ADULT BODY SIZE AND PARITY IN FIELD POPULATIONS OF THE MOSQUITOES *ANOPHELES CRUCIANS*, *AEDES TAENIORHYNCHUS* AND *AEDES SOLLICITANS*[1]

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Variations in adult mosquito body size have been reported from field populations of a number of mosquito species utilizing a wide variety of larval habitat types (Bock and Milby 1981, Haramis 1984, Fish 1985; Nasci 1986a, 1986b). The amount of variation appears to be related to the nature of the larval habitat (Fish 1985). Species using rapidly changing or ephemeral habitats (i.e., flood water, tree holes, man-made containers, salt marshes) display more variance in adult body size than do species using more stable habitats (permanent water, swamps, lake margins).

In addition to having ecological significance, the distribution of body size in a mosquito population has epidemiological significance. Survival and parity are positively correlated with large body size in several mosquito species (Haramis 1983; Nasci 1986a, 1986b).

The purpose of this project was to examine the body size of *Anopheles crucians* Wiedemann, *Aedes taeniorhynchus* (Wiedemann), and *Aedes sollicitans* (Walker) populations, to determine if these three salt marsh inhabiting species demonstrate similar amounts of variation in size. Fish (1985) previously reported that the body size of *Ae. sollicitans* collected in New York is highly variable. Additionally, I examined the relationship of body size to parity in these species.

The mosquito populations were sampled by collecting host-seeking mosquitoes coming to human bait at the edge of a salt marsh located in Calcasieu Parish, Louisiana. Collections were made from one hour before to one hour after sunset, once a week for 5 weeks (starting July 16 through August 11). The mosquitoes were identified in the laboratory, and the left wing of each female mosquito was removed and measured (distance from the axillary incision to the apical margin, excluding the fringe of scales) using a binocular dissecting microscope equipped with an ocular micrometer. In addition, the ovaries of each specimen were removed, and the tracheoles were observed by phase contrast microscopy to determine parity (Detinova 1962).

The wing length measurements for each species are shown in Table 1. All 3 species displayed a wide range of body sizes (as indicated by wing length), and a high degree of variation. Fish (1985) converted the wing length in mm of *Ae. sollicitans* to mg dry weight using a formula derived from measurements on *Aedes triseriatus* (Say) (dry weight = $(0.009 \times \text{wing length}^3) - 0.017$), and determined that the coefficient of variation (CV = standard deviation × 100/mean) for *Ae. sollicitans* dry weight ranged from 24.5 to 36.7, depending on the year of collection. Using the same formula for converting wing length to dry weight, the *Ae. sollicitans* in this study had a CV = 30.5. This demonstrates an amount of variation similar to that found in populations from New York. The coefficients of variation of the other species from the salt marsh were calculated using the same formula to convert wing length to dry weight. The results showed that both species had a moderate degree of variation in size (*Ae. taeniorhynchus* CV = 24.2; *An. crucians* CV = 19.3). Apparently, the salt marsh provides a rather uneven larval habitat in terms of nutrient availability or competition for nutrients.

The relationship of body size to parity was analyzed by computing the Z score for each individual wing length within a species, and grouping the individuals into size categories of 1, 2 and 3 standard deviations above and below the mean (Nasci 1986a). The percent parous in each size category was then calculated (Table 2). In the *An. crucians* population, the percent parous was significantly higher in the largest size class. A similar trend was seen in the *Ae. taeniorhynchus* population. However, the *Ae. sollicitans* population demonstrated exactly the opposite trend: the group with the smaller wing lengths had the higher percent parous.

The results for *An. crucians* and *Ae. taeniorhynchus* are consistent with those from other species (Haramis 1983; Nasci 1986a, 1986b). Therefore, it appears that in most species, large body size is a good indicator of either increased survival or increased blood-feeding success.

The results for *Ae. sollicitans* are difficult to explain. It is possible that the larger individuals

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Table 1. Wing length of host-seeking female mosquitoes collected at the edge of a salt marsh in Calcasieu Parish, LA.

Species	N	Wing length (mm)		
		Mean ± SD	Minimum	Maximum
An. crucians	168	3.5 ± 0.2	2.4	3.9
Ae. taeniorhynchus	144	2.8 ± 0.2	1.8	3.2
Ae. sollicitans	192	3.1 ± 0.3	2.4	3.9

Table 2. Percent parous in Z score-determined groups of three salt marsh mosquito species collected in Calcasieu Parish, LA.

Species (N)	Z score group	Percent of population in group	Percent parous*
An. crucians (168)	+2, +3	16.2	74.1[a]
	−1, +1	64.8	53.2[b]
	−2, −3	19.0	53.1[b]
Ae. taeniorhynchus (144)	+1, +2, +3	52.8	92.1[a]
	−1, −2, −3	47.2	80.9[b]
Ae. sollicitans (192)	+1, +2, +3	50.0	52.1[b]
	−1, −2, −3	50.0	69.8[a]

* Within a species, percent parous with different letters are significantly different (chi square, $P \leq 0.05$).

within a cohort of this species have a greater tendency to disperse from the vicinity of the larval habitat. This would result in the accumulation of a large number of older, smaller females in the vicinity of the marsh, where the mosquitoes were collected. Since the salt marsh used in this study was used as pasture for cattle, the mosquitoes staying in the area had ready access to hosts (as suggested by the high percent parous in each species). Therefore, the collections may have been biased, and may not have accurately reflected the distribution of size or parity in the population. Alternately, it is possible that smaller *Ae. sollicitans* possess some qualities allowing them to survive longer or locate hosts better than larger individuals.

These results reinforce the observation that mosquito populations are heterogeneous, and that the distribution of body size in a population is a useful indicator of the quality of the population. The vector potential of a population strongly depends on the quality of the population, consequently, investigations into vector potential should include an analysis of body size.

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