

VARIATION IN THE LENGTH OF THE  
MEDIAN PALE BAND ON THE PROBOSCIS  
OF *Aedes taeniorhynchus*<sup>1</sup>

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*Aedes (Ochlerotatus) taeniorhynchus* (Wiedemann) is a common pestiferous mosquito-species found along the coasts and inland saline areas from New Hampshire to Brazil, and from California to Peru, as well as the Antilles and the Galapagos Islands (Knight and Stone 1977, Burger 1981). The presence of a well-developed, median, pale-scaled band on the proboscis (BP) of adult females is an important diagnostic character used to separate *Ae. taeniorhynchus*, *Ae. (Och.) mitchellae* (Dyar), *Ae. (Och.) sollicitans* (Walker) and *Ae. (Och.) nigromaculis* (Ludlow) from other Nearctic species of the genus *Aedes* (Carpenter and LaCasse 1955, Darsie and Ward 1981, Matheson 1944). During an arbovirus research project involving identification of field-collected mosquitoes, several *Aedes* specimens were encountered which could not be identified by using the keys of Carpenter and LaCasse (1955) and Darsie and Ward (1981). These specimens lacked pale scales on the proboscis, but, based upon detailed descriptions by Carpenter and LaCasse (1955) and Belkin et al. (1970), they were eventually determined to be *Ae. taeniorhynchus*. The purpose of this paper is to describe the variation in the size of the BP in *Ae. taeniorhynchus*.

Mosquitoes were collected by carbon dioxide-baited (0.5 kg dry ice) CDC light traps located near salt marshes on the Chincoteague National Wildlife Refuge on Assateague Island, Virginia (37° 55' N, 75° 21' W) from July through September, 1978. The 533 specimens examined in this study were collected by routinely removing random samples from pools to be assayed for virus. Specimens were mounted on paper points and examined under a stereoscopic dissecting microscope. Measurements of the length of the proboscis and the distances from the tip of the proboscis to the distal and proximal ends of the band were made using a calibrated ocular micrometer. Both the band length and the position of the band on the proboscis could be calculated from

the measurements. These specimens have been deposited in the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Data were analyzed on an Amdahl 470-V7 computer with various statistical procedures from SAS (Helwig and Council 1979) and BMD-P (Dixon 1983) programs.

There was considerable variation in the size of the median pale-scaled BP of *Ae. taeniorhynchus* (Fig. 1). Ten of the 533 (1.9%) specimens examined did not have a median pale-scaled BP; the proboscis was completely covered with dark scales (Fig. 1C). There was considerable variation in the size of the BP in the remaining 523 specimens. Most had a well-developed BP (Fig. 1A); however, some individuals had a very small BP (Fig. 1B). There were 6 specimens in which the BP did not completely encircle the proboscis. There was reduced pale-scaling on the dorsal surface and increased pale-scaling on the lateral and ventral surfaces of the proboscis in these individuals.

Statistical analysis on the relationship between the lengths of the BP and the proboscis were based on a sample size of 523 individuals. The 10 individuals which did not have a BP were excluded from the analysis. The initial Kolmogorov-Smirnov tests for goodness of fit (Daniel 1978) indicated that the distribution of the proboscis and BP lengths varied significantly from a normal (Gaussian) distribution. Attempts to normalize the data by various transformations such as logarithmic, square-root and power functions were unsuccessful. Therefore, nonparametric statistical procedures were used to analyze the data. A Spearman rank correlation test indicated that the lengths of the BP and proboscis were slightly correlated ( $r = 0.41$ ,  $p < 0.01$ ). It was not possible to linearly predict the length of the BP based upon the length of the proboscis because of this low correlation. Because there was no Gaussian distributions of the proboscis and BP lengths, the medians, not the means, of these lengths were chosen to measure central tendency. Descriptive statistics for the length of the proboscis and the BP are shown in Table 1.

The distribution of the ratio of BP length to proboscis length (BP/P ratio) was also tested for normalcy by the Kolmogorov-Smirnov test. While this distribution was not significantly different ( $n = 523$ ,  $D_{max} = 0.037$ ,  $p = 0.068$ ) from a Gaussian distribution, the  $D_{max}$  value was very close to being rejected. A plot of the distribution of the BP/P ratio is shown in Fig. 2. The distribution of this ratio is slightly skewed to the left. Correlation analysis showed there was very low correlation ( $r = 0.11$ ,  $p = 0.009$ ) between the BP/P ratio and the length of the

<sup>1</sup> The views of the authors do not purport to reflect the positions of the Department of the Army or the Department of Defense.

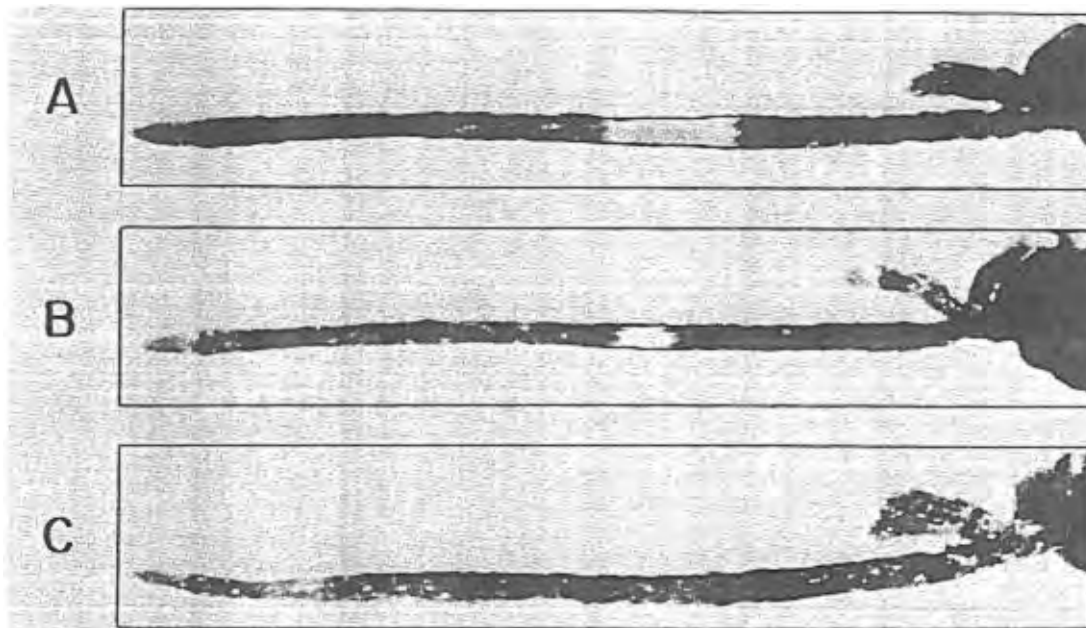


Fig. 1. Variation in the size of the median pale-scale band on the proboscis of *Aedes taeniorhynchus*.

proboscis. Descriptive statistics for the BP/P ratio are shown in Table 1.

For the 10 mosquitoes without a BP, the median proboscis length was 2.24 mm; the minimum and maximum values were 2.08 and 2.38 mm, respectively. The measurements for the lengths of the proboscis were very similar from mosquitoes with (Table 1) and without a proboscidial band.

The low correlation between the BP/P ratio and the length of the proboscis indicated that, for any particular proboscis length, the variation and distribution of the length of the BP was similar. The 25% and 75% quantiles for the median length of the proboscis, the BP, and the BP/P ratio showed that the range in variation was very small (Table 1).

Specimens of *Ae. taeniorhynchus* that do not have a median pale-scaled BP can create con-

siderable problems in routine identification of field-collection specimens. These specimens were keyed to *Ae. riparius* Dyar and Knab by using Carpenter and La Casse (1955). According to the key of Darsie and Ward (1981), specimens with either a few pale scales or no BP at all keyed to the *Ae. vexans-cantator* couplet if the basal pale band of the hindtarsomere covered  $\leq 0.2\%$  of the segment, and to either *Ae. alponotum* Dyar (without lower mesanepimeral setae) or *Ae. increpitus* Dyar (with lower

Table 1. Descriptive statistics for the lengths (mm) of the proboscis, the pale-scaled band on the proboscis (BP), and the ratio of the length of BP to the proboscis (BP/P ratio) in female *Aedes taeniorhynchus*.

Diagnostic character	Quantiles				
	Minimum	25%	Median (50%)	75%	Maximum
Proboscis	1.52	2.05	2.18	1.28	2.64
BP	0.06	0.20	0.26	0.30	0.53
BP/P ratio	0.03	0.10	0.12	0.14	0.23

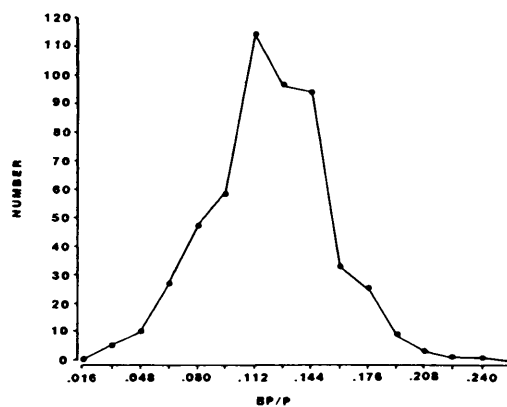


Fig. 2. Plot of the distribution of the ratio of the length of the median pale-scale band on the proboscis to the length of the proboscis (BP/P ratio) in *Aedes taeniorhynchus*.

mesanepimeral setae) if the basal pale band of the hindtarsomere covered  $\geq 0.3\%$  of the segment. To our knowledge, Belkin et al. (1970) is the only reference to discuss variation in the size of the BP. These authors state that in some populations, the BP shows considerable variation and is sometimes incomplete dorsally or nearly absent. The detailed analysis of variation described in this study should facilitate the utilization of this key diagnostic character by demonstrating that although almost 98% of the specimens examined did fit the key, some specimens could not be identified.

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