Mitotic Chromosomes of the Mosquito *Aedes (Gymnometopa) mediovittatus* (Coquillett)

W. K. Hartberg, R. Culp, M. Kerr,
J. Morgan and C. Odom
Institute of Arthropodology and Parasitology
Department of Biology
Georgia Southern College
Statesboro, Georgia 30460-8042

ABSTRACT. The karyotype of *Aedes mediovittatus* consists of 3 submetacentric pairs (2n = 6). The average length of the metaphase chromosomes are: I = 6.92 µm, II = 10.06 µm, and III = 13.71 µm. Average arm ratios are: I = 1.097, II = 1.122, and III = 1.300. Somatic pairing is evident in all three pairs of mitotic chromosomes.

INTRODUCTION

Aedes mediovittatus is a highly variable species (Zavortink 1972) that is distributed in the Caribbean from Cuba in the north and west to Venezuela in the south (Knight and Stone 1977). Zavortink (1972) has placed *Ae. mediovittatus* in its own subgenus, *Gymnometopa*. At various times it has been included in both *Stegomyia* and *Finlaya*.

Gubler et al. (in press) note that the ecology of *Ae. mediovittatus* in Puerto Rico is similar to the ecology of *Aedes albopictus* in Asia. They go on to suggest that in terms of dengue ecology, *Ae. mediovittatus* might be called the *"albopictus"* of the Caribbean. Field and laboratory data collected by Gubler et al. (in press) suggest that *Ae. mediovittatus* is a very efficient host for dengue viruses and that it may be playing an important role in the interepidemic period maintenance of dengue viruses in Puerto Rico.

More information about this potentially important species needs to be gathered. The present study was undertaken to give a brief description of the mitotic chromosomes of *Ae. mediovittatus*.

MATERIALS AND METHODS

The *Ae. mediovittatus* larvae used in this study were randomly selected from a colony maintained at the Mosquito Genetics Laboratory at Georgia Southern College. The colony was established from eggs furnished by Dr. R. Novak, San Juan Laboratories, CDC, San Juan, Puerto Rico, from their colony which was established from collections made in Puerto Rico. The colony has been maintained using rearing methods generally similar to those described by Craig and VandeHey

(1962) for genetic research with *Ae. aegypti*. Rearing was in a Sherer walk-in environmental room with a temperature of 24±.5° C and 80-90% RH. Larvae were reared in tap water and fed on a suspension of liver powder (United States Biochemical Corp.).

At seven days post-hatch, larvae were selected at random from the colony and fixed in a solution of 6 parts methanol, 3 parts chloroform and 2 parts propionic acid (Pienaar 1955). The larval brains were dissected in this solution and then transferred to the stain. The chromosomal slide preparation was essentially the same as that described by Breland (1961) except that the brains were stained for 10-15 minutes in a 1% lacto-aceto-orcein stain. After staining the preparation was gently squashed using coverslips and slides treated with Siliclad and then sealed with fingernail polish. All measurements were made using a micrometer disc and slide micrometer. Each measurement given in Table 1 is based on an arithmetical mean of four separate measurements from at least ten separate chromosome figures (minimum of 40 measurement/chromosome) judged to be in late metaphase.

All photographs of the dividing cells were taken under phase at 1000x magnification with an Olympus PM-7 camera mounted in an Olympus FHA microscope. Kodak Plus-X Pan film was used.

RESULTS AND DISCUSSION

The diploid chromosome number of *Ae. mediovittatus* is 6 (2n = 6). The karyotype consists of 3 slightly submetacentric pairs of homomorphic chromosomes (Figs. 4, 5, 6, and Table 1). The chromosomes have arbitrarily been numbered using the system of Rai (1963) in which the shortest chromosome is designated I and the longest is III. It is recognized that the assignment of chromosome numbers on the basis of length is tentative, with the final number assignment needing to be based on the correlation of linkage groups and chromosomes. This can only be done when enough genetic information is available for *Ae. mediovittatus* to make such correlation feasible.

Somatic pairing (close association) of the homologous chromosomes is evident during prophase, and they separate by metaphase but remain closely associated in their centromere region (Figs. 3-6).

The karyotype of *Ae. mediovittatus* can be described as one each of a small, medium, and large pair of chromosomes (Table 1, Figs. 4, 5, 6). The overall dimensions of the chromosomes (Table 1) are relatively large; however, they fall within the range of measurements from other mosquitoes (Rai 1963, Asman 1974, Hartberg and Faircloth 1983). The ratio of the length of chromosome I to chromosomes II + III is 0.291.

Measurements for the smallest chromosome (I) at metaphase ranged from 4 to 9.34 μm with an average of 6.92. With the next in size, chromosome II,

measurements range from 5.33 to 13.49 μm with an average of 10.06. The largest chromosome (III) had measurements ranging from 8.67 to 19.00 μm with an average of 13.71.

As other workers have noted (Breland 1961, Rai 1963, Asman 1974) the range of measurements for metaphase chromosomes suggests that figures be regarded as relative values rather than absolute ones.

A polyploid cell was observed in the brain of one of the larvae.

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Table 1. Measurements of mitotic chromosomes in *Aedes mediovittatus*.

Chromosome Number	Centromere Location	Length in μm Arm a	Arm b	Total Length	Arm Ratio*
I	submetacentric	3.30	3.62	6.92	1.097
II	submetacentric	4.74	5.32	10.06	1.122
III	submetacentric	5.96	7.75	13.71	1.300

*Arm ratio = length of longer arm/length of shorter arm.

Plate 1. Mitotic chromosomes in *Aedes mediovittatus*.

Fig. 1, 2, 3 - Early, mid, and late prophase, respectively
Fig. 4, 5, 6 - Metaphase
Fig. 7, 8 - Early and late anaphase, respectively
Fig. 9 - Telophase