

ATTRACTIVITY OF LIGHT FOR ANOPHELES MOSQUITOES

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The New Jersey Mosquito Extermination Association has devised and used a mosquito sampling trap for the purpose of determining the effectiveness of anti-mosquito campaigns. The insects are attracted to the trap by electric lights and are then blown by a small electric fan into a cyanide jar from which they are later recovered.

In New Jersey pest mosquitoes are the main object of anti-mosquito activities and when operated during the flight time of the pests these traps have proven far superior to ordinary hand catching in measuring the effectiveness of control measures.

Malaria field workers are well aware of the difficulties of sampling the mosquito population by hand catching in the customary daytime

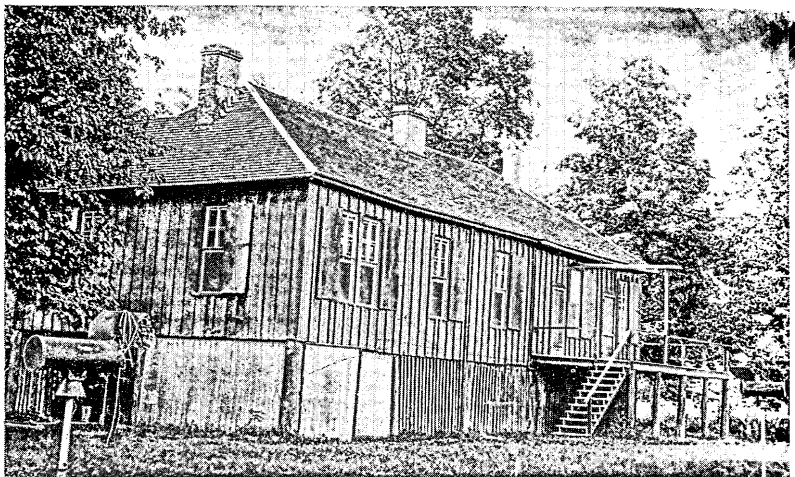


Fig. 1. The Light Traps on Posts at the left and right of the Biological Building. These were the earlier traps used.

resting places. While this has been the most satisfactory method known it entails much effort due to the different habits of various anopheles and does not always give a true picture of anopheles density. It therefore seemed opportune to ascertain whether light traps might be more efficient than hand catching in obtaining a true record of Anopheles prevalence.

This investigation was made at the Reelfoot Lake Biological Station of the Tennessee Academy of Science. The light traps used were similar to those used in New Jersey and consisted of a cylinder approximately one foot in diameter and two feet long. In the center of the cylinder was mounted an electric fan to maintain a current

of air through the cylinder. At the suction end was placed an ordinary electric light socket and at the other end arrangements were provided for blowing the insects into a cyanide jar. With slight modifications this type trap could be used in either a horizontal or vertical position.

During the summer of 1933 hand catching was used exclusively. In the usual daytime resting places (tree roots, hollow logs, in and under cow sheds, chicken pens, and inside inhabited buildings) only two species of *Anopheles* were recovered. *Anopheles quadrimaculatus*, the main malaria carrier of the Southeast, was extremely abundant throughout the summer while *Anopheles punctipennis* was found in small quantities. *A. quadrimaculatus* outnumbered *A. punctipennis* by more than 100 to 1. No other species of *Anopheles* were observed during the summer.

During the summer of 1934 the mechanical light traps were used and collections were made by them during a period of one-half to three-fourths hours at dusk (flight time for *Anopheles*). The traps picked up large quantities of *A. quadrimaculatus*, some *A. punctipennis*, and regularly small numbers of *A. crucians*. Hand catches in the daytime resting places were made during the entire period as a check on the trap. *A. quadrimaculatus* and *A. punctipennis* were thus found regularly, but no *A. crucians* were found by hand until two months after the trap had showed them to be actually present. Trap-caught specimens of *A. crucians* were forwarded the Bureau of Entomology at Washington long before their presence would have been noted from hand catches.

During this same summer experiments were carried out to determine the effect of color and intensity of light on its attractiveness for *Anopheles*. Both factors are apparently involved. An increase in intrinsic brilliancy with a given color resulted in larger catches. The attractiveness of the light also increased with the color as the various colors were tested going down the visible spectrum from red to violet. While infra red and photographic red (ruby) light did not attract *Anopheles*, ultra violet did possess a small degree of attractiveness. The result of the study showed that an ordinary 100-watt frosted Mazda light gave excellent results and that a 60-watt CX light (ordinary 60-watt light in ultra violet transmitting glass) gave almost as good results. Later studies confirmed the fact that the 100-watt light was most satisfactory.

August and September of 1935 was devoted to a further study of the effectiveness of light traps. Shortly after commencing studies the trap with a 100-watt light picked up specimens of what proved to be *A. walkeri* a rather scarce *Anopheles* previously reported in a few sections of the United States and Canada. The first *A. walkeri* were caught in the trap on August 14 and by August 27 better than 50 per cent of the entire trap catch was *A. walkeri*. They then diminished slowly until September 8, after which date no more were caught. At this later date cool fall weather had been prevalent for over a week and probably was responsible for the diminution in *A. walkeri*.

An unusually diligent search was made during the time the trap was catching *A. walkeri*, but none were ever found in the customary daytime resting places. A small number of female *A. walkeri* were captured, however, after they had been induced to enter an enclosure by an electric light at night and then the enclosure sealed. It is safe to state that the presence of *A. walkeri* at the Station would not have been recognized had it not been for the light trap. During the period, August 14 to September 8, 341 *A. quadrimaculatus*, 8 *A. punctipennis*, 66 *A. crucians*, and 133 *A. walkeri* were caught in the light trap. Very few male Anopheles were ever found in the trap and no *A. walkeri* males were caught during the operation of the device.

There is very little information available relative to the habits of *A. walkeri*, although it is known that they are able to carry malaria. *A. walkeri* resemble *A. quadrimaculatus* very closely in markings, but evidently differ widely from them in habits.

The experimental work on the attractivity of lights for Anopheles at the Reelfoot Biological Station has shown:

First, for indicating the relative prevalence of different species of female Anopheles, the light trap is much more efficient than hand catching.

Second, a 100-watt ordinary frosted Mazda light is a most efficient light source for attracting female Anopheles. Weaker lights attract fewer insects.

Third, a properly operated light trap can be expected to indicate the presence of species of Anopheles that would otherwise be missed altogether.

On the assumption that conditions for Anopheles breeding about the Biological Station are essentially similar each year it is apparent that the genus *Anopheles* is represented in the area by at least four species. *A. quadrimaculatus*, an efficient malaria carrier, is prevalent in great quantities throughout the entire mosquito breeding season. *A. punctipennis* and *A. crucians* are prevalent in small numbers throughout the season. *A. walkeri* is apparently prevalent in moderate numbers only during the hottest summer weather.