

## LETTERS

*J. Raptor Res.* 53(4):446–449

© 2019 The Raptor Research Foundation, Inc.

### ECTOPARASITES OF AMERICAN KESTRELS: SHOULD FLEAS BE CONSIDERED?

PAULA M. OROZCO-VALOR<sup>1</sup>

*Instituto de las Ciencias de la Tierra y Ambientales de La Pampa (INCITAP) – Consejo Nacional de Investigaciones Científicas y Técnicas de Argentina (CONICET), Mendoza 109, (6300) Santa Rosa, La Pampa, Argentina*  
and

*Centro para el Estudio y Conservación de las Aves Rapaces en Argentina (CECARA), Facultad de Ciencias Exactas y Naturales, Universidad Nacional de La Pampa, Avenida Uruguay 151, (6300) Santa Rosa, La Pampa, Argentina*

MIGUEL Á. SANTILLÁN

*División Zoología, Museo de Historia Natural de La Pampa, Secretaría de Cultura, Gobierno de La Pampa, Pellegrini 180, (6300) Santa Rosa, La Pampa, Argentina*

MARCELA LARESCHI

*Centro de Estudio Parasitológicos y de Vectores (CEPAVE, CCT-La Plata) – Consejo Nacional de Investigaciones Científicas y Técnicas de Argentina (CONICET) Bv. 120 s/n e/ 60 y 64, (1900) La Plata, Buenos Aires, Argentina*  
and

*Facultad de Ciencias Naturales y Museo, UNLP – Avenida 122 y 60, (1900) La Plata, Buenos Aires, Argentina*

JUAN M. GRANDE

*Instituto de las Ciencias de la Tierra y Ambientales de La Pampa (INCITAP) – Consejo Nacional de Investigaciones Científicas y Técnicas de Argentina (CONICET), Mendoza 109, (6300) Santa Rosa, La Pampa, Argentina*  
and

*Centro para el Estudio y Conservación de las Aves Rapaces en Argentina (CECARA), Facultad de Ciencias Exactas y Naturales, Universidad Nacional de La Pampa, Avenida Uruguay 151, (6300) Santa Rosa, La Pampa, Argentina*

KEY WORDS: *American Kestrel*; *Falco sparverius*; *ectoparasite*; *flea*; *Polygenis platensis*.

Raptors are hosts of a wide array of ectoparasites, including different species of arthropods with diverse habits (Philips and Dindal 1977, Bush et al. 1997, Philips 2000). This ectoparasite community includes different species of flies (Diptera), cimicid bugs (Hemiptera), chewing lice (Phthiraptera), dermestid beetles (Coleoptera), mites and ticks (Acarina; Philips 2007). However, fleas (Siphonaptera), a common hematophagous ectoparasite in other bird groups and mammals, are uncommon on raptors (Boyd 1951, Benton and Shatrau 1965, Philips and Dindal 1977, Philips 2007). Adult fleas bite hosts to obtain blood and lay their eggs on their hosts or in the soil and nests of hosts (Philips 2007, Lareschi et al. 2016). Exceptions to this are the fleas *Echidnophaga gallinacea* and *Hectopsylla* spp. that can remain attached to

their hosts in unfeathered places around the head (Philips 2007, de Oliveira et al. 2011, Lareschi et al. 2016). Fleas can have negative effects on their host's condition and may play a role as disease transmitters due to their potential as parasite vectors (Boyd 1951, Linardi et al. 2005, Lareschi et al. 2016).

The American Kestrel (*Falco sparverius*) is a small falcon, widely distributed from Alaska and Canada to Tierra del Fuego and Falkland Islands. The species inhabits natural and modified habitats, and is especially abundant in agroecosystems and other open areas (Ferguson-Lees and Christie 2001, Smallwood and Bird 2002). It is an opportunist-generalist predator that feeds mostly on insects and small vertebrates (Ferguson-Lees and Christie 2001, Smallwood and Bird 2002, Sarasola et al. 2003, Liébana et al. 2009). The community of ectoparasites that may infest this species has been widely studied in North America (Table 1)

<sup>1</sup> Email address: pauoro\_07@hotmail.com

Table 1. Ectoparasite species known to infest the American Kestrel.

ECTOPARASITE SPECIES	DISTRIBUTION/LOCALITY	AUTHORS
Acarina		
Mesostigmata Dermanyssidae <i>Ornithonyssus bursa</i>	Central Argentina	Liébana et al. 2011, Santillán et al. 2015
Astigmata Pterolichidae <i>Epoplichus minor</i>	Southern Chile	Gonzalez-Acuña et al. 2011
Astigmata Xolalgidae <i>Dubinia</i> spp.	North America	Philips 2000
Astigmata Hypoderatidae <i>Tytodectes cerchneis</i>	North America	Philips 2000
Trombidiformes Trombiculidae <i>Blankaartia velascoi</i>	North America	Philips 2000
Trombidiformes Ereynetidae <i>Boydaia falconis</i>	North America	Philips 2000
Mesostigmata Rhinonyssidae <i>Ptilonyssus cerchneis</i>	North America	Philips 2000
Ixodida <i>Ornithodoros aquila</i>	California, North America	Morishita et al. 2001, Williams 1947
Insecta		
Diptera Hippoboscidae <i>Icosta americana</i>	Central Argentina, North America, Bolivia	Liébana et al. 2011, Mueller et al. 1969, Bequaert 1995
Díptera Calliphoridae <i>Protocalliphora</i> spp.	California	Hill and Work 1947, Balgooyen 1976
Díptera Carnidae <i>Carnus hemapterus</i>	North-central Saskatchewan, Canada, and California	Dawson and Bortolotti 1997, Balgooyen 1976
Phthiraptera Mallophaga Menoponidae <i>Heteromenopon macrurum</i>	Chile	Price and Beer 1967
Phthiraptera Amblycera Laemothriidae <i>Laemobothrion tinnunculi</i>	Central Argentina, southern Chile, North America	Liébana et al. 2011, Price et al. 2003, Cicchino and Castro 1998a, González-Acuña et al. 2008, 2011
Phthiraptera Amblycera Menoponidae <i>Nosopon lucidum</i>	Argentina, North America	Price et al. 2003, Cicchino and Castro 1998a
Phthiraptera Ischnocera Philopteridae <i>Degeeriella carruthi</i>	Central Argentina, southern Chile, North America	Liébana et al. 2011, Price et al. 2003, Cicchino and Castro 1998b, González-Acuña et al. 2008, 2011
Phthiraptera Amblycera Menoponidae <i>Colpocephalum subzerfae</i>	Southern Chile	Gonzalez-Acuña et al. 2011
Siphonaptera Rhopalopsyllidae <i>Polygenis platensis</i>	Central Argentina	this study

and includes mites, carnid flies, lice, and ticks (Morishita et al. 2001, Smallwood and Bird 2002 and references therein). Several ectoparasites have also been reported for this species in South America (Table 1; Bequaert 1995, Cicchino and Castro 1998a, 1998b, González-Acuña et al. 2008, 2011, Liébana et al. 2011, Santillán et al. 2015). However, as far as we know, no fleas have been documented as American Kestrel parasites across the species' range (Smallwood and Bird 2002). Here we present the first record of a flea species, *Polygenis platensis*, found on American Kestrels and we hypothesize a possible route of transmission.

Our study area is located in La Pampa province in central Argentina (approximate geographic center of our study area is 36°3.909'S, 63°57.851'W). It comprises approximately 14,700 km<sup>2</sup> in an ecosystem gradient that transitions from a mosaic of semiarid Caldén (*Prosopis caldenia*) forests interspersed with crops, cultivated exotic pastures, and small patches of natural grasslands in the southwest to a homogeneous landscape of intensive agriculture (primarily soybeans) in the northeast.

We installed 104 nest boxes for American Kestrels on power poles in three different environments: (1) Caldén forests, (2) traditionally farmed agricultural lands (rotation of crops and cattle) with small fragments of Caldén forest, and (3) intensively farmed land (Orozco-Valor and Grande 2016). From 2011 to 2017, in the months prior to and during the breeding season, we marked as many breeding adults as possible. Adults were captured with bal chatri traps (Berger and Mueller 1959) or by hand in their nest boxes while they were incubating or brooding. We also captured nestlings in each nest box at the age of 20–25 d, just prior to the fledging period. All individuals were banded, sexed, weighed, and measured (wing chord, eighth primary, tail, and tarsus lengths). We examined each bird for ectoparasites. When ectoparasites were detected, we collected them and stored them in vials with 70% ethanol for later identification. We identified ectoparasites by using taxonomic keys (Smit 1987, Lareschi and Linardi 2009) and original descriptions, and deposited the specimens in the

entomological collection of the Museo de Historia Natural de La Pampa (MHNL Pam-ZE), Argentina.

We captured and banded 172 adults and 1489 nestlings from 2011 to 2017. Across the 1661 individuals sampled, we found three fleas identified as *Polygenis platensis* (Insecta: Siphonaptera: Rhopalopsyllidae, Rhopalopsyllinae; Table 1). The fleas, one male and two female, were collected from an adult female kestrel captured in the winter of 2016 and from two nestlings during the 2017 breeding season. In each case we found only one flea per kestrel. The adult American Kestrel was captured during the winter near a nest box and the nestlings were retrieved from two different nest boxes. The three nest boxes were located in the same area (the first two were 4 km from each other, and both were 10 km from the third), at the western edge of the traditionally farmed area close to the Caldén forests.

The flea *Polygenis platensis* frequently parasitizes small mammals, marsupials, and armadillos (de la Barrera 1953, Lareschi et al. 2016), and its prevalence and geographic distribution on mammalian hosts seem to have increased in recent years (Ezquiaga et al. 2017). However, we are aware of only one raptor species for which flea infestation is known to be frequent, the Burrowing Owl (*Athene cunicularia*). Among Burrowing Owls, the infestation is probably linked to the occasional use of the same burrows by owls and small mammals, or to accidental transfers of fleas to the owl from rodent prey, or to fleas laying their eggs in the owl burrows (Philips and Dindal 1977, Smith and Belthoff 2001, Lareschi et al. 2016). *Polygenis platensis* is a known parasite of the Burrowing Owl in La Pampa province (Lareschi et al. 2016), although in a different study area. Nevertheless, the fleas *Polygenis platensis* found in our work represent the first record of this species as a potential parasite of American Kestrels. This flea is a common parasite of a variety of hosts, including birds and humans, but most records in Argentina are from marsupials and small rodents including in the families Cricetidae, Caviidae, and Chinchillidae (de la Barrera 1953, Lareschi and Linardi 2009, Lareschi et al. 2016). These rodents, especially *Calomys* spp. and *Akodon* spp., are common prey items in the diet of American Kestrels in our study area (Sarasola et al. 2003). Therefore, it is plausible that the presence of the flea on the American Kestrels was the result of a transfer from prey. It is interesting that the three fleas came from the same area, an area characterized by traditional agricultural production, with rotation of cattle grazing and crops, and very close to the limits of Caldén forests. This ecotonal area might serve as high-quality habitat for small mammals, increasing the probability of contact between fleas and American Kestrels. Further studies on the potential effect of this hematophagous flea on raptors are needed to determine if they are actual parasites of this species and not just opportunists that use the American Kestrel as a vehicle from one small mammal to the next. This would clarify the potential role of fleas as disease vectors for raptors and may be particularly important for the American Kestrel, a species whose populations are declining across much of North America,

and for which the presence of diseases and pathogens has been suggested as a potential driver of the decline (Farmer and Smith 2009, McClure et al. 2017).

Our review of the ectoparasite community found on American Kestrels shows a bias toward studies from the northern (North America) and southern (Argentina, Chile, and Bolivia) portions of the species' range (Table 1). Given the wide range of the species including many tropical areas where the array of parasites might be expected to be greater (Møller 1998) and the recent declines of several populations, we recommend further studies to fill this knowledge gap about the American Kestrel and its ectoparasites.

#### ACKNOWLEDGMENTS

We thank all members of CECARA group, all Basque exchange students, A. Marzialetti, M. Simón, S. Castro, J. Etcheverry, A. Fonseca, A. Videla, F. Moreno, A. Hidalgo, F. Sorrarain, R. L. Casais Montepaone, D. Orozco, H. Marani, M. De Benito, B. Vogler, and Pocho for their help with the fieldwork, and G. Paley for taking the samples to La Plata. The study was conducted under permits from the Subsecretaría de Ecología (La Pampa province, Argentina) to work in Parque Luro Natural Reserve and from the Dirección de Recursos Naturales (La Pampa province, Argentina). Financial support was provided by CONICET (PIP 2012-2014 No. 11420110100366), the ANPCyT (PICTO 2011 0229 UNLPam to JMG), The Peregrine Fund (American Kestrel Partnership), a Tully grant from the Raptor Research Foundation, a Bergstrom Memorial Research Award from the Association of Field Ornithology, Idea Wild, and Grupo Asegurador La Segunda. Two anonymous referees and the editor greatly improved an early version of this letter.

#### LITERATURE CITED

- Balgooyen, T. G. (1976). Behavior and ecology of the American Kestrel (*Falco sparverius* L.) in the Sierra Nevada of California. University of California Publications in Zoology 103:1–83.
- Benton, A. H., and V. Shatrau (1965). The bird fleas of eastern North America. *Wilson Bulletin* 77:76–81.
- Bequaert, J. C. (1995). The Hippoboscidae or louse-flies (Diptera) of mammals and birds. Part II: taxonomy, evolution and revision of American genera and species. *Entomologica Americana New Series* 35:233–416.
- Berger, D. D., and H. C. Mueller (1959). The bal-chatri: a trap for the birds of prey. *Bird-banding* 30:18–26.
- Boyd, E. M. (1951). The external parasites of birds: a review. *Wilson Bulletin* 63:363–369.
- Bush, A. O., K. D. Lafferty, J. M. Lotz, and A. W. Shostak (1997). Parasitology meets ecology on its own terms: Margolis et al. revisited. *Journal of Parasitology* 83:575.
- Cichino, A., and D. Castro (1998a). Amblycera. In *Biodiversidad de Artrópodos Argentinos: Una Perspectiva Biotaxonomía* (J. Morrone and S. Coscarón, Editors). Ediciones del Sur, La Plata, Buenos Aires, Argentina. pp. 84–103.
- Cichino, A., and D. Castro (1998b). Ischnocera. In *Biodiversidad de Artrópodos Argentinos: Una Perspectiva Biotax-*

- onómica (J. Morrone and S. Coscarón, Editors). Ediciones del Sur, La Plata. Buenos Aires, Argentina. pp. 104–124.
- Dawson, R. D., and G. R. Bortolotti (1997). Ecology of parasitism of nestling American kestrels by *Carnus hemapterus* (Diptera: Carnidae). *Canadian Journal of Zoology* 75:2021–2026.
- de la Barrera, J. M. (1953). Roedores silvestres infectados por *Pasteurella pestis* en la Republica Argentina. *Boletín de la Oficina Sanitaria Panamericana* 9:434–438.
- de Oliveira, J. B., T. Santos, C. Vaughan, and H. Santiago (2011). External parasites of raptors (Falconiformes and Strigiformes): identification in an ex situ population from Mexico. *Revista de Biología Tropical* 59:1257–1264.
- Ezquiaga, M. C., A. M. Abba, G. H. Cassini, and M. Lareschi (2017). Prevalence and intensity of fleas parasitizing an isolated population of screaming hairy armadillo in Buenos Aires province, Argentina: Host-related factors and temporal dynamics. *Parasitology Research* 116:2895–2900.
- Farmer, C. J., and J. P. Smith (2009). Migration monitoring indicates widespread declines of American Kestrels (*Falco sparverius*) in North America. *Journal of Raptor Research* 43:263–273.
- Ferguson-Lees, J., and D. A. Christie (2001). *Raptors of the World*. Houghton Mifflin, Boston, MA, USA.
- González-Acuña, D., K. Ardiles, R. A. Figueroa Rojas, C. Barrientos, P. González, L. Moreno, and A. Cicchino (2008). Lice of Chilean diurnal raptors. *Journal of Raptor Research* 42:281–286.
- González-Acuña, D., E. Lohse, A. Cicchino, S. Mironov, R. A. Figueroa Rojas, K. Ardiles, and M. Kinsella (2011). Parasites of the American Kestrel (*Falco sparverius*) in south-central Chile. *Journal of Raptor Research* 45:188–193.
- Hill, H. M., and T. H. Work (1947). Protocalliphora larvae infesting nestling birds of prey. *The Condor* 49:74–75.
- Lareschi, M., and P. M. Linardi (2009). Morphological variability in *Polygenis (Polygenis) platensis* (Jordan and Rothschild) (Siphonaptera: Rhopalopsyllidae: Rhopalopsyllinae) and taxonomic consequences. *Zootaxa* 2310:35–42.
- Lareschi, M., J. Sanchez, and A. Autino (2016). A review of the fleas (Insecta: Siphonaptera) from Argentina. *Zootaxa* 4103:239–258.
- Liébana, M. S., M. Á. Santillán, A. C. Cicchino, J. H. Sarasola, P. Martínez, S. Cabezas, and M. S. Bó (2011). Ectoparasites in free-ranging American Kestrels in Argentina: implications for the transmission of viral diseases. *Journal of Raptor Research* 45:335–341.
- Liébana, M. S., J. H. Sarasola, and M. S. Bó (2009). Parental care and behavior of breeding American Kestrels (*Falco sparverius*) in central Argentina. *Journal of Raptor Research* 43:338–344.
- Linardi, P. M., V. A. Cardoso, J. R. Botelho, M. Lareschi, and T. R. O. Freitas (2005). *Polygenis (Polygenis) platensis* (Jordan and Rothschild) (Siphonaptera: Rhopalopsyllidae, Rhopalopsyllinae), a new record in Brazil. *Neotropical Entomology* 34:837–841.
- McClure, C. J. W., S. E. Schulwitz, R. Van, B. P. Pauli, and J. A. Heath (2017). Commentary: research recommendations for understanding the decline of American Kestrels (*Falco sparverius*) across much of North America. *Journal of Raptor Research* 51:455–464.
- Møller, A. P. (1998). Evidence of larger impact of parasites on hosts in the tropics: investment in immune function within and outside the tropics. *Oikos* 82:265–270.
- Morishita, T. Y., J. W. Mertins, D. G. Baker, C. M. Monahan, and D. L. Brooks (2001). Occurrence and species of lice on free-living and captive raptors in California. *Journal of Avian Medicine and Surgery* 15:288–292.
- Mueller, N. S., H. C. Mueller, and D. D. Berger (1969). Host records and phenology of louse-flies on Wisconsin birds. *Wisconsin Academy of Sciences, Arts and Letters* 57:189–207.
- Orozco-Valor, P. M., and J. M. Grande (2016). Exceptionally large clutches in two raptors breeding in nest boxes. *Journal of Raptor Research* 50:232–236.
- Philips, J. R. (2000). A review and checklist of the parasitic mites (Acarina) of the Falconiformes and Strigiformes. *Journal of Raptor Research* 34:210–231.
- Philips, J. R. (2007). Pathology: B. Ectoparasites. In *Raptor Research and Management Techniques* (D. M. Bird and K. L. Bildstein, Editors). Hancock House Publishers Ltd, Surrey, BC, Canada, and Blaine, WA, USA. pp. 311–317.
- Philips, J. R., and D. L. Dindal (1977). Raptor nest as a habitat for invertebrates: a review. *Raptor Research* 11:86–96.
- Price, R. D., and J. R. Beer (1967). The genus *Heteromenopon* (Mallophaga: Menoponidae), with description of a new subgenus and six new species. *Annals of the Entomological Society of America* 60:328–338.
- Price, R. D., R. A. Hellenthal, R. L. Palma, K. P. Johnson, and D. H. Clayton (2003). *The Chewing Lice: World Checklist and Biological Overview*. Illinois Natural History Survey Special Publication 24, Champaign, IL, USA.
- Santillán, M. Á., J. M. Grande, M. S. Liébana, P. Martínez, L. A. Díaz, L. A. Bragagnolo, C. Solaro, M. A. Galmes, and J. H. Sarasola (2015). New hosts for the mite *Ornithonyssus bursa* in Argentina. *Medical and Veterinary Entomology* 29:439–443.
- Sarasola, J. H., M. Á. Santillán, and M. A. Galmes (2003). Food habits and foraging ecology of American Kestrels in the semiarid forests of central Argentina. *Journal of Raptor Research* 37:236–243.
- Smallwood, J. A., and D. M. Bird (2002). American Kestrel (*Falco sparverius*). In *The Birds of North America* (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA.
- Smit, F. G. A. M. (1987). *An Illustrated Catalogue of the Rothschild Collection of Fleas (Siphonaptera) in the British Museum (Natural History)*. 7. Malacopsylloidea (Malacopsyllidae and Rhopalopsyllidae). Oxford University, London, UK.
- Smith, B. W., and J. R. Belthoff (2001). Identification of ectoparasites on Burrowing Owls in southwestern Idaho. *Journal of Raptor Research* 35:159–160.

Received 4 February 2019; accepted 9 June 2019  
Associate Editor: Christopher J. W. McClure

#### The *Journal of Raptor Research* News

The *Journal of Raptor Research* is planning a special issue on Neotropical raptors. Manuscripts addressing any aspect of the ecology and conservation of these species are encouraged. Authors are invited to submit to the *Journal of Raptor Research* at <https://www.editorialmanager.com/raptorresearch/default.aspx> by 1 April 2020. Manuscripts must meet *Journal of Raptor Research* standards and will be subject to the typical peer-review process. Please see JRR Information for Contributors, <https://raptorresearchfoundation.org/publications/journal-of-raptor-research/submission-guidelines/> for instructions on formatting and submission.