THORACIC VESICLES IN *ANOPHELES* LARVAE

JACK COLVARD JONES

U. S. Department of Health, Education, and Welfare
Public Health Service
National Institutes of Health
National Microbiological Institute [1]
Bethesda, Maryland

While studying the larval morphology and physiology of *Anopheles quadrimaculatus* Say (Diptera, Culicidae),[2] the writer has repeatedly observed some conspicuous thoracic vesicular structures which have apparently never been described. This paper gives a description of them based on a detailed study of more than 65 intact living larvae, representatives from each instar being used. Specimens were examined in distilled water at 120 to 1500 X either in micro slides, or in a special chamber (Jones, 1953a), or held between slide and coverslip.

The vesicles exist as huge, elliptical, grape-like clusters of numerous, clear, colorless, turgid, fluid-filled spheres within the dorso-lateral portion of the thorax (figure 1, v.) They lie in the hemocoel, dorsal and lateral to the alimentary canal, above and partly around the salivary glands; and, in the fourth instar, they abut the imaginal discs. They appear to be connected *only* to the body wall epidermis. The largest vesicles are much larger than any of the cells in the entire body. They are definite structures and are not to be confused with circular holes in the fat body or with special configurations of superficial tracheae. They bear no resemblance to other organs in the thorax.

Under high magnifications (900 to 1500 X) the vesicles appear to lack nuclei. Each vesicle is formed by a very thin structureless envelope (<0.5 μ thick) which resembles the connective tissue membranes surrounding the fat bodies. Vesicles are interconnected very much like a mass of soap bubbles. They vary greatly in size even within the same individual but appear to remain constant in size during a stadium. Fat droplets (<3 to 9 μ diameter) form around them. Sessile hemocytes also may be seen lying over or among the vesicles.

Thirty-one vesicles measured from 13 first instars ranged from 4.5 to 19.5 μ in diameter (mean size 12.0 ± 0.5 μ). Seventy-six vesicles from 15 second instars varied from 5.2 to 47.0 μ (mean size 20.7 ± 0.6 μ), and 102 vesicles from 15 third instars measured from 9.4 to 103.4 μ (mean size 46.1 ± 0.9 μ). Among 22 fourth instars 341 vesicles ranged from 11.8 to 164.5 μ (mean size 60.3 ± 0.5 μ).

In very young first-stage larvae vesicles cannot be clearly distinguished from the watery vacuoles in the fat body, but in somewhat older first instars they are readily separable from each other. The precise mode of their formation was not studied. In newly molted larvae of other stages numerous thoracic vesicles can be seen extending from the anterior edge of the prothorax down into the metathorax. As development proceeds, those in the prothorax are obscured by fat body. During the last quarter of the fourth stadium (age estimation by method given by Jones, 1953b), the vesicles are densely overgrown by fat body and obscured by the great development of the imaginal discs. In larvae which are about to pupate, vesicles either cannot be seen at all, or superficial ones are dimly seen only at the junction of the meso- and metathorax.

The fate of the thoracic vesicles is not known, but they are apparently absent from pupae. In larvae fixed with either 70 percent ethanol or with 10 percent aqueous formalin, the vesicles can be seen

[1] Laboratory of Tropical Diseases.

[2] Reared under laboratory conditions at National Institutes of Health since 1942.

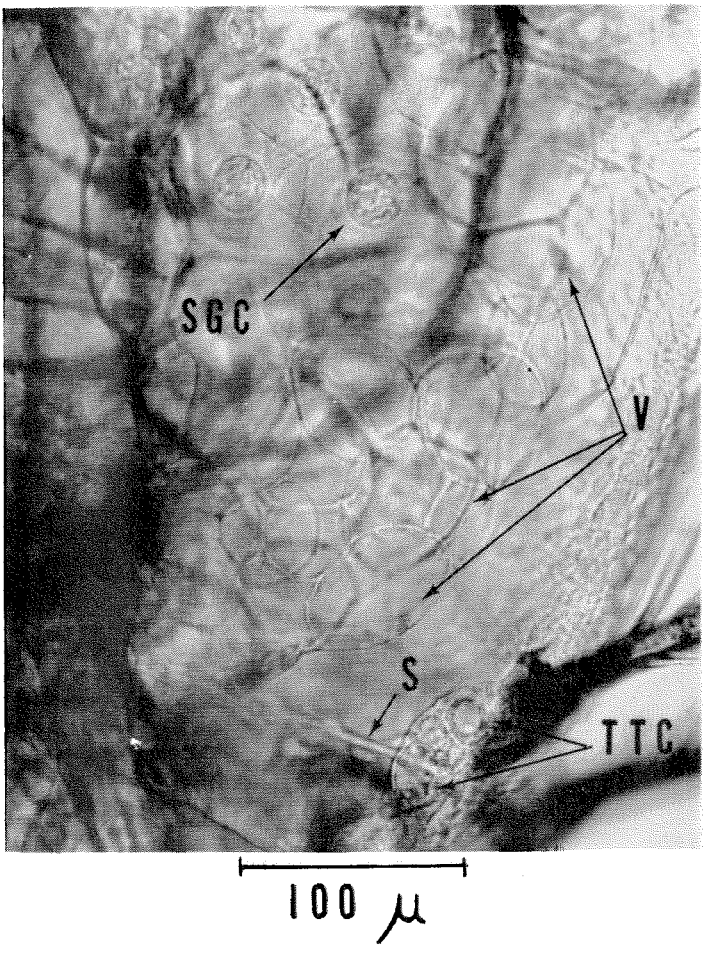

FIG. 1. Photomicrograph showing thoracic vesicles (v), underlying salivary gland cells (SGC), trichogentormogen cell complex (TTC), and scolopophorous sensillum (S).

externally only with difficulty; their finer details are wholly obscured. The vesicles are easily ruptured and not amenable to ordinary dissections. Sectioned material is equally unsatisfactory since the vesicles tend to collapse and do not show up when stained.

Although daily observations on the same individuals did not reveal any marked changes in general size or number of the vesicles in relation to age within stadia, the great variations in sizes of the vesicles, together with the fact that many vesicles become progressively obscured as development proceeds, makes it difficult to settle the question. Vesicles did not disappear in larvae starved several days.

Similar but less numerous and less conspicuous thoracic vesicles were also observed in *Culex tarsalis* and *C. pipiens*. Their vesicles were more superficial and peripheral than in *Anopheles*. Vesicles

were not observed in fourth instar *Aëdes aegypti*.

The relation of the vesicles to other tissues is obscure. It may be that they are a specialized kind of fat body. No clues were obtained concerning the function of thoracic vesicles.

It may be that Giles (1906) saw thoracic vesicles, for in his description of "the hepatic masses" he wrote, "The other two pairs are placed at a distance from the intestine, in the corners of the pro- and metathorax respectively." However, his illustration and description are so vague that it is difficult to be certain that he distinguished them from fat body, gastric caeca, or salivary glands. It is possible that vesicles have been overlooked for so long because they were mistaken for portions of the salivary glands.

References

GILES, G. M. 1906. A handbook of the gnats or mosquitoes. William Wood Co., N. Y., 530 pp.

JONES, J. C. 1953a. A chamber for observations on living larvae of anopheline mosquitoes. Science 117:42.

JONES, J. C. 1953b. Some biometrical constants for *Anopheles quadrimaculatus* Say larvae in relation to age within instar. Mosq. News 13(4): 243–247.

THE RESURRECTION OF *AEDES MELANIMON* DYAR[1]

A. RALPH BARR

Department of Entomology
University of Minnesota

H. G. Dyar in 1924 (p. 126) described *Aedes melanimon* from 15 female and 2 male specimens taken at Bakersfield, California. He noted the similarity of this species to *dorsalis* as follows: ". . . I considered this as a variety of *aorsalis* until a male was obtained. The very distinct hypopygium shows that a distinct species is represented." Freeborn (1926) examined a series of males of this form supplied by C. K. Badger who had also supplied Dyar with his material. He (Freeborn) figured the male terminalia under the name of *Aedes dorsalis melanimon*. He appears to have been of the opinion that the terminalia of *dorsalis* could be produced by distortion of the terminalia of *melanimon* or *vice versa* (p. 372) but he also retained *melanimon* as a "race" of *dorsalis*. Later authors (Matheson, 1929, 1944; Freeborn and Bohart, 1951) have considered *melanimon* to be a subjective synonym of *dorsalis*.

In the process of examining large numbers of male terminalia of Minnesota *Aedes* the writer inadvertently dissected a Californian specimen of *"Aedes dorsalis"* which had terminalia quite different from those of Minnesota *dorsalis*. Subsequently two additional males were found that were identical with the first one. Two of these males are from Tulare, California (October 31, 1942) and the third from Porterville, California (October 26, 1942); all were collected by John T. Medler and pertain to the species *melanimon*.

The terminalia of *melanimon* and *dorsalis* are illustrated in the accompanying figures and are most easily separated by the nature of the claspette filament and the apical and basal lobes of the basistyle. In *melanimon* the apical lobe is quite large; this is particularly pronounced when the terminalia are examined while in potash or in water immediately after clearing in potash. When the specimens are dehydrated for mounting the apical lobe tends to bend back on itself so that it appears smaller; however, the difference

[1] Paper No. 3312 Scientific Journal Series. Minnesota Agricultural Experiment Station, St Paul 1, Minnesota.