

***Aedes (Finlaya) alongi* Galliard and Ngu (Diptera: Culicidae: Aedini): description of the female, redescription of the fourth-instar larva, and reassignment to genus *Bothaella* Reinert**

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Abstract

The female of *Aedes (Finlaya) alongi* is described for the first time and the fourth-instar larva is redescribed in detail. The species is reassigned to *Bothaella* and compared to other species of the genus.

Key words: *Bothaella alongi*, mosquito, Diptera, Culicidae, Aedini

Introduction

Galliard & Ngu (1947: 77) described *Aedes (Finlaya) halongi* as a new species and stated that the larva from Baie d'Along, Tonkin, Indochina, differed from all Oriental species in having stellate setae on the thorax and abdomen (only characters given). These authors later emended the spelling of the name to *alongi* and provided partial illustrations of the larva (Galliard & Ngu 1950: Figs. 1–3). Grothaus *et al.* (1971) reported the species collected as larvae from rockholes in January 1967 from Da Nang, Vietnam. Knight & Stone (1977) noted that the type is nonexistent. These articles include all the information published to date on this species.

Although Galliard & Ngu (1950) did not state that *Aedes alongi* is an emendation of *halongi*, it must be interpreted as the correction of an inadvertent error under article

32.5.1.1 of the *International Code of Zoological Nomenclature* (International Commission on Zoological Nomenclature 1999). This article states that the corrected spelling of a name in work issued in parts is to be accepted as clear evidence of an inadvertent error. The name *halongi* published in part I of the series of papers by Galliard & Ngu was corrected, albeit without explanation, to *alongi* in part III of their series (Galliard & Ngu 1947 and 1950, respectively).

Because the species is known only from a very incomplete description of the fourth-instar larva, it has essentially gone unnoticed. A detailed description of the female, including female genitalia, is provided here for the first time, and the fourth-instar larva is redescribed in detail. Based on the examination of two females, one with dissected genitalia, and three larval exuviae (Vietnam, Cuc Phuong, Ha Nam Ninh, April 1982 and Ha Long, Quang Ninh, August 1983), *alongi* belongs in *Bothaella* Reinert (see discussion below). The *Bo. alongi* specimens were collected from a limited geographical area and habitat and the species is the only member of the genus known to occur in Vietnam. *Bothaella*, originally described as a subgenus of *Aedes* (Reinert 1973), was recently elevated to generic status by Reinert *et al.* (2004).

This study is based on specimens (noted above) from the collection of Culicinae maintained in the National Institute of Malariology, Parasitology and Entomology, Hanoi, Vietnam. Nomenclature used in the descriptions follows that of Harbach & Knight (1980, 1982) and Reinert (1999, 2000).

Description of *Bothaella alongi* (Gilliard & Ngu, 1947)

Female. *Head:* Vertex covered with broad, dark brown, decumbent scales except for large, triangular patch of broad, silvery scales on anteromedian area and extending anteriorly onto interocular space; occiput with numerous dark, erect, forked scales; postgena with broad, dark brown scales; ocular line narrow, with broad scales; few dark ocular setae; 2 dark, interocular setae; eyes touching for most of length above antennal pedicels; antenna 0.83 length of proboscis, with relatively few setae in whorls, flagellomere 1 with few small, brown scales, pedicel dark brown, with large patch of large, overlapping, broad, silvery scales covering mesal, dorsal and ventral surfaces, lateral surface bare; clypeus dark brown, bare; maxillary palpus narrow, 0.17 length of proboscis, dark brown-scaled; proboscis narrow, 1.05 length of forefemur, dark brown-scaled. *Thorax:* Scutal integument dark brown, covered with narrow, curved, dark reddish-brown scales except bare prescutellar area; dark setae on following: few on anterior promontory, antedorsocentral, scutal fossal, prescutellar and antealar areas, numerous on anterior and posterior dorsocentral and supraalar areas, 1 on parascutellar area; paratergite narrow, without scales; scutellum with broad, silvery scales on midlobe, few broad, dark scales on lateral lobes (partially rubbed), several dark setae on all lobes; mesopostnotum bare; anteprepronota widely separated, with patch of broad, overlapping, silvery scales, several dark setae;

postpronotum without scales, 3 dark setae posteriorly; hypostigmal area bare; upper proepisternum with broad, overlapping, silvery scales, 2 long, dark setae; lower proepisternum bare; postspiracular area with large patch of broad, overlapping, silvery scales, 1 dark seta; subspiracular area bare; mesokatepisternum with moderately large upper and lower posterior patches of broad, overlapping, silvery scales, 1 upper and 1,2 lower dark, posterior setae; prealar area without scales, 5 short, dark setae on upper area; mesepimeron with patch of broad, overlapping, silvery scales on upper area, 5 short, dark setae on upper area and 1 long, dark seta on lower area; metameron bare. *Wing*: Dark brown-scaled; alula with row of narrow, brown scales on margin; upper calypter with several setae on margin; remigium with 1 dorsal seta inserted distally, without ventral setae; vein R_{2+3} longer than R_2 ; anal vein terminating distal to juncture of CuA and mcu. *Legs*: Ante- and postprocoxal membranes bare; forecoxa with dorsal patch of broad, overlapping, silvery scales and lower patch of broad, dark brown scales, several dark setae; midcoxa with small patch of broad, silvery scales on anterolateral area, several dark setae; hindcoxa with few broad, brown scales dorsally and small patch of broad, silvery scales ventrally on anterolateral area, several dark setae, base of hindcoxa below margin of mesomeron; forefemur dark brown-scaled with broad, silvery scales forming small patch on apicolateral area of anterior surface and on basolateral area of posterior surface; midfemur dark brown-scaled with small patch of silvery scales dorsally at apex; hindfemur dark brown-scaled, anterior surface with silvery scales forming broad, ventral stripe on proximal, approximately 0.70 and with distal part extending to dorsal margin, similar silvery scales forming moderate apical spot on anterior and dorsal surfaces, posterior surface with broad, white-scaled stripe ventrally on proximal, approximately 0.50; tibiae and foretarsus dark brown-scaled; midtarsus dark brown-scaled with small dorsobasal white-scaled spots on tarsomeres 1–3; hindtarsus dark brown-scaled with narrow, basal and apical white-scaled bands on tarsomeres 1–3, tarsomere 4 with narrow basal white-scaled band, tarsomere 5 white-scaled; fore- and midungues equal, each with 1 tooth; hindungues equal, both simple. *Abdomen*: Dark brown-scaled, tergum I with patch of broad, silvery scales on laterotergite, terga II–VII each with moderate basolateral patch of broad, silvery scales; sterna dark brown-scaled with broad, silvery scales basally. *Genitalia*: Tergum VIII approximately 0.70 retracted into segment VII, covered with minute spicules, moderately pigmented, moderately long, width greater than length, base and apex slightly concave, numerous scales on distal 0.27, several long, stout and few short, slender setae on apical margin, setae on distal 0.31, basolateral seta minute, single, VIII-Te index 0.47, VIII-Te/IX-Te index 2.37, length 0.22 mm, width 0.46 mm; sternum VIII covered with minute spicules, moderately pigmented, width greater than length, base slightly concave, apex with small, median emargination (0.09 of VIII-S length) separating small lobe on each side of midline, apical margin with short, slender setae on lobes and somewhat longer and stouter setae laterally, numerous broad scales on distal 0.70, setae on distal 0.78, setae 1-5-S in more or less diagonal line, 1-S somewhat removed from base, 2-

S inserted posterolateral to 1-S, basolateral seta absent, VIII-S index 0.71, length 0.30 mm, width 0.42 mm; tergum IX comprised of single sclerite, covered with minute spicules, moderately pigmented, wide, apex with shallow, median emargination, 4–6 short setae distally on each side of midline, 10 total setae, IX-Te index 0.56, length 0.09 mm, width 0.16 mm; insula tonguelike, covered with minute spicules, moderately pigmented, long, 2 minute tuberculi on distal part; lower vaginal lip covered with minute spicules, moderately pigmented, narrow, lower vaginal sclerite absent; upper vaginal lip covered with short spicules, moderately pigmented, narrow, upper vaginal sclerite moderately large, moderately to heavily pigmented; spermathecal eminence membranous, ill-defined; postgenital lobe covered with short spicules, moderately pigmented, moderately long, apex with moderately deep, median emargination (0.25 of dorsal length), 7,8 setae on each side of midline, 15 total setae, ventral PGL/Ce index 0.60, dorsal PGL index 1.24, ventral PGL index 1.92, ventral length 0.12 mm; proctiger with short, scattered spicules, membranous; cercus covered with minute spicules, moderately long, apex rounded, inner margin slightly concave, dorsal surface without scales, with several short setae and few long setae on apical margin, setae on distal 0.41, cercus index 2.50, Ce/dorsal PGL index 2.58, length 0.21 mm, width at midlength 0.08 mm; spermathecal capsules spherical, 1 large and 2 moderately large, few small, spermathecal capsule pores near orifice.

Male, pupa, and egg. Unknown.

Fourth-instar larva. *Head:* Moderately pigmented; seta 1-C long, attenuate, single; 3-C short, slender, single; 4-C short, slender, fanlike, with 10–14 branches, inserted mesal and anterior to 6-C; 5-C moderately long, stout, single, lightly aciculate, inserted posterior to 4,6,7-C; 6-C moderately long, stout, single, inserted mesal and slightly anterior to 7-C, anterior and approximately in line with 5-C; 7-C moderately long, moderately stout, fanlike, with 9–15 aciculate branches; 8-10-C slender, 2-branched (10-C single in 1 specimen); 11-C moderately long, moderately stout, fanlike, with 8,9 aciculate branches; 12-C single (2-forked on 1 side of 1 specimen), inserted lateral to 13-C; 13-C moderately stout, single or with 2 aciculate branches, usually 2-branched; 14-C long, stout, stellate, with 5–9 aciculate branches; 15-C short, slender, with 2,3 branches; dorsomentum with 21 teeth; seta 6-Mx short, stellate, with 6–11 aciculate branches; antenna short, moderately pigmented, with few small, scattered spicules, seta 1-A with 2 short, slender branches (rarely 3-branched). *Thorax:* Seta 0-P short, stout, stellate, with 15,16 aciculate branches, inserted posterolateral to 1-3-P; 1-3-P inserted on darkly pigmented, common setal support plate, 2-P > 1-P > 3-P length, 1-P with 6–8 aciculate branches, 2-P single, 3-P stellate, with 15–17 aciculate branches; 4-P moderately stout, single, aciculate; 5,6-P long, stout, single, aciculate; 7-P long, stout, with 3 aciculate branches; 8-P short, stout, stellate, with 14–25 aciculate branches, 8-P < 4-P length; 9,13-P short, stellate, multiple-branched, aciculate; 10,12-P single, aciculate; 11-P short, slender, single or 2-branched; 1-M moderately stout, stellate, multiple-branched, aciculate; 2-M short, slender, 3-branched; 3–5,7-M single, aciculate, 3,4-M moderately stout, 5,7-M long, stout; 6,8,9-M long,

moderately stout, fanlike, multiple-branched, aciculate; 10,12-M long, stout, single, aciculate; 9-11-M inserted on large, darkly-pigmented, setal support plate with long, stout, lateral spine; 13,14-M stellate, multiple-branched, aciculate; 1,8,13-T moderately stout, stellate, aciculate, 1-T with 22–24 branches, 8-T with 11 branches, 13-T with 15–18 branches; 2,6,10,12-T moderately stout to stout, single, aciculate; 3-5-T short, stout, multiple-branched, aciculate; 7,9-T long, fanlike, multiple-branched, aciculate; 9-12-T on large, darkly-pigmented, setal support plate with long, stout, lateral spine. *Abdomen*: With numerous stellate setae; several abdominal segments of 3 larval exuviae examined were twisted making identification of most setae uncertain; setae 1,2,4,5,9,11,13-I stellate, multiple-branched, aciculate; 3,10-I single, aciculate; 6-I moderately long, moderately stout, with 7–9 aciculate branches; 7-I long, moderately stout, with 2 aciculate branches, 7-I > 6-I length; 1,2,4,5,8,12,13-II stellate, multiple-branched, aciculate; 3,9,10-II single, aciculate; 6-II moderately long, moderately stout, with 7,8 aciculate branches; 7-II long, moderately stout, with 2,3 aciculate branches, 7-II > 6-II length; 11-II short, stiff, with 2,3 aciculate branches; 1,2,4,5,13-III-V stellate; 3,10-III-V single; 6-III-V long, moderately stout, with 3,4 aciculate branches; 14-III-VII very short, stellate; 6-VI moderately long, moderately stout, with 2,3 aciculate branches; 1,2-VII moderately long, stellate, multiple-branched, aciculate, 2-VII inserted far anterior to 1-VII; 1,5-VIII stellate, aciculate, 1-VIII with 14–17 branches, 5-VIII with 6 branches; 2,4-VIII single; 3-VIII with 5,6 aciculate branches; comb with 18–21 scales in 2 irregular rows; segment X with ventral brush comprised of 8 long setae with short stems and 2–6 branches attached to grid with both transverse and lateral bars, no precratal setae, saddle moderately pigmented, moderately large, incomplete ventrally, without acus, posterior margin with several large spicules dorsal and several small spicules ventral to insertion of seta 1-X, 1-X inserted on saddle near posterior margin, long, stout, with 2 aciculate branches, 2-X moderately long, with 7–9 branches, 3-X long, stout, single. *Siphon*: Moderately pigmented; covered with minute spicules; acus attached basal to pecten; index (length divided by width at base) 2.02, (length divided by width at midlength) 2.19; pecten with 9–11 evenly spaced spines on proximal 0.48 of siphon, spines long, pointed, with single stout spicule at about midlength and several small spicules proximally on ventral margin; seta 1-S moderately long, moderately stout, with 4 aciculate branches, inserted distal to pecten; 2-S short, single, inserted dorsally on posterior margin of siphon; 6,8-S short, 6-S single, 8-S single to 3-branched; 9-S short, slightly curved, single; spiracular apodeme long, narrow.

Discussion. *Bothaella* is a polythetic genus diagnosed as follows (Reinert 1973). Females by the combination of head with only broad, decumbent scales on vertex; erect forked scales restricted to occiput; antennal pedicel with large patch of broad, silvery scales on dorsal, mesal and ventral surfaces; acrostichal setae absent; anterior and posterior dorsocentral setae well developed; upper proepisternum with 2–4 setae, lower proepisternum bare; mesokatepisternum with 1,2 upper and 1,2 lower posterior setae; and mesepimeron with 3–8 upper and 1 lower setae. Fourth-instar larvae by the combination of

setae 5,6-C long, stout and single; 4-C moderately long, with 4–14 branches, inserted mesal and slightly anterior to 6-C; 5-C inserted posterior to 6-C; antenna short, seta 1-A short, with 2,3 branches; 13-P well developed, with 4–21 branches; 6-I-VI long, aciculate, 6-IV-VI with 2 branches; 1-VII long, stout, with 3–5 branches; 3-VII short; 13-VII far anterior to 10-VII; 1-X long, stout, with 2–4 aciculate branches, inserted near caudal margin of saddle; saddle incomplete ventrally; ventral brush with 8,9 single to 3-branched setae; siphon with 12–17 evenly spaced, pecten spines; and seta 1-S with 2–5 aciculate branches, inserted distal to pecten. The female and fourth-instar larva of *alongi* exhibit these diagnostic character combinations; thus, the species clearly belongs in genus *Bothaella*.

The female of *Bo. alongi* is similar in habitus to other species of the genus, *cf.* descriptions of *Bo. eldridgei* (Reinert), *Bo. helenae* (Reinert), and *Bo. kleini* (Reinert) in Reinert (1973) and *Bo. brownscutuma* (Dong, Zhou & Dong) in Dong *et al.* (1999) (we have not seen specimens of the latter species). The females of *Bo. brownscutuma* and *Bo. kleini* are unknown, but the female of *Bo. alongi* most likely can be separated from these two species by the white markings on the mid- and hindtarsi. The female of *Bo. alongi* differs from those of *Bo. eldridgei* and *Bo. helenae* by the dark-scaled postgena of the head and by the presence of generally fewer setae on the lateral thoracic areas. The fourth-instar larva of *Bo. alongi* can be distinguished from the other species by the branching of setae 4-C, 6-I,II, 7-I, 1-VIII and number of pecten spines.

Distribution. The reported distributions of the *Bothaella* species are as follow: *Bo. alongi*, VIETNAM, Tonkin, Bay of Along (Galliard & Ngu 1947, 1950), Da Nang (Grothaus *et al.* 1971); *Bo. brownscutuma*, CHINA, Yunnan Province, Jinghong County, Jilushan (Dong *et al.* 1999); *Bo. eldridgei*, CHINA, Yunnan Province (Gong & Lu 1988), THAILAND, Chiangmai Province, Ban Tham Kraeb, Chiang Dao, Kanchanaburi Province, Ban Sai Yok, Huai Bong Ti, Huai Mae Nam Noi, Khao Na Chang, Nan Province, Doi Chik Chong (Reinert 1973); *Bo. helenae*, CHINA, Yunnan Province, Jinghong County (Dong *et al.* 1999), THAILAND, Chiangmai Province, Ban Huai Kaeo, Ban Huai Tat, Ban Tham Kraeb, Chiang Dao, Doi Pha Daeng, Lampang Province, San Chao Pho Phatu Pha, Nan Province, Doi Chik Chong (Reinert 1973), Kanchanaburi Province, Sangkhlaburi District, Ban Nong Plang Khong (Knight & Harrison 1988); and *Bo. kleini*, CAMBODIA, Kompong Som Province, Sihanoukville, Kompong Speu Province, Oudong (Reinert 1973).

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