

External and intestinal parasites of the Austral thrush *Turdus falcklandii* (Aves, Turdidae) in central Chile

Parasitas externos e intestinais do tordo-austral *Turdus falcklandii* (Aves, Podicipedidae) no Chile

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Abstract

A total of thirty Austral thrushes *Turdus falcklandii* Quoy & Gaimard, 1824 (Turdidae) carcasses were brought to the Departamento de Ciencia Animal, Facultad de Ciencias Veterinarias, Universidad de Concepción, to be examined for ecto- and endoparasites. Ectoparasites were found on 20% (6/30) of the thrushes and belonged to species *Brueelia magellanica* Cichino, 1986 (Phthiraptera), *Menacanthus eurysternus* Burmeister, 1838 (Phthiraptera) and *Tyrannidectes falcklandicus* Mironov & González-Acuña, 2011 (Acari). Endoparasites were isolated from 26.6% (8/30) of the birds and identified as *Lueheia inscripta* Westrumb, 1821 (Acanthocephala), *Plagiorhynchus cylindraceus* Goeze, 1782 (Acanthocephala), *Wardium* sp. sensu Mayhew, 1925 (Cestoda), *Dilepis undula* (Cestoda) Schrank, 1788, and *Zonorchis* sp. (sensu Travassos, 1944) (Trematoda). To our knowledge, all endoparasites collected in this study are new records in *T. falcklandii* and expand their distributional range to Chile.

Keywords: Acanthocephala, Acari, Cestoda, Phthiraptera, Trematoda, Turdidae.

Resumo

Um total de trinta carcaças do tordo-austral *Turdus falcklandii* Quoy & Gaimard, 1824 (Turdidae) foi encaminhado ao Departamento de Ciência Animal, Facultad de Ciencias Veterinarias, Universidad de Concepción, para ser examinado quanto a presença de parasitas externos e internos. Parasitas externos foram encontrados em 20% (6/30) dos tordos inspecionados e identificados como *Brueelia magellanica* Cichino, 1986 (Phthiraptera), *Menacanthus eurysternus* Burmeister, 1838 (Phthiraptera), e *Tyrannidectes falcklandicus* Mironov & González-Acuña, 2011 (Acari). Parasitas internos foram identificados em 26,6% (8/30) dos espécimes examinados como *Lueheia inscripta* Westrumb, 1821 (Acanthocephala), *Plagiorhynchus cylindraceus* Goeze, 1782 (Acanthocephala), *Wardium* sp. sensu Mayhew, 1925 (Cestoda), *Dilepis undula* sensu Schrank, 1788 (Cestoda) e *Zonorchis* sp. (sensu Travassos, 1944) (Trematoda). Tanto quanto é do nosso conhecimento, todos os parasitas internos coletados neste estudo pertencem a novos registros em *T. falcklandii* e com expansão de sua distribuição para o Chile.

Palavras-chave: Acanthocephala, Acari, Cestoda, Phthiraptera, Trematoda, Turdidae.

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Introduction

The family Turdidae is composed of more than 300 species distributed on most continents. Only five thrush species have been recorded in Chile: The veery *Catharus fuscescens* Stephens, 1817; the wood thrush *Hylocichla mustelina* Gmelin, 1789; the Chiguanco thrush *Turdus chiguanco* Lafresnaye & d'Orbigny, 1837; the creamy-bellied thrush *T. amaurochalinus* Cabanis, 1851; and the Austral thrush *T. falcklandii* Quoy & Gaimard, 1824, with only *T. chiguanco* and *T. falcklandii* being residents (MARTÍNEZ & GONZÁLEZ, 2004). *Turdus falcklandii* is an abundant bird of urban and rural areas of Chile, including city gardens and orchards (CHESTER, 2008) and *Nothofagus* forests of the central and south areas of the country (JARAMILLO, 2005; CHESTER, 2008). It is an omnivorous species, spending most of its time feeding from fruits on trees or preying on invertebrates on the ground (ROZZI et al., 1996). It is distributed from Antofagasta (23°37' S, 70°23' W) to Cape Horn (55°59' S, 67°15' W), with subspecies *T. f. magellanicus* (King 1831) ranging from Chañaral (26°20' S, 70°37' W) to Cape Horn and *T. f. mochae* (Chapman, 1934) found only in the Isla Mocha National Reserve (38°22' S, 73°54' W) (CHESTER, 2008).

Currently, *T. falcklandii* does not face any conservation issues with a stable population size and large distributional range. However, there is a lack of information about parasites carried by this species. To this date, the only descriptions of ectoparasites are *Dasyptyllus stejnegeri* Smit, 1976 (Siphonaptera: Ceratophyllidae) in the Falkland/Malvinas Islands (HASTRITER & SCHLATTER, 2006), *Tyrannidectes falcklandicus* Mironov & González-Acuña 2011 (Acari: Proctophyllolidae) in central Chile (MIRONOV & GONZÁLEZ-ACUÑA, 2011), *Ixodes auritulus* Neumann, 1904 (Acari: Ixodidae) in southern Chile (GONZÁLEZ-ACUÑA et al., 2005), *Brueelia magellanica* Cicchino, 1986 (Phthiraptera: Philoptheridae) in central Chile (CICCHINO, 1986; GONZÁLEZ-ACUÑA et al., 2006), and *Menacanthus eurysternus* Burmeister, 1838 (Mallophaga: Menoponidae) in central and southern Chile (GONZÁLEZ-ACUÑA et al., 2006). Regarding endoparasites, *Hymenolepis fernandensis* Nybelin, 1929 (Cestoda: Hymenolepididae) was described on Robinson Crusoe Island (Chile), the only internal parasite documented for this thrush (NYBELIN, 1929). The main purpose of this study is to identify ecto- and endoparasites of the Austral thrush *T. falcklandii* in Chile.

Materials and Methods

Thirty thrush carcasses were collected in different localities of the Biobío region, Chile, in the period 2004–2010. Carcasses were brought to the Departamento de Ciencia Animal, Facultad de Ciencias Veterinarias, Universidad de Concepción, Chillán, and stored at -20°C until examination. Thrushes examined in this study died of anthropogenic causes common to birds living in the countryside, such as poisoning, dog attacks, and illegal hunting.

External inspection of carcasses included a rigorous examination of their feathers in search of ectoparasites. Specimens found were preserved in ethanol (70%) for future identification. Lice (Phthiraptera) collected were processed using KOH (20%) and dehydrated in a series of alcohols (40, 80 and 100%) and then

mounted using Canada balsam as described in Price et al. (2003). Mites (Acari) were cleared using Nesbitt's solution (40g of chloral hydrate, 25 mL of distilled water and 2.5 mL of hydrochloric acid) for 72 h and were later mounted in Berlese solution (KRANTZ, 1978). Ectoparasites species and sex were identified using keys indicated in Burmeister (1838) and Cicchino (1986, 1987). To evaluate the presence of endoparasites, thrushes were necropsied following procedures described in Kinsella & Forrester (1972). Acanthocephala were cleared in temporary mounts of 80% phenol, identified, and then returned to the preservative. Cestodes and trematodes were and stained in Semichon's carmine stain and mounted in Canada balsam (PRITCHARD & KRUSE, 1982). Helminths were identified following descriptions in Yamaguti (1958, 1959, 1963) and Khalil et al. (1994).

Basic population parameters of prevalence, mean intensity, range, and mean abundance were calculated for ectoparasites and endoparasites collected. Prevalence was defined as the percentage of hosts infested by a particular parasite species. Mean intensity is represented by the mean number of parasites found in infected hosts. Range is the difference in the number of parasites collected in the most and least infested/infected hosts. Mean abundance is the number of individuals of a particular parasite from single host. Calculations were performed according to Bush et al. (1997). Additionally, ecto- and endoparasites collected were digitally measured using KS100 Imaging system 3.0 (Carl Zeiss Vision GmbH, Hallbergmoos, Germany).

Results and Discussion

Ectoparasites

Ectoparasites were present on 20% (6/30) of the thrushes examined. Lice were identified on 20% (6/30) with a total of 672 individuals collected. Mites were found on 3.3% (1/30) of the birds examined with only a single specie of mite collected. Population parameters for ectoparasites are indicated in Table 1.

Phthiraptera

Brueelia magellanica

Brueelia is a diverse genus composed of approximately 276 species (CICCHINO & CASTRO, 1998; PRICE et al., 2003). In South America, 37 representatives of the genus have been documented to parasitize birds of the families Icteridae, Emberizidae, Mimidae, Thraupidae, Turdidae, and Picidae (CARRIKER, 1963; CICCHINO, 1979, 1982, 1983, 1986, 1990, 2004; CASTRO & CICCHINO, 1996; CICCHINO & CASTRO, 1996; GONZÁLEZ-ACUÑA et al., 2006; VALIM & PALMA, 2006; CICCHINO & GONZÁLEZ-ACUÑA, 2008, 2009; CUNHA et al., 2013; GOMEZ-PUERTA & CRIBILLERO, 2015; VALIM & CICCHINO, 2015). In this study, the presence of *B. magellanica* was found in *T. falcklandii* (Figure 1). A total of 10 males, 13 females (23 adults), and 6 nymphs were identified with a female/male ratio of 1.3 and a nymph/adult ratio of 0.2. Body measures for *B. magellanica* are indicated in Table 2.

Brueelia magellanica has been previously recorded for *T. falcklandii* in Argentina and south-central Chile (CICCHINO, 1986; CICCHINO & CASTRO, 1996; GONZÁLEZ-ACUÑA et al., 2006). González-Acuña et al. (2006) suggest that *B. magellanica* has a broader distribution in Chile and parasitizes more Turdidae. They also indicate that many other *Brueelia* species are probably present on Chilean birds.

Menacanthus eurysternus

The genus *Menacanthus* Neumann, 1912 is composed of 94 parasite species hosted by birds from the orders Pelecaniformes, Passeriformes, Piciformes, Tinamiformes, and

Galliformes (PRICE et al., 2003; PRICE, 1975; PRICE & EMERSON, 1975; PRICE et al., 2003). In South America, a total of 34 genus have been reported parasitizing birds from the families Cracidae, Tinamidae, Ramphastidae, Odontophocidae, Picidae, Galbulidae, Tyrannidae, Thraupidae, Pipridae, Turdidae, Grallariidae, Capitonidae, Mimidae, Cardinalidae, Icteridae, and Troglodytidae (PRICE, 1975; PRICE & EMERSON, 1975; PRICE et al., 2003; KUABARA & VALIM, 2017). The presence of *M. eurysternus* was accounted in the thrushes examined with 343 males, 128 females (471 adults), and 172 nymphs identified and a female/male ratio and nymph/adult ratio of 2.67 and 0.4, respectively (Figure 2). Body measurements for both *B. magellanica* and *M. eurysternus* are indicated in Table 2. González-Acuña et al.

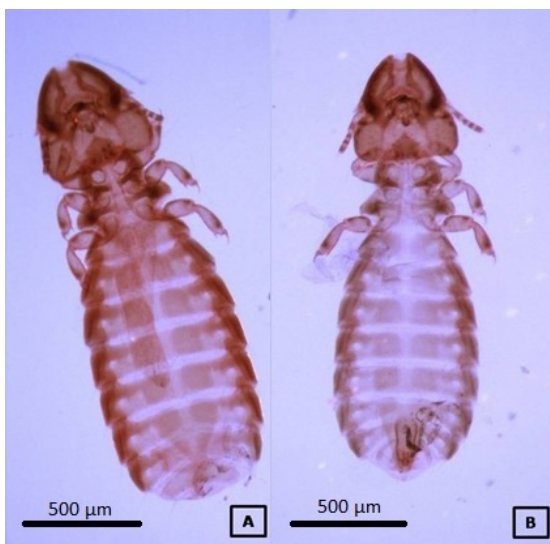


Figure 1. Female (A) and male (B) adult *Brueelia magellanica* (100x magnification).

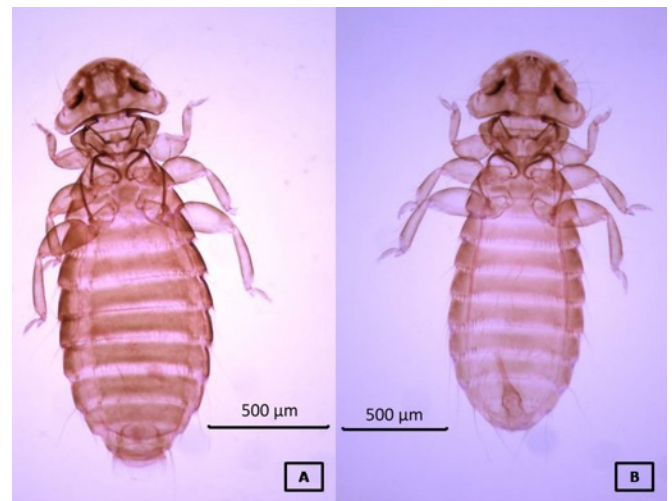


Figure 2. Female (A) and male (B) adult *Menacanthus eurysternus* (100x magnification).

Table 1. Range, mean intensity, mean abundance and prevalence of ectoparasites collected from the Austral thrush (*Turdus falcklandii*), Chile.

Species	N° of birds examined	Positive birds	N° of parasites collected	Range	Mean intensity	Mean abundance	Prevalence (%)
Phthiraptera							
<i>Brueelia magellanica</i>	30	3	29	2-25	9.7±13.3	0.97±4.6	10.0
<i>Menacanthus eurysternus</i>	30	5	643	2-266	128.6±136.0	21.43±70.2	16.7
Acariformes							
<i>Tyrannidectes falcklandicus</i>	30	1	30	1-30	30±5.5	0.1	3.3

Table 2. Mean body measures (µm) of *Brueelia magellanica* and *Menacanthus eurysternus* collected from the Austral thrush (*Turdus falcklandii*), Chile.

Sex	<i>Brueelia magellanica</i>				<i>Menacanthus eurysternus</i>			
	Male (n=10)		Female (n=13)		Male (n=128)		Female (n=343)	
Body structure	Length	Width	Length	Width	Length	Width	Length	Width
Head	396	396.2	416.25	412.87	456.99	466.98	273.67	508.09
Thorax	118.4	260.2	155.75	385.38	166.53	354.30	178.86	388.80
Pterothorax	98.2	345.9	150.12	351.45	106.26	340.41	115.17	342.62
Abdomen	990.6	559	1176.3	616.62	967.86	545.99	1169.92	640.07
Genitalia	195				375.75			

(2006) previously recorded *M. eurystermus* on *T. falcklandii* in Chile. The louse *M. eurystermus* is a cosmopolitan and generalist parasite of 176 bird species from 20 families around the world (PRICE et al., 2003). In America, it has been found on *Sturnus vulgaris* (Sturnidae), *Colaptes auratus* (Picidae), *Cyanocitta cristata* (Corvidae), *Pica hudsonia* (Corvidae), *Turdus migratorius* (Turdidae), *Passer domesticus* (Passeridae), *Acanthis flammea* (Fringillidae), *Quiscalus quiscula* (Icteridae), and *Icterus galbula* (Icteridae) in Canada (PRICE, 1975; FAIRN et al., 2014; GALLOWAY et al., 2014); *Peucaea carpalis* (Emberizidae), *Aphelocoma coerulescens* (Corvidae), *C. cristata*, *C. stelleri*, *Cyanocorax yncas* (Corvidae), *Pica pica* (Corvidae), *Cardinalis cardinalis* (Cardinalidae), *Pheucticus ludovicianus* (Cardinalidae), *P. domesticus*, *S. vulgaris*, *Junco hyemalis* (Passerellidae), *Pipilo chlorurus* (Passerellidae), *Seiurus aurocapilla* (Parulidae), *Setophaga ruticilla* (Parulidae), *Toxostoma bendirei* (Mimidae), *Tx. redivivum*, *Tx. rufum*, *Mimus polyglottos* (Mimidae), *Molothrus aeneus* (Icteridae), *M. ater*, *I. galbula*, *Q. quiscula*, *Agelaius phoeniceus* (Icteridae), *Dryobates pubescens* (Icteridae), *H. mustelina*, *T. migratorius*, *Sialia mexicana* (Turdidae), *Zonotrichia leucophrys* (Passerellidae), and *Z. querula* in the United States (PRICE, 1975; NELDER & REEVES, 2005); *Chlorospingus flavopectus* (Passerellidae), *Arremon brunneinucha* (Passerellidae), *Mitrospingus cassinii* (Thraupidae), *Tangara dowii* (Thraupidae), *Turdus assimilis* (Turdidae), *T. grayi*, and *T. nigrescens* in Costa Rica (PRICE, 1975; LINDELL et al., 2002; SYCHRA et al., 2007; MARTINŮ et al., 2015), *Thraupis bonariensis bonariensis* (Thraupidae), *T. amaurochalinus* and *Manacus manacus* (Pipridae) in Argentina (CASTRO & CICCHINO, 1978, 1996; CICCHINO, 2007); *Manacus manacus*, *Turdus leucomelas*, *T. amaurochalinus*, and *T. rufiventris* in Brazil (ENOUD et al., 2009; CUNHA et al., 2013; MARTINŮ et al., 2015); *Grallaria ruficapilla* (Grallaridae) and *Eubucco richardsoni* (Capitonidae) in Peru (PRICE, 1975; CLAYTON et al., 1992); *Chiroxiphia lanceolata* (Pipridae), *Grallaria quitensis* (Grallaridae), *Mimus gilvus* (Mimidae), and *Pelecanus occidentalis* (Pelecanidae) in Colombia (PRICE, 1975; PARRA-HENAO et al., 2011); *M. gilvus* in Venezuela (PRICE, 1975), *M. polyglottos* in Cuba (PRICE, 1975); and *T. amaurochalinus* in Bolivia (PRICE, 1975).

Acari

Tyrannidectes falcklandicus

The genus *Tyrannidectes* Mironov, 2008 (Analgoidea: Proctophyllolidae) appears to be restricted to passerine birds of the New World, with eleven species distributed along the American continent (VALIM & HERNANDES, 2010; MIRONOV & GONZÁLEZ-ACUÑA, 2011). Previous reports detail the presence of *Tyrannidectes crassus* Trouessart, 1885; *Tyrannidectes pteroptochi* Mironov & González-Acuña, 2015; *Tyrannidectes anairetes* Mironov & González-Acuña, 2011; *Tyrannidectes cinclodes* Mironov & González-Acuña, 2011; *Tyrannidectes berlai* Mironov, 2008; *Tyrannidectes fissuratus* Hernandez & Valim, 2005; *Tyrannidectes synallaxis* Hernandez et al., 2016; *Tyrannidectes amaurochalinus* Hernandez & Valim, 2006; and *Tyrannidectes reticulatus* Černý, 1974 in South America (TROUESSART, 1885; MIRONOV et al.,

2008; VALIM & HERNANDES, 2008; VALIM & HERNANDES, 2010; BARRETO et al., 2012; ENOUT et al., 2012; MIRONOV & GONZÁLEZ-ACUÑA, 2015; HERNANDES et al., 2016); *T. berlai* in Central America (SARI et al., 2013); and *T. banksi* in *Sayornis phoebe* (Tyrannidae) in North America (VALIM & HERNANDES, 2010; GALLOWAY et al., 2014).

Tyrannidectes falcklandicus Mironov & González-Acuña, 2011 was the only mite species identified on *T. falcklandii* in this study (Figure 3). Mironov & González-Acuña (2011) have previously recorded *T. falcklandicus* on *Turdus falcklandii* in Chile.

Endoparasites

Of the birds examined, 26.6% (8/30) were host to at least one kind of endoparasite. Two Acanthocephala, two Cestoda, and a single Trematoda were identified. Population parameters for endoparasites are indicated in Table 3.

Acanthocephala

Luebeia inscripta

The genus *Luebeia* Travassos, 1920 (Acanthocephala: Plagiorhynchidae) is composed of only four species present in the American continent, *L. adluebeia* Werby, 1938 in North America; *L. cajabambensis* Machado & Ibañez, 1967 and *L. luebeia* Travassos, 1919 in South America; and *L. inscripta* Westrumb, 1821 reported in North, Central and South America (GOLVAN, 1994; SALGADO-MALDONADO & CASPETA-MANDUJANO, 2010). *Luebeia inscripta* (Figure 4) was found in 6.7% (2/30) of the thrushes. This acanthocephalan parasitizes birds mainly from the Turdidae family but also infects lizards and anurans as paratenic hosts (TRAVASSOS, 1926; WHITTAKER et al., 1970; ACHOLONU, 1976). Information about the life cycle

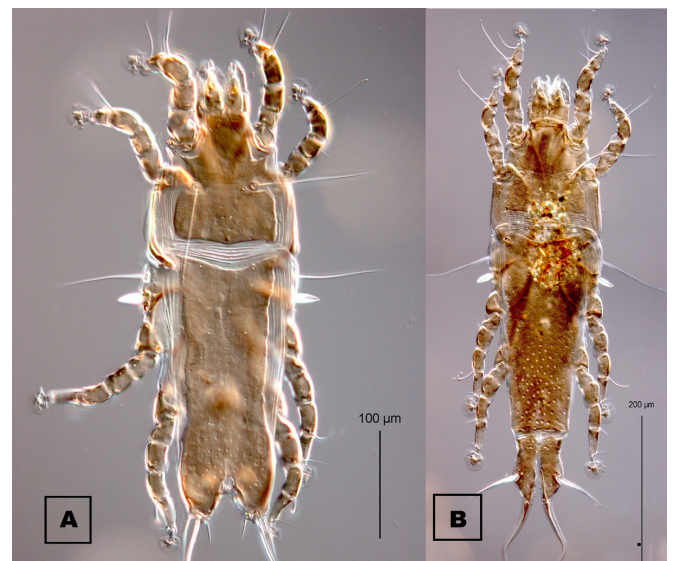
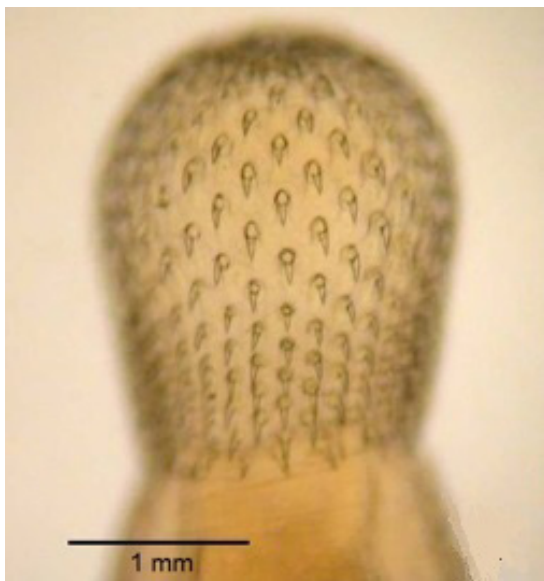


Figure 3. Male (A) and female (B) adult *Tyrannidectes falcklandicus* (400x magnification).

Table 3. Range, mean intensity, mean abundance and prevalence of endoparasites collected from the Austral thrush (*Turdus falcklandii*), Chile.

Species	N° of birds examined	Positive birds	N° of parasites collected	Range	Mean intensity	Mean abundance	Prevalence (%)
Acantocephala							
<i>Lueheia inscripta</i>	30	2	34	1-22	17±14.8	1.13±4.0	6.7
<i>Plagiorhynchus cylindraceus</i>	30	2	7	3-4	3.5±0.7	0.23±0.9	6.7
Cestoda							
<i>Wardium</i> sp.	30	6	27	1-11	4.5±1.4	0.9±2.7	20
Trematoda							
<i>Zonorchis</i> sp.	30	1	1	1-1	1	0.03	3.3

**Figure 4.** Proboscis morphology of *Lueheia inscripta* (100X magnification).

of *L. inscripta* and its possible intermediary hosts is still limited; however, it is known that transmission of this acanthocephalan occurs through ingestion of infected cockroaches (ACHOLONU, 1976). *Lueheia inscripta* has been described in *Platycichla flavipes* (Turdidae), *Turdus rufiventris*, *T. albicollis*, *T. leucomelas*, *T. amaurochalinus*, and *T. fumigatus* in Brazil (TRAVASSOS, 1926; CALEGARO-MARQUES & AMATO, 2010), *T. grayi* in Nicaragua (SCHMIDT & NEILAND, 1966), *Quiscalus niger* (Icteridae) and *Anolis cristatellus* (Squamata) in Puerto Rico (WHITTAKER et al., 1970; ACHOLONU, 1976), and *Leptodactylus fragilis* (Anura) and *Bufo marinus* (Anura) in Mexico (SALGADO-MALDONADO & CASPETA-MANDUJANO, 2010). This is the novel report of *L. inscripta* in *Turdus falcklandii* expanding its distributional range to Chile.

Plagiorhynchus cylindraceus

The subgenus *Plagiorhynchus* Lühe, 1911 (Acanthocephala: Plagiorhynchidae) is composed of 12 validated species, amongst them *P. (P.) crasicollis* Villot, 1875; *P. (P.) odhneri* Lundström, 1942; *P. (P.) charadrii* Yamaguti, 1939; *P. (P.) charadriicola* Dollfus, 1953; *P. (P.) allisonae* Skuballa et al. 2010; *P. (P.) menurae* Johnston, 1912; *P. (P.) cylindraceus* Goeze, 1782; *P. (P.) lemnisalis*

Belopol'skaia, 1959; *P. (P.) linearis* Westrumb, 1891; *P. (P.) paulus*, *P. (P.) spiralis* and, *P. (P.) totani* (LISITSYNA, 1992; GOLVAN, 1994; SMALES, 2002; DIMITROVA, 2009). In this study, *Plagiorhynchus cylindraceus* Goeze, 1782 (Figure 5) was found in 6.7% (2/30) of the birds examined. It is a cosmopolitan internal parasite of birds, mostly passerines, but also infects mammals as paratenic hosts (SMALES, 2002). The life cycle of *P. cylindraceus* has been detailed in SCHMIDT & OLSEN (1964). The infected definitive host releases fully embryonated eggs through its feces, which are ingested by isopod intermediate hosts. The parasite increases its size and develops its organs in the intermediate host until it become infective. When the isopod is ingested by a bird, the parasite attaches itself to its gut wall. It was apparently introduced from Europe to North America, South America, Australia, New Zealand, Asia, and Africa (JONES, 1928; SCHMIDT & KUNTZ, 1966; AMIN et al., 1999; SMALES, 2002; SKUBALLA et al., 2010; VALENTE et al., 2014).

Plagiorhynchus cylindraceus has been found in bird and mammal of various families: Sturnidae in Argentina (VALENTE et al., 2014), Scolopacidae in South Africa (AMIN et al., 1999), Procyonidae and Scolopacidae in Canada (CHING et al., 2000; DIDYK et al., 2007), Picidae, Mimidae, Turdidae, Emberizidae, Passerellidae, Anatidae, Phasianidae, Corvidae, Sturnidae, Icteridae, Didelphidae, and Soricidae in the United States (VAN CLEAVE, 1918; JONES, 1928; CUVILLIER, 1934; VAN CLEAVE, 1942; CHANDLER & RAUSCH, 1949; HUNTER & QUAY, 1953; SCHMIDT & OLSEN, 1964; ELTZROTH et al., 1980; MCDONALD, 1988; COADY & NICKOL, 2000; CARLETON et al., 2012; RICHARDSON, 2013), Strigiformes in Spain (FERRER et al., 2004), Erinaceidae in Czech Republic (PFÄFFLE et al., 2014), Turdidae and Sturnidae in Bulgaria (DIMITROVA et al., 2000), Sturnidae in Ukraine (LISITSYNA, 2010), Erinaceidae in United Kingdom and Germany (SKUBALLA et al., 2010), Turdidae in Poland (RZAÐ et al., 2014), Charadriidae, Rallidae, Turdidae, Sturnidae, Corvidae, Monarchidae, Artamidae, Threskiornithidae, Peramelidae, Muridae, Canidae, Macropodidae, Dasyuridae, and Potoroidae in Australia (EDMONDS, 1989; SMALES, 2002), Erinaceidae in New Zealand (SKUBALLA et al., 2010), and Leiothrichidae, Turdidae, and Muscipidae in Taiwan (SCHMIDT & KUNTZ, 1966). Infections in small mammals such as shrews are apparently dead ends since the parasites do not mature and passerines such as thrushes are unlikely to ingest these mammals. This is the first time that *P. cylindraceus* is reported in a native species of South America (*T. falcklandii*) and expands its range to Chile.

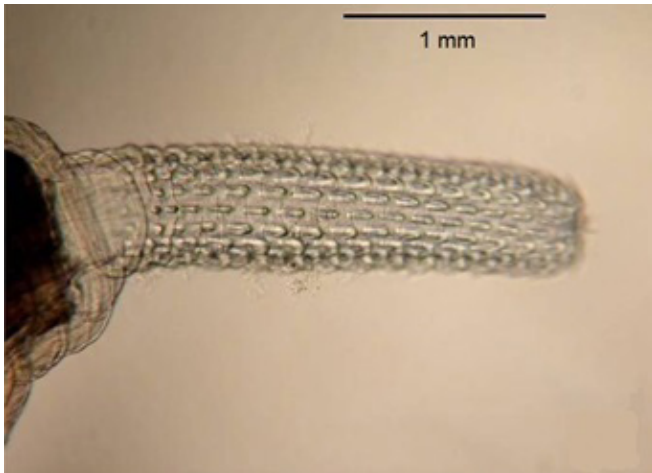


Figure 5. Proboscis morphology of *Plagiorhynchus cylindraceus* (100X magnification).



Figure 6. *Wardium* sp. Specimen (200X magnification).

Cestoda

Wardium sp.

Wardium sp. *sensu* Mayhew, 1925 (Cestoda: Hymenolepididae) (Figure 6 and 7) was identified in 20% (6/30) of the birds examined. *Wardium* is a cosmopolitan genus of cestodes found mostly in shorebirds (Charadriiformes) but also in birds from the orders Podicipediformes Lariformes, Anseriformes, and Passeriformes (MCDONALD, 1969; BONDARENKO & KONTRIMAVICHUS, 1978; BONDARENKO, 1997). In South America, few species have been described: *Wardium fernandensis* in *Turdus rufiventris* from Brazil (CALEGARO-MARQUES & AMATO, 2010), *W. neotropiale* in *Himantopus melanurus* (Charadriidae) from Paraguay (DEBLOCK & VAUCHER, 1997), *W. paucispinosum* in *Larus maculipennis* (Laridae), and *W. semiductilis* in *L. maculipennis* and *Larus dominicanus* from Argentina (LABRIOLA & SURIANO, 2000). This is the first time that the genus *Wardium* is recorded in *T. falckandii* and Chile.



Figure 7. Scolex morphology of *Wardium* sp. (400X magnification).

Dilepis undula

The genus *Dilepis* Weinland, 1858 is composed of only two species, *D. brachyarthra* and *D. undula* (JAMES & LEWELLYN, 1967). *Dilepis undula* Schrank, 1788 (Cyclophyllidea: Dilepididae) (Figure 8) was observed in a single thrush (1/30) examined. *Dilepis undula* is a cosmopolitan cestode that parasitizes the small intestine of passerine birds and mammals (HAUKISALMI, 2015). Its life cycle includes earthworms as intermediate hosts (RYSAVÝ, 1973). *Dilepis undula* parasitizes different species of the genus *Turdus*, *T. rufiventris* in Brazil (CALEGARO-MARQUES & AMATO, 2010), *T. pilaris* in Ukraine, Finland, Germany, and United Kingdom (GÄSSLEIN, 1954; JENNINGS & SOULSBY, 1957; METTRICK, 1958; RAITIS, 1968; ŚWIDERSKI et al., 2000), *T. merula* in Ukraine, Czech Republic, United Kingdom, Poland, Israel, Spain, United States, Bulgaria, Russia, and New Zealand



Figure 8. Rostellum of *Dilepis undula* (200X magnification).

(DAVIES, 1938; GÄSSLEIN, 1954; PASPALEV & PASPALEVA, 1965; TARAZONA, 1974; WEEKES, 1982; SCHMIDT et al., 1986; ŚWIDERSKI et al., 2004; PETKEVIČIŪTĖ et al., 2006; OKULEWICZ & SITKO, 2012; RZAÐ et al., 2014), *T. iliacus* in Finland (RAITIS, 1968), *T. philomelos* in Finland, Spain, United Kingdom, Germany, and New Zealand (DAVIES, 1938; GÄSSLEIN, 1954; TARAZONA, 1974; WEEKES, 1982; HAUKISALMI, 2015), *T. viscivorus* in Finland and the United Kingdom (METTRICK, 1958; PASPALEV & PASPALEVA, 1965; TARAZONA, 1974; HAUKISALMI, 2015), *T. migratorius* in the United States and Canada (SLATER, 1967; CHING, 1993), and *T. grayi* in Nicaragua (SCHMIDT & NEILAND, 1971). This is the first record of *D. undula* in *T. falcklandii* expanding its range to Chile. Sitko & Zaleśny (2014) indicated that *D. undula* is a dominant parasite species of *T. merula* in urban settings but is less prevalent in the individuals living in forests. This could also be the case for *T. falcklandii*, which possesses urban and natural populations in Chile.

Trematoda

Only a single *Zonorchis* sp. *sensu* Travassos, 1944 (Trematoda: Dicrocoeliidae) was collected from the thrushes examined. *Zonorchis* species are usually found in the gall bladder and bile ducts of birds and mammals all over the world, but predominantly in tropical countries of Central and South America (TRAVASSOS, 1945; THATCHER & PORTER, 1968). *Zonorchis goliath* has been found in *Didelphis marsupialis* (Didelphidae) and *Saguinus geoffroyi* (Callitrichidae); *Z. confusus* in *Procnias nudicollis* (Cotingidae) and *Zonorchis* spp. in *Didelphis albiventris* (Didelphidae) from Brazil (TRAVASSOS, 1945; TRAVASSOS et al., 1969; MELO, 2009; RAMOS et al., 2016); *Z. microrchis* in *Psophia viridis* (Gruiformes), *Z. costaricensis* in *Gymnostinops montezuma* (Icteridae) and *Z. macroovarus* in *Pteroglossus torquatus* (Ramphastidae) from Costa Rica (BRENES & JIMÉNEZ-QUIRÓS, 1959; JIMÉNEZ-QUIRÓS & ARROYO, 1960); *Z. allentoshi* in *Caluromys derbianus* (Didelphidae) and *Z. goliath* in *S. geoffroyi* and *Aotus trivirgatus* (Aotidae) from Panamá (THATCHER & PORTER, 1968; LAMOTHE-ARGUMEDO et al., 1997); *Z. delectans* in *Gymnophthys leucaspis* (Thamnophilidae), *Myrmeciza hyperythra* (Thamnophilidae), *Schistocichla leucostigma* (Thamnophilidae), *Cymbilaimus lineatus* (Thamnophilidae), *Hypocnemis cantator* (Thamnophilidae), *Myrmoborus myotherinus* (Thamnophilidae), *M. axillaris* (Thamnophilidae), *M. hauxwelli*, *M. ornate*, *M. schisticolor*, *Phlegopsis erythroptera* (Thamnophilidae), *P. nigromaculata*, *Thamnomanes ardesiacus* (Thamnophilidae) and *Th. caesius*, and *Z. meyeri* in *Laterallus jamaicensis* (Rallidae) in Ecuador (VERCAMMEN-GRANDJEAN, 1966; TALLMAN & TALLMAN, 1994). The only record of *Zonorchis* in the *Turdus* genus is *Zonorchis petiolatus* in the Czech Republic (SITKO & ZALEŚNY, 2014). This is the first time that a member of the *Zonorchis* genus is reported in a free-ranging species in Chile.

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