DESCRIPTION OF THE LARVA OF *AEDES* (*VERRALLINA*) *LUGUBRIS* (DIPTERA: CULICIDAE)[1]

JOHN F. REINERT[2] and RALPH E. HARBACH[3]

ABSTRACT. The fourth-instar larva of *Aedes lugubris* is described and illustrated for the first time. Chaetotaxy is presented in a table. Additional features of the pupa are provided.

INTRODUCTION

Barraud's (1928) original description of *Aedes lugubris* included only the female and an illustration of the female genitalia. Delfinado (1968) described the male and illustrated the male genitalia. Reinert (1974) provided a description and illustration of the pupa. This paper presents the first description and illustration of the larva for this species and provides additional information on the pupa.

For a characterization of the subgenus *Verrallina* Theobald see Reinert (1974, 1984). Chaetotaxy, nomenclature and figure abbreviations follow Harbach and Knight (1980).

The description of the larva is based on the progeny of a single female collected biting a human in a brackish water swamp with mangrove and *Nipa* palm, about 1900 h, 20 April 1988, at Chao Phraya River, Tombol Bang Phla Kot, Amphur Phra Samut Chedi, Samut Prakan Province, Thailand, collection number TH563, and collectors R.E. Harbach and Kol Mongkolpanya. Specimens from the single progeny brood include 8 ♀PeLe, 4 ♂PeLe, 17 ♂Pe, 14 ♀, 2 ♂, 3 ♀g, 2 ♂g, 3 P, 16 Le and 8 L. Detailed setal counts were made on five larval specimens. The specimens are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC.

DESCRIPTION

Larva. The fourth-instar larva is illustrated in Fig. 1 and the chaetotaxy is provided in Table 1. *Head*: Lightly to moderately pigmented; seta 4-C short, with fine, simple branches; 5–7-C moderately long, stout, aciculate; 11,12-C short, fine-branched; 12-C mesad of 13-C; 6-Mx stout, single; mouthbrushes pectinate; dorsomentum with 21,22 teeth. *Antenna*: Moderately long, with scattered, stout spicules; seta 1-A stout, aciculate, borne 0.42–0.45 from antennal base; 4-A approximately 0.6 length of 2-A. *Thorax*: Seta 1-P > 2-P > 3-P length; 5–8-P, 5–10-M, 7,9,10-T long, stout, aciculate; 13-T, 14-M short, fine-branched. *Abdomen*: Many setae with fine branches (e.g., 1, 4, 13-I-VI); 6-I,II, 7-I long, stout, aciculate; 6-III-VI moderately long, moderately stout, often aciculate; 1-VII short; 4-VII moderately long; segment VIII with comb of 17–25 scales in a patch, scales short and with a fringe of short spicules on apical and lateral margins; 1,3,5-VIII stout, fan-like, aciculate; 2-VIII single, close to and longer than 1-VIII; 4-VIII close to 3-VIII; saddle incomplete ventrally, lightly to moderately pigmented, acus absent; 4-X usually with 12 (range 10–12) setae, caudal 8 setae on grid, each with a short stem and terminating in 5–8 long, simple branches, cephalic 2 setae shorter and usually not on grid. *Siphon*: Lightly to moderately pigmented; moderately long; index (width at base to dorsal length) 1.89–1.95; siphon/saddle index 2.42–2.63; acus present; pecten on basal 0.53–0.55 of siphon, composed of 10–15 spines (usually 12–15), distal 1,2 spines wider spaced than remainder; seta 1-S borne on basal 0.64–0.67 of siphon and distad of pecten; 6-S short,

[1]The views of the authors do not purport to reflect the views of the Department of the Army or the Department of Defense.

[2]610 N.W. 40th Terrace, Gainesville, FL 32607.

[3]Walter Reed Biosystematics Unit, Museum Support Center, MRC 534, Smithsonian Institution, Washington, DC 20560. Address for reprint requests.

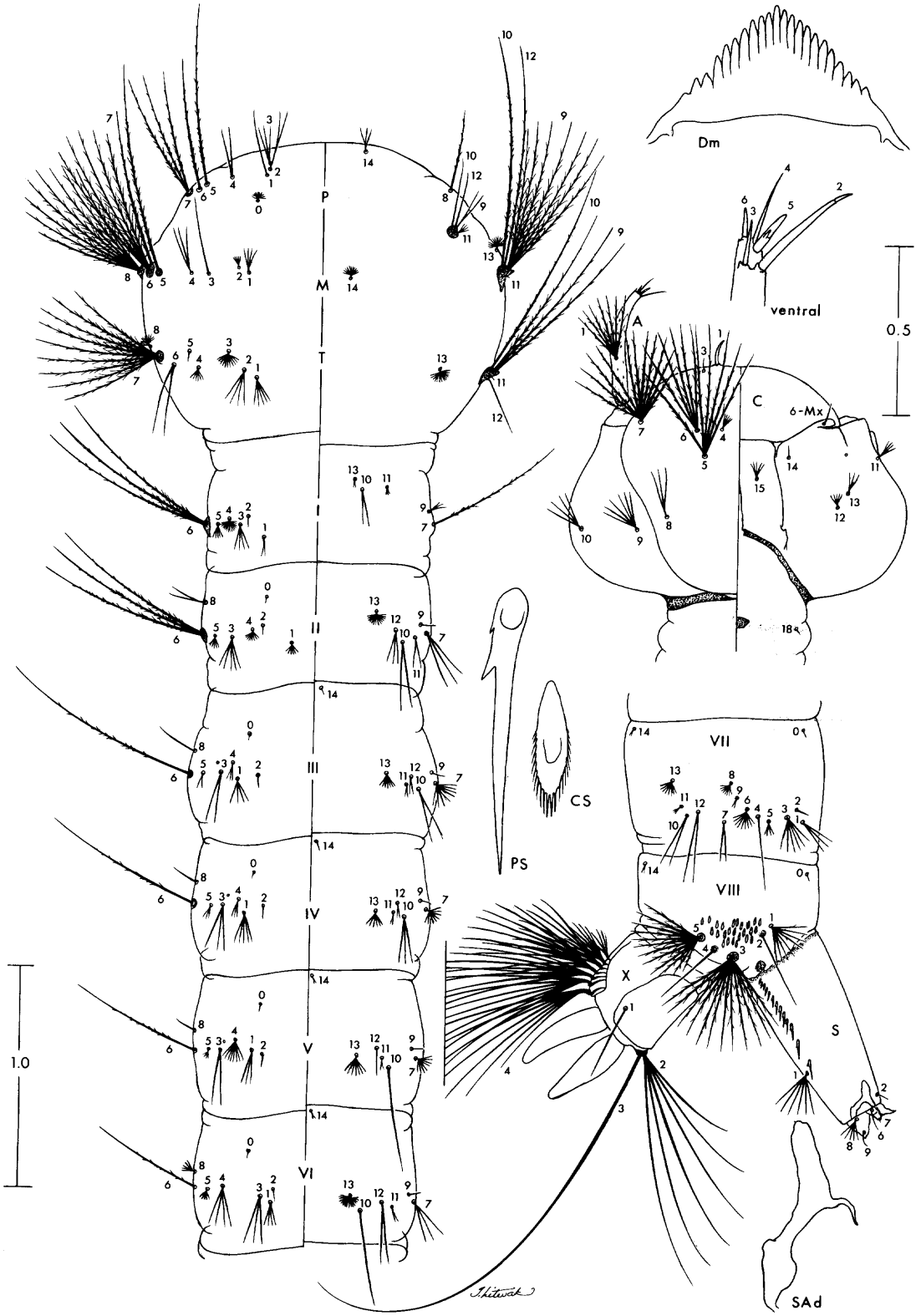

Fig. 1. *Aedes* (*Verrallina*) *lugubris*, larva.

Table 1. Branching of the setae on fourth-instar larvae of *Aedes* (*Verrallina*) *lugubris* (five specimens).

Seta no.	Head	Thorax			Abdominal segments		
	C	P	M	T	I	II	III
0	1	10–19	—	—	—	1	1
1	1	1	3,4(3)	4,5(4)	1–4f(1)	5–9(5)	4–6(5)
2	—	1–4f(1)	3–6(3)	3,4(4)	1	1	1
3	1	2,3(2)	1,2f(1)	10–17(12)	4–7(6)	2–5(5)	2–4(3)
4	5,6(5)	2,3(3)	3–5(4)	4–8(4)	11–24(14)	5–14	2–5(3)
5	3–6(5)	1	1	1–3(1)	4–7(5)	2–6(3)	2–4(4)
6	3–5(4)	1	4–7(6)	2	3,4(3)	2–4(3)	1
7	8–11(9)	2,3(2)	1	7–9(7)	1	3–5(4)	3–13(6)
8	1–3(2)	1	7–9(7)	10–17(12)	—	1,2(2)	1
9	4–6(5)	1,2(2)	5–8(6)	2–4(3)	2–4(3)	1	1
10	3–7(3)	1	1	1	2,3(2)	2	1–3(2)
11	4–7(6)	4–8(8)	1	3–5(4)	2–7	2,3(2)	2,3(2)
12	4–10(6)	1	1	1	—	2,3(3)	2–4(2)
13	2–4(3)	—	14–20(15)	13–20(13)	1–4(2)	12–20	5–10(6)
14	1	2,3(2)	9–17	—	—	—	1
15	4,5(5)	—	—	—	—	—	—
18	1	—	—	—	—	—	—

Seta no.	Abdominal segments					
	IV	V	VI	VII	VIII	X
0	1	1	1,2(1)	1	1	—
1	4–6(5)	3–7(5)	3–7(5)	3–6(5)	5–8(6)	1
2	1	1	1	1	1	3–6(4)
3	2–4(4)	2,3(2)	3–6(4)	2–6(5)	7–12(9)	1
4	2–4(3)	6–9(7)	2–4(2)	1,2(1)	1	—
5	2,3(3)	2,3(2)	2–6(3)	2–7(4)	9–12(10)	—
6	1	1	1	6–13(11)	—	—
7	5–9(7)	5–12	2–4(4)	2	1-S	5–9(5)
8	1,2(1)	1	3–5(3)	8–13(8)	2-S	1
9	1	1	1	2,3(2)	6-S	1
10	1–3(2)	1,2(1)	1	2	7-S	1
11	2–4(3)	2,3(3)	2–4(3)	2–4(2)	8-S	3–7
12	2–4(2)	1	1,2(1)	1,2(1)	9-S	1
13	5–7(7)	5–8(5)	16–26	4–9(6)	—	
14	1	1,2(1)	1–3(1)	1,2(1)	1,2(1)	—
15	—	—	—	—	—	—
18	—	—	—	—	—	—

single; 8-S short, with 3–7 branches; spiracular apodeme short.

Pupa. The pupa of *Ae. lugubris* has a strong, transverse ridge caudad of seta 14 on sterna IV-VI. In pupae of a single family (see above) the range of a sample of setal branching is as follows (mode in parentheses and ranges given by Reinert 1974, 1984 in brackets): 1-II with 9–23 branches (22) [18–37]; 6-VII with 2–6 branches (4) [2–4]; 9-VII single or 2-branched (1) [1–3]; and 9-VIII single to 3-branched (2) [3–6]. These features should be added to Reinert's (1974, 1984) descriptions and illustrations.

DISCUSSION

Larvae of *Ae. lugubris* are similar to those of *Ae. butleri* Theobald. Differences between these species in the branching of some setae follow (*Ae. butleri* in parentheses): 7-C with 8–11 branches (5–7); 3-M single or 2-forked (3); 6-T with 2 branches (3, 4); 1-II with 5–9 branches (1–3); 4-VII single or 2-branched

(4–6); 10-VII with 2 branches (3–5); 12-VII single or 2-branched (4–6); and 2-VIII single (3–5). The comb of *Ae. lugubris* has 17–25 scales and that of *Ae. butleri* has 9–14.

ACKNOWLEDGMENTS

Appreciation is expressed to E.L Peyton, Walter Reed Biosystematics Unit (WRBU), and Ronald A. Ward, Walter Reed Army Institute of Research, Washington, DC, for reviewing the manuscript, and Taina R. Litwak, WRBU, for preparing the illustration.

REFERENCES CITED

Barraud, P.J. 1928. A revision of the culicine mosquitoes of India. Part XXIV. The Indian species of the subgenera *Skusea* and *Aedes*, with descriptions of eight new species, and remarks on a new method for identifying the females of the subgenus *Aedes*. Indian J. Med. Res. 16:357–375.

Delfinado, M.D. 1968. Contributions to the mosquito fauna of Southeast Asia. III. The genus *Aedes*, subgenus *Neomacleaya* Theobald in Southeast Asia. Contrib. Am. Entomol. Inst. (Ann Arbor) 2(4):1–74.

Harbach, R.E. and K.L. Knight. 1980. Taxonomists' glossary of mosquito anatomy. Plexus Publishing, Inc., Marlton, New Jersey.

Reinert, J.F. 1974. Medical entomology studies—I. A new interpretation of the subgenus *Verrallina* of the genus *Aedes* (Diptera: Culicidae). Contrib. Am. Entomol. Inst. (Ann Arbor) 11(1):1–249.

Reinert, J.F. 1984. Medical entomology studies—XVI. A review of the species of subgenus *Verrallina*, genus *Aedes*, from Sri Lanka and a revised description of the subgenus (Diptera: Culicidae). Mosq. Syst. 16:1–130.