

EFFECT OF LARGE CITY CONDITIONS ON THE SPECIES COMPOSITION OF FLEAS PARASITIZING SMALL MAMMALS

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Extensive investigations of small terrestrial mammals and their ectoparasites in an urbanized landscape were performed at České Budějovice and its close vicinity between 1980 and 1983. Individual groups of ectoparasites and changes within these groups in relation to the trapping site were evaluated from the material.

The animals were caught in common life traps exposed for three days in three types of localities:

1. Parks in the city centre. Small parks in built-up city areas, either without a shrub layer or with sporadic shrubs, quite well frequented throughout the day.

2. Parks and open areas on the city outskirts, surrounded by scattered city buildings, rarely frequented except the afternoon hours.

3. Grassy and shrub areas and suburban forests adjacent to the city outskirts, rarely frequented throughout the day.

A total of 471 small mammals of 12 species were captured. 508 fleas of 14 species were collected from the fur of the animals.

The siphonapterium of small mammals in the suburban areas was very rich in species: 11 flea species were found. This corresponds well with the large numbers of biotopes inhabited by many host species. More than half of all the fleas collected were represented by the species *Ctenophthalmus agyrtes*. The next most frequent species were *Ctenophthalmus assimilis* and *Amphipsylla rossica*.

The siphonapterium of small mammals in parks on the periphery lacks some species inhabiting the forest and field biotopes. Nevertheless, these localities are inhabited by several other species, therefore the overall number of species occurring there is nearly the same as in the suburban areas or as in the localities where *C. agyrtes* is markedly dominant. The second most frequent species in parks on the periphery is *Palaeopsylla kohauti*, the third is *P. soricis*, which is directly connect-

ed with the high numbers of insectivores in the fauna of small mammals in parks as opposed to other types of localities.

A marked decrease in the numbers of fleas was evident in parks near the city centre, where only 5 species were found. The significant dominance of *C. agyrtes* observed in the other localities was not recorded there. The most frequent species parasitizing small mammals in the city centre was *Leptopsylla segnis*. The next were *C. agyrtes* and *Nosopsyllus fasciatus*.

Of interest there were the studies on representation of individual flea species in different localities. Only sporadic findings of *Hystrihopsylla talpae* were recorded in the suburban area and in parks on the periphery (1.1% and 0.8%, respectively, of all the fleas found).

Ctenophthalmus bisoctodentatus was recorded in parks on the city periphery. The parasite was found to parasitize only its specific host, *Talpa europaea*, and represented 2.3% of the fleas collected in that locality, which is a relatively high proportion considering its generally sporadic occurrence.

The most common species in the material collected was *Ctenophthalmus agyrtes*. The frequency of this flea in the suburban areas and parks on the periphery did not significantly differ (55.2% and 53.6%, respectively, of all the flea species), however, in the city centre its participation decreased to 29.0%.

Ctenophthalmus assimilis in the suburban areas represented 12.0% of fleas, in parks on the periphery and the city centre, its proportion decreased to 2.3% and 1.6%, respectively.

Palaeopsylla soricis is less frequent in the suburban areas, representing 2.7% of the fleas. Its proportion increases up to 8.4% in parks on the periphery, which directly corresponds with large numbers of field shrews. The flea was not recorded in central parks, although it is probably present there.

Palaeopsylla kohauti was not recorded in the suburban areas, although it is undoubtedly present there; in the parks on the periphery, it represented 27.8% of the fleas collected. In the city centre this flea was sporadic.

Peromyscopsylla bidentata was recorded only in the suburban areas, representing 2.7% of the fleas collected. The species does not reach even the parks in the city periphery.

Leptopsylla segnis was recorded most often in the city centre. Although its specific host — the house mouse — was not captured, the flea represented 40.3% of all the fleas collected in the city centre. Nevertheless, in other localities, the species represented only 0.4% and 1.1%, respectively.

Amphipsylla rossica was found only in the suburban areas, where it represented 15.9% of the fleas. The parasite probably reaches the parks together with its host, the common vole, although it was not recorded there.

Megabothris turbidus was more frequent in the suburban areas, representing 2.2% of the fleas collected. Its proportion in the peripheral parks decreased to 0.8%. The species does not penetrate to the parks in the city centre.

Nosopsyllus fasciatus is as abundant as *Leptopsylla segnis*. It is one of the most frequent species in the city centre, representing 27.4% of the fleas. In the other localities studied the parasite is far less frequent (1.9% and 2.7%, respectively, however, its proportion is somewhat higher than that of *L. segnis*).

The findings of the remaining two species — *Ceratophyllus gallinae* and *Monopsyllus sciurorum* were more or less accidental and are of too little importance to be discussed in this paper.

From the aspect of population ecology, it is interesting to compare the siphonaptera of small mammals with regard to species diversity and equitability. Shannon's species diversity index (H) was used and the equitability index (e) calculated. In our study, the species diversity of flea communities in the localities studied fully confirmed our assumptions: the most diverse community was recorded in the localities outside the city ($H = 1.5053$). According to Shannon's index, the siphonapterium of small mammals inhabiting parks on the city periphery was rather poor in diversity, although the number of flea species was the same as in the suburban areas ($H = 1.3256$).

As expected, the lowest diversity index in flea communities ($H = 1.2132$) was recorded in the city centre parks.

Somewhat different is the situation regarding the equitability of the siphonaptera. The most equitable community appears to be the siphonapterium in the city centre. Although relatively low numbers of flea species were recorded there, the equitability index was quite high ($e = 0.7538$). The equitability index in the communities inhabiting the suburban areas is somewhat lower ($e = 0.6278$), however, in general, it corresponds to the communities in natural localities represented by common and less frequent species. The extremely low equitability index in flea communities of small mammals inhabiting the parks on the city periphery ($e = 0.5528$) is remarkable. This may be due to the fact that only a few species penetrate from the vicinity of the city to these parks, and also the numbers of flea species parasitizing synanthropic rodents in these localities are extremely low. A highly unbalanced and possibly unstable flea community is formed in this way.

In species composition, diversity and equitability of the siphonapterium of small mammals in the suburban areas of České Budějovice is similar to that of communities in the wild. Flea communities in the peripheral parks are very diverse in species, but highly unbalanced. Species parasitizing insectivorous animals which have favourable shelter and sufficient food in the biotopes of large parks in the city periphery are abundant. Species parasitizing eusynanthropic rodents are the most frequent in city-centre parks. *A. sylvaticus* is the most common host. The communities in these localities are rather poor though very balanced in species.

WPLYW WARUNKÓW WIELKIEGO MIASTA NA SKŁAD GATUNKOWY PCHEŁ DROBNYCH SSAKÓW

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Autor przedstawia wyniki badań przeprowadzonych w Czeskich Budziejowicach (Pld. Czechy) i w ich najbliższej okolicy w latach 1980 i 1983. Zebrano 471 drobnych ssaków (12 gatunków) oraz 408 pcheł (14 gatunków). Z tego 11 gatunków pcheł stwierdzono w strefie podmiejskiej (najliczniej występowały tu *Ctenophthalmus agyrtes*, *C. assimilis* i *Amphipsylla rossica*), 11 gatunków w parkach peryferyjnej części miasta (najczęściej *C. agyrtes*, *Palaeopsylla kohauti* i *P. soricis*) i 5 w parkach położonych w centrum miasta (najliczniejsze: *Leptopsylla segnis*, *C. agyrtes* i *Nosopsyllus fasciatus*).

Porównanie stanowisk parami: strefy podmiejskiej z parkami na peryferiach lub parków na peryferiach z centrum miasta ujawnia podobieństwo zbiorowisk pcheł. Istotna różnica występuje w składzie pcheł strefy podmiejskiej i parków w centrum miasta.

Z punktu widzenia specyficznej zmienności i zróżnicowania — zbiorowiska pcheł drobnych ssaków w strefie podmiejskiej przypominają także zbiorowiska z biotopów naturalnych. Zbiorowiska z parków na peryferiach cechują się specyficzną zmiennością, choć są w wysokim stopniu nie zrównoważone. W parkach centrum miasta zbiorowiska pcheł są ubogie, lecz dość stałe pod względem składu gatunkowego.