ularis were made from 7 to 12 p.m. Biting activity reached a peak between 30 and 45 minutes following sunset, and the heleids continued to bite in small numbers during the remainder of the period.

Several factors probably influenced the biting activity of *C. crepuscularis*; however, the relative importance of the various factors was not studied. From general observations, light intensity appears to be of major significance; while daily variations in temperature, within the ranges observed, appeared to have little effect in the daily activity.

Culicoides haematopotus Malloch females were collected while biting on several occasions along with *C. crepuscularis* but in smaller numbers. During July 1953, 839 specimens of *Culicoides* were taken in a New Jersey-type light trap operated in Mitchell, Nebr. *C. crepuscularis* (657 specimens) was the most abundant species collected. Other species taken and their order of abundance were: *Culicoides hieroglyphicus* Malloch (132), *Culicoides palmerae* James (21), *Culicoides stellifer* (Coq.) (14), *Culicoides variipennis* (Coq.) (10), and *C. haematopotus* (5).

Most of the Heleidae were identified through the courtesy of Dr. Willis W. Wirth of the Division of Insect Detection and Identification, Bureau of Entomology and Plant Quarantine, Washington 25, D. C.

Literature Cited

JAMES, MAURICE T. 1943. The genus *Culicoides* in northern Colorado. Pan Pacific Ent. 19(4):148–153.

THE DISCOVERY OF *PARAEDES (UDAYA) ARGYRURUS* EDWARDS, 1934, IN THAILAND (DIPTERA: CULICIDAE)

DEED C. THURMAN, JR.[1]

Edwards (1934) erected the genus *Paraedes* for two species of mosquito found in South India and Assam, which, though very different in ornamentation, possessed the following characters:

Paraedes Edwards, 1934 (pp. 446–447). "Margin of squama quite bare. Membrane of wing with distinct microtrichia. Pulvilli absent. Anterior pronotal lobes small and well separated. Several posterior pronotal and a few postspiracular bristles present, but no spiracular and no lower mesepimeral. Wing-venation normal; vein-6 extending to well beyond the base of the fork vein-5. Wing-scales normal, not emarginate at tips."

This generic diagnosis led Edwards to the conclusion that the two species under discussion could not be placed in any then known genus of Culicidae. The genotype of *Paraedes* he described as *P. barraudi* from two males and figured the male terminalia (Edwards, 1934). The other species he called *Paraedes* (?) *argyrurus* (Edwards, 1934, pp. 448–449).

Recently, specimens of this second species have been collected by the author

[1] Sanitarian, Division of International Health, United States Public Health Service, assigned as Regional Malaria Control Adviser for Northern Thailand with the U.S.A. Operations Mission to Thailand (USOM) of the Foreign Operations Administration. (After the sudden death of the author on April 18, 1953, this and other papers were completed by Mrs. Ernestine B. Thurman, Senior Assistant Sanitarian (R), Division of International Health, USPHS, assigned as Malaria Control Entomologist, USOM to Thailand, FOA.)

and two Thai assistants. The mosquitoes were resting on a tree in a mountain valley at about 3000 feet above sea level in a shaded jungle area near the Wat (temple) of Doi (mountain) Sutep, Chiengmai Province, Northern Thailand. On January 13, 1953, two females were taken that answer to Edwards' description with only minor variations which are stated farther in the paper. A male collected two days later from the same tree has ornamentation identical to the females and is considered to be conspecific with them. Another female was captured from the area on January 17, 1953, and an additional one taken on February 14, 1953, in a similar mountain valley with denser jungle on an adjacent mountain peak, Doi Chom Cheng, of the Doi Sutep range.

The structures of the terminalia of the one male are quite distinct from those pictured by Edwards for *P. barraudi* and the adult has long palpi, almost as long as the proboscis, compared with Edwards' statement that *P. barraudi* has short palpi in the male. A further distinction is that *P. agyrurus* adults are ornamented with silvery scales in tufts on the pleura and the sides of the abdomen, while *P. barraudi* is described as being without ornamentation.

For these reasons the subgenus *Udaya* is proposed for the species *P. argyrurus* as there have been too few specimens found to attempt to separate these two different species into genera. This subgenus is named in honor of Dr. Udaya Sandhinand, Chief Malaria Control Officer, Northern Thailand, a valued co-worker and loyal friend.

Udaya NEW SUBGENUS

Male and female ornamented with tufts of silvery scales on pleura and sides of abdomen. Male palpus about as long as proboscis. Male terminalia.—Ninth sternite conspicuously enlarged, longer than wide, base rounded, apex with tuft of 7 setae; claspette less than ½ the length of basistyle, simple, terminating in single spine; basistyle without distinct basal or apical lobe; dististyle not highly modified.

Structures of the male terminalia of *P. barraudi,* according to the description and figure by Edwards (1934, p. 448), differ from *P. argyrurus* by having the basistyle nearly cylindrical, more than twice as long as broad, with a tuft of hairs at the somewhat truncate tip; basal lobe large, inner branch with bluntly rounded tip, outer more pointed, and bearing short bristles at tip; dististyle highly modified, broad, almost as long as basistyle, mediobulge bearing a finger-like process dorsally.

Three females, one male, and slide of male terminalia are deposited in the collection of the USNM. (Genotype and co-types are in the British Museum of Natural History.)

Paraedes (Udaya) argyrurus Edwards, 1934. Female (quoted from Edwards, 1934, pp. 448–449): *"Head:* Scales on dorsal surface all broad and flat, mostly black, but with a broad oblique stripe of white on each side and a small white area in front between the eyes, which are not very widely separated; scales on under surface of head yellowish; a few dark upright scales on nape. Upper pair of orbital bristles strong, others weaker but fairly numerous. Proboscis about length of fore femur, slender, recurved, dark. Palpi about ⅕ length of proboscis, entirely dark. Clypeus of normal shape, dark, bare. Thorax: Integument uniformly reddish-ochreous; mesonotum clothed rather densely with small narrow brown scales, no lighter scales, even above wing-roots or on front margin, two pairs of dorso-central bristles on disc, in addition to several in front of scutellum. Scutellum largely bare, but with a small patch of flat dark brown scales on each lobe. Pleural with four patches of flat silvery-white scales; one (the largest) forming a longitudinal stripe immediately below mesonotal border, one on upper part of mesepimeron, one in middle of sternopleura, and one on lower part of sternopleura immediately above base of midcoxa; *apn* (anterior pronotal lobe) clothed with flat silvery-white scales; *ppn*

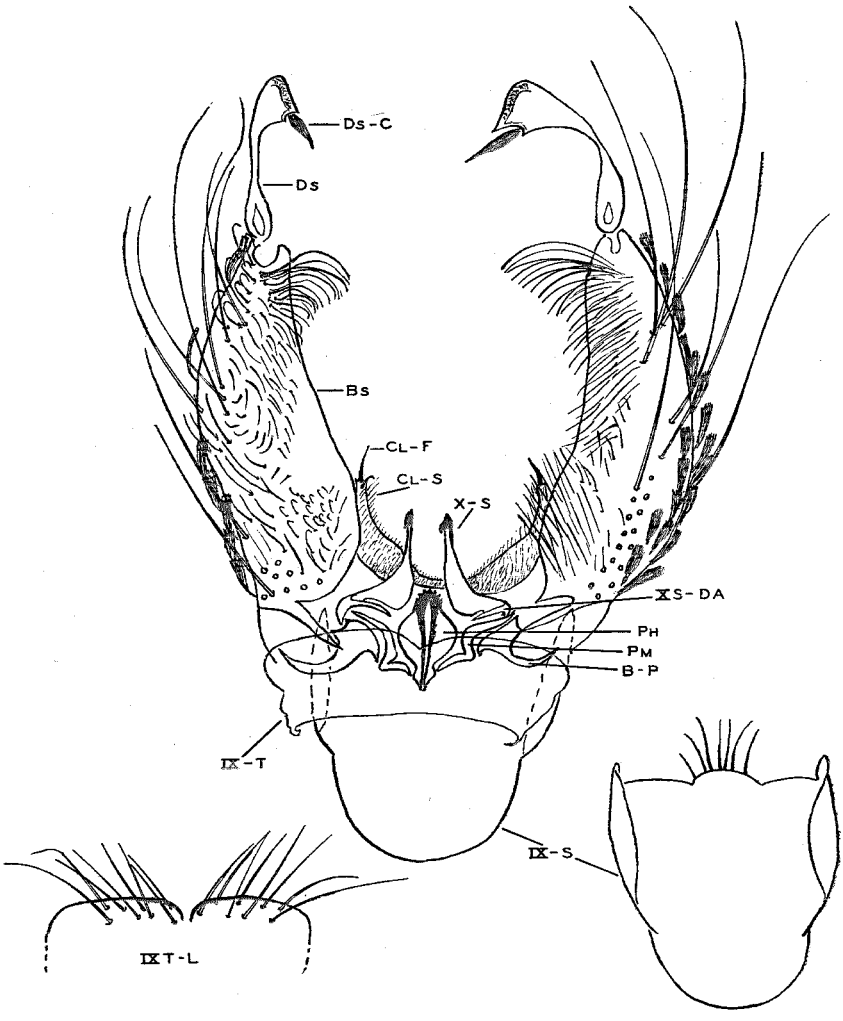

FIG. 1. Structures of male terminalia of *Paraedes (Udaya) argyrurus* Edwards, 1934

B-P	Basal Plate	Ix-S	Ninth Sternite
Bs	Basistyle	Ix-T	Ninth Tergite
Cl-F	Filament of Claspette	IXT-L	Lobe of Ninth Tergite
Cl-S	Stem of Claspette	Ph	Phallosome
Ds	Dististyle	Pm	Paramere
Ds-C	Claw of Dististyle	X-S	Tenth Sternite
Ib-F	Interbasal Fold	XS-DA	Dorsal Arms of Tenth Sternite

(posterior pronotal lobe) devoid of scales, as is also the post spiracular area. About 4–5 posterior pronotal and 3–4 post spiracular bristles; few sternopleural. Wings: dark scaled, scales moderately dense, those in plume series narrow. Venation normal, fork-cells about as long as their stems, bases level. Knob of halteres with black scales at base, silvery at tip. Legs: dark scaled, undersides of femora yellow; hind femora largely yellow, but dark above to base; all femora (but not tibiae) with small white knee-spots; all tarsi with narrow white rings at bases of each of the first three segments, hind tarsi also with a broad white ring on fourth segment, leaving only that tip narrowly black; fifth segment black. Claws simple. Abdomen: dorsal surface mainly dark scaled, with narrow and rather indefinite yellowish bands at bases of tergites II-VII; tergite VIII with a conspicuous patch of silvery scales; tergites I-VII each with a lateral subbasal patch of metallic silvery scales; venter mainly yellow. Cerci small and hidden within segment VIII."

The Thai specimens differ by having a line of silvery scales around the eyes; minute setae on the torus; anterior fork-cell almost twice as long as the stem; bases of anterior fork and posterior fork not quite level; rings completely encircling the tarsal segments on the hind leg only.

Male (new description): Ornamentation and structure similar to female with these exceptions: Palpus almost as long as proboscis, marked with white scales; first segment very short, about the length of clypeus, all dark; second segment long, scattered white scales on upper surface; third segment (the longest one) with a broad ring of white scales covering slightly less than the basal half; remainder of palpus all dark scaled. Proboscis longer than first femur, slightly turned down at apex. Tarsus of fore leg with basal white rings on first two segments (rather than three as in the female). Fore leg with large claw; mid- and hind leg with small claw. Terminalia.—Basistyle 3½ times as long as wide, tapering to narrow apex ventral surface clothed with large, flat closely-set scales; dorsal surface with many short setae in basal patch; setae in thick row along inner edge graduating in length into long setae curving downward from apical patch; laterally numerous long strong setae and few flat scales. Dististyle about ½ as long as basistyle; slightly expanded at base; narrowed medially; expanded into triangular apex, crowned with irregular striations; terminating in a simple claw, spine-like, bulging medially. Claspette less than ½ length of basistyle covered with minute setae; bulging basally tapering to narrow apex; filament short spine-like; one small subapical spine. Tenth sternite simple; basal arm curving dorsally; apex slender, point retrose. Phallosome closed dorsally; expanded medio-laterally, tapering to base and apex open ventrally, apex with 5–6 small points. Paramere S-curved, basal curve sharp apical curve less abrupt, tapering into point. Basal plate broad, two lateral points; long, curved basal arm. Ninth tergite three times wider than long; lobes narrowly separated, each bearing 8 setae directed laterally. Ninth sternite conspicuously developed, longer than wide base rounded; apex with medial lobe bearing 7 setae.

The author was assisted in the field by Mr. Manop Rattanopradith and Mr. Prayoon, Malaria Control Trainees, Chiengmai, Thailand. Their assistance, and also that of Dr. Alan Stone, USNM, and of Dr. Melvin E. Griffith, USOM, FOA in guiding this and other studies is gratefully acknowledged.

Reference Cited

EDWARDS, F. W. 1934. Appendix to (pp. 427–453) Barraud, P. J., Fauna of British India, Diptera, Vol. V (Culicidae, Megarhinini and Culicini). Taylor and Francis, Red Lion Court, London, 463 pp.