

SCIENTIFIC NOTE

SEPARATION OF FOURTH-STAGE LARVAE AND PUPAE OF *URANOETAENIA LOWII* AND *UR. SAPPHIRINA* IN FLORIDA

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ABSTRACT. Easy-to-use characters for separating living 4th-stage larvae and pupal exuviae are given for the 2 species of *Uranotaenia* that occur in Florida.

KEY WORDS *Uranotaenia lowii*, *Uranotaenia sapphirina*, 4th-stage larvae, pupae

Personnel assigned to the Mosquito and Fly Research Unit, Center for Medical, Agricultural and Veterinary Entomology, Gainesville, Florida, routinely screen large numbers of living larvae to larvae for pathogens. Because these larvae are used in pathogen isolation and transmission studies they must remain alive. The rapid identification of large numbers of living 4th-stage larvae of the 2 species of *Uranotaenia* Lynch Arribalzaga that occur in Florida recently has become necessary. To meet this need, a search was made for easy-to-see characters, which resulted in the discovery of the following features.

In Florida, 4th-stage larvae of *Uranotaenia sapphirina* (Osten Sacken) (Fig. 1A) have the ventral surface of the cranium (head) with a pattern composed of a pair of darkly pigmented, longitudinal bars extending from the anterior margin to the posterior margin. One bar covers an area on each side of the lateralia and extends laterally from the posterior tentorial pit to near the mesal margin of the eye and then expands onto the area posterior to the eye. The dark bars are separated mesally by a golden-colored, longitudinal strip on the labiogula that has the hypocranial ecdysial line narrow and darkly pigmented. The area anterior to and surrounding the eye also is golden-colored. The ventral surface of larval *Uranotaenia lowii* Theobald (Fig. 1B) does not have a lightly colored pattern and is uniformly darkly pigmented. Although these characters appear to be diagnostic for Florida specimens, only 6 (14.3%) of 42 larval *Ur. sapphirina* from eastern North Carolina had the golden-colored longitudinal strip on the labiogula. However, 100% of

these specimens had the golden-colored area surrounding the eye, which easily separates them from larvae of *Ur. lowii*.

Belkin et al. (1970) indicated that seta 14-P was branched in larvae of *Ur. sapphirina* and single in *Ur. lowii*. Seta 14-P is 5–10 branched in specimens of *Ur. sapphirina* examined from Florida and North Carolina. Seta 14-P is single in specimens of *Ur. lowii* examined from Florida. Although a low-powered microscope is needed, this character is easily seen in living (chilled) or preserved larvae. This character is useful in separating the 4th-stage larvae of these 2 species and is much easier to see than the characteristics of setae 3-P and 6-I,II that are usually used in published keys to the larval *Uranotaenia* of the eastern United States.

In pupal exuviae, the dorsal apotome can be used to easily separate these 2 species of *Uranotaenia*. The dorsal apotome of *Ur. sapphirina* (Fig. 2A) is uniformly lightly pigmented, whereas in *Ur. lowii* (Fig. 2B), the distal approximately 0.5–0.6 is heavily pigmented and the remainder is lightly pigmented. The dorsal apodome extends anteriorly from the median area of the cephalothorax of the pupal exuviae. This feature was illustrated by Belkin et al. (1970) and Reinert (1999). Additionally, the trumpet is long and narrow in *Ur. sapphirina* but relatively short and with the distal portion somewhat flared in *Ur. lowii*.

Specimens examined included both living and slide-mounted 4th-stage larvae and individually reared adults with their associated pupal and 4th-stage larval exuviae. Although only specimens from Florida and North Carolina were examined, the above larval and pupal features are anticipated to be useful in separating these 2 species throughout their ranges in the eastern United States. The above distinguishing characters were not mentioned by Darsie and Morris (2000), Darsie and Ward (1981), and Carpenter and LaCasse (1955). The terminology used follows Harbach and Knight (1980).

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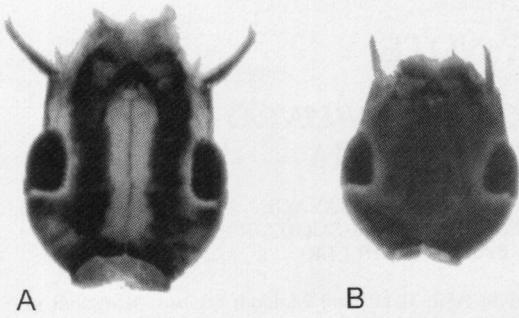


Fig. 1. Ventral surface of cranium of 4th-stage larva. (A) *Uranotaenia sapphirina*. (B) *Uranotaenia lowii*.

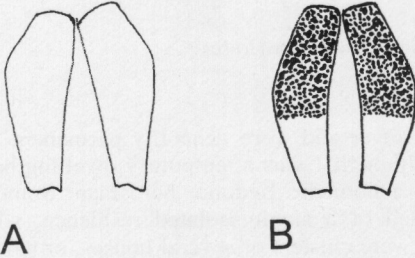


Fig. 2. Dorsal apotome of pupal exuviae. (A) *Uranotaenia sapphirina*. (B) *Uranotaenia lowii*.

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REFERENCES CITED

- Belkin JN, Heinemann SJ, Page WA. 1970. Mosquito studies (Diptera, Culicidae) XXI. The Culicidae of Jamaica. *Contrib Am Entomol Inst (Ann Arbor)* 6(1):1-458.
- Carpenter SJ, LaCasse WJ. 1955. *Mosquitoes of North America (north of Mexico)* Berkeley and Los Angeles, CA: Univ. Calif. Press.
- Darsie RF Jr, Morris CD. 2000. *Keys to the adult females and fourth-instar larvae of the mosquitoes of Florida (Diptera, Culicidae) Volume 1 (revised)*. Fort Myers, Florida: Florida Mosquito Control Assoc.
- Darsie RF Jr, Ward RA. 1981. Identification and geographical distribution of the mosquitoes of North America, north of Mexico. *Mosq Syst* 1(Suppl):1-313.
- Harbach RE, Knight KL. 1980. *Taxonomists' glossary of mosquito anatomy* Marlton, NJ: Plexus Publishing, Inc.
- Reinert JF. 1999. The dorsal apotome of pupae and fourth-instar larvae of Culicidae (Diptera), a structure of phylogenetic significance. *J Am Mosq Control Assoc* 15: 77-83.