

## CULISETA MELANURA (COQUILLET) AND EASTERN EQUINE ENCEPHALITIS IN CONNECTICUT

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*Culiseta melanura* is a mosquito which has become the subject of special investigation since 1951, when the virus of eastern equine encephalitis (EEE) was isolated from it by Chamberlain, *et al.* (1). This mosquito occurred at the site of an encephalitis epidemic among penned pheasants at Farmington, Connecticut, in 1953, and observations on its biology were reported by Wallis (2). During the same year isolations of EEE virus were reported by Holden, Miller and Jobbins (3) from three pools of *C. melanura* collected in New Jersey and intensive study of its biology was initiated in that state. Since then studies of virus-vector relationships indicated that *C. melanura* was a good host and was capable of transmitting the EEE virus in the laboratory (Chamberlain *et al.* (4)). In 1955, observations were reported by Chamberlain, Sudia and Nelson (5) on the biology of this species in the laboratory and during the following year Burbulis and Lake (6) reported bionomic field studies in New Jersey. During the 1956 season, four isolations of virus were obtained from pools of *C. melanura* in New Jersey (Chamberlain *et al.* (7)), and five virus isolations were obtained from pools of this species in Massachusetts (Feemster *et al.* (8)). It began to look as if *C. melanura* might be a primary vector of transmission of the EEE virus. However, our studies in Connecticut between 1953 and 1958 have produced very little evidence in the field to support this hypothesis.

EEE in Connecticut has been an agricultural and wildlife problem since there has been no confirmed human case of the disease (Jungheer and Wallis (9)). Between 1938 and 1958, presence of virus has been confirmed on 25 farms in Connecticut either in horses or pheasants. The mosquito population of 20 of these farms was investigated at the time of virus activity.

From these studies 15,819 adult female mosquitoes were collected and identified. Of these, 1,730 were *C. melanura*, most of which were collected at Farmington, Connecticut. This was the only one of the 25 sites where *C. melanura* was found repeatedly. It was encountered only once at two other of the 25 sites, and was not collected in the other 22 areas where virus activity has occurred. Therefore, this species must be considered rare in Connecticut, and the correlation of its distribution with that of the incidence of the disease has not been confirmed.

While it was not possible to collect this species from all epidemic sites, the one area where it could be found readily provided bountiful material for studies of its ecology. Many of the details reported by Burbulis and Lake (6), such as the spring and fall seasonal peaks in the adult population, and the overwintering of larvae were observed in the field. It was particularly interesting to find that during the 1957 and 1958 seasons, most of the blood feeding of the adult females occurs during the June population peak. At this time, as high as 50 percent of the adult females were either freshly blooded or gravid with eggs. Particular efforts were made in collecting when bird nesting was at its peak. It was disappointing to find that even though nesting birds in an area contained EEE antibody, and a high proportion of the *C. melanura* population were engorged with avian blood, there was no virus isolation from pools of this species (Taylor (10)).

At the Farmington study site, conditions were ideal for investigation of the feeding activity of the mosquito population as it related to both wild and domestic birds. Each year, early in July, 400 young pheasant chicks were obtained by a local hunt club and released in a large open range pen

where they were reared to adult pheasants. Within 100 yards of the pen there were diurnal resting places which provided excellent sites for sampling the *Culiseta* population in the area. The numbers of female mosquitoes in the routine collections which contained fresh avian blood meals were recorded for comparison of the percentage of fed specimens prior to and after the time when pheasant chicks were introduced into the environment. During the early period, when only wild bird nestlings were available for feeding, it was found that from 3 to 50 percent of the *C. melanura* females were engorged. However, during the interval after the pheasant chicks were available, the incidence of blooded *C. melanura* increased to as high as 90 percent. From this it appeared that pheasant chicks were attractive hosts for blood feeding. In addition it may indicate that there is a tendency for the localization of this species around the penned pheasant flock, and may perhaps help explain the reported frequency of virus isolation from collections of *C. melanura* taken at the sites of domestic pheasant flocks.

In laboratory study of the host-feeding of *C. melanura*, experimental engorgement with blood was obtained from chicken egg embryo, juvenile pheasants, chicks, rats, rabbit, white mice, red-winged blackbird and man. In all cases the feeding activity occurred only in subdued light and was a prolonged process characterized by many proings before blood was slowly taken. The easily disturbed feeding was, as described by Chamberlain and coworkers (5), and by Hayes and Doane (11), such a tedious process that many probing attempts were usually necessary before engorgement occurred. This nervous feeding habit probably accounts for the high incidence of mixed blood meal composition reported for this species, and as Hayes and Doane (11) point out, may be an important factor in its role as a virus vector.

#### SUMMARY

*Culiseta melanura* is a mosquito which has become of special interest since it is

the only arthropod from which EEE virus has been repeatedly isolated. While circumstantial evidence has been reported indicating it may be a vector of the EEE virus either in endemic or epidemic cycles, the distribution of this species in Connecticut has not correlated with the distribution of farms where there has been virus activity. Studies indicate that *C. melanura* will take blood from a wide range of hosts but is not persistent in its feeding activity.

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