

RESEARCH NOTE

Helminths of Geoffroy's cat, *Oncifelis geoffroyi* (Carnivora, Felidae) from the Monte desert, central Argentina

Pablo M. Beldomenico^{1,2*}, John M. Kinsella², Marcela M. Uhart³, Gabriela L. Gutierrez¹, Javier Pereira^{3,4}, Hebe del Valle Ferreyra³ and Carolina A. Marull³

¹Facultad de Ciencias Veterinarias, Universidad Nacional del Litoral, RP Kreder 2805 (3080) Esperanza, Argentina; ²HelmWest Laboratory, 2108 Hilda Avenue, Missoula, MT 59801, U.S.A.; ³Proyecto Gatos del Monte, Field Veterinary Program, Estivariz 197, Puerto Madryn (9120), ⁴Asociación para la Conservación y el Estudio de la Naturaleza, Iberá 1575 8° B, Buenos Aires; Argentina

Abstract

Gastrointestinal parasites were collected from 7 free-ranging Geoffroy's cats, *Oncifelis geoffroyi* from Lihué Calel National Park, Argentina. Also, fecal samples were analyzed from these animals and 3 other sympatric ones. The helminths were identified as *Vigosospirura potekhina*, *Didelphonema longispiculata*, *Pterygodermatites cahirensis*, *Trichuris campanula*, *Ancylostoma tubaeforme*, *Toxocara cati*, and *Taenia* sp. Fecal analysis revealed the presence of eggs of *Capillaria* sp. and an unidentified anoplocephalid tapeworm, and coccidian oocysts. The findings of *V. potekhina*, *D. longispiculata*, *P. cahirensis*, and *T. campanula* represent first records of these species in *O. geoffroyi*. Further, the former three had never been reported in South America.

Key words

Gastrointestinal parasites, *Oncifelis geoffroyi*, Felidae, Argentina

Information on the helminths of Neotropical felids is scarce. Although 10 of the 12 existing wild felids of the Americas can be found in Argentina (Nowell and Jackson 1996), there are few reports of these carnivore parasites in that country. One of the most widespread species in southern South America is the Geoffroy's cat, *Oncifelis geoffroyi* (d'Orbigny et Gervais, 1844), which can be found from southern Brazil and Bolivia throughout southern Patagonia in Argentina and Chile. Although this species occurs in a wide variety of habitat types, most of this cat's range encompasses arid and semiarid environments (Gomes de Oliveira 1994, Nowell and Jackson 1996). Like most other small wild cats of the region, the biology of this species is poorly known. Its helminth fauna is one of the least explored topics.

In central Argentina, the Geoffroy's cat population of Lihué Calel National Park (LCNP; 37°57'S 65°33'W, 9900 ha) is being studied by the project *Gatos del Monte*. This protected area, representing the Monte Ecoregion, is composed of flat terrain except for a large, isolated set of bare rock hills

(590 m a.s.l.). The vegetation is characterized by a mosaic of creosote bush flats (*Larrea* sp.), grasslands (mainly bunch grasses of the *Stipa* sp.), and mixed shrub patches (Administración de Parques Nacionales, Buenos Aires, 1983). A severe drought occurred in 2003 in central Argentina. In some places such as the LCNP, this was the most severe drought since 1965. As a result, six radio-collared adult female Geoffroy's cats were found dead between May-June 2003. Necropsies and parasite collection were conducted. Death was tentatively attributed to starvation, which was later confirmed by histopathology. Additionally, in July 2004 an adult male cat was shot by a farmer near the park's boundaries and it was necropsied to collect parasites. A fecal sample had been previously taken from each dead cat and from three other sympatric radio-collared cats. By previously described methods (Beldomenico *et al.* 2003), each section of the gastrointestinal tract was searched for metazoan parasites, and fecal samples were preserved in 3.5% formalin saline until analyzed at the laboratory by a sedimentation-flotation technique. Five of

*Corresponding author: pbeldome@fcv.unl.edu.ar

each specific adult parasites or eggs were measured, and the measurements were reported as arithmetic mean and standard deviation (SD). When fewer specimens were available for measuring, the range or the unique value were reported.

Voucher specimens were deposited at the Colección de Parasitos de Vertebrados Silvestres of Universidad Nacional del Litoral, Esperanza, Argentina (Acc. no: LP00016-LP00035). Our findings are summarized in Table I.

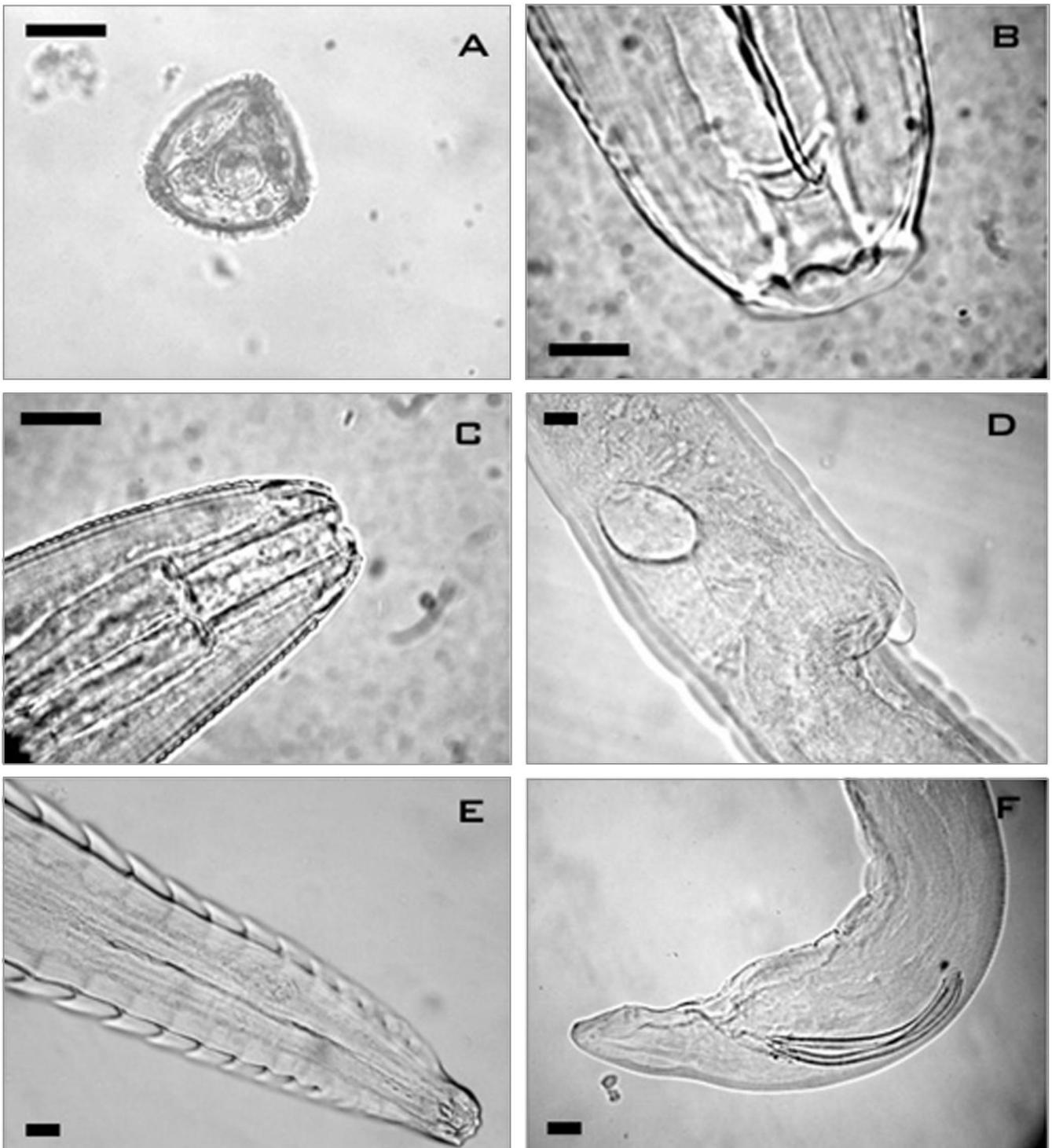


Fig. 1. Parasites recovered from necropsied Geoffroy's cats from Lihué Calel National Park, Argentina: **A** – cestode egg, **B** – oral extremity of *Vigispirura potekhina*, **C** – oral extremity of *Didelphonema longispiculata*, **D** – vulvar region of *Trichuris campanula*, **E** – oral extremity of *Pterygodermatites cahirensis*, **F** – caudal extremity of a male *Pterygodermatites cahirensis*. Scale bars = 25 μ m

Fecal analysis

Capillaria sp. eggs measuring 49.5 (SD = 2.6) \times 37.9 μm (SD = 2.8) were detected in 4 of 9 fecal samples. Eggs resembling *Ancylostoma* sp., measuring 65.6 (SD = 3.5) \times 37.9 μm (SD = 2.8) were detected in 2 of 9 fecal samples. *Trichuris* sp. eggs measuring 70.6 (SD = 5.7) \times 32.2 μm (SD = 3.5) were detected in 5 of 9 fecal samples. Eggs resembling *Toxocara* sp., measuring 74.4 (SD = 14.9) \times 60.3 μm (SD = 7.2) were detected in 1 of 9 fecal samples. Triangular cestode eggs with a pyriform apparatus resembling those of Anoplocephalidae (Fig. 1A) were found in one sample. Immature coccidian oocysts measuring 26.2 μm (SD = 1.7) were detected in 2 of 9 fecal samples. These findings are not different from those reported for other Neotropical felids (Patton *et al.* 1986).

Adults

Vigisospirura potekhina (Petrow et Potekhina, 1953) (Spirurida, Spirocercidae) (Fig. 1B): a total of 39 adult specimens was collected from the oesophagus and 11 from the stomach of 5 cats. The female:male ratio (FMR) was 4.1. This spirurid parasitizes both felids (Wong *et al.* 1980, Torres *et al.* 1998) and badgers, *Meles meles* (Torres *et al.* 2001) in the Old and the New World. This represents the first report of the species in South America.

Didelphonema longispiculata (Hill, 1939) (Spirurida, Spirocercidae) (Fig. 1C): 160 adult specimens were collected from the stomach of 2 of the cats. The FMR was 4.0. Although this New World parasite has been found in marsupials and felids of North America (Stewart and Dean 1971, Pence and Eason 1980, Wong *et al.* 1980), very little has been published about its host-parasite relationships. This represents the first report of the species in South America.

Pterygodermatites (Multipectines) cahirensis Quentin, 1969 (Spirurida, Rictulariidae) (Fig. 1E–F): a single male of this species was found in the small intestine of one necropsied cat. The spicules measured 161×15 μm . This parasite is preva-

lent in canids from the Old and the New World (Young and Pence 1979). In the southern United States, it is commonly found in coyotes (*Canis latrans*) and less frequently in bobcats (*Lynx rufus*) (Stone and Pence 1978). Although *P. cahirensis* is considered to be distributed in carnivores worldwide (Young and Pence 1979), this is the first record from South America.

Trichuris campanula Linstow, 1889 (Enoplida, Trichuridae) (Fig. 1D): 97 adult specimens were collected from the large intestine of 3 cats. The FMR was 1.7. In males, the spicule measured 1065 μm (SD = 105) and was contained within a spinous sheath. Until the late 1970's, the findings of feline whipworms in the New World were confined to South America and Cuba (Enzie 1951; Hass 1973, 1978). To date, the only *Trichuris* sp. reported for domestic cats are *Trichuris serrata* Linstow, 1879 and *Trichuris campanula* Linstow, 1889 (Urioste 1923, Clarkson 1960, Kelly 1973, Ng and Kelly 1975, Hass and Meisels 1978). Both species were originally described from domestic cats from Brazil. Regarding wild felids, there is only one record of a *Trichuris* sp. (named *Trichocephalus*) from a tiger-cat (*Leopardus tigrinus*) in Brazil (Diesing 1851). Our finding constitutes the first record of *T. campanula* for *O. geoffroyi*.

Ancylostoma tubaeforme (Zeder, 1800) (Strongylida, Ancylostomatidae): nine hookworms were found in the small intestine of two Geoffroy's cats. The FMR was 0.6. *A. tubaeforme* is a cosmopolitan hookworm of cats (Anderson 2000). In the Neotropical region, it was reported for otter cat, *Herpailurus yagouaroundi*; jaguar, *Panthera onca* (Thatcher 1971); and Argentinean *O. geoffroyi* (Martinez 1987). The infection by this species may indicate interaction with domestic cats.

Toxocara cati (Shrank, 1788) (Ascaridida, Ascarididae): 211 specimens were collected from the stomach and small intestine of 6 cats. The FMR was 3.25. This ascarid is a cosmopolitan parasite of felids, including domestic cats and wild felids in the subfamilies Felinae and Pantherinae (Anderson

Table I. Helminths collected from free-ranging *Oncifelis geoffroyi* from Lihué Calel National Park, Argentina

	<i>D. longispiculata</i>	<i>P. cahirensis</i>	<i>Taenia</i> sp.	<i>T. cati</i>	<i>T. campanula</i>	<i>V. potekhina</i>	<i>A. tubaeforme</i>
Prevalence	2/7	1/7	3/7	6/7	3/7	5/7	2/7
Maximum intensity	146	1	37	57	52	24	5
Length, females ^a	7.1	NA	NA	63.8	23.9	15.7	6.5–10.0
Mean (SD)	(0.7)			(10.5)	(8.2)	(2.5)	
Length, males ^a	3.9	3.3	NA	41.0	22.1	10.9	6.4
Mean (SD)	(0.2)			(3.7)	(2.5)	(0.3)	(0.4)
Eggs, measures ^b	31 \times 15	NA	30.8 \times 36.5	74.4 \times 60.3	70.6 \times 32.2	55.5 \times 27.5	65.6 \times 37.9

^aIn millimeters, ^bin micrometers, NA – is not available.

2000). This species was found in association with *Toxocara canis* in free-ranging *O. geoffroyi* from northern Argentina (Martinez 1987). The infection by this species probably represents interaction with domestic cats.

Taenia sp. (Cestoda, Taeniidae): 3, 7 and 37 tapeworms of this genus were found in the small intestines of 3 cats, respectively. The scolex diameter measured 524–620 µm, the rostellum diameter was 356–403 µm, and the suckers ranged from 201 to 248 µm. Total numbers of hooks ranged from 40 to 46; large hooks were 165 to 170 µm long and small hooks 130 to 140 µm long. Eggs were typical of Taeniidae. For South America, the only records of *Taenia* spp. of felids are *Taenia omissa* Lühe, 1910 from cougar (*Puma concolor*), and *Taenia macrocystis* (Diesing, 1850) from *O. geoffroyi*, *P. onca* and *H. yagouaroundi* (Verster 1969, Schmidt and Martin 1978). The number, size, and shape of the rostellar hooks found here are quite different from *T. omissa* and *T. macrocystis*, as well as the common North American taeniids of felids, *T. taeniaeformis* and *T. rileyi*. Hook size and shape seem closest to *T. hydatigena*, but the size of the large hooks is at the extreme low end of the range for this species, which has not been reported from South America (Loos-Frank 2000). It is possible the species found here is undescribed and more study is warranted (Robert L. Rausch, pers. commun.). To date, the only cestode reported for *O. geoffroyi* in Argentina was *Echinococcus oligarthrus* (Diesing, 1863), which was found in animals from the same province as the present study (Schantz and Colli 1973).

The findings of *V. potekhina*, *D. longispiculata*, *P. cahirensis*, and *T. campanula* represent the first records of these species in *O. geoffroyi*. Further, the former three had never been reported for South America. Probably, this reflects lack of investigation rather than recent introduction of the parasites. Infections with *T. cati*, *A. tubaeforme* and *T. cf. hydatigena* might be the result of interactions with domestic cats.

Acknowledgements. This project was funded by The Rufford Foundation, The Whitley Laing Foundation, The Cleveland Metropolitan Zoo and The Rhode Island Zoological Society. We also thank the financial and institutional support of Jim Sanderson (Conservation International), and the Field Veterinary Program, Wildlife Conservation Society, Natalia Fracassi for sampling assistance, Leandro Antoniazzi and Luciana Camuz Ligios for field support, and Dr. Robert L. Rausch for his opinion on the cestodes.

References

- Anderson R.C. 2000. Nematode parasites of vertebrates: their development and transmission. CABI Publishing, Wallingford.
- Beldomenico P.M., Uhart M., Bono M.F., Marull C., Baldi R., Peralta J.L. 2003. Internal parasites of free-ranging guanacos from Patagonia. *Veterinary Parasitology*, 118, 71–77.
- Clarkson M. 1960. The species of *Trichuris* in the domestic cat. *Journal of Helminthology*, 34, 319–322.
- Diesing K.M. 1851. Systema helminthum. Vol. 2. Vindobonae.
- Enzie F.D. 1951. Do whipworms occur in domestic cats in North America? *Journal of the American Veterinary Medical Association*, 119, 210–213.
- Gomes de Oliveira T. 1994. Neotropical cats. Ecology and conservation. São Luís, EDUFMA.
- Hass D.K. 1973. Do whipworms occur in cats? *Feline Practice*, 3, 36–37.
- Hass D.K. 1978. Feline whipworms do exist. *Feline Practice*, 8, 31–32.
- Hass D.K., Meisels L.S. 1978. *Trichuris campanula* infection in a domestic cat from Miami, Florida. *Journal of Veterinary Research*, 39, 1553–1555.
- Kelly J.D. 1973. Occurrence of *Trichuris serrata* von Linstow, 1889 (Nematoda: Trichuridae) in the domestic cat (*Felis catus*) in Australia. *Journal of Parasitology*, 59, 1145–1146.
- Loos-Frank B. 2000. An up-date of Verster's (1969) 'Taxonomic revision of the genus *Taenia* Linnaeus' (Cestoda) in table format. *Systematic Parasitology*, 45, 155–184.
- Martinez F.A. 1987. Zooparásitos de mamíferos silvestres. *Veterinaria Argentina*, 4, 266–271.
- Ng B.K.Y., Kelly J.D. 1975. Isolation of *Trichuris campanula* von Linstow, 1889 from Australian cats. *Australian Veterinary Journal*, 51, 450–451.
- Nowell K., Jackson P. 1996. Wild cats. Status survey and conservation action plan. Gland, Switzerland, IUCN/SSC Cat Specialist Group.
- Patton S., Rabinowitz A., Randolph S., Johnson S.S. 1986. A coprological survey of parasites of wild neotropical Felidae. *Journal of Parasitology*, 72, 517–520.
- Pence D.B., Eason S. 1980. Comparison of the helminth faunas of two sympatric top carnivores from the rolling plains of Texas. *Journal of Parasitology*, 66, 115–120.
- Schantz P., Colli C. 1973. *Echinococcus oligarthrus* (Diesing, 1863) from Geoffroy's cat (*Felis geoffroyi*) in temperate South America. *Journal of Parasitology*, 59, 1138–1140.
- Schmidt G.D., Martin R.L. 1978. Tapeworms of the Chaco Boreal, Paraguay, with two new species. *Journal of Helminthology*, 52, 205–209.
- Stewart T.B., Dean D. 1971. *Didelphonema longispiculata* (Hill, 1939) Wolfgang, 1953 (Nematoda: Spiruroidea) and other helminths from the opossum (*Didelphis marsupialis virginiana*) in Georgia. *Journal of Parasitology*, 57, 687–688.
- Stone J.E., Pence D.B. 1978. Ecology of helminth parasitism in the bobcat from West Texas. *Journal of Parasitology*, 64, 295–302.
- Thatcher V.E. 1971. Some hookworms of the genus *Ancylostoma* from Colombia and Panama. *Proceedings of the Helminthological Society of Washington*, 38, 245–248.
- Torres J., Garcia-Perea R., Gisbert J., Feliu C. 1998. Helminth fauna of the Iberian lynx, *Lynx pardinus*. *Journal of Helminthology*, 72, 221–226.
- Torres J., Miquel J., Motje M. 2001. Helminth parasites of the eurasian badger (*Meles meles* L.) in Spain: a biogeographic approach. *Parasitology Research*, 87, 259–263.
- Urioste O. 1923. Contribuição ao estudo do *Trichuris*. These, Rio de Janeiro, 1–57.
- Verster A. 1969. A taxonomic revision of the genus *Taenia* Linnaeus, 1758. *Onderstepoort Journal of Veterinary Research*, 36, 3–58.
- Wong P.L., Watson T., Anderson R.C. 1980. *Vigisospirura potekhina* (Petrov and Potekhina, 1953) (Nematoda: Spiruroidea) from a bobcat, *Lynx rufus* (Schreber), in the Southeastern U.S.A. *Canadian Journal of Zoology*, 58, 1612–1616.
- Young V., Pence D. 1979. Redescription and notes on the ecology of *Pterygodermatites (Multipectines) cahirensis* (Jägerskiöld, 1909) Quentin, 1969 (Nematoda: Riculariidae) from West Texas carnivores. *Proceedings of the Helminthological Society of Washington*, 46, 28–35.

(Accepted June 10, 2005)