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Research note

Parasites of the Green-backed Firecrown (*Sephanoides sephaniodes*) in Chile

Parásitos del picaflor chico (*Sephanoides sephaniodes*) en Chile

Daniel González-Acuña[1] ✉, Carolina Silva[1], Marta Soto[1], Sergei Mironov[2], Lucila Moreno[1], Paulina L. González-Gómez[3,4], Hasan Badrul[5,6] and Mike Kinsella[7]

[1]*Facultad de Ciencias Veterinarias, Universidad de Concepción, Departamento de Ciencias Pecuarias, Casilla 537, 3780000 Chillán, Chile.*
[2]*Zoological Institute, Russian Academy of Sciences, Universitetskaya quay 1, Saint Petersburg 199034, Russia.*
[3]*Department of Neurobiology, Physiology and Behavior, UC Davis, One Shield Avenue, Davis CA 95616, USA.*
[4]*Instituto de Filosofía y Ciencias de la Complejidad, Los Alerces 3024, Santiago, Chile.*
[5]*Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University, Pahartali, Chittagong 4202, Bangladesh.*
[6]*Section for Zoonotic Ecology and Epidemiology, School of Pure and Applied Natural Sciences, Linneaus University, SE - 391 82 Kalmar, Sweden.*
[7]*Helm West Laboratory, 2108 Hilda Avenue, Missoula, MT 59801, USA.*
✉ *danigonz@udec.cl*

Abstract. Gastrointestinal and external parasites from 12 Green-backed Firecrown (*Sephanoides sephaniodes*) were collected between January 2004 and December 2008 from the Biobío Region south-central Chile and Santiago (central Chile). Helminths collected included 1 trematode species (*Mosesia sp.*) and 1 cestode species (*Hymenolepis trinidadensis*). The mite *Proctophyllodes huitzilopchtlii* was the only ectoparasite species found. All these parasites represent new records for Chile and the first parasites reported for this host species.

Key words: birds, mites, helminths, trematodes, cestodes, Chile.

Resumen. Se recolectaron parásitos internos (gastrointestinales) y externos de 12 picaflores (*Sephanoides sephaniodes*) entre enero del 2004 y diciembre del 2008, de la región del Biobío en el centro-sur de Chile y en Santiago, en la región central de Chile. Los helmintos recolectados incluyeron 1 especie de trematodo (*Mosesia sp.*) y 1 de cestodo (*Hymenolepis trinidadensis*). Únicamente se encontró 1 especie de ectoparásito, el ácaro *Proctophyllodes huitzilopchtlii.* Todos los parásitos mencionados representan nuevos registros para Chile y se registran por primera vez para este hospedero.

Palabras clave: aves, ácaros, helmintos, trematodos, cestodos, Chile.

The Green-backed Firecrown (*Sephanoides sephaniodes* Molina, 1782) is a migratory hummingbird which ranges from south Atacama Desert and west Argentina to Tierra del Fuego, including a substantial population on Robinson Crusoe Island off the coast of Chile. Green-backed Firecrowns inhabit forests, glades, thickets and gardens, from the sea level to above 2 000 m (del Hoyo et al., 1999). Typically they find nectar varying in quality from 0.25 to 1.21 M (Fraga et al. 1997; Smith-Ramirez and Armesto, 1998) which is complemented with a 5% arthropod in the diet (Lopez-Calleja et al., 2003).

Previous records of helminths from South American hummingbirds are restricted to cestodes, including *Anonchotaenia trochili* Fuhrmann, 1908 in the Swallow-tailed Hummingbird *Eupetomena macroura* (Gmelin, 1788); *Anomaloporus hesperiphonae* Voge et Davis, 1953 and *Arostellina reticulata* Neiland, 1955 in the Scaly-breasted Hummingbird *Phaeochroa cuvierii roberti* Peters, 1945, and *Hymenolepis* (=*Amazilolepis*) *trinidadensis* Schmidt and Dailey, 1992 in the Copper-rumped Hummingbird *Amazilia tobaci* (Gmelin, 1788). Records of ectoparasites in firecrowns are restricted to a few species of lice distributed in 2 families: Menoponidae with 5 species: *Leremenopon fisheri* Dalgleish and Price, 2003, *L. sanchezi* Dalgleish and Price, 2003, *L. donnaldorum* Dalgleish and Price, 2003, and *L. obermani* Dalgleish and Price, 2003, and *Myrsidea imbricata* Neumann, 1891; and Trochiliphagidae with the genera *Trochiloecetes* Paine and Mann, 1913 with 30 species, and *Trochiliphagus* Carriker, 1960 with 13 species. In this study, we report for the first time both external and internal parasites from Green-backed Firecrowns collected in central and south central Chile.

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From January 2004 to December 2008 we obtained 22 injured Green-backed Firecrowns from different localities in the Biobío region, south central Chile, and Santiago, central Chile. The birds were sent to the Wildlife Rehabilitation Center at the Veterinary Faculty of Concepción University. Causes of injury were attacks by cats and collisions with windows and vehicles. Birds were euthanized when injuries were too severe to treat. Carcasses were stored in a freezer until further examination. Mites were collected from feathers and preserved in 70 % ethanol and later they were cleared in Nesbitt solution (40 g chloral hydrate, 25 ml distilled water and 2.5 ml of concentrated HCl) for 72 hr and mounted on slides in Berlese solution (Krantz, 1978). References by Gaud and Atyeo (1996) and Atyeo and Braasch (1966) were used for identification of mites.

Each bird was dissected and their organs examined under a stereomicroscope to obtain endoparasites. Helminths collected were preserved in 70% ethanol or 10% formalin. Cestodes and trematodes were stained with carmine or hematoxylin, dehydrated and mounted in Canada balsam (Prichard and Kruse, 1982). For trematode identification, we used the keys of Yamaguti (1958, 1959), and for cestodes those of Czaplinski and Vaucher (1994). Ecological infection parameters (prevalence, mean intensity, abundance, and mean abundance) were calculated following Bush et al. (1997). Specimens were deposited at the Collection of the Laboratory of Zoology of the Veterinary Faculty of Concepción University, Chillán, Chile.

Two endoparasite species (1 trematode and 1 cestode) and 1 species of ectoparasite (Acari) representing 227 individuals in total, were collected from 12 Green-backed Firecrowns (Table 1). We found 18 specimens of *Mosesia* sp. (Trematoda: Phanerosolidae) in the small intestine of 3 hosts, and 34 cestodes (*Hymenolepis trinidadensis* (Schmidt and Dailey, 1992) [Cestoidea: Hymenolepididae]) in the same habitat of 5 birds (Table 1). Likewise, 175 individuals of the feather mite *Proctophyllodes huitzilopchtlii* (Atyeo et Braasch, 1966) (Acarina: Proctophylloidae) were found. These findings represent the first record of these 3 parasite species in this host and new records for the fauna of Chile.

The only species of the genus *Mosesia* reported from South America is *Mosesia mosesi* Travassos, 1921, collected from an unidentified bird in Brazil by Travassos (1921). Our specimens somewhat resemble *M. mosesi*, but differ in the size and position of the cirrus sac, and the shape of the ovary. It is possible that they represent an undescribed species, but because all are highly gravid and the eggs hid internal morphology, identification to the specific level could not be carried out. Stoneflies and mayflies are involved as infective intermediate hosts by species of *Mosesia* (McMullen, 1936; Besprozvannyk, 1994).

Hymenolepis trinidadensis was described as *Amaziolepis trinidadensis* from the small intestine of the Copper-rumped Hummingbird in Trinidad, West Indies, by Schmidt and Dailey (1992); subsequently Czaplinski and Vaucher (1994) considered *Amazilolepis* a synonym of *Hymenolepis* Weinland, 1858. Most hummingbirds feed principally on nectar although they also eat small insects (Wolf and Hainsworth, 1971; Pyke, 1980), which can be between 2% to 15% of their daily time budgets (Grass and Montgomerie, 1981; Pyke, 1980). Insects are the principal intermediate hosts of the trematodes and cestodes found in hummingbirds. The arthropods associated with flowers usually have mouth structures incapable of ingesting bird feces and the limited ability of these insects to ingest tapeworm onchospheres probably accounts for the paucity of cestodes in this family of about 320 species of birds (Schmidt and Dailey, 1992).

Atyeo and Braasch, 1966 described a new species of feather mites *P. huitzilopchtlii* in Blue-Throated Hummingbird *Lampornis clemenciae* (Lesson, 1829) as type host and 12 other hummingbird species as additional hosts: *Amazilia beryllina* Deppe, 1830*, A. rutila* Delattre,

Table 1. Infection and infestation parameters of helminths and mites collected from 22 Green-backed Firecrowns from south-central Chile

Parasites species	*Location in Host*	*Prevalence (%)*	*Mean intensity (± SE)*	*Abundance*	
				Mean	*Total*
Trematoda					
Mosesia sp.	P, SI	13.6	6.0 ± 4.4	0.8	18
Cestoda					
A. trinidadensis	SI	22.7	6.8 ± 4.7	1.5	34
Acari					
P. huitzilopchtlii	F	18.2	43.8 ± 29.1	8.0	175

P= proventriculus, SI= small intestine, F= feather

1843, *A. violiceps* (Gould, 1859), *Chlorostilbon canivettii* (Lesson, 1832), *Colibri thalassinis* (Swainson, 1827), *Cynanthus latirostris* (Swainson, 1827), *C. sordidus* (Gould, 1859), *Eugenes fulgens* (Swainson, 1827), *Hylocharis leucotis* Vieillot, 1818, *Selasphorus platycercus* (Swainson, 1827), *S. rufus* (Gmelin, 1788), and *S. sasin* (Lesson, 1829). This mite has recently been reported from the Glittering-throated Emerald *Amazilia fimbriata* (Gmelin, 1788) and the Glittering-bellied Emerald *Chlorostilbon lucidus* (Shaw, 1812) in the Cerrado Region, Brazil (Kanegae et al., 2008), and it is the only species of the genus *Proctophyllodes* Robin, 1877 known from the family Trochilidae. It is possible that the mites from all these hosts could represent a complex of several cryptic species; however, more studies are required to resolve this question. *P. huitzilopchtlii* is relatively rare on the firecrowns in the explored region (Table 1). Taking into account that this is the only species of Proctophyllodinae occurring on hummingbirds, while the absolute majority of the species-rich genus *Proctophyllodes* is distributed on passerines (Atyeo and Braasch, 1966), it is quite reasonable to conclude that the ancestor of this species was transferred to hummingbirds from some passerine hosts.

The absence of any representatives of Pterodectinae, the second proctophyllodid subfamily, on the Green-backed Firecrown in the explored region is quite surprising. Pterodectine feather mites are very common ectoparasites of hummingbirds, and 1 host species usually bears several different species from this subfamily (Park and Atyeo, 1975). All pterodectines associated with hummingbirds constitute the tribe Rhamphocaulini which include 8 genera (Mironov, 2009): *Allodectes* Park et Atyeo, 1972, *Rhamphocaulus* Park et Atyeo, 1971, *Schizodectes* Park et Atyeo, 1973, *Sclerodectes* Park et Atyeo, 1973, *Syntomodectes* Park et Atyeo, 1971, *Toxerodectes* Park et Atyeo, 1971, *Trochilodectes* Park et Atyeo, 1971, *Xynonodectes* Park et Atyeo, 1971. Mironov (2009) proposed a preliminary hypothesis about the origin and dispersion of mites of the subfamily Pterodectinae on their hosts. He suggested that this subfamily originated on the ancestors of Passeriformes. The origin and subsequent diversification of 2 major phylogenetic branches of pterodectines (Pterodectini and Rhamphocaulini) was correlated with 2 main taxonomic group of avian hosts, passerines (Passeriformes) and hummingbirds (Apodiformes: Trochilidae) respectively, although on the latter hosts these mites are of secondary origin. In the phylogeny, host associations and geographic distribution of pterodectines predominantly associated with passerines generally correspond to the phylogeny and historical biogeography of the order Passeriformes. The current distribution of pterodectines among passerines was realized by cospeciation with their hosts, and also by numerous cases of switching to new host taxa, mainly within Passeriformes, but also to birds of other orders (Mironov, 2009).

The effect of parasite infection on the energetic balance of hummingbirds is completely unknown. Studies have demonstrated that parasites can increase (Nilsson, 2003; Devevey et al., 2008) or decrease (Heaworth et al., 1988) host metabolism. An increase of metabolic rate could be achieved indirectly through the reduction of plumage insulation due to the ectoparasite infection (Booth et al., 1993) or a direct effect of gastrointestinal parasites (Kristan and Hammon, 2000). An increase of energy expenditures in hummingbirds inhabiting temperate zones could decrease dramatically their chances of survival, especially in winter. In order to assess the magnitude of the parasite impact on *S. sephaniodes* more studies are needed.

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