

Short Communication

A CONTRIBUTION TO THE BIONOMY OF *CULEX MODESTUS* FIC. (DIPTERA, CULICIDAE) IN SOUTHERN MORAVIA

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Abstract. The author studied the distribution, seasonal dynamics and bionomy of the species *Culex modestus* in southern Moravia, Czechoslovakia. The association of this species with the biotope of reed thickets in the studied region has been established. The females of *C. modestus* feed on ducks, hedgehog and man.

The pontic species *Culex modestus* Ficalbi 1890 reaches the northern boundaries of its consistent distribution in southern Moravia. As it is the only species of the genus *Culex* which attacks man in masses under our conditions, it may be of considerable medical importance. In connection with the projected construction of shallow water reservoirs in this region its significance as a parasite of man and potential vector of causative agents may be greatly enhanced.

MATERIAL AND METHODS

The investigations on the bionomy of this mosquito species were carried out in southern Moravia in the years 1963—1965. More than 40,000 females of *C. modestus* were collected, out of which 32,173 were used in virological research.

The investigations on food sources of females of this mosquito species were carried out by method of exposing vertebrates to them in free nature. Cylindrical and prismatic tin traps with funnel- and crevice-like openings (MINÁŘ, in press), partly also cylindrical traps made of wire net, were used.

The following vertebrate species were employed in the experiments: wild rabbit (*Oryctolagus cuniculus* L.), hedgehog (*Erinaceus europaeus* L.), bank vole [*Clethrionomys glareolus* (Schreber)], yellow-necked field mouse [*Apodemus flavicollis* (Melchior)], harvest mouse [*Micromys minutus* (Pallas)], common vole [*Microtus arvalis* (Pallas)], hen (*Gallus gallus* L.), duck (*Anas platyrhynchos* L.), warbler (*Acrocephalus scirpaceus* Hermann) and frog (*Rana temporaria* L.). The experiments were conducted in the area of fish ponds near Lednice in July and September 1964. The traps were placed in reed thickets 20 m apart. During the 40 experiments lasting 24 hours each, 4,794 females were collected, of which 1,809 were engorged. The experiments were conducted under optimal meteorological conditions. The temperature in the period of the night maximum of activity reached 16.5—20 °C.

RESULTS

C. modestus was found in the following localities in southern Moravia: the fish-ponds near Lednice (Mlýnský, Prostřední, Hlohovecký), near Sedlec (Nesyt), Rakvice, Hodonín, near Mikulov, (Okružák), Drnholec and Nejdek.

The breeding site of larvae of this species was in the reed thickets of littoral zones of fish ponds. [In southern Slovakia the characteristic biotope of larvae of this species was rice paddy (TRPIŠ 1960).] These larvae often occurred together with larvae of *Culex pipiens* L. in the period from May to the end of August.

The adult mosquitoes occurred from the first half of June to the beginning of September in several broods. The maximum of their occurrence was observed in the second half of July and in August. Unengorged females intensively attacked man in the reed thickets and in their close vicinity even in the daytime.

The distribution of *C. modestus* in the region was considerably irregular, depending on the type of biotope (Table 1). In the reed thickets of some fish ponds this species was abundant and represented practically 100 % of mosquito population of this biotope. Other mosquito species, mostly occurring in abundance or in masses in southern Moravia, were represented in this biotope only occasionally [*C. pipiens*, *Aedes vexans* Meig., *Aë. cantans* (Meig.), *Aë. cinereus* Meig., *Aë. excrucians* (Walk.), *Aë. flavescens* (Müll.), *Aë. sticticus* (Meig.), *Aë. dorsalis* (Meig.), *Mansonia richiardi* Fic., *Anopheles claviger* Meig., *Anopheles maculipennis* s. l.].

The adults of *C. modestus* were associated with the reed biotope, did not leave the immediate surroundings of their breeding places and only few of them flew farther than that. They were collected only in the duck pens and hen houses 50—150 m distant from their breeding sites. The observations conducted under optimal conditions (calm, air temperature 22.00—21.2 °C, the evening maximum

Table 1. Numbers of mosquitoes *Culex modestus* collected in various biotopes of southern Moravia

Biotope	Year	Month	Locality	Total number of mosquitoes collected	Number of mosquitoes <i>C. modestus</i> collected	%
Reeds	1963	August	Fish pond Nesyt	9,510	9,508	99.99
	1964	July	Nesyt	329	163	51.07
	1963	August	Lednice	4,225	4,224	99.99
	1964	July	Fish pond	21,155	21,024	99.308
	1964	July	Fish pond Okružák	283	56	23.53
Total				35,502	34,975	99.63
Inundated forest (total)	1963—1965	May to August	Nejdek Drnholec	77,095	67	0.009

Table 2. Numbers of mosquitoes *Culex modestus* Fic. which attacked animals exposed in traps

Type of trap	Date	25. 7.	26. 7.	27. 7.
Cylindrical sheet metal trap	Experimental animal	duck	hen	hedgehog
	Number of engorged mosquitoes	326	—	487
	Number of unengorged mosquitoes	815	632	111
	Total	1141	632	548
Prismatic sheet metal trap	Experimental animal	duck	hen	rabbit
	Number of engorged mosquitoes	395	—	—
	Number of unengorged mosquitoes	205	596	301
	Total	600	596	301
Cylindrical wire net trap	Experimental animal	duck	hen	hen
	Number of engorged mosquitoes	21	—	—
	Number of unengorged mosquitoes	6	8	515
	Total	27	8	515
Cylindrical wire net trap	Experimental animal	rabbit	rabbit	4 ducklings
	Number of engorged mosquitoes	1	—	470
	Number of unengorged mosquitoes	28	22	70
	Total	29	22	40

of activity between 19—20 hours) showed pronounced differences in the attacks of mosquitoes at various distances from the reeds. During the 5-minute collecting period the catcher stationed in the reeds was attacked by 35 females, on the edge of the reeds by 42 females, 10 m from the reed edge by 18 females and on the meadow 50 m distant from the reed thickets no mosquitoes alighted at all. These features of the bionomy of *C. modestus* were taken into consideration during the investigations on the spectrum of hosts of this species.

The most attractive bait for the mosquitoes *C. modestus* in the experiments were ducks, which were attacked in a tin cylindrical trap by as many as 1141 females

and in a prismatic trap by 600 females. Ducks were used as baits in 10 experiments during which 51 % of mosquitoes alighted on traps to feed on the ducks. The mosquitoes fed on adult ducks as well as on ducklings. Frequent feeding of *C. modestus* (81 % of attacking mosquitoes) was also observed in an experiment with hedgehog (Tab. 2). Hordes of mosquitoes also alighted on traps where hens were exposed. In the closed area of the trap, however, the hens were observed to peck at the engorged mosquitoes and the results of these experiments were therefore somewhat distorted. The findings of the engorged females of *C. modestus* in hen-houses testify to the possible feeding of this species on hens.

The traps with rabbits were also entered by the *C. modestus* mosquitoes, but only a single engorged specimen was found there. The traps with mouse-like rodents, frogs and warbler, as well as the empty control traps, were ignored by the *C. modestus* females.

Masses of mosquitoes alighting on ducks were also observed outside the traps, during the manipulation with the experimental animals. Pronounced differences in the mosquito attacks of the simultaneously exposed animals and the high percentage of engorged mosquitoes showed that mainly ducks, currently nesting in the biotopes of *C. modestus* in the reed thickets, are the essential source of food.

The prevailing ornitophilia of *C. modestus* was confirmed by the fact that females of this species were observed to fly to the pens of domestic animals. In close vicinity to the mosquito breeding sites altogether 68 units were examined. The mosquitoes *C. modestus*, mostly engorged, were found only in duck pens, duck farms and hen-houses situated in close vicinity to the breeding sites or in places 150 m distant from them. It is interesting to note that the disturbed mosquitoes of this species attacked man even in a small enclosed space. In stables, pig-sties, goat sheds and rabbit pens situated in the immediate vicinity to the units where fowl was kept, no mosquitoes *C. modestus* were found, although all these places were well accessible and the mosquitoes of other species, mainly those of the genus *Anopheles*, occurred there in abundance. These differences in the preference of hosts by the mosquitoes were especially striking in the farm buildings of the village Rakvice, where the calf-shed and the duck-pen were situated one next to the other at a distance of 150 m from a small fish pond which was the breeding place of mosquitoes *C. modestus*, *Anopheles maculipennis* (Meig.) and *An. messeae* Fall. In the hen-houses where hens and pigeons were kept together, engorged females of *Culex pipiens* L. were found.

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