FLEAS OF FREE-LIVING CARNIVORES FROM THE TERRITORY OF THE CZECH SOCIALIST REPUBLIC (ČSR)

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Abstract. The paper deals with fleas encountered on five species of free-living carnivores from the territory of ČSR. A total of 6735 fleas belonging to 20 species were found. The species Chaetopsylla superciliata (Jordan, 1929) and Ch. rothschildi Kohaut, 1963 are reported from the territory studied for the first time. Also compared is the intensity of flea infestation in healthy foxes and in those infected with rabies.

A study treating extensive material of fleas parasitizing free-living carnivores has been so far lacking in the Czechoslovak parasitological literature. Information about this flea group is to be found only in a few papers (Rosický 1943, 1952, 1957, Rosický and Ryba 1977, Dudich 1980). Jurík and Kukla (1974) reported about fleas collected from minks reared at mink farms. Because it is difficult to obtain the hosts, the European fauna of these fleas is only insufficiently studied. These ectoparasites were studied in detail primarily by Aubert and Beauchourn 1976, Bartkowska 1976, Beauchourn 1973, Skuratowicz 1963, 1977, Suciu 1973. Quite recently the flea fauna of carnivores in Poland was treated by Skuratowicz (1981).

MATERIAL AND METHODS

The fleas were collected from the bodies of 8 936 free-living carnivores, mainly foxes, which were sent to the State Veterinary Institute in Liberec between 1975 and 1980, for rabies examination. A total of 6735 fleas belonging to 20 species were encountered on 337 red foxes (Vulpes vulpes), 13 badgers (Meles meles), 28 stone martens (Martes foina), 4 pine martens (Martes martes) and 10 polecat (Mustela putorius) supplied from 37 districts of ČSR (Fig. 1). I based my determination of material on papers of Rosický (1957), Hopkins and Rothschild (1966), Skuratowicz (1967), but before determination I cleared the material by O'Mahony's method (10% KOH, glacial acetic acid, fenoxylene, xylene). The females, in which the egg development in ovaries had been ascertained were first examined in alcohol without previous preparation.

RESULTS AND DISCUSSION

The considerably low per cent stage of parasitized carnivores may be explained by non-standard and careless handling of hosts after their capture, causing escape of the major number of ectoparasites. In case of foxes this was promoted by the fact that most animals were examined between May and July when the most abundant parasite Chaetopsylla globiceps did not occur on them. A list of findings is given in Table 1.

Chaetopsylla globiceps (Taschenberg, 1880)

This specific parasite of foxes is widespread all over Europe except the British Isles and the Iberian Peninsula. On the territory of ČSR it is regularly distributed along with its main host. My collections contained 4 744 specimens collected from 186 foxes,
one stone marten and one pole cat. The sex ratio was 1:1.5 (1885♂♂, 2699♀♀). On foxes this species was localized primarily on the posterior part of body. The overwhelming majority of collections were made in the cool months, between November and March (Fig. 2), when 94% of females with eggs were encountered. The highest number of fleas collected from one fox was 237.

Fig. 1. Map of flea findings in the territory of ČSR.

**Chaetopsylla trichoza** Kohaut, 1908

It is the most widespread species of the genus in Europe. I obtained 689 specimens of this flea from 102 foxes and 11 badgers. The sex ratio on these two hosts was approximately the same 1:1 (392♂♂, 397♀♀). On foxes this flea accompanied regularly the preceding species. Likewise the seasonal dynamics on foxes was similar to that in *Ch. globiceps*, with the maximum in January and December. Its occurrence on the badger, which is considered to be the main host, is influenced by its way of life, or more precisely, by its non-activity in the winter months. The highest numbers were observed in April, when I examined 29 badgers, accounting for 42% of the total number of animals examined.

**Chaetopsylla matina** (Jordan, 1925)

This flea is known from France (Jordan, 1925, Beauchouf 1973), Romania (Suef 1973), Poland (Skuratowicz 1953) and Czechoslovakia (Dudich 1980). The occurrence of this species in Central Europe was already anticipated by Rosický (1957). Except for the collections made in the Białowieża forest reserve all remaining localities are situated above the altitude of 500 m. The average altitude of the localities from the territory of ČSR amounts to 360 m. In literature the two representatives of the genus *Martes* are reported as main hosts. This flea was also collected from the fox and the polecat. My collections contained 149 specimens obtained from 9 stone martens, 11 red foxes and 2 polecats, coming from the districts of Karlovy Vary, Louny, Děčín.
Ctenocephalides canis (Curtis, 1826)

I obtained 88 specimens of this parasite of canine carnivores from 36 foxes, 5 stone martens and one polecat. This species occurred on foxes throughout the year without any distinct maximum number. The sex ratio in my collections was 1 : 1.5 (35♂: 53♀).

As a marginal task in this study also 12 foxes, kept in captivity for a longer period, were examined. I found only 264 specimens of C. canis on these foxes.

The material studied contained furthermore a large number of specimens belonging to 5 flea species, whose main hosts were other mammal species. I encountered 413 specimens of the flea Spilogypus cuniculi (Dale, 1878) whose main host is the wild rabbit (Oryctolagus cuniculus), on 70 foxes, one stone marten and one polecat. The sex ratio was 1 : 2 (136♂: 277♀).

I obtained 258 specimens of the flea Archysopyps s. erinacei (Bouché, 1833), whose main host is the hedgehog (Erinaceus europaeus), from 67 foxes, 5 stone martens, 2 pine martens and 4 polecats. On foxes this flea was localized primarily on head and neck. The sex ratio was 1 : 2.4 (76♂: 182♀).

The following two flea species are specific parasites of arboricolous rodents, primarily of the squirrel (Sciurus vulgaris). The flea Monopsyllus s. sciuromorus (Schrank, 1803) was encountered on a relatively wide range of hosts. I collected 62 specimens from 16 foxes, 9 stone martens, one pine marten and one polecat. The sex ratio was 1 : 1.8 (22♂: 40♀). The paper by Jurík and Kukla (1974) who collected a large number of this species from the bodies and from the nest boxes of minks reared at mink farms, indicates the considerable adaptability of this flea.

A total of 17 specimens of the species Tarsopsylla o. octodecimdentata (Kolenati, 1863) was collected from 7 foxes, 2 stone martens and one pine marten. The last of the five species, Ctenocephalides f. felis (Bouché, 1835), currently associated with the domestic cat, was rarely encountered on the fox, stone marten and polecat, amounting to 17 specimens.

The foxes were further found to be parasitized by 29 flea species belonging to the following 8 species, which are specific parasites of small terrestrial mammals and birds: Neopsylla fasciculata (Boose, 1800) 3♂: 9♀, Amphisceps rossica Wagner, 1912, 1♂, Leptopsylla segnis (Schönherr, 1811) 1♂, Amblyomma pennsylvanicum krochowi Rosicky 1955, 1♂, 1♀, Ctenophthalmus o. angustus (Heller, 1896) 1♂, 1♀, Megabothris torridus (Roschzlord, 1901), 1♂, Ceratophyllum g. gallinaceum (Schrank, 1803) 5♂: 4♀, Dugesia g. gallinacea (Dale, 1878) 1♂. The hosts of these species are the main component of the foxes' food (Něvěšník et al. 1976), and evidently a transfer of ectoparasites during the carnivores-prey contact was involved here.

In 87 out of 337 flea-infested foxes rables was diagnosed. Table 2 compares the average number of the most abundant flea species encountered on healthy or rabid foxes. Unlike the observations made by Aubert and Beaucournu (1976), the table shows that rabid foxes are more infested with fleas, primarily with the species A. erinacei and S. cuniculi. In rabbit foxes this phenomenon is probably due to the character of clinical symptoms of the disease. The animal leaves its territory and its mobile activity increases temporarily. The attractiveness of a sick fox for fleas is probably enhanced by the increased body temperature. The dependence of the intensity of flea infestation on hosts on their health condition is also pointed out by Rosicky (1957).

Acknowledgement. The author is grateful to Dr. J. Ryba of the Institute of Parasitology, Czechoslovak Academy of Sciences, for generous assistance in the preparing of this paper.
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Received 20 January 1982.
Translated by: E. Bětová

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