

THE BITING ACTIVITY OF *Aedes sollicitans* IN NEW JERSEY.

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ABSTRACT. Biting collections from June 18 to August 23, 1975 yielded 3,145 *Aedes sollicitans* females of which 1,240 were dissected. There were 450 nulliparous, 664 1-parous, 109 2-parous and 17 3-parous mosquitoes. Both the total catch and the component age groups exhibited bimodal patterns of activity. Maximum activity occurred within 15 to 30 minutes of civil

twilight at dusk and dawn. The total number of females collected from the dawn period was significantly greater than for the dusk period. No difference in activity of the nulliparous, or 1-parous and 3-parous females was noted between dusk and dawn periods, but a significant difference was noted in the abundance of 2-parous females from the dawn period.

Aedes sollicitans is a serious hematophagous pest and vector of eastern encephalitis (EE) to man (Crans 1977) requiring hundreds of thousands of dollars annually for its control in New Jersey. Except for Provost (1959) and Bidlingmayer (1964) who examined the influence of moonlight on *Ae. sollicitans* as part of a more intensive series of investigations, surprisingly little is known concerning the detailed biting activity of this mosquito. The present study was initiated to determine the temporal pattern of biting activity of *Ae. sollicitans* and to correlate the activity patterns with the physiological age of the females collected.

METHODS AND MATERIALS

Samples were collected over 10 nights of study at approximate weekly intervals from June 18 to August 23, 1975 at Taylor Road (39° 43' 30" N, 74° 14' 10" W) near the town of Barnegat, New Jersey.

Daytime sampling was conducted June 9, but *Ae. sollicitans* was not found to be free flying during daylight hours. It is possible to induce *Ae. sollicitans* to bite during the day, but they must be disturbed from their resting sites. Therefore, only free flying nocturnal collections were made.

Each nightly collection consisted of dusk, night and dawn observation periods which were delimited as follows:

Dusk: Start of observations to 60 min. after civil twilight.

Night: Sixty min. after civil twilight to 60 min. before civil twilight at dawn.

Dawn: Forty-five min. before civil twilight to 1 hr after sunrise.

During dusk and dawn periods, samples were collected every 15 min. Hourly samples were taken during the remainder of the night.

Females seeking a blood meal were aspirated with a hand-held car vacuum which was plugged into the automobile cigarette lighter. The mosquitoes were aspirated from the exposed arms and covered back and chest of the investigator who stood motionless in the middle of the road at the marsh/ upland ecotone. Two collections of 2 min duration each were made at each sample period. The specimens were immediately frozen with dry ice, returned to the laboratory, and stored until ready for dissection.

Dissections were performed in distilled water at 30 X magnification under a stereomicroscope. A small slit was made with minuten probes in the tip of the ab-

domen; the ovaries were removed by applying gentle traction to the abdominal tip.

One ovary from each of the females examined per sample period was placed on a clean, dry glass slide and permitted to air dry at room temperature. When dry, the tracheole endings were examined at 150 X magnification. Coiled tracheoles indicated nulliparity; stretched and unwound tracheoles indicated parity (Detinova 1962).

In parous specimens the opposite ovary was examined for dilations according to Polovodova (1949). To determine the physiological age the ovary was transferred to a drop of distilled water where the ovarian sheath was removed and the individual ovarioles teased apart with minuten probes. By gently spreading the ovarioles the pedicels were exposed and the dilations counted. Subdued light and a magnification of 100 X on a stereomicroscope were necessary for examination. Several ovarioles per ovary were examined.

The light intensity, which was later converted to foot candles, was measured with a Weston Master 6 light meter.

RESULTS AND DISCUSSION

From 10 nightly catches, 3,145 *Ae. sollicitans* were collected and 1,240 dissected. The population consisted of 450 nulliparous, 664 1-parous, 109 2-parous and 17 3-parous mosquitoes. The cumulative parity rate for the season was 63.7 percent.

The activity of *Ae. sollicitans* is shown in Fig. 1. The biting cycle (Fig. 1 A) showing the mean number of females collected throughout the study indicates that there was an increase in flight activity with the advance of twilight at dusk and dawn. Maximum numbers occurred at or shortly after civil twilight when the light intensity was less than 3 foot-candles. Following civil twilight at dusk the number of females collected diminished through the night peaking again at dawn with increasing light intensity. The component age groups (Fig. 1 B and C) exhibited similar

patterns of activity to the number of females collected (Fig. 1 A).

A chi square analysis of the total number of females collected for the dusk (1283) and dawn (1639) periods indicated that there was a significant difference ($P < .05$) with greater numbers being collected during the morning period.

The data in this study indicate that maximum mosquito activity occurred between civil twilight (1 crep) (Nielsen 1961) and 15 to 30 min after (1.5 to 2.0 crep). These results agree closely with Bidlingmayer (1964) who determined peak activity for *Ae. sollicitans* and *Ae. taeniorhynchus* between 1.2 and 2.0 crep.

An analysis of variance of the data (Table 1) indicated that there was no difference between the number of nulliparous, 1-parous or 3-parous females collected at dusk and at dawn. However, when the 2-parous mosquitoes were compared there was a significant difference ($P < .05$) for greater numbers collected during the dawn period. This suggests a behavioral difference in 2-parous females compared with other age groups in the population. The reason for this difference is unknown. The possibility exists that moonlight intensity may be the cause by providing a stimulus for increased activity. Further research is indicated to clarify this aspect of activity in *Ae. sollicitans*.

An analysis of variance was also conducted to determine if there was a difference in age groups collected during the night and dusk periods (Table 1). The results indicated that the difference was not significant for the nulliparous females col-

Table 1. Total number of dissected *Ae. sollicitans* females by age group and nightly collection period.

Age Group	Collection Period			
	Dusk	Night	Dawn	Percent
Nulliparous	179	90	181	36.3
1-parous	279	101	284	53.5
2-parous	29	13	67	8.8
3-parous	5	2	10	1.4

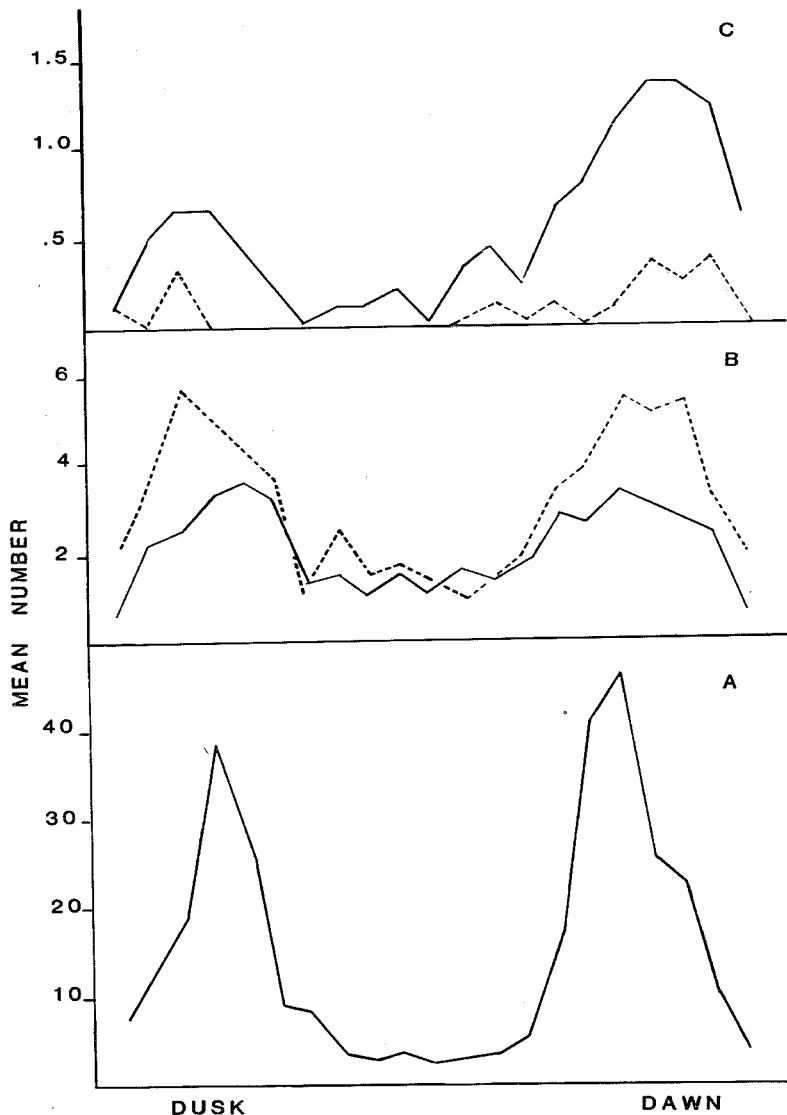


Fig. 1. Mean biting activity and component age groups of *A. sollicitans* collected over 10 nights in New Jersey. A. Females collected. B. nulliparous (solid line) and 1-parous (broken line) females. C. 2-parous (solid line) and 3-parous (broken line) females.

lected, but significant differences were noted for the 1-parous and 2-parous mosquitoes ($P < .05$). Sufficient data were not available for a variance analysis of the 3-parous females. However, when subjected to a chi square analysis no difference was noted between groups.

The data (Fig. 1, Table 1) indicate that *Ae. sollicitans* was more abundant at dusk and dawn when compared with the longer night interval. Since man tends to be more active during twilight hours, particularly dusk, the biting patterns of *Ae. sollicitans* help bring man and mosquito together thus increasing contact. If EE virus were present in the mosquito population, the probability of virus transmission to and establishment within the human population is increased. To assess this aspect, virus isolation studies should be conducted on *Ae. sollicitans* collected from dusk and dawn periods. This would better define the role of *Ae. sollicitans* in EE virus transmission to man.

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