ANOMALOUS MALENESS OF *Aedes sticticus* (MEIGEN) (DIPTERA: CULICIDAE) [1]

WILLIAM R. HORSFALL
University of Illinois

Teratologs of imaginal insects have been reported as gynandromorphs, intersexes and nonspecific anomalies. The first are mosaics induced by genetic aberrations (Gowen, 1961). Intersexes result from stresses imposed during development by factors such as temperature (Anderson and Horsfall, 1963), parasitism (Wensler and Rempel, 1962) and hormonal disfunction (Charniaux-Cotton, 1965). Erratic anomalous development of any organ or part may have a toxic (Horsfall, 1934), nutritional (Trager, 1953) or genetic (Gowen, 1961) origin. The anomalous mosquito discussed in this note has an unknown origin, but resmbles, in part, adults produced by thermal stress acting on a juvenile stage.

The masculine genotype of several species of *Aedes* mosquitoes responds in varying degrees to thermal stress applied during development by (1) becoming demasculinized, (2) becoming feminized, (3) losing parts of the genital tract, or (4) having supernumerary genital appendages. The whole of a susceptible population responds in a similar manner. Demasculinization begins as a threshold effect of thermal stress; feminization occurs when the larval stage is under maximum stress throughout development. Adjunct genital appendages appear on segment 8 in response to maximum thermal stress applied during the first three larval instars only (Horsfall and Anderson, 1963). Abnormal temperature during embryogeny results in loss of part or all of the male genital tract beyond the gonads (Anderson and Horsfall, 1965).

Aedes sticticus normally shows no anomalies when reared at 21° C. The anomalous male of *A. sticticus* described below was reared at 21° and had internal modifications similar to those imposed by thermal stress acting on embryos of *Aedes stimulans* (Walker), and modifications of external features are unrelated to any known stresses. The only unusual background in the life of this mosquito was that 19 months elapsed between oviposition and hatching.

An anomalous male of *Aedes sticticus* appeared in an F_2 population of a laboratory strain colonized from Champaign County, Illinois. Eggs were deposited April 26, 1965. They were incubated in a moist chamber at 21° C. until July 16, 1965, then they were placed at 4°. November 23, 1966 they were removed for one day to an incubator set at 21°. They were hatched in nutrient broth (1:1000 dilution). Only about 10 percent of the eggs were viable, and mortality of early larvae caused further loss during rearing. The imaginal population that survived was composed of 10 males and 28 females. Only one of the males was abnormal morphologically.

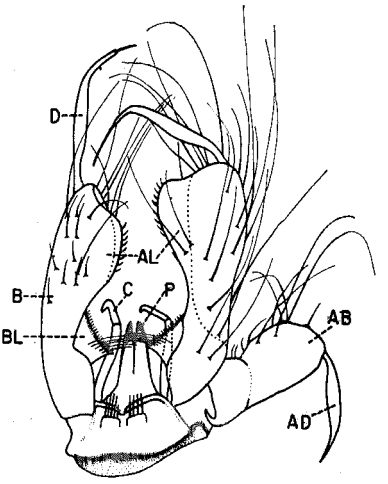

FIG. 1—Genitalia of anomalous male of *Aedes sticticus* (dorsal view before rotation.) AB—anomalous basistyle, AD—anomalous dististyle, AL—apical lobe, B—basistyle, BL—basal lobe, C—claspette, D—dististyle, P—paraproct.

The anomalous male was alive 5 days after emergence until it was dissected. It was demasculinized by deletion of internal parts and was in no wise feminized. Both gonads were testes each of which was well sheathed by fatbody. Both testes were filled with sperm. The genital tract from one testis was complete from gonad to gonopore; only the vas efferens remained of the genital tract on the other side, and it ended as a blind tube filled with sperm. The accessory gland was absent from both sides. The genital appendages consisted of 3 gonopods on the ninth segment and 2 paraprocts (Fig. 1). The right gonopod had attached to its base a smaller deformed one extending laterally and ventrally. The deformed member was composed of a basistyle and dististyle but lacked apical and basal lobes. The gonopod to which the supernumerary one was attached had both lobes present but lacked the hooked spinose hair on the basal lobe characteristic of the species. The left gonopod had a slightly deformed basistyle and normal dististyle. It, too, had both lobes present with the hooked spine absent from the basal lobe. Paraprocts and claspettes were normal.

[1] Supported by USPH Grant GM 12612.

Literature Cited

ANDERSON, J. F., and HORSFALL, W. R. 1963.

Thermal stress and anomalous development of mosquitoes (Diptera: Culicidae). I. Effect of constant temperature on dimorphism of adults of *Aedes stimulans*. J. exp. Zool. 154:67–107.

ANDERSON, J. F. and HORSFALL, W. R. 1965. Thermal stress and anomalous development of mosquitoes (Diptera: Culicidae). V. Effect of temperature on embryogeny of *Aedes stimulans*. J. exp. Zool. 158:211–221.

CHARNIAUX-COTTON, H. 1965. Contrôle endocrinien de la différénciation sexuelle chez les crustacés supérieurs. Archs Anat. microsc. Morph. exp. 54:405–416.

GOWEN, J. W. 1961. Genetic and cytologic foundations for sex. *In* Young W. C. (ed.) Sex and internal secretions. Baltimore: The Williams Wilkins Co. pp. 3–75.

HORSFALL, W. R. 1934. Some effects of ethylene oxide on the various stages of the bean weevil and the confused flour beetle. J. econ. Ent. 27:405–409.

HORSFALL, W. R. and ANDERSON, J. F. 1963. Thermally induced genital appendages on mosquitoes. Science, 141:1183–1184.

TRAGER, W. 1953. Nutrition. *In* Roeder's Insect Physiology. New York: John Wiley and Sons, Inc. pp. 350–386.

WENSLER, R. J. D. and REMPEL, J. G. 1962. The morphology of the male and female reproductive systems of the midge, *Chironomus plumosus* L. Canad. J. Zool. 40:199–229.

ISOLATION OF ST. LOUIS ENCEPHALITIS VIRUS FROM *Deinocerites pseudes* IN PANAMA[1]

MARGARET A. GRAYSON, SUNTHORN SRIHONGSE AND PEDRO GALINDO

Gorgas Memorial Laboratory, Panama, R.P.

During the course of yellow fever surveillance activities in Panama, a station for the collection of mosquitoes was established in the spring of 1964 in a mangrove swamp near Juan Díaz, a small rural community located at the mouth of the Juan Díaz River just east of Panama City. The virus of St. Louis encephalitis (SLE) was isolated from a pool of 46 *Deinocerites pseudes* Dyar and Knab mosquitoes captured at this station between 1830 and 2100 on August 10, 1964 with human bait. The virus, which was isolated in suckling mice, was found to be closely related by cross hemagglutination-inhibition, complement-fixation and mouse neutralization tests to the Buena Vista strain of SLE previously isolated from *Sabethes chloropterus* in Panama (Galindo, et al., 1959). An agent identified as SLE virus was re-isolated from these mosquitoes approximately one month later.

The isolation of SLE virus from *Deinocerites* mosquitoes is of interest since it represents the first reported isolation of a viral agent from this genus, which is known to breed by preference in crab holes and was once thought to have lost the bloodsucking habit (Bates, 1949). However, it has been recently observed that *D. pseudes* readily attacks several species of vertebrates, including man (Galindo, 1967), and is presumably, therefore, a potential vector of this medically important agent.

[1] This work was supported in part by Grant AI-02984 from the National Institute of Allergy and Infectious Diseases, National Institutes of Health, U.S.P.H.S.

References

BATES, M. 1949. The natural history of mosquitoes, pp. i-xv, 1–379. Macmillan Co., New York, N. Y.

GALINDO, P. 1967. Preliminary observations on the colonization and bionomics of the crab-hole breeding mosquito *Deinocerites pseudes* Dyar and Knab, 1909. In Manuscript.

GALINDO, P., RODANICHE, E., and JOHNSON, C. M. 1959. St. Louis encephalitis in Panama. I. Isolation of the virus from forest mosquitoes and human blood. Am. J. Trop. Med. and Hyg., 8:557–560.