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PREDATION BY THE LARVAE OF THE FLEA HYSTRICHOPSYLLA TALPAE (CURTIS, 1826)

The majority of known flea larvae have specialized mouthparts, characteristic especially by the shape of mandibles. They are provided with three to eleven dorsomedially directed denticles of lobular shape, which do not fit together with the notches of the opposite mandible — the mandibles mostly cannot even touch one another and cannot be used for biting or chewing. Functional analysis of such mouthparts in *Ctenocephalides felis* (Bouché, 1935), confirmed by experimental data, has been given by Widhalm-Finke (1974: Zool. Jb. Anat. 92: 497—518.) The principal food of these larvae are dried excrements of adults, containing indigested blood of host; the mandibles are used for breaking pieces of coagulated blood in small particles, which are then softened by the salivary enzymes. Flea larvae with analogous mouthparts are supposed to feed in this way; few exceptions are mentioned by Rothschild (1975: Ann. Rev. Ent. 20: 241—259.)

On the other hand, the larvae of the flea genera *Stenoponia* (Klein, 1964: Bull. Soc. ent. Fr. 69: 174—176; Vysotskaya and Kirjakova, 1970: Metody sbora i izuchenia blokh i ikh lichinok, Nauka, Leningrad, 82 pp.; Ye et al., 1982: Acta ent. sin. 25: 209—216.) and *Hystrichopsylla* (studied by Oudemans, 1913: Tijdschr. Ent. 56: 238—280.) possess mandibles of different shape — comparatively long, apically acute and without lobular denticles. Their feeding has never been observed.

On 30 September 1986, the senior author collected in the nest of *Talpa europaea* L., 1758 (at Klabava nr. Rokycany, western Bohemia) six flea larvae(4— 9 mm in length) and attempted to rear them in a petri dish (diameter 70 mm) on the original nest substrate at the temperature of 16 °C. The substrate consisted of bits of oak and hornbeam leaves, carefully examined in order to rule out the presence of other arthropods. The larvae were examined on 7 October. Only three of them and a remainder of the fourth were found. The surviving larvae were then killed and identified as *Hystrichopsylla talpae* (Curtis, 1826). Their gut contained an unidentified substance.

This is the first known case of predation by flea larvae (maybe its special case — cannibalism). As a laboratory observation, this only confirms the possibility of at least facultative predatory behaviour of these larvae. However, with regard to the characteristic shape of mandibles, this behaviour may be considered

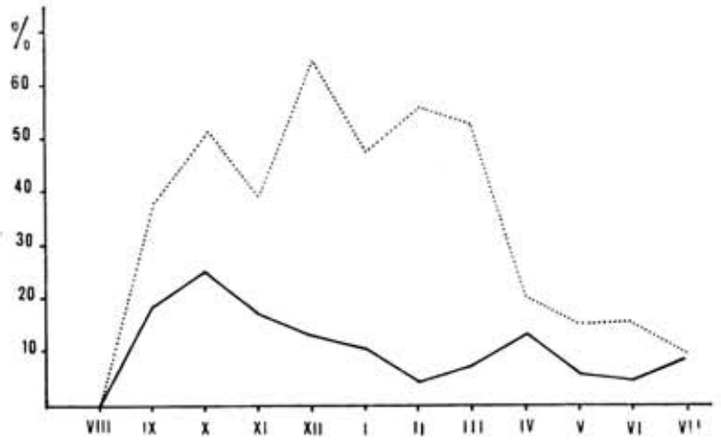

Fig. 1. Seasonal fluctuation of the number of *Hystrichopsylla talpae* adults in mole nests (% of the number of fleas of all species, in the average for each month): ————. Proportion of mole nests with adults *H. talpae* to all nests investigated (%): ..... (Material from 262 nests of common mole from river valleys in western Bohemia, containing 95 ♂♂, 179 ♀♀ of *H. talpae*).

a regular way of feeding; further details on the food specialization remain unclear. Well corresponding with their position of secondary consuments is the mostly low number of *Hystrichopsylla* fleas in nests (Rosický, 1957: Fauna ČSSR 10, Blechy — Aphaniptera, Nakl. ČSAV, Praha, 439 pp.), as well as their size (the predator is usually larger than the prey). Also the negative or poor results of rearing experiments (Sikes, 1931: Parasitology 23: 243—249; Kiriakova, 1968: Ent. obozr. 47: 71—79.) provide some information. Oudemans (1913: Tijdschr. Ent. 56: 238—280.) speculated that larvae of *Hystrichopsylla talpae* and other nest fleas would attack young nestlings. This would be theoretically possible in *Hystrichopsylla*, but it does not seem to apply to this case with regard to the phenology of moles. The larvae of *H. talpae* were found by the authors only in autumn (September—November) which indicates the occurrence of larvae in early autumn (Fig. 1). In April, which is the period of mole reproduction, the number of mole nests with *H. talpae* rapidly decreases; simultaneously, the number of *H. talpae* in some nests (perhaps the nests of females) increases, but this is probably due to the migration. Nothing is known about trophic relations of *Hystrichopsylla* larvae to other small mammals.

Rothschild (1975: Ann. Rev. Ent. 20: 241—259; 1986: Flea News 32: 210.) published an interesting view that *Hystrichopsylla* and *Stenoponia* (both having polytrophic ovaries) should form a monophyletic group deserving relatively high taxonomic rank. The specific shape of larval mandibles and the food strategy offer other arguments for this hypothesis. It should be checked to what extent the type of ovaries correlates with the larval food. Hase (1930: Z. Parasitenk. 3: 258—263.) observed a special behaviour assumed to be predatory in the larva of *Myodopsylla* (Ischnopsyllidae); however, the predation itself was not observed and the mouthparts were not studied. On the other hand, the larva of *Typhlocerás poppei* Wagner, 1903, included by most authors in Hystrichopsyllinae, has mandibles of usual type with lobular denticles (Bartkowska, 1965: Ann. Zool., Warszawa, 23: 237—250.) and thus it is probably not predacious.

Due to the fact that larvae of only about 2 % of the described flea species are known at present and that the morphology of ovaries has not been studied in a wide extent it is necessary to direct here further research. With regard to the difficulties in obtaining *Hystrichopsylla* larvae our studies are presented as a preliminary note.

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