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ECOLOGY OF THE MOSQUITO *AËDES CANTANS*

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Aëdes cantans is a common Palearctic mosquito that bites man and other animals and is a vector of Tahyna virus in certain areas. Principal larval habitats are shaded woodland pools. From 1967-1972 a detailed ecological study was undertaken on the species in Monks Wood, a National Nature Reserve, comprising some 160 ha about 10 km north of Huntingdon in southern England. The purpose of the study was twofold. Firstly, to investigate the biology of *Aë. cantans* and secondly to develop sampling techniques and methods of analysis that could be used to study the population dynamics of other mosquito species. The life-cycle of *Aë. cantans* in Monks Wood can be summarised as follows. All adults die before the end of September, and from then until the end of December the population exists only in the egg state. Eggs start to hatch at the end of December or beginning of January, and adult emergence occurs in late April and may continue through June.

For three consecutive years leaf litter and mud samples were collected from a ditch in September and the eggs extracted by wet sieving and flotation (Service, 1968). Knowing the area of the ditch that was sampled (about 3% total oviposition surface) an estimate was made of the absolute population of eggs in the habitat. This sampling procedure was repeated in December, just prior to egg hatching, and the egg population recalculated. Each year the estimated egg population was 2-5% smaller in December than in September and was ascribed to egg "loss" during this interval. Because laboratory experiments showed that 1.25% of the eggs failed to hatch due to either sterility or mortality of the embryos, the egg population estimate in December was corrected to give the total population of viable eggs available for hatching. In April each year immediately pupae were found large cages were placed over the ditch which collected the daily emergence of adults from an area representing about 4-10% of the total water surface. From the numbers caught, estimates

were made each year of the total number of adults that emerged from the entire ditch.

Now, from estimates of the total population of viable eggs in December and estimates of the absolute population of adults that emerged in April-June, the estimated mortalities that occurred each year from egg to adult were calculated, and found to be about 90-94%. Although this gives an estimate of the mortality of the immature stages there is no information as to how this mortality is distributed amongst the four larval instars and pupae, that is among the age classes. To determine this weekly samples were taken from December-June each year of the larvae and pupae. The total numbers of each age class collected were recorded and divided by the duration of each age class as observed in the field to enable the age distribution of the larval instars and pupae to be plotted as histograms. It was assumed that the relative mortality rate during each age class was constant, although this could vary from instar to instar. Under the assumption that the population is in a "steady state" the age distribution has the same shape as the survivorship curve, and thus a smoothed age distribution can be assumed to give the approximate shape of the survivorship curve. When plotted these survivorship curve clearly showed that most mortality occurred in the younger larval instars, especially in the first two. Extrapolating the ends of the survivorship curve provides an estimate of the numbers of eggs hatching and adults emerging from the pupae. These two estimates are independent of any field sampling of the egg and adult populations, and provide another measurement of the mortality from egg to adult. These mortalities (94.9-95.2%) were in fact in good agreement with estimates based on direct measurement.

In addition to estimating mortality rates in a natural population of *Aë. cantans* the causes of the mortality were investigated. It was found that some loss was due to diseases such as an iridescent virus (Tinsley et al., 1971), to *Coelomomyces* fungi taxonomically near the species *psorophorae* and to various microsporidian infections. The use of serological techniques (Service, 1973a) identified the natural predators of *Aë. cantans,* the most important of which were larval *Dytiscidae* (*Coleoptera*) and various adult predacious *Diptera.* However, it was calculated that the actual impact of these predators on the population of *Aë. cantans* was relatively small, and it was concluded that unknown factors, possibly competition for food or space, were responsible for the large population loss that occured yearly.

Date specific marking with enamel paints was used on the adults caught each day in the emergence traps. These were released and later recaptured by sweep-netting vegetation, in non-attractant suction traps (Service, 1969, 1971) and at human bait. Relatively high recapture rates

were obtained. Marked unfed nulliparous females containing sugar solutions in their crops were often caught in suction traps and by sweep-netting the day after releasing, but each year there was a very marked interval of about three weeks before marked adults were caught at bait (Service, 1973b). Those caught biting contained no, or very little, sugar solution in their crops and at the beginning of the season all were still nulliparous. It appeared that orientation to blood feeding was always delayed until about three weeks after emergence. Moreover, some adults caught at bait seven weeks after marking were still nulliparous, suggesting that not all females were very successful in obtaining a blood-meal even when they were seeking hosts. Precipitin tests showed that in Monks Wood natural hosts were mainly rabbits.

LITERATURE

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EKOLOGIA KOMARA *AËDES CANTANS*

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Aëdes cantans jest pospolitym komarem leśnym w Palearktyce, kłującym człowieka, zdolnym do przenoszenia wirusa Tahyna. Biologię i ekologię komara badano przez 5 lat w rezerwacie Monks Wood (w pobliżu Cambridge, w południowej Anglii). Imagines giną we wrześniu i odtąd aż do początku stycznia, czyli do rozpoczęcia okresu wykluwania się z jaj, omawiany gatunek istnieje w przyrodzie wyłącznie w stadium jaj. Przez kilka kolejnych lat pobierano próbki błota i ściółki liściastej z siedlisk larw w sierpniu i grudniu, aby obliczyć liczebność i ubytek jaj w tym okresie. Pułapki umieszczone w kwietniu ponad tymi miejscami pobierały próbki z wykluwających się imagines. Tak prowadzone odłowy pozwoliły szacować corocznie wielkość populacji na etapie jaj (w grudniu) i w momencie wylęgu imagines. To z kolei dało możliwość obliczenia przeżywalności od jaja do imago.

Drogą regularnego pobierania prób ze stadiów preimaginalnych w okresie od stycznia do kwietnia lub maja można było obliczyć względną śmiertelność w poszczególnych stadiach larwalnych i w poczwarce.

Po zmierzeniu naturalnej śmiertelności każdego roku, podjęto badania w celu wykrycia jej przyczyn, np. jaką rolę odgrywają tu patogeny, drapieżnictwo innych gatunków czy może niesprzyjające warunki klimatyczne.

Grupy imagines znakowano farbą w dniu wykłucia się i wypuszczano. Odławiano je na żywą przynętę (człowiek) oraz za pomocą pułapek zasysających (bez przynęty), przez „koszenie" siatką i w pułapki świetlne. Analiza tak odłowionych znakowanych samic dostarczyła informacji o wieku samic po raz pierwszy pobierających krew, o długości życia, dyspersji i wielkości populacji.