

OBSERVATIONS ON THE FLIGHT AND MATING BEHAVIOR OF *ANOPHELES PSEUDOPUNCTIPENNIS* UNDER INSECTARY CONDITIONS¹

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ABSTRACT. *Anopheles pseudopunctipennis* showed a bimodal daily pattern in flight activity with the largest peak at 2000 h and the smaller one at 0400 h. In the first 10 days as adults, the maximum swarming activity was observed between 2–6 days of age. Also, sexual encounters were registered at the same time interval.

Anopheles pseudopunctipennis Theobald has been frequently incriminated as a primary vector of malaria in the New World (World Health Organization 1982, Bruce-Chwatt 1985). This species is widely distributed, having been recorded from Argentina and Chile north to the southcentral United States (Lane 1953, Carpenter and LaCasse 1955, Darsie and Ward 1981). In northeastern Mexico we have found *An. pseudopunctipennis* larvae to be very abundant in pools of streams and rivers. High population levels of this vector species represent a serious health threat due to the significant immigration of people from malaria endemic areas of southern Mexico. Information on larval and adult biology in the field (Breeland 1972a, 1972b; Savage et al. 1990) and under insectary conditions (Gerberg 1970) for *An. pseudopunctipennis* remains limited. Colonization of this species has typically required artificial or forced mating (Martinez-Palacios and Davidson 1967, Darsie and Lopez 1980, Warren et al. 1980). In a few cases natural coitus has been noted under laboratory conditions (Baerg 1971, M. H. Rodriguez, personal communication). A better understanding of adult activity patterns and mating behavior is required to successfully develop a self-mating colony.

Immature stages of *An. pseudopunctipennis* were collected with a dipper in the Salinas River approximately 25 km north of Monterrey, Nuevo León. Immature stages were transported to the laboratory in 3-liter plastic bottles and placed into plastic pans with water and filamentous algae from larval habitats. Larvae were fed a powder diet consisting of equal proportions of

Spirulina, shrimp flour and chicken feed. Insectary temperature was maintained at 27–30°C and photoperiod at the natural summer cycle for 26.5°N latitude (13L:11D).

On June 24, 1989, 32 one-day-old adults (16 of each sex), reared from field collected immatures, were confined in a 48 × 78 × 48 cm nylon mesh cage under conditions of 28°C and 82% RH. Adults were continually supplied with a small piece of cotton containing a 1:1 solution of honey and water. A hamster in a small metal cage was placed in the mosquito cage during each dark phase, and at the same time the observer's hand was offered through mesh as a bloodmeal source. For 10 days, the number of individuals flying and the numbers of sexual encounters were recorded during the first 15 min of each hour from 1800 to 0700 hours. The duration of each observed coitus was measured with a chronometer. Insemination rates were determined by dissection of spermathecae on the 11th day.

The daily pattern of flight activity over a 10-day period between 1800 and 0700 h (the next morning) is presented in Fig. 1. Activity was bimodal with the first and largest peak occurring at 2000 h followed by a smaller activity peak at 0400 h. Although the mosquito behavior was observed under insectary controlled conditions, the frequent exposure of the observer's hand as a food source might be an interference factor in this study, due to the production of body heat, CO₂ or lactic acid. In spite of these variables that are stimuli for flight reactions in mosquitoes (Davis et al. 1987), it is probable that adult behavior was more rhythmic than reactive because the exposure time to the hand was the same per hour in each dark phase. Similar swarming and mating activity patterns were observed for an *An. pseudopunctipennis* colony in Panama (Baerg 1971). Interestingly, Elliott (1972) reported a similar bimodal pattern for

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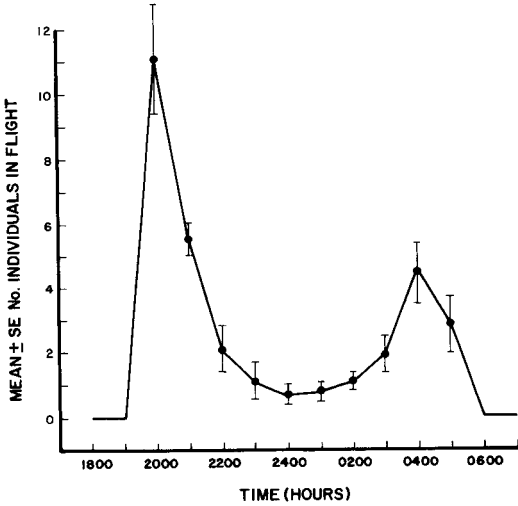


Fig. 1. Daily pattern of swarming activity of *Anopheles pseudopunctipennis* under insectary conditions.

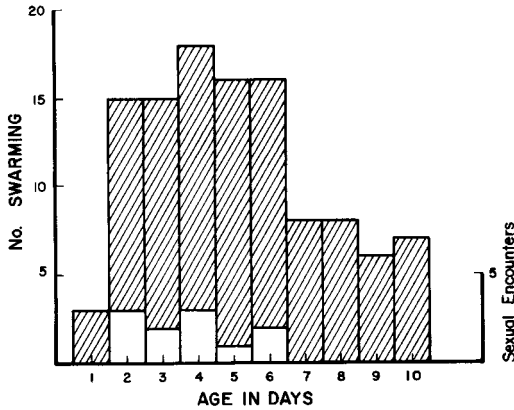


Fig. 2. Sexual and swarming activity of 16 couples of *Anopheles pseudopunctipennis* during the first 10 days as adults.

host seeking and feeding activity in field populations of *An. pseudopunctipennis* in Peru.

Coitus was observed to occur only during the 2000-h observation period, which coincided with maximum flight activity. Coupling was observed only in individuals 2-6 days old (Fig. 2) and lasted an average of 6.31 ± 0.65 sec ($n = 11$). Mating began in flight and ended after the pair fell to the floor of the cage with males and females facing the same or opposite directions. Dissection of spermathecae for all females re-

sulted in just one spermatheca found positive for sperm. Although at least 11 couplings took place, successful sperm transfer was very rare. All females were observed to have taken at least one bloodmeal with most females preferring the human source. Evidence of unfertilized egg formation was observed in several females.

In conclusion, flight activity of *An. pseudopunctipennis* follows a bimodal daily pattern influenced apparently by swarming and pre-copulatory activities. Even though only a single female was inseminated, it was observed that insemination can occur under laboratory conditions.

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