

Institute, London; Dr. M. Gillies, School of Biological Sciences, University of Sussex, Brighton, Great Britain; the South African Institute for Medical Research, Johannesburg and Dr. Alec Smith of the World Health Organization for specimens and discussions. Mr. Chris Green of the Blair Institute, Salisbury, kindly commented on the manuscript and let us have the results of his chromosome work. Dr. R. A. Ward of the Walter Reed Army Institute of Research and The Medical Entomology Project, Smithsonian Institution, Washington, D. C., read the manuscript and kindly arranged for its final typing.

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THE NIGHT-TIME FLIGHT ACTIVITY AND RELATIVE ABUNDANCE OF FIFTEEN SPECIES OF LOUISIANA MOSQUITOES

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ABSTRACT. Fifteen species of Louisiana mosquitoes were sampled by use of a truck-mounted funnel trap. Collections were made hourly for a 12-hr period through the night. It

was shown that for most species, including *Aedes sollicitans* and *Culex salinarius*, the greatest activity occurred at dusk and dawn.

For various reasons, a knowledge of the flight activity of mosquitoes is essential to a mosquito control program. Comparative analysis of adult surveillance data should be contingent upon information concerning the periods of adult activity and inactivity. To be most effective, a ULV space spray should be applied at the peak of flight activity of a species. Therefore, flight activity data are of paramount importance in the scheduling of ULV treatments.

Migration, appetential dispersion, circadian rhythm, moonlight, brood age, season of the year, and species characteristics are factors which determine overall flight activity.

Migration probably occurs only on the

night of initial departure from the breeding site, with twilight departure resulting in a longer migration than departures later in the night (Provost 1957). Using p³² labeled *Aedes taeniorhynchus* adult males and females, Provost showed that appetential flights expand the distribution of the brood well beyond the migrational range. Females were recovered up to 25 miles away through the 24th night after emergence. However, the few males which were recovered were within 3 miles of the departure point.

Circadian rhythm of mosquito flight activity has been documented by several workers (Haddow et al. 1961, Jones et al. 1967, Nayar and Sauerman 1971). Simply stated, circadian rhythm refers to biologi-

cal cycles which recur at approximately 24-hr intervals. Normal night-time flight activity for some species appears to be phase-set by a change from light to dark and dark to light (Haddow et al. 1961, Taylor and Jones 1969). Taylor and Jones reported that peaks of activity of *Ae. aegypti* occur 13–14 hr after light-on and 22–23 hr after light-off. They also showed that the mosquitoes maintained a weak 26-hr rhythm of flight activity even when subjected to constant light.

Moonlight also has a significant effect on mosquito activity. Ribbands (1945) stated that moonlight extends the twilight flight effect at a higher level than would normally occur in the absence of moonlight. Light traps compete with moonlight, and lower trap counts result.

Bidlingmayer (1964) found that full moonlight extended the effect of twilight on truck-trap collections. Compared with moonless night catches, *Ae. taeniorhynchus* female adults showed a 95% increase at quarter moon, and a 546% increase at full moon.

To an extent, flight activity is also affected by brood age. Taylor and Jones (1969) reported that *Ae. aegypti* female adults exhibited their maximum flight activity 5–12 days post-eclosion and that all of their colony-reared females had been inseminated by 5–6 days post-eclosion. Insemination had occurred in only a third of those examined 2–3 days post-eclosion.

A valuable tool for monitoring mosquito flight activity in the field is the truck trap. This method of collecting mosquitoes has been used beginning in the mid-forties by Chamberlin and Lawson (1945), de Zulueta (1950), Provost (1952, 1957) and other workers and has been reviewed by Bidlingmayer (1966). A roof-mounted truck trap was employed for the following study.

MATERIALS AND METHODS

A 7.1 km truck trap route was selected in southeast Orleans Parish. The road extends through a 1,300 ha fresh-water marsh, which is bordered on the south and

southeast by extensive salt marsh. The northern side of the route is bounded by a thin margin of woodland and densely populated subdivisions.

The trap opening is 1.48 m². Each run sampled a 10,480 m³ volume of air, 2 m above the surface of the road. The trap was operated at 21 kph on 4 occasions from July to September, 1974. On each occasion, trapping started at 6:30 p.m. and continued every 30 min until 6:00 a.m. the following morning. The collection from each run was killed with dry ice, transferred to 0.5 liter cardboard containers, and identified to species and sex.

Before each run, temperature and relative humidity were recorded from an Abbeon Cal® Model HTAB 169-B hygrometer and temperature Indicator. Wind speed was determined and recorded using a Dwyer® handheld meter. Time and trap speed were monitored and recorded on a Sangamo® Tachograph #404104 with a 0–23 mph (37 kph) scale.

Weather conditions were similar for 3 of the trials. Data from a 4th trial were not used due to high winds and low temperatures.

RESULTS

During all 3 trials, winds were from the south at less than 8 kph; temperatures ranged from 27° to 31°C; and the humidity from 65% to 98%. The temperature and humidity regimes were normal, with the temperature drop corresponding with a rise in humidity. A total of 527 males and 3,597 females was collected on the 3 trials, representing 15 species of mosquitoes. Species collected were: *Ae. aegypti* (0.02%), *Ae. sollicitans* (7.78%), *Ae. taeniorhynchus* (16.33%), *Ae. triseriatus* (0.05%), *Ae. vexans* (5.09%), *Anopheles crucians* (2.72%), *An. quadrimaculatus* (0.97%), *Coquillettidia perturbans* (0.05%), *Culex salinarius* (58.63%), *Cx. (Melanocnion) sp.* (1.45%), *Culiseta melanura* (0.36%), *Psorophora columbiana* (1.62%), *Uranotaenia lowii* (2.26%), and *Ur. sapphirina* (1.45%).

Figure 1 represents the flight activity of the averaged combined trials. The term

"twilight" refers to the period of time 1 hr after official sunset, and 1 hr before official sunrise. The term "midnight" is used to denote the midpoint between the end of evening twilight and the beginning of morning twilight.

DISCUSSION

A general pattern seemed to prevail for all species sampled during this study. Although the flight activity of each species is not presented here, the peak mosquito

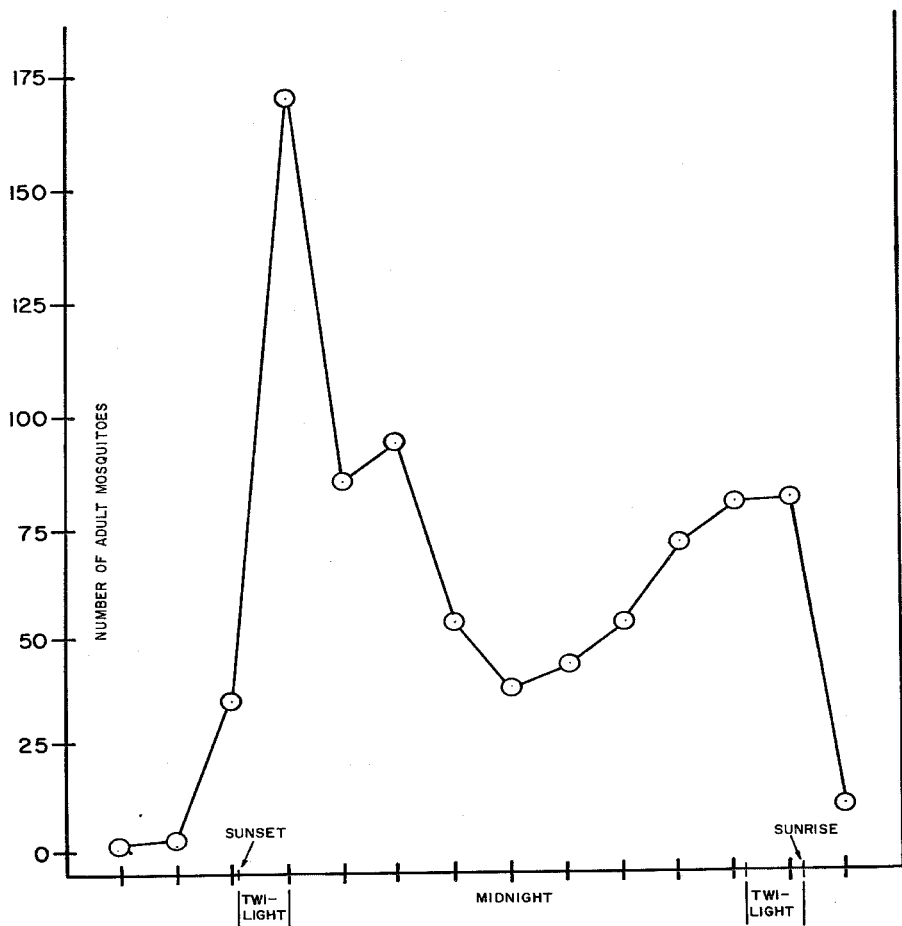


Fig. 1. Relative levels of nighttime flight activity. Combined species averages from three truck trap collections.

flight periods for nearly all occurred in association with sunrise and sunset as shown in Figure 1.

It is concluded that the optimum time to schedule ground or aerial adulticiding treatments is during evening twilight. When early morning treatments are desirable, the most effective treatment time is during morning twilight, or dawn.

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LABORATORY STUDIES OF *TOXORHYNCHITES SPLENDENS* Part I. COLONIZATION AND LABORATORY MAINTENANCE

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ABSTRACT. All known earlier attempts to colonize *Toxorhynchites splendens* (Wiedemann) have been unsuccessful. This report records the

first successful laboratory colonization of this species and a description of colony maintenance is given.

INTRODUCTION

The genus *Toxorhynchites* consists of large usually brilliantly colored diurnal, non-bloodsucking species, occurring mostly in the tropics. Because the larvae are predacious on other mosquito larvae in areas where they co-exist in aquatic

habitats, their potential usefulness for the biological control of certain vector mosquitoes in the tropics has been favorably discussed (National Academy of Sciences 1973).

The adults of *Toxorhynchites amboinensis* have been successfully used as laboratory hosts for the propagation and assay of