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THE AITKENII GROUP FROM THAILAND¹**

JOHN E. SCANLON² and E. L. PEYTON³

During routine surveys of jungle mosquitoes in Southeastern Thailand a small number of larvae and pupae of the *Anopheles aitkenii* group were found in water aspirated from crab holes along a small freshwater stream. Examination of the immature stages and the reared adults disclosed that this was a new species.

The *aitkenii* group was most recently reviewed by Reid (1965), who listed seven valid species for Malaya and Borneo. According to the infrasubgeneric classification adopted by Reid and Knight (1961) the *aitkenii* species group belongs to the *Anopheles* series of the Angusticorn section of the subgenus *Anopheles*. The species of the *aitkenii* group are very similar in gross adult morphology, the adults being rather small, brownish, and with a somewhat culicine appearance. Identification is based chiefly on the male terminalia and larval and pupal chaetotaxy; the females of the group cannot be separated with certainty. Members of the group are largely restricted to hill forests in Southern and Southeast Asia. The adults are rarely taken in large numbers and their habits are very poorly known. The immature stages are collected more frequently and seem to favor small streams, seepages and springs under forest cover. There is practically nothing known of the biting habits of the females and nothing known of their possible role in the transmission of human or animal malaria.

The most salient group characters outlined by Reid (1965) are as follows: very narrow upright forked occipital scales in the adults; wing scales uniformly brown in color; larva with branched antennal hair not over $\frac{1}{2}$ the length of the antennal shaft; inner clypeal hairs rather far apart at the base for the subgenus *Anopheles*, saddle hair often branched. Reid (1965) also indicated that abdominal seta 5 in the pupa is considerably shorter than the abdominal segments, but the present species differs from other pupae of the *aitkenii* group in this respect.

In the following description and accompanying illustrations the terminology and numbering of the setae are essentially those of Belkin (1962).

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² Lieutenant Colonel, Medical Service Corps, US Army. Walter Reed Army Institute of Research, Washington, D. C. *Southeast Asia Mosquito Project, Smithsonian Institution, Washington, D. C.*

³ Master Sgt., US Army, Medical Component—Southeast Asia Treaty Organization, Bangkok, Thailand.

Anopheles (Anopheles) tigerti, sp. n.

(Figs. 1, 2)

Female. A rather small (wing 2.9 mm) delicate species, uniformly brownish in color. No characters have been found which will permit its separation from other members of the *aitkenii* group. *Head.* Proboscis long, thin, uniformly dark, labellum dark brown; palpus similarly colored, slightly shorter than proboscis; antennal flagellomeres brown, without scales, but with well developed whorls of setae; vertex with a small number of forward projecting chetae and thin upright forked scales. *Thorax.* Propleural setae obscured in the single female available; wing with dark scales only, fringe unicolored, anterior fork-cell index 1.25, posterior fork-cell index 0.55; halter knob dark scaled, stem paler; legs without distinct markings, femora somewhat lighter ventrally than dorsally; scutum with well developed achrostichal and dorso-central bristles, a median dark line from the anterior promontory to the pre-scutellar space, single lateral lines on either side of the median line, from the anterior margin of the scutum to the scutellum; scutellar bristles strongly developed; anterior pronotal lobe with eight setae, sternopleuron with three setae, three upper mesepimeral setae. *Abdomen.* Dull olive brown above, slightly paler ventrally, heavily covered with fine setae; no distinctive markings.

Male. Very similar in general appearance to female. *Head.* Proboscis long, thin, dark; palpus with elongated apical knob; antennal flagellomeres lighter in color than in the female, with more strongly developed setal tufts; scales of vertex similar to female. *Terminalia.* General structure as in figure 2. Basimere short, conical, with well developed setae; two basal spines tapered, curved apically; subapical spine curved; distimere evenly curved, with 5-6 short setae near the apex; dorsal lobe of the harpago divided, outer portion with two strong flattened setae, inner portion with a flattened spine having a club-like apex; ventral lobe of the harpago also divided, outer portion with two spines, inner rounded portion with one long seta and numerous smaller setae, tip of the phallosome without leaflets, body of the phallosome with several small spines on dorsal and ventral surfaces and near the apex.

Larva. Chaetotaxy and general appearance as in figure 1. *Head.* Antenna with well developed spicules on basal two-thirds, smaller number on apical third, antennal hair (1-A) dorsal, 5-9 branches; hair 2-C divided into 3-4 branches about $\frac{2}{3}$ from the base, bases of hairs 2-C separated by less than the distance between 2-C and 3-C on either side; hair 4-C with 3-4 branches, inserted slightly external to the base of 2-C, hair 3-C divided into 2 branches about $\frac{3}{4}$ from base. *Thorax.* Hair 1-P with 8-10 branches; 2-P longer, with a more strongly developed basal tubercle. One long hair of each meso- and meta-thoracic pleural group (9-12) 2 branched beyond the middle; metathoracic palmate hair (3-T) well developed, with flattened leaflets and terminal filaments. *Abdomen.* Hair 1-I poorly developed, filamentous hair 1-II with flattened leaflets, but without definite shoulders or terminal filaments; palmate hairs well developed on segments III-VII hair 6-III with 6-12 branches; pecten with 14-18 teeth, fairly uniform in length, but occasionally with 1-2 shorter teeth; hair 1-X with 1-3 branches.

Pupa. Chaetotaxy and general appearance as in figure 2. *Cephalothorax.* Trumpet tubular, with a deep cleft; hair 12-C with numerous branches. *Abdomen.* Hairs 1, 3 and 5 well developed on segments II to VII; hair 5 long on most

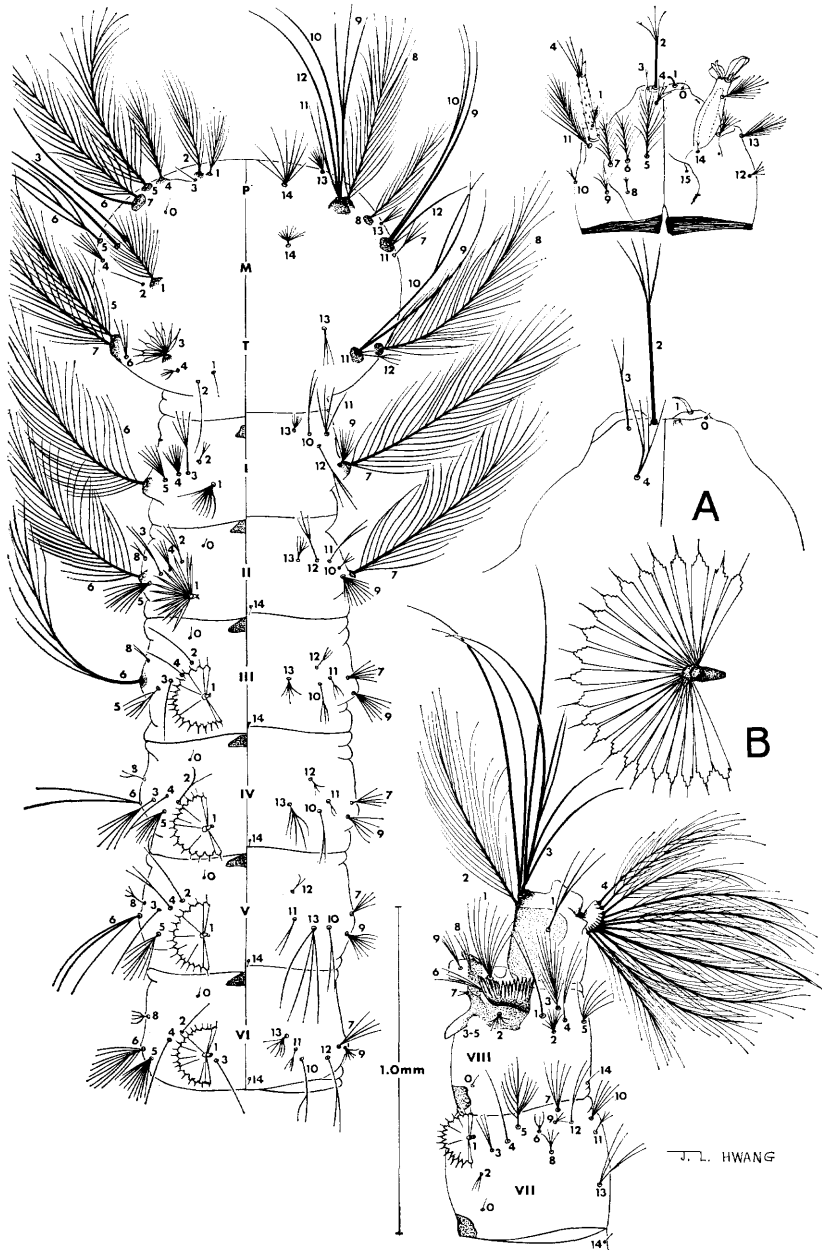


Fig. 1. *Anopheles (Anopheles) tigerti* sp. nov. Dorsosventral view of the fourth stage larva. A, enlarged view of placement of clypeal setae; B, enlarged view of hair 1-IV.

segments particularly IV and V, reaching or exceeding the posterior margins of the succeeding segments; hair 9 long on segments IV-VIII.

Type Data. Holotype male with associated larval and pupal skins and terminalia slide mounted with the following data; Thailand, Prahinburi Province, Ban Bu Phram, 150 m, 20 January 1966, Peyton and Kol collectors, deposited in the U. S. National Museum, No. 69239. Paratypes: 1 male with associated pupal skin and terminalia, 1 male with associated terminalia, one female and six larvae having the same data as the holotype to be deposited in the British Museum and the U. S. National Museum. The species is named for Colonel William A. Tigertt, Director of the Walter Reed Army Institute of Research who has done much to promote the study of mosquitoes and malaria in Southeast Asia in recent years.

Distribution. In addition to the type locality (14°16'N., 101°53' E.) the junior author has identified larval specimens from Khao Sai Dao, Chantanburi Province (12°51'N., 102°13'E.). This is a heavily forested mountain near the Cambodian border and approximately 100 miles southeast of the type locality.

Taxonomic Discussion. The *aitkenii* species group forms a well defined and fairly homogeneous entity with the *Anopheles* series. The present species differs from other *aitkenii* group species in the male terminalia; most strikingly in having small spines or denticles on the surface of the phallosome. In *A. insulaeflorum* the phallosome has spicular processes, but these are limited to the sides of the phallosome toward the apex. The external portion of the dorsal lobe of the harpago has two spines, as in *fragilis* and *bengalensis*, rather than three as in *aitkenii*, *insulaeflorum* and *stricklandi*. The larvae of *tigertti* have relatively few branches (6-12) on hair 6-III, and in this respect resemble *insulaeflorum* and *stricklandi* more than they do the other members of the group, in which this hair has 20-50 branches. In both *insulaeflorum* and *stricklandi*, however, the inner clypeal hairs (2-C) are simple and have their bases set very close together, while these hairs are multiple and inserted somewhat apart in *tigertti*. Among other species of the *aitkenii* group: *pinjeurensis* Barraud is known from a single male which has a remarkably elongated phallosome without spicules. *A. acaci* Baisas and *bornsensis* McArthur have larvae with extensive dichotomous branching of hair 2-C. The larvae of *palmatus* have greatly enlarged tergal plates and short frontal hairs (5-7-C).

Biology. The finding of the immature stages in holes bored by land crabs may have been fortuitous in that the larvae might have been stranded in the overflowing and subsequent drying of a nearby stream. However, two factors rule against this—the finding of larvae of *tigertti* in a similar niche some 100 miles to the southeast of the type locality

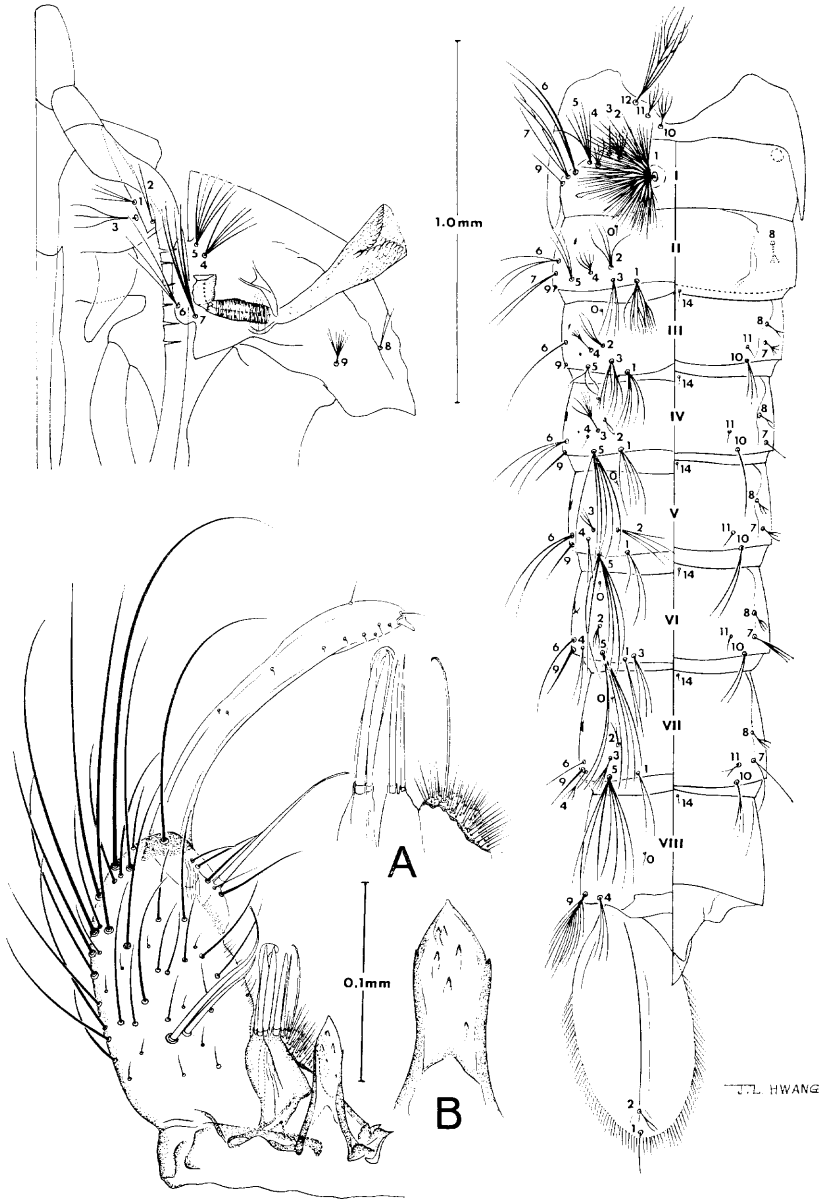


Fig. 2. *Anopheles (Anopheles) tigerti* sp. nov. Dorsoventral view of pupa and dorsal view of male terminalia. A, apical portion of harpago; B, phallosome.

and the failure to collect larvae from the nearby stream. A significant number of mosquito species are known to inhabit crab holes, including species of the genus *Deinocerites* Theobald 1901 in the New World, and a number of forms in SE Asia, including *Uranotaenia atra* Theobald, 1905 *Aedes* (*Rhinoskusea*) *longirostris* (Leicester) 1908, and several species of *Aedes* (*Cancaedes*) Edwards 1929. Most of these, however, involve marine crabs and littoral areas. Terrestrial crabs are fairly common in the evergreen forests of Southeast Asia and it is possible that further collecting will show their burrows to be a prolific source of mosquitoes.

The adult habits of *tigertti* are entirely unknown since all of the adults examined were reared from immature stages. Adults of the *aikeni* group are rather rarely collected, usually being found resting in the jungle. There are reports of *aikeni* group females attacking man (Christophers, 1933; Scanlon and Esah, 1965; Macdonald and Traub, 1960) and Reid (1965) specifically lists *bengalensis* as biting man in Malaya. However, the usual impossibility of distinguishing the females of the group and their relative rarity in inhabited areas in SE Asia makes it difficult to make very definite statements in this regard. There seems to be little reason to believe that species of the *aikeni* group play any role in the transmission of human malaria. The paucity of human biting records in jungle areas where extensive collections have been made probably indicates that females of the group usually feed on some forest vertebrate other than man.

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