

Risks Associated With Ectoparasites of Wild Mammals in the Department of Quindío, Colombia

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ABSTRACT

Animals impounded by local regulatory agencies could be used as a source of ectoparasites for monitoring vectors of zoonotic pathogens. In the period between April 2004 and September 2005, 41 wild mammals were either impounded by the Corporación Autónoma Regional del Quindío (CRQ) or voluntarily delivered to this institution. The mammals represented 6 different orders and 14 species, from which 17 individuals (41%) had ectoparasites. A total of 582 arthropod ectoparasites were identified from 11 different genera. The highest mean intensities corresponded to the chewing lice *Gyropus ovale*, the flea *Xenopsylla cheopis*, and the ticks *Amblyomma* sp. This is the first systematic ectoparasite infestation data for a sample of wild mammals in the department of Quindío, Colombia, that shows the presence of ectoparasitic vectors of zoonotic pathogens. These results may help to evaluate the risks associated with the increased contacts of wild mammals with domestic animals and people in this region.

INTRODUCTION

The Quindío is a department in the coffee growing region of Colombia. This area is located in the western central region of the country within the central mountain range. Its capital is Armenia. Despite the prosperity that coffee brought to the country in the last century, this department has turned to tourism in the last 10 years. The increase in tourism as an alternative source of income for the region has increased the contact between humans and domestic animals and wild animals, and in turn has increased the probability for ectoparasite infestations and vector-borne infections of humans and domestic animals.¹

The Corporación Autónoma Regional del Quindío (CRQ) preserves local fauna by guaranteeing the well-being of the impounded animals. The number of impounded animals increases as a result of the indiscriminate extraction and illegal commerce of exotic species.²

Little information is available on the wild mammal ectoparasites in Colombia.^{1,3-8} Ectoparasites are irritating pests of humans and animals and may be vectors of zoonotic pathogens that cause diseases such as anaplasmosis, ehrlichiosis, rickettsiosis, borreliosis, plague, viral encephalitis, typhus, and tularemia.

The objective of the work reported herein was to identify the arthropod ectoparasites parasitizing wild mammals in the department of Quindío to provide information on the risks associated with contacts of the wild fauna with domestic animals and people in this region.

MATERIALS AND METHODS

Forty one wild mammals impounded by the CRQ or voluntarily delivered to the institution between April 2004 and September 2005 were analyzed. Wild mammals were captured in different municipalities of the department of Quindío. The mammals were classified according to the Emmons and Feer⁹ guidelines for families and genera and the Colombian field guide for terrestrial and flying mammals.¹⁰

For examination, each animal was restrained and anesthesia was administered to 4 sloths only (3 *Choloepus hoffmanni* and 1 *Choloepus didactylus*) following CRQ guidelines and protocols.¹¹ Mammals were examined for ectoparasites using the method of Bittencourt and Rocha.¹² This method was modified to examine 10 of the 12 body areas originally described for rodents. The animals were put on a white bed sheet and then combed with a flea comb or a toothbrush to remove the ectoparasites. Ectoparasites were collected by hand or using a narrow pointed set of pliers.¹³ The ectoparasites found on each host were stored in independent flasks in 70% ethanol.

Ectoparasites were taken to the University of Quindío, and counted and grouped according to morphotype. Samples were then taken from each morphotype group, bleached with KOH, and placed on microplates for taxonomic identification under the microscope. Ectoparasites were identified following the keys provided for Mallophaga,^{14,15} Siphonaptera,^{14,16} Diptera, and mites¹⁴ and ticks.¹⁷

Photographic registries were taken for both host and ectoparasites. Voucher specimens from this study are deposited in the University of Quindío entomology laboratory collection.

Infestation parameters calculated for each ectoparasite species parasitizing each host species were prevalence (percent of hosts infested), mean intensity (mean per infested host), species richness (S = number of species), and Shannon diversity's index ($H = -\sum [pi \ln pi]$, where pi = proportion of each ectoparasite species in the sample) following Bush et al¹⁸ and Lareschi et al.¹⁹

RESULTS

Forty one wild mammals impounded by the CRQ or voluntarily delivered to the institution between April 2004 and September 2005 were examined for ectoparasites.

These 41 mammals represented the families Didelphidae (*Didelphis marsupialis*, n = 4), Megalonychidae (*C. hoffmanni*, n = 11; *C. didactylus*, n = 1), Dasypodidae (*Dasyopus novemcinctus*, n = 4), Myrmecophagidae (*Tamandua tetradactyla*, n = 1), Sciuridae (*Sciurus granatensis*, n = 6), Dinomyidae (*Dinomys branickii*, n = 1), Dasyproctidae (*Dasyprocta punctata*, n = 4), Cebidae (*Aotus* sp, n = 1), Canidae (*Cerdocyon thous*, n = 2), Procyonidae (*Nasua nasua*, n = 1; *Potos flavus*, n = 3), and Cervidae (*Mazama rufina*, n = 1; *Odocoileus virginianus*, n = 1) (Table 1).

Of the 41 mammals examined, 17 individuals from 10 different species had ectoparasite infestations (Table 1). Individuals from 4 species (*S. granatensis*, *P. flavus*, *D. punctata*, and *Aotus* sp) did not present ectoparasites. Lice (Insecta: Mallophaga), fleas (Insecta: Siphonaptera), fly (Insecta: Diptera), and mites and ticks (Chelicerata: Acari) (n = 582) were identified infesting the wild mammals examined in the study (Table 1). Although limited by the number of individuals examined, the highest mean intensities corresponded to the chewing lice, *Gyropus ovale*, the flea *Xenopsylla cheopis*, and the ticks *Amblyomma* sp (Table 1). High values of ectoparasite species richness and diversity were found on *C. thous* (S = 4; H = 1.28) and *T. tetradactyla* (S = 3; H = 0.82).

Table 1. Ectoparasites Collected From Wild Mammals in the Department of Quindío, Colombia.

Ectoparasite Species	Host Species	Prevalence (%)*	Mean Intensity†
Lice			
<i>Gyropus ovale</i>	<i>Dinomys branickii</i>	1/1 (100)	487
Fleas			
<i>Leptopsylla</i> sp	<i>Didelphis marsupialis</i>	1/4 (25)	1
<i>Echidnophaga</i> sp	<i>Tamandua tetradactyla</i>	1/1 (100)	1
<i>Xenopsylla cheopis</i>	<i>Tamandua tetradactyla</i>	1/1 (100)	1
	<i>Dasyus novemcinctus</i>	1/4 (25)	29
<i>Pulex</i> sp	<i>Cerdocyon thous</i>	2/2 (100)	3
<i>Ctenocephalides felis</i>	<i>Cerdocyon thous</i>	1/2 (50)	1
<i>Ctenocephalides canis</i>	<i>Nasua nasua</i>	1/1 (100)	3
	<i>Odocoileus virginianus</i>	1/1 (100)	2
Fly			
<i>Simulium</i> sp	<i>Odocoileus virginianus</i>	1/1 (100)	1
Mites			
<i>Dermanyssus</i> sp	<i>Dinomys branickii</i>	1/1 (100)	4
	<i>Didelphis marsupialis</i>	1/4 (25)	1
Ticks			
<i>Amblyomma</i> sp‡	<i>Tamandua tetradactyla</i>	1/1 (100)	12
	<i>Choloepus hoffmanni</i>	1/11 (9)	1N
<i>Amblyomma varium</i>	<i>Choloepus hoffmanni</i>	6/11 (54)	4.3
	<i>Choloepus didactylus</i>	1/1 (100)	1
<i>Ixodes</i> sp	<i>Mazama rufina</i>	1/1 (100)	1
	<i>Cerdocyon thous</i>	2/2 (100)	1N
<i>Rhipicephalus sanguineus</i>	<i>Cerdocyon thous</i>	1/2 (50)	2

N = nymph

*Prevalence represents the percent of hosts infested.

†Mean intensity represents the mean per infested host.

‡Probably *A. nodosum* (A. Estrada-Peña, personal communication).

DISCUSSION

Animals impounded by local regulatory agencies could be used as a source of ectoparasites for monitoring vectors of zoonotic pathogens. Herein we report the first systematic ectoparasite infestation data for a sample of wild mammals in the department of Quindío, Colombia. These data are significant because of the possible impact on the evaluation of the risks associated with the increased contacts of wild mammals with domestic animals and people in this region.

The chewing lice (*G. ovale*), commonly found in guinea pigs (*Cavia porcellus*) and other rodents in the Neotropics,¹⁵ was the

most abundant ectoparasite in the study with 487 individuals in one pacarana (*D. branickii*). Pacarana is a rare species in the region. The infestation of pacarana with vectors of pathogens may contribute to the local extinction of this species.²⁰

Fleas were found infesting several host species in the study. Many flea species parasitize different distantly related hosts.^{21,22} *Leptopsylla* and *Echidnophaga* species are widely distributed throughout many regions of the world infesting rats.²³ *Pulex* species have been found parasitizing wild mammals in South America.^{21,24} *Ctenocephalides canis* is a common ectoparasite of dogs that has been found in other host species, such as

cats, rabbits, rats, crab-eating foxes (*C. thous*), and humans.²⁵ *Ctenocephalides felis* was previously described from a jaguar (*Panthera onca*) in Brazil²⁶ and from southern opossums (*D. marsupialis*).¹³ *Xenopsylla cheopis* and other flea species are vectors of *Yersinia pestis*, *Rickettsia typhi*, and other disease-causing organisms.²⁷ *Xenopsylla cheopis* is found infesting rodents and opossums in South America.^{13,28} However, the finding of *X. cheopis* in the southern tamandua (*T. tetradactyla*) and the 9-banded armadillo (*D. novemcinctus*) indicated that other host species that could be in close contact with humans and domestic animals may be infested by this ectoparasitic vector. For example, armadillos are natural reservoir for leprosy and are used in the Quindío by local inhabitants for culinary and healing practices.²⁹

The only fly described in the study (*Simulium* sp) was collected from a deer (*O. virginianus*). This ectoparasite, which frequently parasitizes humans and wild and domestic animals in coffee plantations in Colombia,³⁰ was found in a wound that had conidia of *Trichophyton* sp in the base of the horns of the deer. *Simulium* species are irritating pests that produce multiple bites in their hosts and are the principal vector of onchocercosis caused by *Onchocerca volvulus*.²⁹

One mite, *Dermanyssus* sp, was collected from a southern opossum (*D. marsupialis*). *Dermanyssoidea* are implicated in the transmission of both bacteria (Salmonella, Spirocheta, Rickettsia, or Pasteurella) and viruses (equine encephalitis viruses, West Nile virus, Fowl pox virus, the virus causing Newcastle disease, and tick-borne encephalitis viruses or hantaviruses).³¹ The presence in the opossum of this bloodsucking mesostigmatid mite, which normally infests birds, could be explained by recent contacts of the opossum with infested birds and/or by the possibility that this mite could infest mammals when other hosts are not available.

Amblyomma, *Ixodes*, and *Rhipicephalus* species of ticks were collected from infested mammals. *Amblyomma varium* was the most abundant tick species found in the study. In agreement with the findings reported here, this tick species parasitizes predominantly mammals of the order Xenarthra.⁷ An *Amblyomma* species was found in the only tamandua (*T. tetradactyla*) examined. Infestations of tamandua with *Amblyomma nodosum*,³² *Amblyomma calcaratum*,³² *Amblyomma parvum*,³³ and *Amblyomma cajennense*³⁴ have been previously reported. The *Amblyomma* sp nymph collected from a southern 2-toed sloth (*C. hoffmanni*) probably corresponds to *A. varium*.

An *Ixodes* species was found in the external auditory conduct of a little red brocket deer (*M. rufina*). In this host species, infestations by *Haemaphysalis leporispalustris*, *Haemaphysalis juxtakochi*, *Boophilus microplus*, and *Ixodes affinis* have been previously reported.³²

Rhipicephalus sanguineus adults were collected from a crab-eating fox (*C. thous*). This tick species parasitizes Carnivora in the Neotropics and other regions of the world.⁷ However, some authors question whether more than one species occurs under the name of *R. sanguineus* in the Neotropical region.⁷ *Rhipicephalus sanguineus* is a vector of pathogens causing diseases in the Neotropic.⁷

In summary, the results presented herein document the infestation of wild mammals in the department of Quindío with ectoparasitic vectors of zoonotic pathogens. Characterizing the host associations and distributions of ectoparasites of wild animals is fundamental to understand and control zoonotic diseases.

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