. **Reference:** Parona (1900). **Comment:** Cited by Parona (1900) as *Ascaris spiculigera* Rudolphi, 1809. There is much confusion in the literature about the many species of *Contracaecum*. Hartwich (1964) revised this genus and presented a list of synonyms. Among them, considered *Contracaecum spiculigera* (Rudolphi, 1809) and *A. spiculigera* synonymous of *C. microcephalum*. Also, he studied other specimens identified by Rudolphi (1809) as *A. spiculigera*, but considered these specimens as members of *Contracaecum rudolphii* Hartwich, 1964.

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** San Carlos de Bariloche (-43.05, -75.4167), Río Negro Province¹; Chubut Province². **References:** Kreiter & Semenas (1997)¹; Díaz *et al.* (2011a)². **Comment:** immature adult specimens².

Host: *Phalacrocorax albiventer*. **SI:** recovered from pellets. **Lo:** Punta León Reserve (-43.0778, -64.4958), Chubut Province. **Reference:** Malacalza *et al.* (1988).

Host: *Phalacrocorax atriceps*. **SI:** recovered from pellets. **Lo:** Punta León Reserve (-43.0778, -64.4958), Chubut Province. **Reference:** Garbin *et al.* (2019b). **Comment:** third and fourth stage larvae and adults specimens.

Host: *Phalacrocorax brasilianus* (cited as *Phalacrocorax olivaceus olivaceus*). **SI:** proventriculus. **Lo:** Río de La Plata¹ (unspecified Province); and Los Quiroga dam, Santiago del Estero Province². **References:** Szidat & Nani (1951)¹; Zeiss & Seigmur (1981)². **Comment:** cited as *Contracaecum spiculigerum* (see previous taxonomic comment).

Host: *Phalacrocorax gaimardi*. **SI:** recovered from pellets. **Lo:** Isla Elena (-47.75, -65.9333), Ría Deseado, Santa Cruz Province. **Comment:** third and fourth stage larvae and adults specimens. **Reference:** Garbin *et al.* (2019b).

Host: *Spheniscus magellanicus*. **SI:** proventriculus. **Lo:** Río de la Plata (-35.4333 to -41.0333; -57.1167 to -62.8), Buenos Aires Province. **Material deposited:** MLP–He 7465. **Reference:** Garbin *et al.* (2019a).

Family Ascarididae

Genus *Porrocaecum* Railliet & Henry, 1912

***Porrocaecum heteroptera* (Diesing, 1851)**

Host: *Plegadis chihi*. **SI:** intestine. **Lo:** Guaminí (-37.00, -62.4833), Buenos Aires Province. **Material deposited:** MLP–He 4307/4 and NHMUK 1999.2.5.1–2. **Reference:** Digiani & Sutton (2001).

Host: *Theristicus melanopis* (Gmelin) (cited as *Theristicus melanopis melanopis*). **SI:** intestine. **Lo:** Rahue (-39.35, -70.9167), Neuquén Province. **Material deposited:** MLP–He 4599/1, 4600/1. **Reference:** Digiani & Sutton (2001).

Superfamily Heterakoidea

Family Ascaridiidae

Genus *Ascaridia* Dujardin, 1845

***Ascaridia hermaphrodita* (Frölich, 1789)**

Host: *Ara chloropterus*. **SI:** small intestine. **Lo:** San Cosme Department, Corrientes Province. **Reference:** Martínez *et al.* (2003).

Host: *Pionus maximiliani* *siy*. **SI:** small intestine. **Lo:**

San Antonio, Misiones Province. **Material deposited:** CH–N–FML 259. **Reference:** Schuurmans Stekhoven (1951).

Ascaridia sp.

Host: *Nothura maculosa annectens*. **SI:** small intestine. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Family Heterakidae
Genus Heterakis Schrank, 1790
Heterakis sp.

Host: *Nothura darwinii darwinii*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Host: *Nothura maculosa annectens*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Genus Odontoterakis Skrjabin
& Schikhobalova, 1947
Odontoterakis valvata (Schneider, 1866)

Host: *Crypturellus tataupa*. **SI:** intestinal caeca. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Nothura maculosa*¹; *Nothura maculosa nigroguttata*². **SI:** intestinal caeca. **Lo:** Maipú, Magdalena, Tandil and Rauch, Buenos Aires Province¹; and Buenos Aires Province². **References:** Kaseta (1973)¹; Boero *et al.* (1968)².

Comment: cited as *Heterakis valvata* Schneider, 1866, this species was synonymized with *O. valvata* by Inglis (1991).

Superfamily Seuratoidea
Family Seuratidae
Genus Skrjabinura Gnedina, 1933
Skrjabinura sp.

Host: *Megascops choliba*. **SI:** intestine. **Lo:** La Marcela farm (-26.2931, -59.1439), Pirané, Formosa Province. **Material deposited:** MLP–He 7247. **Reference:** Drago *et al.* (2015).

Superfamily Subuluroidea
Family Subuluridae
Genus Oxyinema Linstow, 1899
Oxyinema sp.

Host: *Oreopholus ruficollis*. **SI:** intestine. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Genus Subulura Molin, 1860a
Subulura olymptoi Barreto, 1918

Host: *Nothura maculosa*. **SI:** duodenum. **Lo:** Maipú, Magdalena, Coronel Dorrego and Rauch, Buenos Aires Province. **Reference:** Kaseta (1973).

Subulura strongylina (Rudolphi, 1819)

Host: *Crypturellus tataupa*. **SI:** intestine. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Subulura sp.

Hosts: *Nothura darwinii darwinii*; *Nothura darwinii salvadorii*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Host: *Nothura maculosa annectens*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Order Oxyurida

Superfamily Oxyuroidea

Family Heteroxynematidae

Genus Eudromoxyura Anderson & Prestwood, 1972
Eudromoxyura aspiculuris (Boero & Led, 1971)

Hosts: *Eudromia elegans*¹; *Eudromia elegans albida*²; *Eudromia elegans elegans*^{1, 2}; *Eudromia elegans wetmorei* (cited as *Eudromia elegans morenoi*)³. **SI:** caecum^{1, 2}. **Lo:** Buenos Aires Province¹; La Pampa, San Juan and Mendoza Provinces²; General Acha, La Pampa Province³. **Material deposited:** MLP–He 1621 D¹; MNHN kh–443¹, sb–559¹; USNM 1358790, 1358791, 1358792 (cited as USNPC 63080, 63081, 63082)². **References:** Boero & Led (1971)³; Anderson & Prestwood (1972)²; Hugot *et al.* (1991)¹. **Comment:** Boero & Led (1971) described *Syphaciella aspiculuris* from *E. e. wetmorei*. Anderson & Prestwood (1972) described *Eudromoxyura elonbyrdis* from *E. e. elegans* and *E. e. albida*. Later, Hugot *et al.* (1991) studied these specimens and synonymized both species with *E. aspiculuris*.

Order Spirurida

Superfamily Acuarioidea

Family Acuariidae

Genus Ancyracanthopsis Diesing, 1861a
Ancyracanthopsis winegardii Wong & Anderson, 1990

Host: *Larus dominicanus*. **SI:** gizzard. **Lo:** Balneario Orense (-38.70, -59.7833), Buenos Aires Province. **Material deposited:** MLP–He 4552. **Reference:** Cremonte *et al.* (2000).

Genus *Cosmocephalus* Molin, 1858a
***Cosmocephalus obvelatus* (Creplin, 1825)**

Host: *Larus dominicanus*. **SI:** esophagus. **Lo:** Chubut Province. **Material deposited:** MLP–He 4811-1 (cited as 4811) and CNP–Par 17. **Reference:** Díaz *et al.* (2011a).

Host: *Spheniscus magellanicus*. **SI:** esophagus. **Lo:** Península (-42.0667 to -42.8833, -63.633 to -64.5), Chubut Province. **Material deposited:** MLP–He 4811. **References:** Díaz *et al.* (2001, 2010).

Genus *Desportesius* Chabaud & Campana, 1949
***Desportesius longevaginatus* (Molin, 1860b)**

Host: *Ciconia maguari*. **SI:** esophagus. **Lo:** not reported. **Reference:** Boero *et al.* (1972b). **Comment:** cited as *Synhimantus longevaginatus* (Molin, 1860b), and later this species was synonymized with *D. longevaginatus* by Wong *et al.* (1986).

Genus *Echinuria* Soloviev, 1912
***Echinuria cygni* Morini, Colombo & Martin, 1959**

Host: *Cygnus melancoryphus*. **SI:** proventriculus². **Lo:** Buenos Aires Zoological Garden, Buenos Aires city¹; La Plata Zoological Garden, Buenos Aires Province². **References:** Rodríguez & Boero (1964)¹; Boero & Led (1968)². **Comment:** the females of this species were originally described by Morini, Colombo & Martín in the proceedings of a meeting “*Actas y Trabajos del primer congreso Sudamericano de Zoología*” in 1959. Rodríguez & Boero (1964) and Boero & Led (1968) consider it a valid species, and described the males.

***Echinuria skrjabiniensis* Efimov in Skrjabin, Sobolev & Ivashkin, 1965**

Host: *Calidris bairdii*. **SI:** proventriculus. **Lo:** Estancia María Cristina (-43.55, -70.6333), Sarmiento (-45.5833, -69.1167) and Estancia Quicahua (-42.45, -71.2167), Chubut Province. **Material deposited:** MLP–He 6346. **Reference:** Díaz *et al.* (2011b).

Host: *Calidris fuscicollis*. **SI:** proventriculus. **Lo:** Caleta Valdés (-42.50, -63.4167), Bahía Bustamante (-54.10, -66.5167) and Laguna del Ornitólogo (-43.2333, -65.2333), Chubut Province. **Material deposited:** MLP–He 6347. **Reference:** Díaz *et al.* (2011b).

Host: *Phoenicopterus chilensis*. **SI:** proventriculus. **Lo:** Epecuén Lake (-37.2167, -62.85), Buenos Aires Province. **Material deposited:** MLP–He 7258. **Reference:** Núñez *et al.* (2017).

***Echinuria uncinata* (Rudolphi, 1819)**

Host: *Lophonetta specularioides*. **SI:** lumen of proventriculus. **Lo:** San Jorge Gulf (-45.0333; -65.8667), Chubut Province. **Material deposited:** MLP–He 7021 and CNP–Par (number not provided). **Reference:** Agüero *et al.* (2015).

Host: *Netta peposaca*. **SI:** proximal esophagus, almost at the junction with the proventriculus, within granulomas. **Lo:** Alvear (-29.1536, -56.9094), Corrientes Province. **Material deposited:** CHIOC 36627, 36628. **Reference:** Silveira *et al.* (2006).

Genus *Ingliseria* Gibson, 1968
***Ingliseria cirrohamata* (Linstow, 1888)**

Host: *Phalacrocorax atriceps* [cited as *P. (atriceps) albiventer*]. **SI:** esophagus. **Lo:** Patagonian Gulves (-42.0667 to -42.8833, -63.35 to -65.0667), Chubut Province. **Material deposited:** MLP–He 5863. **Reference:** Díaz *et al.* (2009).

Host: *Phalacrocorax brasilianus*. **SI:** esophagus. **Lo:** Patagonian Gulves (-42.0667 to -42.8833, -63.35 to -65.0667), Chubut Province. **Material deposited:** MLP–He 5864. **Reference:** Díaz *et al.* (2009).

Genus *Paracuaria* Rao, 1951
***Paracuaria adunca* (Creplin, 1846)**

Host: *Larus dominicanus*. **SI:** under the koilin at the junction of the proventriculus and gizzard¹ and esophagus². **Lo:** Puerto Madryn (-42.7833, -65.0333) and Fracasso Beach (-42.4167, -64.1167), Chubut Province¹; Chubut Province². **Material deposited:** MLP–He 5282^{1,2}; CNP–Par 18². **References:** Díaz *et al.* (2004¹, 2011a²).

Genus *Pectinospirura* Wehr, 1933
***Pectinospirura argentata* Wehr, 1933**

Host: *Larus atlanticus*. **SI:** proventriculus. **Lo:** Bahía Blanca estuary¹ and Isla del Puerto (-38.80, -62.25)², Buenos Aires Province. **Material deposited:** MLP–He 5896¹. **References:** La Sala *et al.* (2009¹, 2012²).

Host: *Larus dominicanus*. **SI:** proventriculus. **Lo:** Balneario Orense (-38.70, -59.7833)¹ and Mar del Plata (-38.0833, -57.6333)², Buenos Aires Province. **Material deposited:** MLP–He 4064 (cited as 40,064)¹. **References:** Cremonte & Navone (1999)¹; Labriola & Suriano (2001)²

Genus *Sciadiocara* Skrjabin, 1916a***Sciadiocara haematopodi* Cremonte, Navone & Etchegoin, 1999**

Host: *Haematopus palliatus*. **SI:** gizzard. **Lo:** Mar Chiquita coastal lagoon (-37.7667, -57.45), Buenos Aires Province. **Material deposited:** MLP–He 4066/1, 4066/2, 4066/3 (cited as 40,066/1, 40,066/2, 40,066/3). **Reference:** Cremonte *et al.* (1999).

Host: *Larus dominicanus*. **SI:** gizzard. **Lo:** Balneario Orense (-38.70, -59.7833), Buenos Aires Province. **Reference:** Cremonte *et al.* (1999).

Comment: Cremonte *et al.* (2000) reported third and fourth stage larvae of this species parasitizing *Larus dominicanus* from Mar Chiquita coastal Lagoon.

***Sciadiocara legendrei* (Petter, 1967)**

Host: *Tachyeres leucocephalus*. **SI:** gizzard. **Lo:** San Jorge Gulf (-45.0333; -65.8667), Chubut Province. **Material deposited:** MLP–He 7023 and CNP–Par (number not provided). **Reference:** Agüero *et al.* (2015).

***Sciadiocara* sp.**

Host: *Larus atlanticus*. **SI:** proventriculus. **Lo:** Isla del Puerto (-38.80, -62.25), Bahía Blanca estuary, Buenos Aires Province. **Material deposited:** MLP–He 5898. **References:** La Sala *et al.* (2009, 2012).

Genus *Skrjabinoclava* Sobolev, 1943***Skrjabinoclava andersoni* Cremonte & Navone, 1999**

Host: *Larus atlanticus*. **SI:** proventriculus. **Lo:** Isla del Puerto (-38.80, -62.25), Bahía Blanca estuary, Buenos Aires Province. **Material deposited:** MLP–He 5897. **References:** La Sala *et al.* (2009, 2012).

Host: *Larus dominicanus*. **SI:** proventriculus. **Lo:** Balneario Orense (-38.70, -59.7833), Buenos Aires Province. **Material deposited:** MLP–He 4065/1, 4065/2, 4065/3 (cited as 40,065/1, 40,065/2, 40,065/3). **Reference:** Cremonte & Navone (1999).

***Skrjabinoclava* sp.**

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** Mar del Plata (-38.0833, -57.6333), Buenos Aires Province. **Reference:** Labriola & Suriano (2001).

Genus *Stegophorus* Wehr, 1934***Stegophorus diomedea* (Johnston & Mawson, 1942)**

Host: *Thalassarche melanophris* (cited as *Diomedea m.*). **SI:** muscular stomach. **Lo:** Fracasso Beach (-42.4167, -64.1167) and San José Gulf, Península Valdés, Chubut Province. **Material deposited:** MLP–He 5095. **Reference:** Cremonte *et al.* (2002).

Genus *Streptocara* Railliet, Henry & Sisoff, 1912***Streptocara formosensis* Sugimoto, 1930**

Host: *Tachyeres leucocephalus*. **SI:** gizzard. **Lo:** Bahía Melo (-45.65, -65.8833)¹ and San Jorge Gulf (-45.0333, -65.8667)², Chubut Province. **Material deposited:** MLP–He 6661 and CNP–Par 60¹. **References:** Agüero & Díaz (2013)¹; Agüero *et al.* (2015)².

Genus *Syncuaria* Gilbert, 1927***Syncuaria diacantha* Petter, 1961**

Host: *Platalea ajaja*. **SI:** gizzard. **Lo:** Guaminí Lagoon (-37.00, -62.4833), Buenos Aires Province. **Material deposited:** MLP–He 4301/4. **Reference:** Digiani (1999).

***Syncuaria plegadisi* Digiani, 1999**

Host: *Plegadis chihi*. **SI:** gizzard. **Lo:** Punta Blanca (-34.9333, -57.6833), Guaminí Lagoon (-37.00, -62.4833) and Ramallo (-33.4667, -60.0333), Buenos Aires Province. **Material deposited:** MLP–He 3714/3, 3702/4, 3701/4, 3741/5, 3713/5, 3734/5 and IPCAS Helm. Coll. 749. **Reference:** Digiani (1999).

Genus *Synhimantus* Railliet, Henry & Sisoff, 1912***Synhimantus milvago* Boero & Led, 1971**

Host: *Phalacrocorax chimango*. **SI:** stomach. **Lo:** Urubelarrea, Buenos Aires Province. **Reference:** Boero & Led (1971).

Subgenus *Synhimantus (Dispharynx)* Railliet,**Henry & Sisoff, 1912*****Synhimantus (Dispharynx) brevicordon*****Schuermans Stekhoven, 1951**

Host: *Falco sparverius cinnamominus*. **SI:** cavity and stomach. **Lo:** Tafi del Valle, Tucumán Province. **Material deposited:** CH–N–FML 626. **Reference:** Schuurmans Stekhoven (1951). **Comment:** cited as *Dispharynx brevicordon*.

Host: *Muscisaxicola maculirostris maculirostris*. **SI:** cavity. **Lo:** Tafi del Valle, Tucumán Province. **Material**

deposited: CH–N–FML 582. **Reference:** Schuurmans Stekhoven (1951). **Comment:** cited as *Dispharynx brevicordon*.

***Synhimantus (Dispharynx) nasuta* Chabaud, 1975**

Host: *Sturnus vulgaris*. **SI:** esophagus, proventriculus, and gizzard. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6733. **Reference:** Valente *et al.* (2014).

Subgenus *Synhimantus (Synhimantus)* Railliet, Henry & Sisoff, 1912

***Synhimantus (Synhimantus) laticeps* (Rudolphi, 1819)**

Host: *Asio clamator*. **SI:** proventriculus. **Lo:** San Clemente del Tuyú (-36.35, -56.7167), Buenos Aires Province. **Material deposited:** MLP–He 7246. **Reference:** Drago *et al.* (2015). **Comment:** cited as *S.* (*S.*) cf. *laticeps*.

Host: *Tyto alba*. **SI:** gizzard. **Lo:** Mar Chiquita (-37.7667, -57.45), Buenos Aires Province. **Material deposited:** MLP–He 4609. **Reference:** Etchegoin *et al.* (2000).

Superfamily Aprotoidea

Family Aproctidae

Genus *Aprocta* Linstow, 1883

***Aprocta colaptidis* Schuurmans Stekhoven, 1951**

Host: *Colaptes campestris*. **SI:** neck (muscles and under the skin). **Lo:** Yabebiry Stream, San Ignacio, Misiones Province. **Reference:** Schuurmans Stekhoven (1951).

Host: *Furnarius rufus*. **SI:** squamous tissue of legs. **Lo:** Aguapey River, Misiones Province. **Reference:** Boero *et al.* (1972a).

Host: *Zonotrichia capensis*. **SI:** squamous tissue of legs. **Lo:** Aguapey River, Misiones Province. **Reference:** Boero *et al.* (1972a).

***Aprocta ptiloscelidis* Schuurmans Stekhoven, 1951**

Host: *Vanellus resplendens* (cited as *Ptiloscelys resplendens*). **SI:** nasal cavity. **Lo:** Tafi del Valle, Tucumán Province. **Material deposited:** CH–N–FML 236. **Reference:** Schuurmans Stekhoven (1951).

Genus *Tetracheilonema* Diesing, 1861a

***Tetracheilonema quadrilabiatum* (Molin, 1858b)**

Host: *Colaptes campestris*. **SI:** kidney (capsular membrane and adipose tissue) and neck (muscles and

under the skin). **Lo:** Yabebiry Stream, San Ignacio, Misiones Province. **Reference:** Schuurmans Stekhoven (1951).

Host: *Crypturellus tataupa*. **SI:** thoracic and abdominal cavity. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Hosts: *Nothura darwinii darwinii*; *Nothura darwinii salvadorii*. **SI:** body cavity. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Hosts: *Nothura maculosa*¹; *Nothura maculosa annectens*²; *Nothura maculosa maculosa*³; *Nothura maculosa nigroguttata*⁴. **SI:** kidney (capsular membrane and adipose tissue) and neck (muscles and under the skin)³; thoracic and abdominal cavity^{1, 2, 4}. **Lo:** Maipú, Magdalena and Coronel Dorrego, Buenos Aires Province¹; not reported²; Yabebiry Stream, San Ignacio, Misiones Province³; Buenos Aires Province⁴. **Material deposited:** CH–N–FML 263, 264³. **References:** Schuurmans Stekhoven (1951)³; Boero *et al.* (1968)⁴; Bump & Bump (1969)²; Kaseta (1973)¹.

Superfamily Diplotriaenoidea

Family Diplotriaenidae

Genus *Dicheilonema* Diesing, 1861a

***Dicheilonema rhae* (Owen, 1843)**

Host: *Coscoroba coscoroba*. **SI:** general cavity. **Lo:** Azul, Buenos Aires Province. **Reference:** Gutiérrez (1956).

Hosts: *Rhea americana*^{1, 2, 3, 5, 6, 7}; *Rhea americana albescens* (cited as *Rhea americana rothschildi*)⁴. **SI:** stomach^{1, 2}, egg³, thoracic and abdominal cavity⁴, thoracic region (between flesh and bone)⁵; general cavity (peritoneum)⁶; abdominal and thoracic air sacs, coelomic cavity and subcutaneous tissue of left paw (femoro-tibial joint)⁷. **Lo:** Bahía Blanca, Buenos Aires Province^{1, 2}, Luján, Buenos Aires Province³, Buenos Aires Zoological Garden, Buenos Aires city⁴, San José, San Martín Department, Salta Province⁵; Argentinean Chaco⁶; Buenos Aires Province⁷. **Material deposited:** CH–N–FML 787⁵. **References:** Cobbold (1873¹, 1886²); Berg (1896)³; Marelli & Ubach (1923)⁴; Schuurmans Stekhoven (1951)⁵; Gutiérrez (1956)⁶; Comolli *et al.* (2011)⁷. **Comment:** Cobbold (1873, 1886), Berg (1896) and Marelli & Ubach (1923) cited these specimens as *Filaria horrida* Diesing, 1851. Yamaguti (1961) considered *F. horrida* synonymous of *D. rhae*.

Host: *Rhea pennata garleppi* (cited as *Pterocnemia p. g.*). **SI:** intercostal space (under the skin) and general cavity. **Lo:** Andalgalá, Catamarca Province. **Material deposited:** CH–N–FML 1060, 1071. **Reference:** Schuurmans Stekhoven (1951).

Genus *Diplotriaena* Henry & O'Zoux, 1909***Diplotriaena modesta* Schuurmans Stekhoven, 1951**

Host: *Asthenes modesta modesta*. **SI:** general cavity. **Lo:** Tafi del Valle, Tucumán Province. **Material deposited:** CH–N–FML 624. **Reference:** Schuurmans Stekhoven (1951).

***Diplotriaena muscisaxicola*
Schuurmans Stekhoven, 1951**

Host: *Muscisaxicola maculirostris maculirostris*. **SI:** general cavity. **Lo:** Tafi del Valle, Tucumán Province. **Reference:** Schuurmans Stekhoven (1951).

**Genus *Hamatospiculum* Skrjabin, 1916b
Hamatospiculum flagellispiculosum Schuurmans
Stekhoven, 1951**

Host: *Asio clamator* (cited as *Rhinoptynx clamator maculatus*). **SI:** neck. **Lo:** Bella Vista, Faimallá Department, Tucumán Province. **Material deposited:** CH–N–FML 72. **Reference:** Schuurmans Stekhoven (1951).

Host: *Campephilus magellanicus*. **SI:** joints of the legs and tail. **Lo:** San Carlos de Bariloche (-41.179, -71.415), Río Negro Province. **Reference:** Casalins *et al.* (2019).

Host: *Myiodynastes maculatus solitarius* (cited as *Myiodynastes solitarius*). **SI:** intestine. **Lo:** Tafi Viejo, Tucumán Province. **Reference:** Schuurmans Stekhoven (1951).

***Hamatospiculum insigne* (Schneider, 1866)**

Host: *Colaptes campestris*. **SI:** neck (muscles and under the skin). **Lo:** Yabebiry Stream, San Ignacio, Misiones Province. **Reference:** Schuurmans Stekhoven (1951).

**Genus *Monopetalonema* Diesing, 1861a
Monopetalonema alcedinis (Rudolphi, 1819)**

Host: *Megaceryle torquata* (cited as *Ceryle torquata*). **SI:** abdominal cavity. **Lo:** Tucumán Province. **Reference:** Parona (1900). **Comments:** cited as *Filaria physalura* Bremser in Diesing 1851, and considered as synonymous of *M. alcedinis* by Yamaguti (1961).

**Genus *Serratospiculum* Skrjabin, 1915
Serratospiculum tendo (Nitzsch in Giebel, 1857)**

Host: *Asio flammeus* (cited as *Asio brachyotus*). **SI:** under the skin of the nuchal region. **Lo:** not reported.

Reference: Parona (1900). **Comment:** cited as *Filaria attenuata* Rudolphi 1819.

Host: *Falco peregrinus cassini*. **SI:** air sacs. **Lo:** Maipú Department, Mendoza Province. **Reference:** Ibarra *et al.* (2019).

**Superfamily Filarioidea
Family Filariidae
Genus *Filaria* Müller, 1787
Filaria bipapillosa Molin, 1858b**

Host: *Athene cunicularia* (cited as *Noctua cunicularia*). **SI:** under the skin. **Lo:** Buenos Aires Province. **Reference:** Parona (1900).

**Family Onchocercidae
Genus *Pelecitus* Railliet & Henry, 1910
Pelecitus fulicaeatrae (Diesing, 1861a)**

Host: *Podiceps occipitalis*. **SI:** nodule of the tibiotarsometatarsus articulation. **Lo:** Puerto Madryn (-42.00, -65), Chubut Province. **Material deposited:** MLP–He 5702. **Reference:** Escudero *et al.* (2007).

***Pelecitus tercostatus* (Molin, 1860c)**

Host: *Amazona vinacea*. **SI:** subcutaneous nodes in both legs. **Lo:** San Pedro (-26.6217, -54.1097), Misiones Province. **Material deposited:** MLP–He 6504. **Reference:** Díaz *et al.* (2012).

Host: *Pionus maximiliani* *siy*. **SI:** leg joints. **Lo:** San Antonio, Misiones Province. **Material deposited:** CH–N–FML 258. **Reference:** Schuurmans Stekhoven (1951).

**Superfamily Habronematoidea
Family Habronematidae
Genus *Habronema* Diesing, 1861b
Habronema sp.**

Hosts: *Nothura darwinii darwinii*; *N. d. salvadorii*. **SI:** proventriculus and gizzard. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Host: *Nothura maculosa annectens*. **SI:** proventriculus and gizzard. **Lo:** not reported. **Reference:** Bump & Bump (1969).

**Genus *Procyrnea* Chabaud, 1958
Procyrnea choique Bagnato, Frixione, Digiani & Cremonte, 2017**

Host: *Rhea pennata*. **SI:** proventriculus. **Lo:** Protected Natural Area Península Valdés (-42.5407, -64.7901),

Chubut Province. **Material deposited:** CNP–Par 144/1, 144/2, 144/3. **Reference:** Bagnato *et al.* (2017).

Family Tetrameridae

Genus *Tetrameres* Creplin, 1846

Tetrameres sp.

Host: *Coscoroba coscoroba*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, La Plata, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Phoenicopterus chilensis*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Subgenus *Tetrameres* (*Gynaecophila*) Gubanov, 1950 *Tetrameres* (*Gynaecophila*) *aspicula* Digiani, 2000

Host: *Plegadis chihi*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Punta Blanca (-34.9333, -57.6833), Guaminí (-37.00, -62.4833) and Ramallo (-33.5833, -59.8167), Buenos Aires Province. **Material deposited:** MLP–He 3778/5, 3682/1 and NHMUK 1999.11.29.1-6. **Reference:** Digiani (2000).

Subgenus *Tetrameres* (*Petrowimeres*) Chertkova, 1953

Tetrameres (*Petrowimeres*) *fissispina* (Diesing, 1861a)

Host: *Lophonetta specularioides*. **SI:** proventricular glands. **Lo:** San Jorge Gulf (-45.0333, -65.8667), Chubut Province. **Material deposited:** MLP–He 7022 and CNP–Par (numbers not provided). **Reference:** Agüero *et al.* (2015).

Subgenus *Tetrameres* (*Tetrameres*) Creplin, 1846 *Tetrameres* (*Tetrameres*) *megaphasmidiata* Cremonte, Digiani, Bala & Navone, 2001

Host: *Calidris fuscicollis*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Fracasso Beach, San Jorge Gulf (-42.4167, -64.1167), Chubut Province. **Material deposited:** MLP–He 4617. **Reference:** Cremonte *et al.* (2001).

Host: *Charadrius falklandicus*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Fracasso Beach, San Jorge Gulf (-42.4167, -64.1167), Chubut Province. **Material deposited:** MLP–He 4614, 4615, 4616, 4618. **Reference:** Cremonte *et al.* (2001).

Tetrameres (*Tetrameres*) *salina* Núñez, Drago, Digiani & Lunaschi, 2017

Host: *Phoenicopterus chilensis*. **SI:** proventriculus. **Lo:** Epecuén Lake (-37.2167, -62.85) and Del Monte Lake (-36.9833, -62.4667), Buenos Aires Province. **Material deposited:** MLP–He 7254, 7255, 7256, 7257. **Reference:** Núñez *et al.* (2017).

Tetrameres (*Tetrameres*) *spirospiculum* Pinto & Vicente, 1995

Host: *Theristicus melanopis* (as *Theristicus melanopis melanopis*). **SI:** proventriculus. **Lo:** Rahue (-39.35, -70.9167), Neuquén, Province. **Material deposited:** MLP–He 4600/2. **Reference:** Digiani & Cremonte (2001).

Tetrameres (*Tetrameres*) *tinamicola* Pence, Mollhagen & Prestwood, 1975

Hosts: *Eudromia elegans albida*; *Eudromia elegans elegans*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Tupungato, Mendoza Province and San Luis Province. **Material deposited:** USNM 1369385, 1369386, 1369387 (cited as 73822, 72823, 73824). **Reference:** Pence *et al.* (1975).

Genus *Microtetrameres* (Travassos, 1915) *Microtetrameres canadensis argentinensis* Labriola & Suriano, 1996

Host: *Bubulcus ibis ibis*. **SI:** proventriculus. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833), Buenos Aires Province. **Material deposited:** MACN–pa 384. **Reference:** Labriola & Suriano (1996).

Microtetrameres urubitinga Dueñas Díaz, Drago & Núñez, 2018

Host: *Buteogallus urubitinga*. **SI:** proventriculus; females within the glands, males free in the lumen. **Lo:** La Marcela farm (-26.2931, -59.1439), Pirané, Formosa Province. **Material deposited:** MLP–He 7447, 7448, 7449, 7450. **Reference:** Dueñas Díaz *et al.* (2018).

Microtetrameres sp.

Host: *Coryphospingus cucullatus*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Cyanocorax chrysops*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Sturnus vulgaris*. **SI:** proventriculus. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6734. **Reference:** Valente *et al.* (2014).

Superfamily Physalopteroidea

Family Physalopteridae

Genus *Physaloptera* Rudolphi, 1819

Physaloptera alata Rudolphi, 1819

Host: *Circus cinereus*. **SI:** cavity. **Lo:** Tafi del Valle, Tucumán Province. **Reference:** Schuurmans Stekhoven (1951).

Superfamily Thelazioidea

Family Thelaziidae

Genus *Thelazia* Bosc, 1819

Thelazia longicaudata Schuurmans Stekhoven, 1951

Host: *Strix rufipes rufipes*. **SI:** eyes. **Lo:** Pozo Hondo, Santiago del Estero Province. **Material deposited:** CH–N–FML 1297. **Reference:** Schuurmans Stekhoven (1951).

Order Strongylida

Superfamily Strongyloidea

Family Deletrocephalidae

Genus *Paradeletrocephalus* Freitas & Lent, 1947

Paradeletrocephalus minor (Molin, 1861)

Host: *Rhea americana*. **SI:** intestine. **Lo:** Los Planteles farm, Tandil, Buenos Aires Province¹. **References:** Parona (1900), Comolli *et al.* (2006)¹. **Comment:** cited as *Strongylus dimidiatus* (Diesing, 1851) by Parona (1900). This species was synonymized with *P. minor* by Freitas & Lent (1947).

Superfamily Trichostrongyloidea

Family Amidostomatidae

Genus *Epomidiostomum* Skrjabin, 1916a

Epomidiostomum vogelsangi Travassos, 1937

Host: *Cygnus melancoryphus*. **SI:** gizzard. **Lo:** La Plata Zoological Garden, Buenos Aires Province¹; Nuevo Gulf (-45.0333, -65.8667) and Bahía Engaño coast (-43.3333, -65.3333), Chubut Province². **Material deposited:** MLP–He 7024 and CNP–Par². **References:** Boero & Led (1968)¹; Agüero *et al.* (2015)².

Species *incertae sedis*

Microfilaria corderoi Mazza & Franke, 1928 in the bloodstream of *Campephilus leucopogon* (cited as *Scapanus leucopogon*) (Piciformes, Picidae) from Zapla, Jujuy Province (Mazza & Franke, 1928).

Microfilaria fonsecai Mazza & Franke, 1928 in the bloodstream of *Coryphospingus cucullatus* (Passeriformes, Thraupidae) from Zapla, Jujuy Province (Mazza & Franke, 1928).

Microfilaria parodii Mazza & Franke, 1928 in the bloodstream of *Cyanocorax chrysops* (Passeriformes, Corvidae) from Zapla, Jujuy Province (Mazza & Franke, 1928).

Microfilaria rojasi Mazza, Deautier & Steullet, 1927 in the bloodstream of *Ictinia plumbea* (Accipitriformes, Accipitridae) from Colonia Azara, Misiones (Mazza *et al.*, 1927).

Microfilariae in the bloodstream of *Turdus leucomelas* (Passeriformes, Turdidae) from Tucumán Province (Biglieri, 1918).

Species *inquirenda*

Cosmocephalus argentinensis Boero & Led, 1970 was briefly described in the proceedings of a congress, based only on female specimens found parasitizing *Spheniscus magellanicus* from the La Plata Zoological Garden. Later, it was considered *species inquirenda* by Diaz *et al.* (2001) because of its inadequate description, no type material deposited and not formally published.

Host-parasite list

Order Accipitriformes

Family Accipitridae

Buteogallus urubitinga

Microtetrameres urubitinga

Circus cinereus

Physaloptera alata

Order Anseriformes

Family Anatidae

Coscoroba coscoroba

Dicheilonema rheae

Tetrameres sp.

Cygnus melancoryphus

Echinuria cygni

Epomidiostomum vogelsangi

Lophonetta specularioides

Echinuria uncinata

Tetrameres (Petrowimeres) fissispina

Netta peposaca

Echinuria uncinata

Tachyeres leucocephalus

Sciadiocara legendrei

Streptocara formosensis

Order Charadriiformes

Family Charadriidae

Charadrius falklandicus

Tetrameres (Tetrameres) megaphasmidiata

Oreopholus ruficollis*Oxynema* sp.**Vanellus resplendens***Aprocta ptiloscelidis***Family Haematopodidae****Haematopus palliatus***Sciadiocara haematopodi***Family Laridae****Larus atlanticus***Pectinospirura argentata**Sciadiocara* sp.*Skrjabinochlava andersoni***Larus dominicanus***Ancyracanthopsis winegardi**Capillaria* sp.*Contracaecum* sp.*Cosmocephalus obvelatus**Eucoleus* sp.*Paracuaria adunca**Pectinospirura argentata**Sciadiocara haematopodi**Skrjabinochlava andersoni**Skrjabinochlava* sp.**Family Scolopacidae****Calidris bairdii***Echinuria skrjabiniensis***Calidris fuscicollis***Echinuria skrjabiniensis**Tetrameres (Tetrameres) megaphasmidiata***Order Coraciiformes****Family Alcedinidae****Megaceryle torquata***Monopetalonema alcedinis***Order Falconiformes****Family Falconidae****Falco peregrinus cassini***Serratospiculum tendo***Falco sparverius cinnamominus***Synhimantus (Dispharynx) brevicordon***Phalcoboenus chimango***Synhimantus milvagoi***Order Gruiformes****Family Rallidae****Fulica leucoptera***Contracaecum* sp.**Order Passeriformes****Family Corvidae****Cyanocorax chrysops***Microtetrameres* sp.**Family Furnariidae****Asthenes modesta modesta***Diplotriaena modesta***Furnarius rufus***Aprocta colaptidis***Family Passerellidae****Zonotrichia capensis***Aprocta colaptidis***Family Sturnidae****Sturnus vulgaris (introduced species)***Microtetrameres* sp.*Ornithocapillaria ovopunctata**Pterothominx exilis**Synhimantus (Dispharynx) nasuta***Family Thraupidae****Coryphospingus cucullatus***Microtetrameres* sp.**Family Tyrannidae****Muscisaxicola maculirostris maculirostris***Synhimantus (Dispharynx) brevicordon**Diplotriaena muscisaxicola***Myiodynastes maculatus solitarius***Hamatospiculum flagellispiculosum***Order Pelecaniformes****Family Ardeidae****Ardea alba***Contracaecum multipapillatum***Ardea alba egretta***Contracaecum microcephalum**Contracaecum multipapillatum***Ardea cocoi***Contracaecum microcephalum***Bubulcus ibis ibis***Contracaecum multipapillatum**Microtetrameres canadensis argentinensis***Egretta thula thula***Contracaecum multipapillatum***Nycticorax nycticorax***Contracaecum microcephalum***Family Ciconiidae****Ciconia maguari***Desportesius longevaginus***Family Phalacrocoracidae****Phalacrocorax albiventer***Contracaecum travassosi**Contracaecum* sp.**Phalacrocorax atriceps***Contracaecum chubutensis**Contracaecum* sp.*Ingliseria cirrohamata*

Phalacrocorax brasilianus*Contracaecum australe**Contracaecum* sp.*Ingliseria cirrohamata****Phalacrocorax gaimardi****Contracaecum* sp.*Contracaecum australe***Family Threskiornithidae*****Platalea ajaja****Syncuaria diacantha****Plegadis chihi****Porrocaecum heteropterum**Syncuaria plegadisi**Tetrameres (Gynaecophila) aspicula****Theristicus melanopis****Porrocaecum heteropterum**Tetrameres (Tetrameres) spirospiculum***Order Phoenicopteriformes****Family Phoenicopteridae*****Phoenicopterus chilensis****Echinuria skrjabiniensis**Tetrameres (Tetrameres) salina**Tetrameres* sp.**Order Piciformes****Family Picidae*****Campephilus magellanicus****Hamatospiculum flagellispiculosum****Colaptes campestris****Aprocta colaptidis**Hamatospiculum insigne**Tetracheilonema quadrilabiatum***Order Podicipediformes****Family Podicipedidae*****Podiceps major****Eustrongylides tubifex****Podiceps occipitalis****Pelecitus fulicaeatrae****Rollandia rolland****Contracaecum ovale***Order Psittaciformes****Family Psittacidae*****Amazona vinacea****Pelecitus tercostatus****Ara chloropterus****Ascaridia hermaphrodita****Pionus maximiliani****Ascaridia hermaphrodita**Pelecitus tercostatus***Order Procellariiformes****Family Diomedidae*****Thalassarche melanophris****Contracaecum pelagicum**Stegophorus diomedea***Order Rheiformes****Family Rheidae*****Rhea americana****Dicheilonema rheae**Paradeletrocephalus minor****Rhea americana albescens****Dicheilonema rheae****Rhea pennata****Procyrnea choique****Rhea pennata garleppi****Dicheilonema rheae***Order Sphenisciformes****Family Spheniscidae*****Spheniscus magellanicus****Contracaecum mirounga**Contracaecum pelagicum**Contracaecum* sp.*Cosmocephalus obvelatus****Eudyptes chrysocome****Contracaecum pelagicum***Order Strigiformes****Family Tytonidae*****Tyto alba****Synhimantus (Synhimantus) laticeps***Family Strigidae*****Asio flammeus****Serratospiculum tendo****Asio clamator****Hamatospiculum flagellispiculosum**Synhimantus (Synhimantus) cf. laticeps****Athene cunicularia****Filaria bipapillosa****Megascops choliba****Skrjabinura* sp.***Strix rufipes rufipes****Thelazia longicaudata***Order Tinamiformes****Family Tinamidae*****Crypturellus tataupa****Odontoterakis valvata**Subulura strongylina**Tetracheilonema quadrilabiatum****Eudromia elegans****Eudromoxyura aspiculuris****Eudromia elegans albida****Eudromoxyura aspiculuris**Tetrameres (Tetrameres) tinamicola*

Eudromia elegans elegans*Eudromoxyura aspicularis**Tetrameres (Tetrameres) tinamicola****Eudromia elegans wetmorei****Eudromoxyura aspicularis****Nothura darwinii darwinii****Habronema* sp.*Heterakis* sp.*Subulura* sp.*Tetracheilonema quadrilabiatum****Nothura darwinii salvadorii****Habronema* sp.*Subulura* sp.*Tetracheilonema quadrilabiatum****Nothura maculosa****Eucoleus penidoi**Odontoterakis valvata**Subulura olympioi**Tetracheilonema quadrilabiatum****Nothura maculosa annectens****Ascaridia* sp.*Habronema* sp.*Heterakis* sp.*Subulura* sp.*Tetracheilonema quadrilabiatum****Nothura maculosa maculosa****Tetracheilonema quadrilabiatum****Nothura maculosa nigroguttata****Capillaria* sp.*Odontoterakis valvata**Tetracheilonema quadrilabiatum***DISCUSSION**

Helminths of wild birds have been less studied than those of other vertebrates, mainly because the birds are one of the most charismatic and protected groups. Then, it is difficult to obtain a sufficient number of these hosts because many are protected by national and international laws (Pérez Ponce de León *et al.*, 2011). Much of the information available on parasites in wild birds comes from studies carried out in birds that died by natural causes (Núñez *et al.*, 2017, 2018). Other important sources of information for taxonomic studies on helminths of birds are the helminthological collections, which preserve information on spatial and temporal biodiversity (Drago *et al.*, 2018).

Reports of nematodes parasitizing wild birds were found in 17 of the 23 Argentinean Provinces. Most of the studies were carried out in Buenos Aires Province, with 63 reports, followed by Chubut and Tucumán Province with 38 and 11 reports, respectively. In Chaco, Entre Ríos, Jujuy, La Rioja, Santa Fe and Tierra del Fuego Provinces no nematodes have been reported parasitizing wild birds. The rest of the Provinces presented less

than ten records. Sixteen reports were carried out in Zoological Gardens. This seems to be more related to the development of this line of work in scientific research centers in these Provinces, than with the real diversity in each Province, i.e. Centro de Estudios Parasitológicos y de Vectores (CEPAVE), Museo de la Plata and Facultad de Ciencias Veterinarias de La Plata in Buenos Aires Province, Centro Nacional Patagónico (CENPAT) in Chubut Province and Instituto Miguel Lillo in Tucumán Province. Sixteen reports were carried out in Zoological Gardens.

In Argentina, 1042 species of birds (1033 native and nine introduced species) belonging to 86 families have been reported (Roesler & González Táboas, 2016); however, only 65 bird species (6.24%) grouped into 29 families have been reported to be parasitized by adult nematodes. The families of birds with the highest number of reported taxa are Tinamidae, Laridae, Anatidae and Phalacrocoracidae with 12, 11, 8 and 7 taxa reported, respectively. The bird species with the highest number of taxa of nematodes reported are *Larus dominicanus* (Laridae) and *Nothura maculosa* (Tinamidae) with 10 and 9 taxa reported, respectively. *Larus dominicanus* is an abundant species that inhabits a great diversity of environments and has a generalist and opportunistic diet (Yorio *et al.*, 2013), which means that it would be more likely to acquire a wide variety of nematodes with indirect life cycle. In addition, the helminths of these birds have been studied in numerous opportunities, being also the bird species with the highest number of digenean species reported (see Lunaschi *et al.*, 2007; Drago & Lunaschi, 2015). The higher number of reports in tinamids may be related to the abundance of these birds and their ease of collection, because it is a species consumed by local inhabitants and the contribution of rural hunters with viscera is frequent. Only one introduced species, the European starling (*S. vulgaris*), was reported as host of nematodes. The first sightings of these birds in Argentina were in the city of Buenos Aires in 1987, expanding its distribution to various Provinces (Jensen, 2008). Although only one paper related to its helminths was published, three nominal species and one taxon identified at generic level of nematodes were reported (Valente *et al.*, 2014).

The highest number of taxa of nematodes was recorded in the family Acuariidae with 20 nominal species and two taxa identified at generic level, followed by Anisakidae with eight and one, and Tetrameridae with eight and two, respectively. This could be related to the preference of habitat of studied birds, in this case mostly aquatic, given that these three families of Nematodes possess mainly aquatic life cycles.

In addition, five species of passeriform, accipitriform and piciform birds were reported as hosts of larval stages of nematodes (microfilariae) described as species of the genus *Microfilaria*. The name "*Microfilaria*" can be found as an informal generic name referring to a collective

group of blood filaroids, as proposed by Cobbod (1882). However, this genus is not valid and these names are also invalid. Unfortunately, it is not possible to assign these species to any other genus because adults are unknown, for proper identification it is necessary to found the adults housed in the subcutaneous tissue associated with these microfilariae. Numerous species of Filarioidea are known parasitizing birds (see Schmidt-Rhaesa, 2014), although in Argentina only two genera, *Pelecitus* (Onchocercidae) and *Filaria* (Filaridae), have been reported.

The group of helminths most studied in Argentinean birds are the digeneans (Drago & Lunaschi, 2015), with almost twice more nominal species reported than for nematodes (112 vs. 64), however the number of bird species studied is similar (70 vs. 65). The three families of birds with the highest number of digeneans reported are Laridae, Ardeidae and Accipitridae, while the families with the highest number of nematodes reported are Tinamidae, Laridae and Anatidae.

When comparing the number of species of nematodes in Argentinean birds with the richness found in other regions of similar birds diversity, for example Mexico, with 1096 bird species, it can be observed similar values of nematodes species. For example, García-Prieto *et al.* (2014) reported 64 nominal species and 17 indeterminate taxa of nematodes, parasitizing 65 bird species, which represents 5.9% of the birds present in this country.

These results highlights the need for further investigation and research on this group of parasites, expanding the number of bird species examined, especially in poorly explored regions.

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