

Blood-feeding patterns in nature. — *Cx. nigripalpus* has an annual shift in its blood-feeding pattern, feeding mainly on avian hosts in the winter and spring, and then switching to an equal or greater feeding on mammals in the summer and fall (Edman & Taylor 1968). This feeding pattern is similar to that observed with *Culex tarsalis* in California (Hayes et al. 1973, Reeves et al. 1963, Tempelis et al. 1965, Tempelis et al. 1967). The time and magnitude of this shift varies from year to year in accordance with the onset and duration of the rainy season (Edman 1974).

In the summer and early fall when afternoon showers occur frequently, more *Cx. nigripalpus* move from wooded areas to the adjacent open habitats (Bidlingmayer 1971), where mammalian hosts are more likely to be found. The cause of this seasonal change in their flight behavior is difficult to assess, but the effect of temperature and light is inadequate to explain the phenomenon since humidity seems to greatly influence the activity of *Cx. nigripalpus*.

Reeves (1971) introduced another consideration which involves the relationship of mosquito density to host selection. In analyzing the shift from birds to mammals by both *Cx. tarsalis* and *Cx. nigripalpus*, he hypothesized that since larger mosquito populations coincide with the shift from birds to mammals, this may have an effect on mosquito feeding behavior, which can be interpreted in two ways: (1) the increased population results in mosquitoes interfering with each other during feeding or (2) the increased biting activity on the preferred host makes this host intolerant to the mosquito. The latter has been shown to play an important role in the feeding behavior of *Cx. nigripalpus* (Edman et al. 1972).

Mosquito behavior and host receptivity also influence blood-feeding patterns. Certain mosquito species do not leave protected areas, such as woodlands, seeking blood, while others move readily into open areas (Bidlingmayer 1971). This can determine to some extent the host selected for feeding. When species are reluctant to leave these protected areas, they are restricted to feeding on the fauna that share the same woodland habitat. However, mosquitoes that fly into open areas increase their host choice to include pastured animals.

Until recently, a host's anti-mosquito behavior had not been ascertained to be a key determinant in host preference, but it is now recognized that certain hosts do demonstrate heightened activity when attacked by mosquitoes. Rodents are abundant in nature and in many cases the most common animal group present. However, they seldom serve as mosquito hosts in any significant degree. The infrequency of feeding on rodents may be due to their inaccessibility during times of peak mosquito biting activity and their defensive behavior (Edman & Kale 1971). Seven Ciconiiform bird species were studied and variations in their receptivity to the biting of *Cx. nigripalpus* were observed (Edman & Kale 1971, Webber & Edman 1972). Fifteen different anti-mosquito movements were recognized, such as foot-slapping and foot-pecking, and on those birds that were most active, the mosquitoes were least successful in obtaining a blood meal. When the birds were confined in cages, few *Cx. nigripalpus* were engorged and