

SEPARATION OF FOURTH-INSTAR LARVAE OF *CULEX NIGRIPALPUS* FROM *CULEX SALINARIUS* IN FLORIDA USING THE SPIRACULAR APODEME

JOHN F. REINERT

Center for Medical, Agricultural and Veterinary Entomology (CMAVE), Agricultural Research Service,
U.S. Department of Agriculture, 1600/1700 SW 23rd Drive, Gainesville, FL 32608

ABSTRACT. The spiracular apodeme of the 4th-instar larvae of *Culex nigripalpus* and *Culex salinarius* is described and illustrated. The development of this structure provides an additional character for separating these 2 species.

KEY WORDS *Culex nigripalpus*, *Culex salinarius*, spiracular apodeme, larvae, mosquito

Culex nigripalpus Theobald has been incriminated in the transmission of arboviruses in the United States and is an important species from a public health standpoint. The distribution of *Cx. nigripalpus* is primarily in the southeastern states, whereas *Culex salinarius* Coquillett has a broader range extending over the eastern one half of the country (see distribution maps in Darsie and Ward 1981).

Characters commonly used in references (Carpenter and LaCasse 1955, King et al. 1960, Stojanovich 1960, Darsie and Ward 1981, Breeland and Loyless 1982, Darsie and Morris 1998) to separate the 4th-instar larvae of *Cx. nigripalpus* from those of the morphologically similar species *Cx. salinarius* follow. *Culex nigripalpus* possesses thoracic integument with fine aculeae, mesothoracic seta 1-M subequal to seta 2-M, and saddle seta 1-X single, whereas *Cx. salinarius* possesses thoracic integument glabrous, mesothoracic seta 1-M noticeably longer (4 times or longer) than seta 2-M, and saddle seta 1-X usually 2-branched.

The following additional character, the spiracular apodeme, can be reliably used to separate the 2 species and is easily seen through a microscope in slide-mounted specimens. Harbach and Knight (1980) define the spiracular apodeme as follows "In culicine and toxorhynchitine larvae, the usually hollow funnel-shaped ingrowth of the dorsal surface of the spiracular apparatus located between but largely posterior to the postabdominal spiracles; receiving the muscles responsible for folding up the spiracular apparatus and hence closing the spiracles; partly homologous with the median plate of anopheline larvae." In *Cx. nigripalpus* the spiracular apodeme possesses a long, narrow projection on the middle portion of the posterior curved margin (Fig. 1A), whereas this projection is absent in *Cx. salinarius* (Fig. 1B). Figure 1 (scale in millimeters) shows the distal portion of the siphon with the spiracular apodeme but without the apical spiracular lobes. This feature has been examined in numerous larvae and larval exuviae from Alachua, Dade, Indian River, Levy, and Palm Beach counties

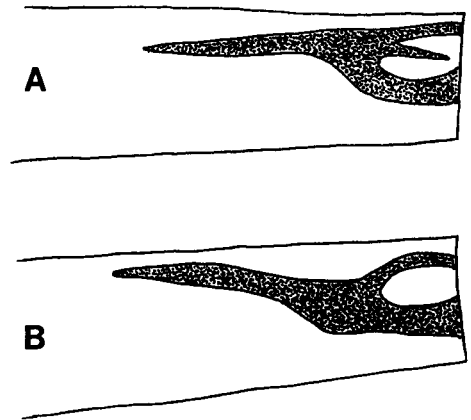


Fig. 1. Spiracular apodeme of *Culex nigripalpus* (A) and *Culex salinarius* (B).

in Florida; many of the larval exuviae were also associated with pupal exuviae and adults from individually reared specimens. The character needs to be confirmed for these 2 species in areas outside Florida. The shape of the spiracular apodeme has been used previously to separate some species of mosquitoes (Breland 1952, 1957; Linam and Nielsen 1963; Reinert 1990) and may be useful for separating others.

ACKNOWLEDGMENTS

I thank Jack A. Seawright and Daniel L. Kline (CMAVE) for reviewing the manuscript.

REFERENCES CITED

- Breeland, S. G. and T. M. Loyless. 1982. Illustrated keys to the mosquitoes of Florida, adult females and fourth stage larvae. J. Fla. Anti-mosq. Control Assoc. 53:63-84.
Breland, O. P. 1952. The stirrup-shaped piece as an aid in the taxonomic study of mosquito larvae. Mosq. News 12:253-255.
Breland, O. P. 1957. Variations in the larvae of *Culex*

- stigmatosoma* Dyar with notes on similar species (Diptera: Culicidae). *Ann. Entomol. Soc. Am.* 50:175-178.
- Carpenter, S. J. and W. J. LaCasse. 1955. Mosquitoes of North America (north of Mexico). Univ. California Press, Berkeley and Los Angeles, CA.
- Darsie, R. F., Jr. and C. D. Morris. 1998. Keys to the adult females and fourth instar larvae of the mosquitoes of Florida (Diptera, Culicidae). *Bull. 1. Fla. Mosq. Control Assoc.* Fort Meyers, FL.
- Darsie, R. F., Jr. and R. A. Ward. 1981. Identification and geographical distribution of the mosquitoes of North America, north of Mexico. *Mosq. Syst.* 1(Suppl.):1-313.
- Harbach, R. E. and K. L. Knight. 1980. Taxonomists' glossary of mosquito anatomy. Plexus Publishing, Inc., Marlton, NJ.
- King, W. V., G. H. Bradley, C. N. Smith and W. C. McDuffie. 1960. A handbook of the mosquitoes of the southeastern United States. *Agric. Handbook* 173. U.S. Department of Agriculture, Washington, DC.
- Linam, J. H. and L. T. Nielsen. 1963. Notes on the identification of some western *Culex* larvae. *Proc. N.J. Mosq. Exterm. Assoc.* 15:411-415.
- Reinert, J. F. 1990. Medical entomology studies—XVII. Biosystematics of *Kenknightia*, a new subgenus of the mosquito genus *Aedes* Meigen from the Oriental Region (Diptera: Culicidae). *Contrib. Am. Entomol. Inst.* 26(2):1-119.
- Stojanovich, C. J. 1960. Illustrated key to common mosquitoes of southeastern United States. C. J. Stojanovich, Atlanta, GA.