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DAILY FLIGHT ACTIVITY OF *AEDES MELANIMON* DYAR (DIPTERA:CULICIDAE)

TAKESHI MIURA [1] AND D. E. REED [2]

Aedes melanimon Dyar is an important pest mosquito in the Central Valley of California. This species breeds in large numbers in seasonally flooded areas, such as in the duck clubs of the west side of the San Joaquin Valley; it is also found in irrigated pastures in association with *Aedes nigromaculis* (Ludlow). The dispersal of this species from breeding sites into residential areas is wellknown; it has been reported that this mosquito generally moves along waterways, with the prevailing winds (Kliewer and Miura 1969, Reed 1969). In order to understand the dispersal of *A. melanimon,* a study of the daily flight activity was made.

A study area was selected in the southern portion of the Grasslands Water District. It is located about midway and toward the western edge of the San Joaquin Valley. The surrounding land is generally level. About 5 miles westward there is an upward slope which extends to the foothills of the Coastal Range; the foothills of the Sierra Nevada Range lie about 35 miles to the northeast. The climate of the area is mild in the winter and dry and hot in the summer. The daily maximum temperature during the

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summer months ranges from 85° to 115° F, and relative humidity readings of 10 percent are common on summer days. The predominant vegetation in the area is salt grass, *Distichlis spicata* (L.); wire rush, *Juncus balticus* Willd.; cattail, *Typha latifolia* L.; bulrush, *Scirpus robustus* Pursh; and iodine bush, *Allenvolfea occidentalis* (Wats) (Mason 1957).

MATERIALS AND METHODS. Daily flight activities were determined from hourly collections made during the spring, summer and fall. Both a standard American light trap, equipped with a 25-watt light bulb, and a Malaise trap, without bait, were used during each collection period. The light trap was placed at a duck club lodge, on the south side of a cabin, and the Malaise trap was set upon dry land about 500 yards southeast of the light trap. The specimens from each hourly collection were placed in a dixie cup and transported to the laboratory where the mosquitoes were identified and counted by sex. During each study period, observations on biting and swarming activity were made; wind direction and speed, temperature, and relative humidity data were recorded.

RESULTS AND DISCUSSION. In the spring and summer, the daily flight rhythm of *A. melanimon* was crepuscular with a flight peak during twilight periods (Figure 1). A typical relationship of flight cycles to daily environmental changes is illustrated in Figure 2. During the day, mosquitoes rested in grass, or brush, adjacent to their emergence sites. At dusk, local weather conditions changed rapidly (lowering temperature and light intensity and increasing relative humidity) and females were sighted sporadically in the air; biting activity began at this time. The

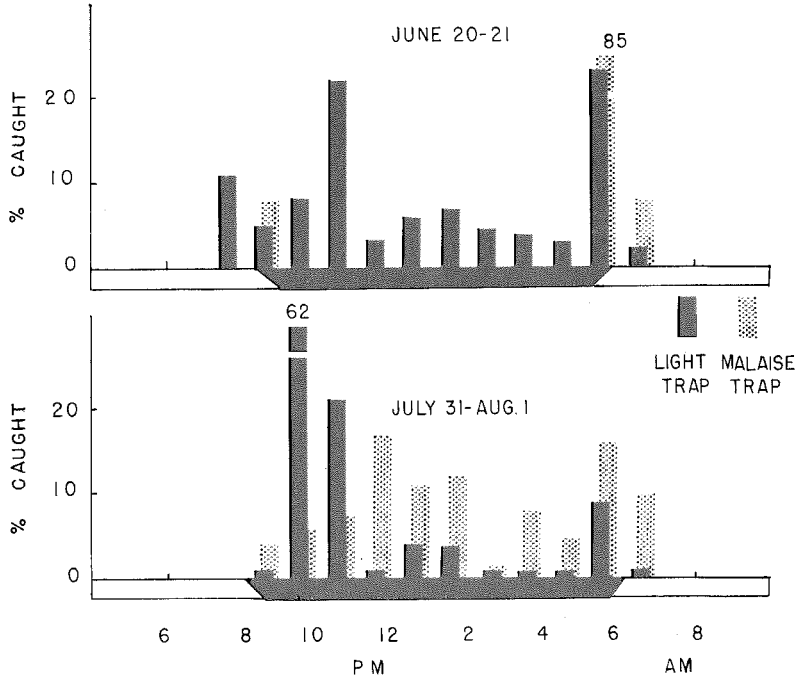

FIG. 1.—Overnight collections of *Aedes melanimon* in the San Joaquin Valley of California, 1969.

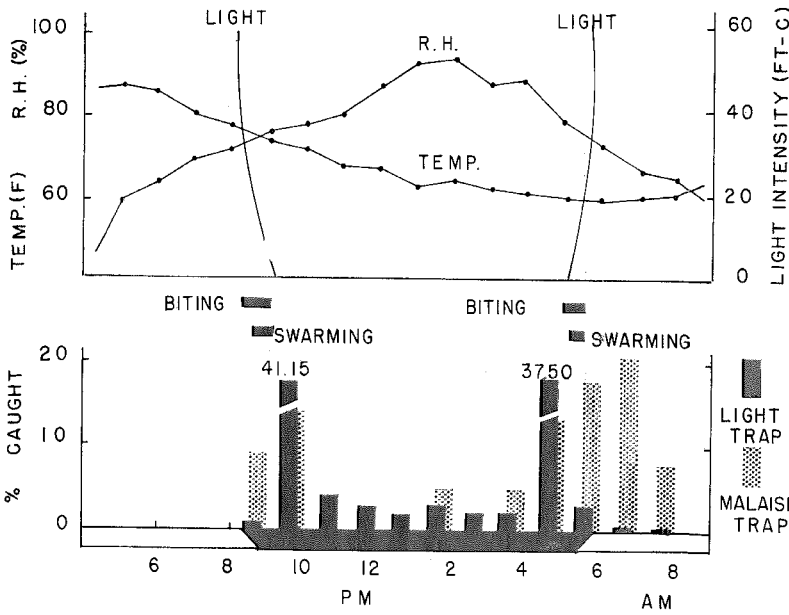

FIG. 2.—Relationship of daily patterns of behavioral activity of *Aedes melanimon* as shown by the overnight collections to daily weather change in the San Joaquin Valley of California, June 13–14, 1969.

first swarm of males was noticed over a fence post at 8:30 pm[3] (light intensity about 21 ft-c[4]). Flight activity began at dusk and substantial catches were made during the 1-hour period after sunset; the mean temperature during this period was 74° F and the relative humidity was 77 percent. At dawn, biting and swarming activities resumed. Substantial catches also occurred just before sunrise. Between these peak catches little nocturnal flight activity was apparent.

In the fall, the crepuscular flight peaks were reduced and the intervening nocturnal flight between the peaks was considerably greater. (Figure 3). Furthermore, in the fall, there was a marked increase of nonspecific flight; 54 percent of the hourly collections were obtained from unbaited Malaise traps, while in the spring and summer, Malaise traps collections did not exceed 10 percent of the total catches (Table 1). This nonspecific, nocturnal flight of *A. melanimon* may play an important role in the population displacement of this species (Miura and Reed 1969). In the fall, populations of this species are large and constitute a major annoyance both to local residents and to those some distance downwind from the emergence sites. No specific study was conducted to investigate the cause of this dispersal; however, the fall weather condition—lower temperature and higher relative humidity during the night—probably is more favorable for nocturnal flight.

It is well-known that strong winds prevent mosquito flight (Lumsden 1952, Wright and Knight 1966). A light trap, which collected between 2436 and 6832 specimens during calm nights, caught only

[3] Pacific Daylight Saving Time.

[4] Measured by the Gossen Lunasix photo-exposure meter.

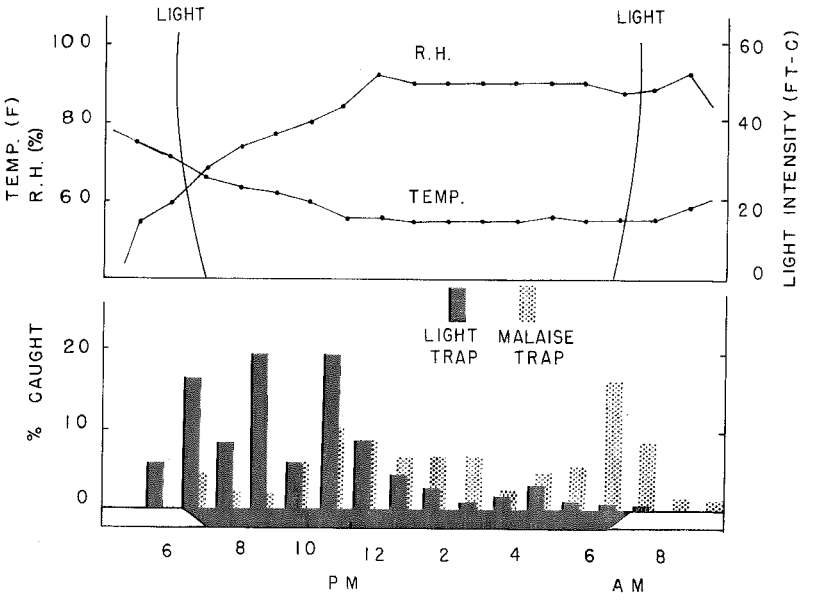

FIG. 3.—Relationship of daily flight activity of *Aedes melanimon* as shown by the overnight collections to daily weather change in the San Joaquin Valley of California, October 13–14, 1968.

832 to 956 mosquitoes during windy nights. Figure 4 shows the effect of air movements on flight; almost all mosquitoes trapped were taken during wind velocities of less than 5 miles per hour and very few specimens were obtained during windy hours (5 mph or more).

SUMMARY. The daily flight cycle of *A. melanimon* was crepuscular with bimodal peaks at twilight periods. There were also some nocturnal flights between the peaks. In the fall, the extent of nocturnal flight increased and the bimodal peaks at the twilight periods were reduced. A marked increase of nonspecific nocturnal flight in the fall might help to explain the dispersal of *A. melanimon*. Air movement of 5 miles or more per hour seems to inhibit flight.

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TABLE 1.—Comparison between *A. melanimon* light trap collection data and unbaited Malaise trap collection data.

Date	Total Collected	Light Trap	Malaise Trap
June 13–14	293	93.47%	6.53%
June 20–21	139	90.65	9.35
July 31–August 1	4,643	98.49	1.51
October 13–14	10,173	45.63	54.37

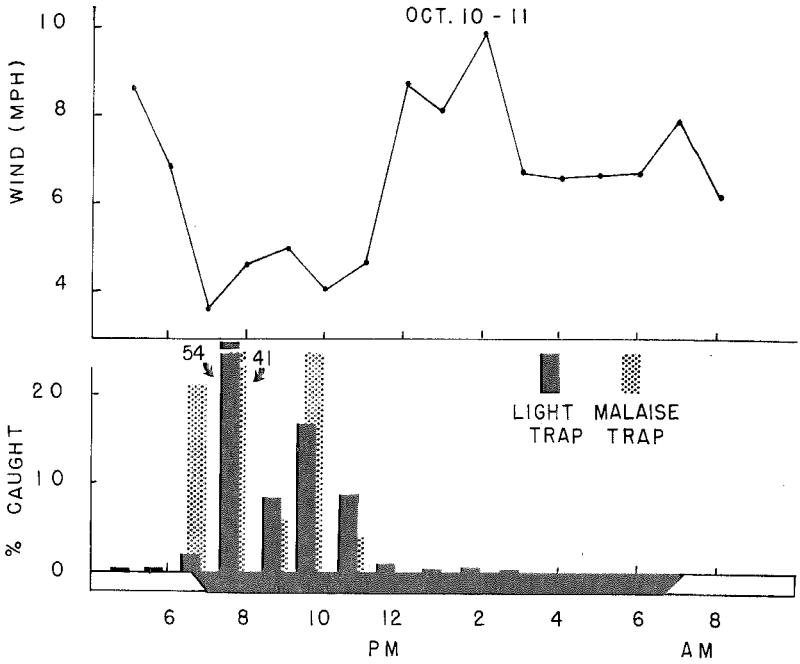

FIG. 4.—Effect of wind speed on flight activity of *Aedes melanimon*.

rhythms of *Aedes melanimon* Dyar (Diptera: Culicidae) on duck club lands of the west side of the San Joaquin Valley of California. Calif. Mosquito Control Assoc. Proc. 37:94–97.

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FROM THE MEMBERSHIP COMMITTEE, (GLENN STOKES, CHAIRMAN).

The AMCA Board of Directors has approved the proposition of one year's free membership for each five new members recruited for AMCA. Rgulations regarding this will be to the effect that new members must not be renewals and the five new members must be recruited within a calendar year. The Executive Secretary in conjunction with the Membership Committee Chairman will keep the necessary records and make the free year's membership awards.