

Flea (Siphonaptera: Pulicidae) prevalence and first record of *Ctenocephalides canis* (Curtis, 1826) in domestic dogs in north-central México

Abstract

The objective of the present study was to report the prevalence of fleas and describe for the first time the presence of *Ctenocephalides canis* (Curtis) in dogs from Gómez Palacio and Lerdo, Durango, México. A total of 217 dogs were inspected, five of them (2.3%) were parasitized by fleas. The specimens were identified as *C. canis* and *C. felis* fleas. The existence of these ectoparasites in domestic dogs is of public and veterinary concern, due to the putative role of this fleas in the transmission of zoonotic pathogens in the study area.

Keywords: fleas, first record, *ctenocephalides canis*, *ctenocephalides felis*, domestic dogs, comarca lagunera

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Introduction

The domestic dog is parasitized by arthropods like ticks (Acari: Ixodidae), lice (Insecta: Anoplura), and fleas (Insecta: Siphonaptera). Fleas are wingless, with laterally compressed body, obligate ectoparasites, with a very high specialization to live over its host.¹ Commonly, fleas are considered important only as plague of some domestic animals; however, they are important due to their association in the transmission of zoonotic diseases.² Around the world 2574 flea species are known, of which in México there exist eight families, and 172 species corresponding to 7% of the total fleas of the world, and the two main families are Ceratophyllidae with 74 species and Ctenophthalmidae with 45 species.³ The domestic dog can be parasitized by two main flea species: *Ctenocephalides canis* (Curtis) and *Ctenocephalides felis* (Bouché), and the last being considered the most predominant species worldwide.⁴

Around the world it is known that fleas are vectors of pathogenic agents transmitted to humans and animals with, some of these microorganisms including *Bartonella henselae*, *Rickettsia felis*, *R. typhi*, and *Yersinia pestis*.^{5,6} However, in the last years fleas have been implicated as potential vectors of bacteria belonging to the “Spotted Fever” rickettsia, new genotypes of *Bartonella*, as well as *Coxiella burnetii*, *Mycoplasma haemominutum*, *Mycoplasma haemofelis*, *Anaplasma ovis*, *A. marginale*, *A. phagocytophilum*, and *Ehrlichia canis*.⁷⁻⁹

In México, reports over the presence of *C. canis* and *C. felis* parasitizing domestic dogs in the central and south part of the country;¹⁰⁻¹² nevertheless, in the north-central part there are no reports

over the presence of these flea species parasitizing domestic dogs. The objective of the present study was to identify the flea species that parasitize domestic dogs of Gomez Palacio and Lerdo, in Durango state, México.

Material and methods

Fleas were collected during June to September 2016 in Gómez Palacio (25°32' and 25° 54' N, -103°19' and 103°42' O) and Lerdo (25°10' and 25°47' N, -103°20' and -103°49' O), both cities in Durango state, located at north-central part of México, at an average altitude of 1,150 and 1,140 msnm, respectively. Both cities have a very dry semi-arid climate, with a temperatura ranging from 14-22°C, summer rains (100-400mm), and a scrub and pasture like vegetation (Figure 1).^{13,14}



Figure 1 Location of the study area.

Each domestic dog in this study was visually inspected, and as described by Rinaldi et al.,¹⁵ with the sites of predilection by fleas were specially inspected. All specimens were collected manually using entomologic forceps, and deposited in 70% alcohol containing vials, and transferred at the Laboratorio de Biología Molecular, Departamento de Parasitología, Universidad Autónoma Agraria Antonio Narro, Unidad Laguna. The taxonomic identification of the specimens was realized using stereoscopic microscope (Zeiss Discovery V8), according to adequate taxonomic keys.¹⁶

Results and discussion

A total of 217 female and male domestic dogs of different age and breed were inspected to detect the presence of fleas. Only in five dogs, fleas were observed for a total prevalence of 2.3% (Table 1). For each dog, 30 fleas were collected for a total of 150 specimens, of which, 138 (92%) were consistent with *C. felis* description, and 12 (8%) with *C. canis* description. The identification of the specimens was limited only to genera and species, but not to determine the sex; furthermore, during the study no other flea species were identified.

Table 1 Site and characteristics of the sampled animals and specimen collected in the study

Locality	Sample	Sex	Specimen	
Gómez Palacio			<i>C. canis</i>	<i>C. felis</i>
	1	Male	1	29
	2	Female	5	25
	3	Female	2	28
	Lerdo			
	4	Female	2	28
	5	Female	2	28
Total			12	138

In Figure 2, differences between the two flea species are shown. It could be noted the presence of the pronatal comb (with six spines for both species), as well as the rounded margin in the case of *C. canis*; however, the head has a longer and more pronounced angle in *C. felis*. It is notably to highlight that the two species were found as mixed infestation in the studied dogs; however, *C. felis* was the most prevalent flea (Table 1), as stated by Beugnet et al.⁴ In the scientific literature, there are reports of mixed infections by *C. canis* and *C. felis*,^{11,15,17} similar to the observations in our study, were all the positive dogs presented infestation of at least one specimen of both species. It is known that the presence of *C. canis* has more restricted geographic distribution, and that the presence of *C. felis* has increased, even displacing *C. canis*, from which the reasons are not well.¹¹ In the present study, more than 90% of the specimens were *C. felis*.

Our results are in agreement with the report of Beugnet et al.⁴ who mentioned that in the domestic dog the most prevalent flea species around the world is *C. felis*. In our study, the prevalence observed for *C. felis* was of 92%, surpassing the 38% reported by Hernández-Valdivia et al.¹¹ in Aguascalientes, México; as well as the 46.4% reported by Orozco-Murillo et al.¹⁷ in Valle de Aburrá, Colombia, and the 16.3% reported by Rinaldi et al.¹⁵ in Campania, Italia. The obtained prevalence in this study (2.3%) with respect to *C. canis*, contrasts with the report of Nuchjareed and Somprasong,¹⁸

in Pattaya, district of Thailand, where they found this flea species in 11.7% of the examined dogs; while Jafari-Sohoorijeh et al.¹⁹ in Shiraz, Iran, reported a prevalence of 13.7%, and Cruz-Vázquez et al.¹⁰ in Cuernavaca, Morelos a total of 16.8% of *C. canis* in infested dogs respectively. However, Bahrami et al.²⁰ and Jamshidi et al.²¹ described prevalences as high as 28.8 %, in Islam, and 29.4%, in Tehran, Iran; respectively. While Orozco-Murillo et al.¹⁷ in Valle de Aburrá, Colombia, reported a highest prevalence for *C. canis* (53.6%).

Worldwide, fleas has a special role in the transmission of pathogens. Historically, diseases such as Plague and Murine Tifus are of the most important in terms of infection of humans. Although the dog is less susceptible to *Y. pestis* infection, and its role in the dissemination of the disease is not well established, epidemiological data supports that some patients infected with plague, shared the bed with dogs, suggesting that fleas on these dogs played an important role.²² Furthermore, other pathogens like *Bartonella henselae*, and some *Rickettsia* spp, can be transmitted to humans during the exposure to contaminated fleas, that occasionally feed on humans.⁶ It is important to control these ectoparasites by using cutaneous or systemic ectoparasiticides,²³ by means of oral administration of natural products²⁴. As well, topical solutions are an excellent option to control fleas, this product could be used to prevent and eradicate infestations.²⁵ Furthermore, other products, can help to prevent reinfestations up to five weeks.²⁶ Even, recent investigations suggests that the utilization of entomopathogenic fungi can be used in order to reduce the employment of chemical products in order to protect animal, human and environmental health.²⁷

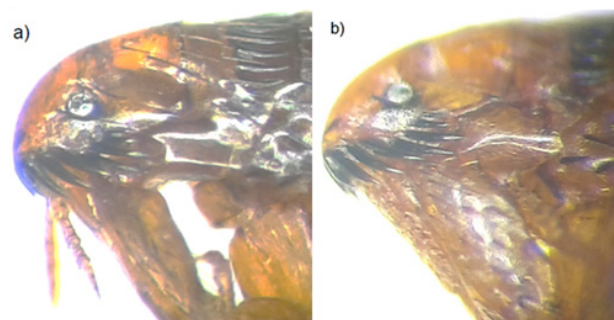


Figure 2 Differences between the two flea species.

- (a) *C. canis*. Rounded head on its anterior portion, eyes present. The *ctenidia* has more than five spines; of which, the spine I is distinctively shorter than the spine II.
- (b) *C. felis*. Head larger and wide, eyes present. The *ctenidia* have six spines. The length of the first two spines is approximately similar.

Conclusion

The presence of *C. felis* and *C. canis* in domestic dogs should be considered by public health and veterinary authorities, due to the zoonotic risk of the pathogens present on these fleas. Further research is needed to determine the role of these ectoparasites in the dissemination of diseases in the study area.

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Conflict of interest

Authors declares there is no conflict of interest.

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