

MORPHOLOGICAL CHARACTERISTICS OF THE LARVAE OF *Aedes triseriatus* AND *Aedes hendersoni* IN NEBRASKA¹

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ABSTRACT. Nebraska is one of the states in which the tree-hole mosquito *Aedes triseriatus* (Say) reaches its western limit; it is found only in the eastern half of the state. *Ae. hendersoni* is found throughout the state. Samples of these 2 mosquitoes were collected from extreme western Iowa across Nebraska into the extreme eastern portions of Wyoming and Colorado.

Breland (1960) established a western tree-hole mosquito, *Aedes hendersoni* Cockerell, as a valid species distinct from its eastern relative *Ae. triseriatus* (Say). It is now known that *Ae. hendersoni* actually occurs throughout most of the United States, whereas *Ae. triseriatus* is restricted to the eastern half of the country (Zavortink 1972). Nebraska is one of the states in which *Ae. triseriatus* reaches its western limit; it is not found west of the 100th meridian in central Nebraska. In contrast, *Ae. hendersoni* is found throughout the state (Lunt and Peters 1976, Lunt 1977).

Two important recent studies have been conducted on the morphological characteristics of these two species (Zavortink 1972 and Grimstad et al. 1974). However, neither investigation consisted of uniform collecting over a continuous geographical area in which the association between these two species changes from predominantly *Ae. triseriatus* to exclusively *Ae. hendersoni*. The purpose of the present study was to characterize these 2 species in this type of geographical area. Only the results of the larval studies are reported here.

MATERIALS AND METHODS

Collections were made at about 10-mile

intervals along the Platte River system from eastern Nebraska to Norden Dam in Wyoming and Sterling, Colorado. Collecting in Nebraska was also done along the floodplain of the Missouri River from Omaha south to the junction of the Missouri and Platte Rivers. In Iowa, collections were made along the floodplain between Council Bluffs and Lake Manawa State Park, south of Council Bluffs. A more detailed description of the total area and the ecology of these 2 species is given by Lunt & Peters (1976).

Careful study was made of 24 morphological traits of the 4th instar larvae to characterize these 2 species in this part of their geographical range. Seven of the 24 traits were of taxonomic value. A spot check of 4 additional traits revealed that all of those appeared to be of value, making a total of 11 diagnostic characteristics.

Study material consisted of 1752 fourth instar larvae. The *Ae. hendersoni* sample contained 1324 specimens, with 53 collected in Colorado, 6 in Wyoming, 1232 in Nebraska, and 33 in Iowa. The *Ae. triseriatus* sample comprised 428 specimens, with 169 collected in Nebraska and 259 in Iowa. There were 25 larvae which in general appeared to fit the description of hybrids described by Truman and Craig (1968) and Grimstad et al. (1974). These specimens were not included in the present study but will be reported on elsewhere.

Twenty-four morphological traits were examined on each specimen. Twenty-one of the traits involved the number of branches comprising head hairs 4-10, prothoracic hairs 1-5, third abdominal segment hairs 1-5, lateral hair of abdominal segment X, siphonal hair, and the number of tufts forming the ventral and dorsal brushes. The three remaining traits

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were acus attached to the siphon, or detached and well-separated from the siphon; upper and lower gills long and equal, or short and unequal; saddle of segment X large (covered more than half the dorsal area and extended more than half way ventrally along the sides), or small (covered about half of the dorsal area and extended less than half way ventrally along the sides).

RESULTS AND DISCUSSION

The most common expressions of a given character (Table 1) provided an indication of the inter- and intraspecific variation and the taxonomic value of the

trait. Most of the traits were virtually identical or at least very similar. However, 7 of them (third abdominal segment hairs 2 and 3, lateral hair, ventral brush, acus, saddle, and gills) were distinctly different and of taxonomic value. The siphonal hair was not a reliable diagnostic character for Nebraska specimens; the same was true in Wisconsin (Grimstad et al. 1974).

A spot check of 4 additional morphological traits revealed a general trend as follows. In *Ae. hendersoni* the lateral hair was usually on the margin of the saddle or off the saddle near the margin, live larvae were light in color, pecten teeth were relatively short and wide with moderate pigmentation, and the number of hairs/tuft in the ventral brush was generally 2-3. Con-

Table 1. Summary of 24 larval characteristics for *Ae. hendersoni* and *Ae. triseriatus*.

	<i>Ae. hendersoni</i>		<i>Ae. triseriatus</i>		
	Most Common Number	Percent	Most Common Number	Percent	
Head Hair: no. branches	4	8-10	84	8-10	83
	5	1	99	1	97
	6	2-4	98	2-3	95
	7	7-9	83	7-9	88
	8	2	83	2	96
	9	2-3	85	3-4	95
	10	1-2	91	1	81
Prothoracic Hair: no. branches	1	2-3	81	2-3	84
	2	1	100	1	100
	3	2-3	84	2-3	94
	4	2-3	83	2-3	77
	5	2-3	79	2-3	95
III Abdominal Segment Hair: no. branches	1	2-4	85	3-4	73
	2	1	78	2	83
	3	2-3	67	1	86
	4	1	79	1	88
	5	2-3	68	3-4	85
Siphonal Hair: no. branches		2-3	99	2	91
Lateral Hair: no. branches		2-3	98	4-6	76
Ventral Brush: no. tufts		5	85	6	71
Dorsal Brush: no. tufts		4-5	85	5	80
Acus		Well detached from base of siphon.		Well attached to, or lightly detached from siphon.	
Saddle		Small		Large	
Gills		Long and equal length.		Short and unequal length.	

versely, *Ae. triseriatus* had the lateral hair well placed on the saddle, live larvae were dark in color, pecten teeth long and narrow with dark pigmentation, and the number of hairs/tuft in the ventral brush was generally 3 or more. These trends were consistent with those reported by Zavortink (1972) and Grimstad et al. (1974).

It is not known if these two species occupy the same or slightly different niches as larvae. Likewise it is not known what factors prevent the western distribution of *Ae. triseriatus*, or what stages of the mosquito are affected by these factors. Lunt and Peters (1976) studied the influence of a number of ecological conditions on the distribution of these two species in Nebraska. They concluded that the average annual precipitation appeared to be important in the case of *Ae. triseriatus*. Generally, they found this species to be predominant where the average annual precipitation exceeded 50 cm/yr. However, *Ae. hendersoni* was predominant where the precipitation was near 50 cm/yr, and it completely replaced *Ae. triseriatus* where the precipitation dropped below that amount.

The data from the present study show that these 2 species can be distinguished in the 4th instar larval stage by at least 7—and probably as many as 11—morphological traits. However, the data

do not reveal any obvious correlation between the morphological traits and the adaptive fitness of the 4th instar larvae as the dominant species changes from *Ae. triseriatus* to *Ae. hendersoni*.

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ERRATA

Vol. 36 (3): 364 (September 1976)—*Aedes hepti* should be *Aedes* sp.

Vol. 37 (2): 224 (June 1977)—The footnotes in the table should be as follows:

RFR = reared from pupa
 Rest = captured reposing indoors
 Bite = captured when attracted to human bait
 NJ = captured in New Jersey trap
 Mani = captured in Manitoba trap