Ectoparasitic charge of small carnivores and its sanitary implications

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Ectoparasites are broad indicators of an animal's sanitary status and may be of importance in disease transmission processes. Fleas and ticks are commonly seen on mammals and a single small animal, such as a shrew, can host three or four large ticks, but while these may transmit viruses and other infections they seem not have any direct adverse effects (Churchfield, 1990). However, little attention has been paid to ectoparasites in small carnivores, even though there has been a great deal of research on these animal's endoparasites (Millán et al. 2004). In this work we analyze the ectoparasites of three species of free ranging carnivores from Biscay: the European Mink *Mustela lutreola*, the American Mink *Mustela vison* and the Common Genet *Genetta genetta*. Animals were live-trapped during an extensive study of mink species' distribution in the area, and captured animals where explored for ectoparasites during handling. For each animal, we set the number of individual parasites into five abundance categories (Minimam: 0-5, Low: 5-15, Medium: 15-30, High: 30-45, Very High >45) and recorded their location on the body of the animal. We took samples of ectoparasites in the field using tweezers: 3-5 individuals were taken form each infested animal, and afterwards they were stored individually in Eppendorff tubes that were kept frozen until identification.

In total, from October 2004 to January 2005, we captured 36 animals, of which 13 were American Mink, 6 European Mink and 17 Common Genets. We took 74 samples from them, all ticks (Table 1). Ticks were mainly located in the upper part of the back, neck and ears (especially in the tragus in genets), and occasionally in the face. No lice or fleas were found. In addition we found a leech on one European Mink. 23 % of genets had ticks, 69% of American Mink and 100 % of European Mink. Considering only parasitised individuals, European Mink hold more parasites than the other carnivores ranking High (30 to 45) as a mean, while American Mink ranked Low (5 to 15) and Common Genet ranked Minimal (less than 5). Genets had significantly fewer parasites than the other species (X^2_3=28.06; p=0.0054), but between mink species differences were not significant X^2_3=6.658; p=0.0836). The collected 70 specimens corresponded to two species: *Ixodes hexagonus* and *I. acuminatus*, in addition, four specimens could not be identified because they were damaged during the extraction and handling, however three of them were certainlyof the genus *Ixodes* . *I. hexagonus* was most abundant and occurred in both mink species, whilst *I. acuminatus* occurred in all three species, and was the only species found in genets, existing a relationship between them (X^2_3=26.747; p<0.001).

Contrasting with our data, Dunstone (1993) found that minks commonly carry light infestation of external parasites: ticks, mites and fleas. Normally, tick infestations involved one or two engorged individuals embedded in or around an ear, on the head, or between the shoulder blades, but occasionally as many as six were found (Dunstone, 1993). Evidently, these are the body parts which animals cannot reach with the mouth and clean themselves. Therefore, the high frequency of appearance in minks suggests the social grooming as a rare behavior, which would be as expected in solitary mustelids (Lodé, 1996). Interestingly, Dunstone (1993) reported that tick infestation tends to be monospecific, with *I. hexagonus* found in minks in Ireland and *I. ricinus* in minks from Britain. In opposition, Page & Langton (1996) report four different tick species infesting American Mink in Britain, that were, in order of frequency, *I. hexagonus*, *I. canisuga*, *I. ricinus* and *I. acuminatus*, the mean infestation being of 4.7 ticks for animal. In the same way, Powell (1993) reported a single species of tick (*I. cookie*) in the Fisher *Martes pennanti*, where it seems to be uncommon.

The frequency of apparition of ticks in genets was minimal in all individuals but two, which were both females; both had cubs, as deduced by their swollen breasts. Interestingly, *I. acuminatus* occurred only at immature stages (larvae and nymphs) in these two genets, while only in mature stages in mink species. Both, *I hexagonus* and *I acuminatus* are burrow-inhabiting species, found in dens and resting sites of mammals, where they wait for the host to come back, usually parasitising the same host across its different stages (Gilot & Aubert 1985; Sonenshine 1993). Although mink species change den often, there is a degree of reuse (Zabala *et al*. 2003) that renders them vulnerable to burrow-inhabiting species. In the same way, Common Genets do not rest in the same den for long periods, generally changing it every few days; breeding females may occupy the same day for several consecutive days (Zubero-

Table 1: Ticks found in wild carnivores. The unidentified ticks found pn a European Mink and two from American Mink were Ixodes *sp(p)genus: damage prevented identification to species.*

Tick Species	Unidentified	*Ixodes hexagonus*			*Ixodes Acuminatus*			Total
		Larvae	Nymph	Adult	Larvae	Nymph	Adult	
European Mink	1	4	5	5	0	0	5	20
American Mink	3	0	26	10	0	0	6	45
Common Genet	0	0	0	0	1	8	0	9
Total	4	4	31	15	1	8	11	74

goitia *et al*., 2001). This would explain why in genets, infestation was found only in lactating females. In addition, the lack of ticks in genets, even in hardly reachable areas of the body, suggests that social grooming may be regular.

Finally, regarding the biosanitary implications, both mink species share tick species that can act as a vector of illness between them. This last poses an interesting research issue in the transmission of illness between the native and alien species.

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