



Revista Brasileira de Parasitologia
Veterinária

ISSN: 0103-846X

zacariascbpv@fcav.unesp.br

Colégio Brasileiro de Parasitologia
Veterinária
Brasil

Fuentes, Danny; Reyes, Jaime; Sepúlveda, María Soledad; Kinsella, Mike; Mironov,
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Revista Brasileira de Parasitologia Veterinária, vol. 24, núm. 3, julio-septiembre, 2015, pp.
276-282

Colégio Brasileiro de Parasitologia Veterinária
Jaboticabal, Brasil

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Gastrointestinal and external parasites of the white-crested elaenia *Elaenia albiceps chilensis* (Aves, Tyrannidae) in Chile

Parasitas gastrointestinais e externos de guaracava de crista branca *Elaenia albiceps chilensis* (Aves, Tyrannidae) de Chile

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Received January 14, 2015

Accepted May 26, 2015

Abstract

The objective of this study is to evaluate the ectoparasites and helminths of the white-crested elaenia, *Elaenia albiceps chilensis*. Feather mites *Anisophyllodes elaeniae*, *Trouessartia elaeniae*, and *Analges* sp. were detected in 51% of birds (n=106), whereas 24% were infected with lice (*Tyranniphilopterus delicatulus*, *Menacanthus* cfr. *distinctus*, and *Ricinus* cfr. *invadens*). Helminths *Viguiera* sp. and *Capillaria* sp. were found in five of the birds that were necropsied (n=20). With the exception of *A. elaeniae*, *T. elaeniae*, and *T. delicatulus*, all parasites represented new records found for the white-crested elaenia, and therefore for the Chilean repertoire of biodiversity.

Keywords: Birds, *Elaenia albiceps chilensis*, feather mites, Acarina, Phthiraptera, Nematoda.

Resumo

O objetivo deste estudo foi avaliar a fauna de ectoparasitas e helmintos do guaracava de crista branca *Elaenia albiceps chilensis*. Em 51% das aves (n=106), foram detectados os ácaros de pena *Anisophyllodes elaeniae*, *Trouessartia elaeniae* e *Analges* sp. enquanto 24% foram infectadas por piolhos (*Tyranniphilopterus delicatulus*, *Menacanthus* cfr. *distinctus* e *Ricinus* cfr. *invadens*). Em contrapartida, em cinco aves necropsiadas foram encontrados os helmintos *Viguiera* sp. e *Capillaria* sp. Com exceção de *A. elaeniae*, *T. elaeniae* e *T. delicatulus*, todos os parasitas representam novos registros para a guaracava de crista branca e, portanto, para a diversidade da fauna parasitária do Chile.

Palavras-chave: Pássaros, *Elaenia albiceps chilensis*, ácaros de penas, Acarina, Phthiraptera, Nematoda.

Introduction

The knowledge of parasite–host associations provides vital information regarding the hosts, which should be taken into account in biodiversity and conservation initiatives (PÉREZ-PONCE DE LEON & GARCIA, 2001). The winter range of the white-crested elaenia *Elaenia albiceps* d'Orbigny and Lafresnaye, 1837 (Passeriformes: Tyrannidae) spans from southeastern Colombia to the Peruvian and Brazilian Amazonian regions, and is mainly represented by the subspecies *E. albiceps chilensis* Hellmayr, 1927

(ARAYA & MILLIE, 2000; COUVE & VIDAL, 2003). In Chile, this bird is present from spring to fall, where it is known to reproduce throughout its entire geographic range (MARTÍNEZ & GONZÁLEZ, 2004; JARAMILLO, 2005). The subspecies *E. albiceps modesta* Tschudi, 1844 has been recorded near Arica (MARTÍNEZ & GONZÁLEZ, 2004), in the valleys and oases of the Tarapacá Region, Chile northern (ARAYA & MILLIE, 2000).

Currently, only three studies have examined parasites in *E. albiceps*. Kellogg & Mann (1912) described a louse *Physostomum fasciatus* var. *arcuatus* from *Tyrannus vociferans* collected from Cerros Island in Baja California, which later transferred to *Ricinus* De

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Geer, 1778 by Hopkins and Clay (1952:324). Price et al. (2003) reported this species on *E. albiceps*, although no geographic location was reported. More recently, Mey (2004) described a new Ischnoceran louse, *Tyranniphilopterus delicatulus*, on *E. albiceps modesta* collected in Santa Cruz, central Chile. The identification of this host subspecies was likely made in error since the geographic distribution of *E. albiceps modesta* is restricted to northern Chile in Tarapacá (MARTÍNEZ & GONZÁLEZ, 2004). Thus, *T. delicatulus* was likely collected from *E. albiceps chilensis*, as it is a subspecies that inhabits central and southern Chile. Lastly, González-Acuña et al. (2005) reported immature stages of the tick *Ixodes auritulus* Newmann, 1904 on *E. albiceps* from Ñuble, Chile. Mironov and González-Acuña describes the species *Anisophyllodes elaeniae* and *Trouessartia elaeniae* from *E. albiceps*, in 2009 and 2013, respectively. Due to the scant amount of information on the parasitic fauna of the white-crested elaenia, the main goal of the present work was to conduct a study on the ecto- and endoparasitic fauna of this species during its spring and fall migratory periods in Chile.

Materials and Methods

Over more than a decade (2001–2012), a total of 20 white-crested elaenias was collected from different Chilean localities ranging from the northern (Arica and Parinacota), central (Valparaíso), and southern (Biobío and Los Lagos) regions. All birds were found dead on roads after being struck by cars or by unknown causes.

Immediately after collection, the birds were frozen in sealed plastic bags until laboratory examination. Ectoparasites were preserved in 70% ethanol. Lice were mounted in Canada balsam following protocols described by Palma (1978) and Price et al. (2003). Mites were cleared in Nesbitt's solution (40 g 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). Phthiraptera were identified using papers by Kellogg & Mann (1912), Nelson (1972), and Mey (2004). Acarina were identified from keys published by Santana (1976), Gaud & Atyeo (1996) and Mironov & González-Acuña (2009).

Birds were necropsied using protocols described by Kinsella & Forrester (1972). Helminths were preserved in 70% ethanol. Nematodes were cleared in temporary mounts of lactophenol and were identified using different keys including those by Chabaud (1975), Moravec (1982), and Gibbons (2010), and the samples later were fixed in glycerin. The terminology that was used follows the work of Bush et al. (1997). All parasites have been deposited into the collection of the Zoology Laboratory, Faculty of Veterinary Science, University of Concepción, Chile.

In addition, 106 specimens of *E. albiceps chilensis* were captured using mist nests (Permit number: 6082 23/11/2006; Servicio Agrícola y Ganadero). Captures occurred between 2006 and 2014 from the following locations: Huemules de Niblinto National Reserve (36°43' S; 71°33' W); Pemuco (36°36' S; 72°06' W), Los Peucos, Ñuble National Reserve (37°06' S; 71°38' W); Chillán Campus, University of Concepción (36°34' S; 72°05' W); highway El Itata (36°39' S; 72°15' W); El Carmen (36°54' S; 72°01' W); Santa Elena Lagoon (36°48' S; 72°23' W); Santa Bárbara (37°40' S; 72°01' W);

Santa Juana (37°10' S; 72°56' W); Bosques Fray Jorge National Park (30°30' S; 71°35' W); Valle de Azapa (18°31' S; 70°11' W); Río Clarillo National Reserve (33°45' S; 70°25' W); La Mina (35°49' S; 70°47' W); Altos de Lircay National Reserve (36°36' S; 71°03' W); Siete Tazas National Park (35°27' S; 71°01' W); Parque Inglés (35°28' S; 70°59' W); Termas del Flaco (34°57' S; 70°26' W); Sierras de Bellavista (34°48' S; 70°45' W); La Patagua (34°42' S; 71°21' W); Til Til (33°04' S; 70°56' W); Ocoa, La Campana National Park (32°58' S; 71°02' W); Lago Peñuelas National Reserve (33°11' S; 7°29' W); and El Yali National Reserve (33°44' S; 71°42' W) (Figure 1). Once captured, the birds were measured, weighed, and exhaustively examined for the presence of ectoparasites. Only birds captured alive were considered for analysis of ectoparasites. All birds were ringed with a unique leg number and immediately released.

Results and Discussion

Ectoparasites

Ectoparasites were found in 51% (n = 54) of the birds examined. A total of 227 mites were collected from 37 birds (34.9%), with 116 belonging to *Trouessartia elaeniae* (15.1%) – a recently described species by Mironov & González-Acuña (2013) (Acarina, Trouessartiidae) (Figures 2 and 3). The overall male to female ratio was 1.5 and the adult to juvenile ratio was 5.8. The mites were collected in Chillán, Santa Elena Lagoon, Huemules del Niblinto National Reserve, Los Peucos, Santa Juana, Santa Bárbara, La Mina, Altos de Lircay National Reserve, Parque Inglés, La Campana National Park, and El Yali National Reserve. One hundred and one specimens were identified as *Anisophyllodes elaeniae* Mironov and González-Acuña, 2009 (Acarina, Proctophyllodidae) (21.4%) (Figures 4 and 5). The overall male to female ratio was 0.33 and the adult to juvenile ratio was 10.2, they were collected in Bosques Fray Jorge National Park, Chillán, Santa Elena Lagoon, Huemules del Niblinto National Reserve, Los Peucos, Santa Juana, Santa Bárbara, La Mina, Altos de Lircay National Reserve, Parque Inglés, La Campana National Park, and Lago Peñuelas National Reserve. The remaining ten specimens belonged to the genus *Analges* Nitzsch, 1818 (3.3%), and they possibly represented a new species. These mites were found in the breast and rump of three birds collected in Santa Elena Lagoon, La Mina, and La Campana National Park.

Mites of the family Trouessartiidae are known to parasitize birds belonging to the orders Caprimulgiformes, Coraciiformes, Cuculiformes, Piciformes and Passeriformes (PROCTOR, 2003; HERNANDES, 2014). The genus *Trouessartia* Canestrini, 1899 is the most species-rich one in the family, and there are currently over 100 species that have been counted, which have been collected from bird species belonging to 28 families of Passeriformes (GAUD & ATYEO, 1996; MIRONOV & GONZÁLEZ-ACUÑA, 2013). Five species, including *T. elaeniae*, have been recorded so far from birds of the family Tyrannidae (SANTANA, 1976; HERNANDES, 2014).

The family Proctophyllodidae includes mites that predominately parasitize Passeriformes and hummingbirds, with a few species

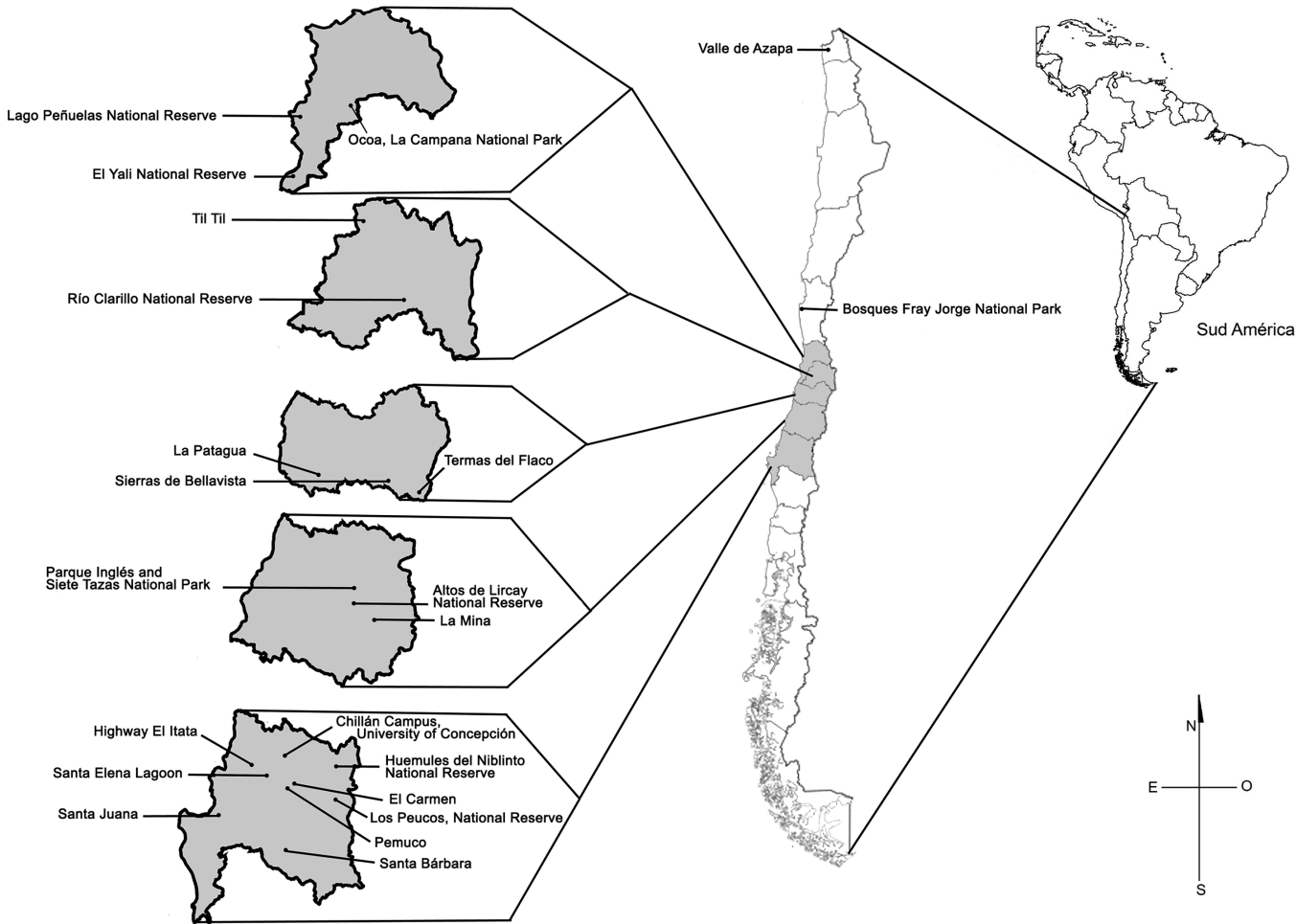


Figure 1. Map of Chile showing the sampling locations.

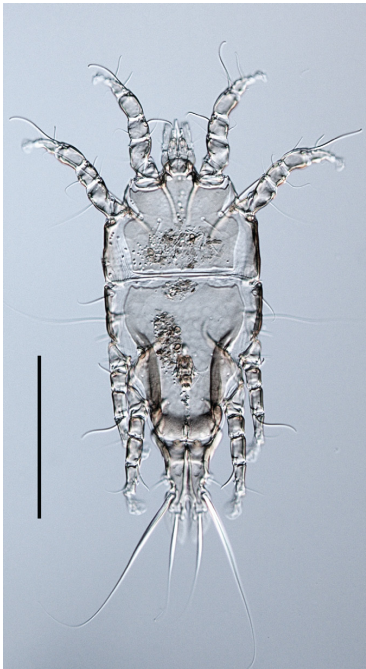


Figure 2. *Trouessartia elaeinae*: Male (A). Dorsal view.



Figure 3. *Trouessartia elaeinae*: Female. Dorsal view.

recorded from birds of the orders Gruiformes, Charadriiformes, and Psittaciformes (GAUD & ATYEO, 1996; PROCTOR, 2003). Relatively little is known regarding the diversity of proctophyllodid mites found on South American Passeriformes (HERNANDES et al., 2007; VALIM & HERNANDES, 2010; MIRONOV & GONZÁLEZ-ACUÑA, 2011). Three other



Figure 4. *Anisophyllodes elaeniae*: Female.



Figure 5. *Anisophyllodes elaeniae*: Male.

known species of the genus *Anisophyllodes* Atyeo, 1967 are also associated with birds of the family Tyrannidae: *A. pipromorphae* has been reported from *Mionectes oleagineus* (Tyrannidae); *A. intermedius* on *Elaenia martinica* Linnaeus, 1766 and *Elaenia flavogaster* (Tyrannidae) (ČERNÝ & LUKOSCHUS, 1975); *A. candango* on *Elaenia chiriquensis* Lawrence, 1865 from Brazil (HERNANDES et al., 2007) and *Anisophyllodes* sp. on *Elaenia chiriquensis* and *Mionectes rufiventris* Cabanis, 1846 (Tyrannidae) (KANEGAE et al., 2008).

The feather mites of the genus *Analges*, as is the case for all representatives of the family Analgidae, live exclusively on passerines and are mainly located in the hosts' downy and body covert feathers. Given their location in the plumage of hosts, analgids are a quite difficult group of feather mites to collect from live birds, and even from museum skins. The genus *Analges* is also the most abundant genus of the family, and it currently includes over 50 species, most of which are known from passerines of the Old World. To date, only one species, *Analges tyranni* Tyrrell, 1882, was recorded on a tyrannid host, *Tyrannus tyrannus* Linnaeus, 1758 in Canada.

Three species of lice totaling 78 specimens were found on 25 birds (24%). These included 65 specimens of *Tyranniphilopterus delicatulus* Mey, 2004 (Ischnocera: Philopteridae) (Figure 6), which

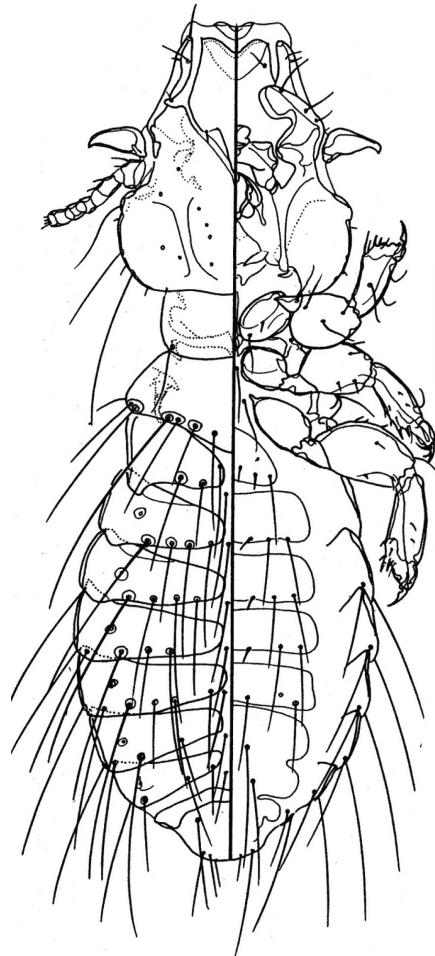


Figure 6. *Tyranniphilopterus delicatulus*: Male. Drawing by Armando Cicchino.

were commonly found on the head and upper neck of 15 birds in Chillán, Altos de Lircay National Reserve, Parque Inglés, and La Campana National Park. Moreover, seven specimens (all nymphs) of *Menacanthus* cfr. *distinctus* Neumann, 1912 (Amblycera: Menoponidae) (Figure 7) were found on five white-crested elaenia birds from Chillán, Santa Bárbara, Sierras de Bellavista, and Altos de Lircay National Reserve. Finally, four specimens of *Ricinus* sp. (Figure 8) were found on three birds collected in Chillán and Valle de Azapa.

Lice of the genus *Tyranniphlopterus* Mey, 2004 are represented by 14 species, half of which are known as parasites of birds belonging to the family Tyrannidae (CICCHINO, 2007). These lice inhabit and lay their eggs in the plumage of the head of their passeriform hosts, which belong to the families Pipridae, Cotingidae, Tyrannidae, and Platysteiridae (MEY, 2004).

Menacanthus Neumann, 1912 is a cosmopolitan genus, which is known to parasitize birds in the orders Passeriformes, Galliformes, Piciformes, Tinamiformes, Coraciiformes, and Cuculiformes (PRICE et al., 2003). *Menacanthus distinctus* has been described as parasitizing the following species of Tyrannidae: *Myiarchus tyrannulus* Müller, 1776; *M. cinerascens* Lawrence, 1851; *M. ferox* Gmelin, 1789; *M. tuberculifer* d'Orbigny and

Lafresnaye, 1837; *Rhytipterna simplex* Lichtenstein, 1823; *Contopus borealis* Swainson, 1832; and *Lathrotriccus euleri* Cabanis, 1868 (PRICE et al., 2003). The specimens obtained were nymphs of the first (N I) and second instars (N II), and they were tentatively attributed to this species (here noted as *M. cfr. distinctus*) by direct comparison with the N II available from numerous males, females, and nymphs of *M. distinctus* from *L. euleri* collected in Buenos Aires Province, Argentina.

The genus *Ricinus* De Geer, 1778 is composed of 72 species that are characterized by a relatively large size (3.1–5.3 mm), and which feed on blood, although some of them may complement their diet with feathers. They infest avian hosts belonging to at least 30 Passeriforme families (CICCHINO & CASTRO, 1998). The two heavily pigmented *Ricinus* female specimens collected from *E. albiceps chilensis* belong to the *invadens* species group *sensu* Nelson, 1972, but details of their pigmentation, cephalic chaetotaxy, and dimensions do not fit well with those typical of the only species included in this group, *Ricinus invadens* Kellogg, 1899 (NELSON, 1972). This species, primarily described as a member of the family Pipridae, has been collected from birds of at least three genera in this family, and also from one member of the family Tyrannidae, *Anairetes parulus* (Kittlitz, 1830) (PRICE et al.,

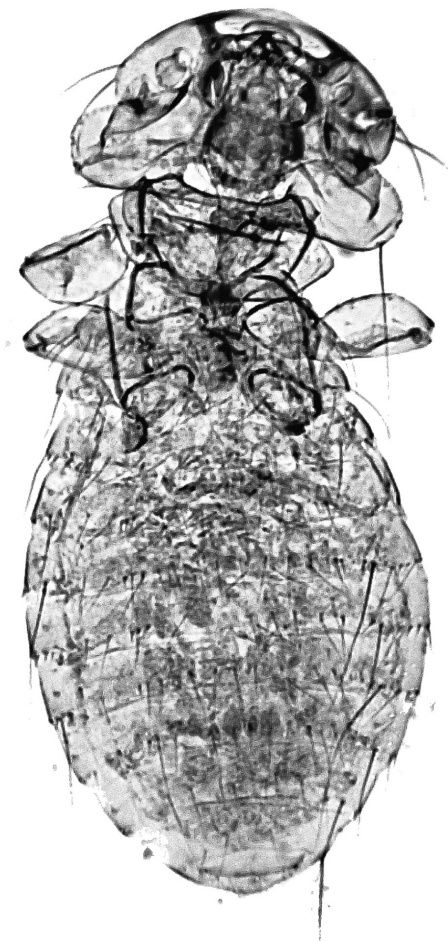


Figure 7. *Menacanthus distinctus*: second nymphal instar (N II) male. Magnification 100×.

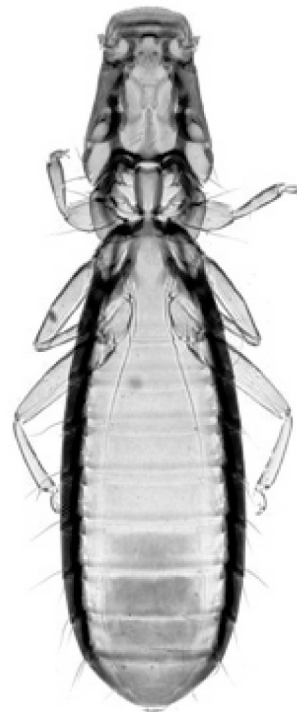


Figure 8. *Ricinus* cfr. *invadens*: Female. Magnification 100×.

Table 1. Infection and infestation parameters of endoparasites from 20 *Elaenia albiceps chilensis*, and ectoparasites from 126 same hosts, during 2001-2012.

Parasite species	Location in host	Positive birds (Prevalence)	Mean intensity	Range	Abundance Mean	Total
Endoparasites (n=20)						
Nematoda						
<i>Viguiera</i> sp.	SI*	5 (25.0%)	2.6	0–5	0.65	13
<i>Capillaria</i> sp.	SI*	1 (5.0%)	1	0–1	0.05	1
Ectoparasites (n=126)						
Acari						
<i>Trouessartia elaeniae</i>	WT	19 (15.1%)	6.1	0–16	0.92	116
<i>Anisophyllodes elaeniae</i>	WT	27 (21.4%)	3.7	0–22	0.80	101
<i>Analges</i> sp.	AR	3 (2.4%)	3.3	0–5	0.08	10
Phthiraptera						
<i>Tyrannophilopterus delicatulus</i>	HN	15 (4.3%)	4.3	0–11	0.52	65
<i>Menacanthus</i> cfr. <i>distinctus</i>	BD	5 (1.4%)	1.4	0–2	0.06	7
<i>Ricinus</i> cfr. <i>invadens</i>	BD	3 (1.3%)	1.3	0–2	0.03	4

*SI= small intestine, WT= wing and tail feathers, AR= abdomen and rump, HN= head and upper neck, BD= breast and dorsus.

2003). Another well-pigmented species belonging to another very different species group, *Ricinus arcuatus* (KELLOGG & MANN, 1912), which is widely distributed on several tyrannid hosts, has also been recorded on this same host (PRICE et al., 2003). A larger number of specimens, including males, is required for the proper identification of the taxa recorded here.

Endoparasites

Of the 20 *E. albiceps chilensis* necropsied, five harbored a total of 14 nematodes. Thirteen of these (93%) were identified as *Viguiera* sp. Seurat, 1913 (Nematoda: Habronematidae) and were found in the small intestine of the white-crested elaenia from Chillán. The specimens were not identified due to the lack of sufficient material. All individuals were adults (eight males, five females), with a male to female ratio of 1.6. No females were gravid, which could indicate that *E. albiceps chilensis* may not be the true definitive host for this nematode. The genus *Viguiera* includes 20 species (NANDI, 2005), some of which parasitize Passeriformes of the families Cuculidae (Cuculiformes) and Paridae (Passeriformes) in the United States (PENCE, 1973). *Viguiera buckleyi* (Chabaud, 1957) has been reported on *Nectarinia pulchella incidipectus* (Passeriformes: Nectariniidae) in Africa (CANARIS & GARDNER, 2002). In addition, nine *Viguiera* species have been described from India (NANDI, 2005). In South America, *Viguiera osmanhilli* Yeh, 1955 has been reported from *Cyanerpes cyaneus* Linnaeus, 1766 (Passeriformes: Thraupidae) in Brazil (Yeh, 1954).

A single male of the nematode genus *Capillaria* sens. lat. Zeder, 1800 (Nematoda, Trichuridae) was also recovered from the small intestine of the white-crested elaenia from Chillán. This genus, which is characterized by the absence of caudal alae and a spiny spicule sheath in the male, is known to infect the gastrointestinal tract of all vertebrate groups (MORAVEC, 1982). Identification at the species level could not be made on the basis of the single specimen found.

Infection and infestation parameters of parasites of *E. albiceps chilensis* are shown in Table 1.

With the exception of *A. elaeniae*, *T. elaeniae*, and *T. delicatulus*, all of the parasites reported here represent new parasitological records for *E. albiceps chilensis* and for the Chilean repertoire of biodiversity.

Acknowledgements

The authors wish to thank the Corporación Nacional Forestal for graciously providing its facilities in the various protected areas in Chile that we visited. In addition, we owe special thanks to Pablo Olmedo, Pedro Álvarez, Sebastián Muñoz, Braulio Muñoz, Iván Torres, Nicolás Fernández, Daniela Doussang, Gonzalo Torres, Cecilia Figueroa, Consuelo Manosalva, Carolina Silva, Nicolás Martín, Francisco González, Sofía González, and Karen Ardiles, for their valuable assistance during field work. This study was funded by the FONDECYT project number 1130948.

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