

NOTES ON THE *AEDES (DICEROMYIA) FURCIFER* GROUP, WITH  
A DESCRIPTION OF A NEW SPECIES (DIPTERA: CULICIDAE)<sup>1</sup>

YIAU-MIN HUANG

Systematics of *Aedes* Mosquitoes Project, Department of Entomology, Smithsonian Institution, Washington, D.C. 20560.

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*Abstract.*—The larva and pupa and both sexes of the adult of *Aedes (Diceromyia) cordellieri* n. sp. from Ivory Coast are described and illustrated. *Aedes cordellieri* is most closely related to *Aedes (Diceromyia) taylori* Edwards. Detailed description and illustrations of the male genitalia of *Ae. taylori* are also presented. Diagnostic characters for separating the *Aedes furcifer* group from other *Diceromyia* are provided. The distribution of *Ae. cordellieri* is based on examined specimens.

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Recent field work in Ivory Coast produced a reared series of a third species of the *Aedes (Diceromyia) furcifer* group, confirming my earlier observations of an additional species from the limited material then available in our collections. Although members of this species group are important as vectors of certain arboviruses, there remains some confusion in distinguishing among the species. Thus, the purpose of this paper is to describe the new species, with emphasis on characters to distinguish it from its sister species, *Aedes taylori* Edwards, and to provide other clarifying comments on the species group.

MATERIALS AND METHODS

This study is based on specimens that were collected or otherwise acquired by the Medical Entomology Project (MEP) and the Systematics of *Aedes* Mosquitoes Project (SAMP), Department of Entomology, National Museum of Natural History, Smithsonian Institution (USNM). Distribution records are listed in the following order and format: country names are in capital letters, administrative divisions, where known, are in italics, and place names have the first letter capitalized.

The terminology follows that of Harbach and Knight (1980), with the exception of "tarsal claws," which is retained for "unguis." The venational terms follow those of Belkin (1962).

**The *Aedes (Diceromyia) furcifer* group**

Included species.—The *Aedes (Diceromyia) furcifer* group in the Afrotropical Region consists of at least three species. These include *Aedes furcifer* (Edwards),

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# Report Documentation Page

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*Ae. taylori* Edwards, and the new species, *Aedes cordellieri*, described here. The last two species form the *taylori* complex.

**Diagnosis.**—The *furcifer* group can be distinguished from other *Diceromyia* by the following combination of characters: (1) proboscis with a distinct white band; (2) erect, forked scales numerous, not restricted to occiput; (3) acrostichal, dorso-central and prescutellar setae well developed; (4) paratergite with pale scales; (5) lower mesepimeral setae present; (6) scutellum with broad scales on all lobes; (7) wing with broad dark scales mixed with broad white scales on all veins; and (8) femora, tibiae and tarsomeres 1 sprinkled with pale scales.

**Medical importance.**—Members of the *furcifer* group have been incriminated as vectors of Yellow Fever in Africa (Lewis, 1943, in the Nuba mountains, Sudan [as Anglo-Egyptian Sudan]; Cordellier et al., 1974, in Burkina Faso [as Upper Volta] and Mali; Port and Wilkes, 1979, in Gambia), and of Chikungunya (McIntosh et al., 1964, and Paterson and McIntosh, 1964, in Zimbabwe [as Southern Rhodesia]; McIntosh et al., 1977, and Jupp, 1980, in South Africa). The following viruses have also been isolated from members of the *furcifer* group: yellow fever, chikungunya, Zika, Bouboui and Bunyamwera in Senegal (Cornet et al., 1978, 1979) and yellow fever in Burkina Faso [as Upper Volta] (Baudon et al., 1984).

**Discussion.**—*Aedes furcifer* and *Ae. taylori* have been treated as two species, usually found sympatrically, that are difficult to separate morphologically. The difficulty in separating females of *Ae. furcifer* from *Ae. taylori* was first reported by Lewis (1943: 72), who stated that, "The distinguishing character of the females given by Edwards (1941)—the degree of speckling of the abdominal tergites—proves to be so variable in Sudan specimens of *Ae. furcifer* that the two species cannot always be differentiated . . . . In the following observations these two very similar species are treated together." Since then, the so-called "*Aedes furcifer-taylori* group" has been used for these two species of mosquitoes, which have not always been differentiated by workers conducting studies on them (Haddow, 1961; McIntosh et al., 1964; Paterson and McIntosh, 1964; Cordellier et al., 1974; Cornet et al., 1978, 1979; Port and Wilkes, 1979; Germain et al., 1980; Jupp, 1980). The difficulty in distinguishing females of *Ae. furcifer* from *Ae. taylori* was also noted by Lewis (1945: 12), Bailey (1947: 39), Mattingly (1949: 388), Muspratt (1955: 174), Van Someren et al. (1955: 481), Haddow (1961: 323), Hamon (1963: 106), Cornet et al. (1978: 1450; 1979: 157), Port and Wilkes (1979: 343) and Germain et al. (1980: 11).

Edwards (1936:55) described *Ae. taylori* from specimens collected in Gadau, Nigeria, and mentioned that it "resembles *furcifer* . . . but differs from *furcifer* in having no scattered pale scales on the dark parts of the abdomen." In a later treatment of *Ae. taylori*, Edwards (1941: 216) mentioned that it is "closely related to *A. furcifer* . . . except that there are no (or at most extremely few) scattered yellowish scales on the abdominal tergites." The variation noted in the character Edwards used to differentiate *Ae. taylori* from *Ae. furcifer* was attributed to intraspecific variation. Edwards did not realize that his concept of *Ae. taylori* included two species and that he was dealing with interspecific variation.

It is now evident from using couplet 4 of Edwards' key (1941: 214) that *Ae. cordellieri* has apparently been misidentified as *furcifer*, as the "abdomen speckled dorsally" is a character found in both *furcifer* and *cordellieri*. On the other hand, the second half of couplet 4, "abdomen not speckled dorsally" is a reliable specific

character for *taylori* and can be used to separate *taylori* from either *furcifer* or *cordellieri*. Males of *Ae. cordellieri* have been misidentified as *taylori* because the character "without the tuft of setae on the tips of the gonocoxites," which has been used to differentiate *Ae. taylori* from *Ae. furcifer* since Edwards (1936), is also found in *Ae. cordellieri*. For example, I have found that all male specimens from Kenya, Tanzania, Uganda and South Africa in the USNM collection were misidentified as *taylori*. It must be noted that the character "without the tuft of setae on the tips of the gonocoxites" cannot be used as the specific diagnostic character for identifying *taylori* Edwards, but it is the character for separating the *taylori* complex (*taylori* and *cordellieri*) from the *furcifer* complex (*furcifer* and perhaps others).

The diagnostic value of the ornamentation on the abdominal sternites, as mentioned by Ferrara et al. (1984: 182), can only be used for distinguishing between *Ae. furcifer* and *Ae. taylori*, but cannot be used for distinguishing between *Ae. furcifer* and *Ae. cordellieri* (see descriptions under female and male of *Ae. cordellieri*). Therefore, the key given by Ferrara et al. (1984) is inadequate for distinguishing between *Ae. furcifer* and *Ae. taylori*.

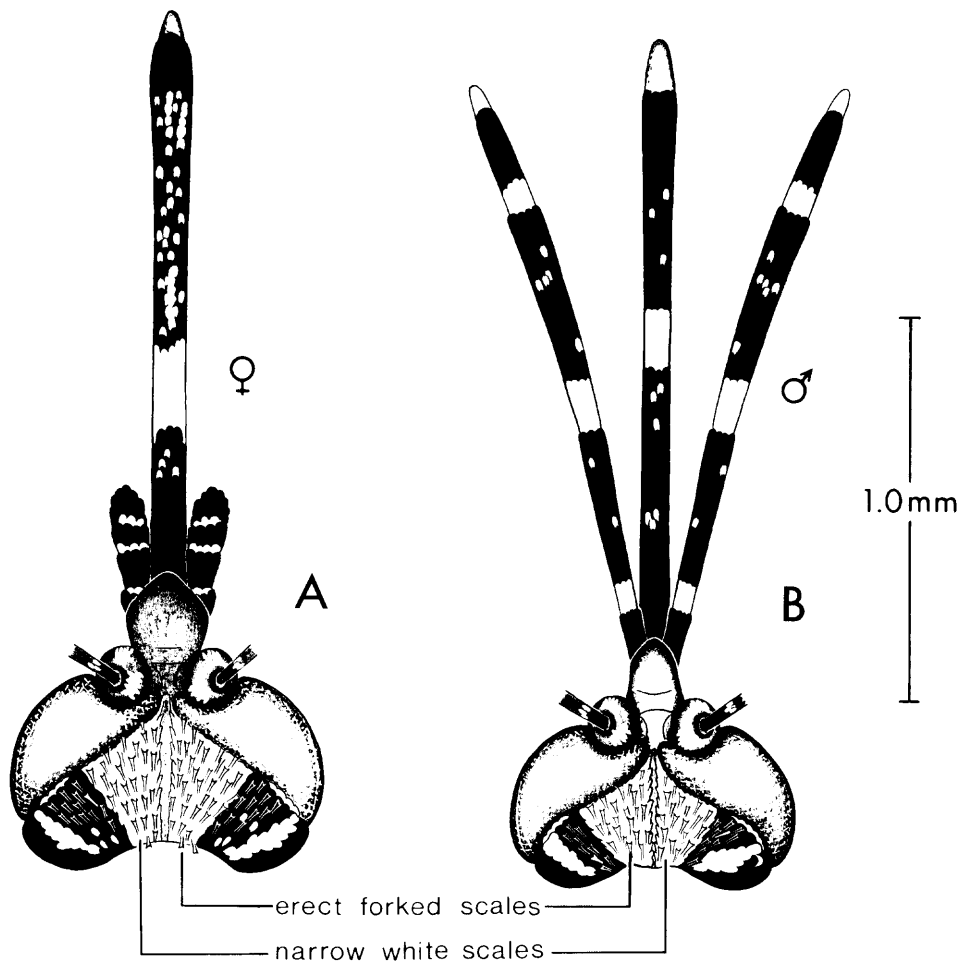
Adults of *Ae. cordellieri* n. sp. and *Ae. furcifer* (Edwards) run to the first half of couplet 4 in Edwards' (1941) key to Ethiopian species of subgenus *Diceromyia*. The two species can be distinguished as follows: terga II–VII with pale scales scattered on apicolateral and dorsomedian areas (*furcifer*); terga II–VII with yellowish scales scattered on apicolateral areas only, no scattered pale or yellowish scales on dorsomedian areas (*cordellieri* n. sp.).

In view of the past taxonomic confusion in the *furcifer* group and its involvement in the epidemiology of arboviruses in Africa, it is desirable to describe the new species and to provide also a detailed description and illustrations of the male genitalia of *Ae. taylori*. Results of further investigations on the *furcifer* group will be published in due course.

#### *Aedes (Diceromyia) cordellieri* Huang, NEW SPECIES

Figs. 1, 2, 3A, 4, 5

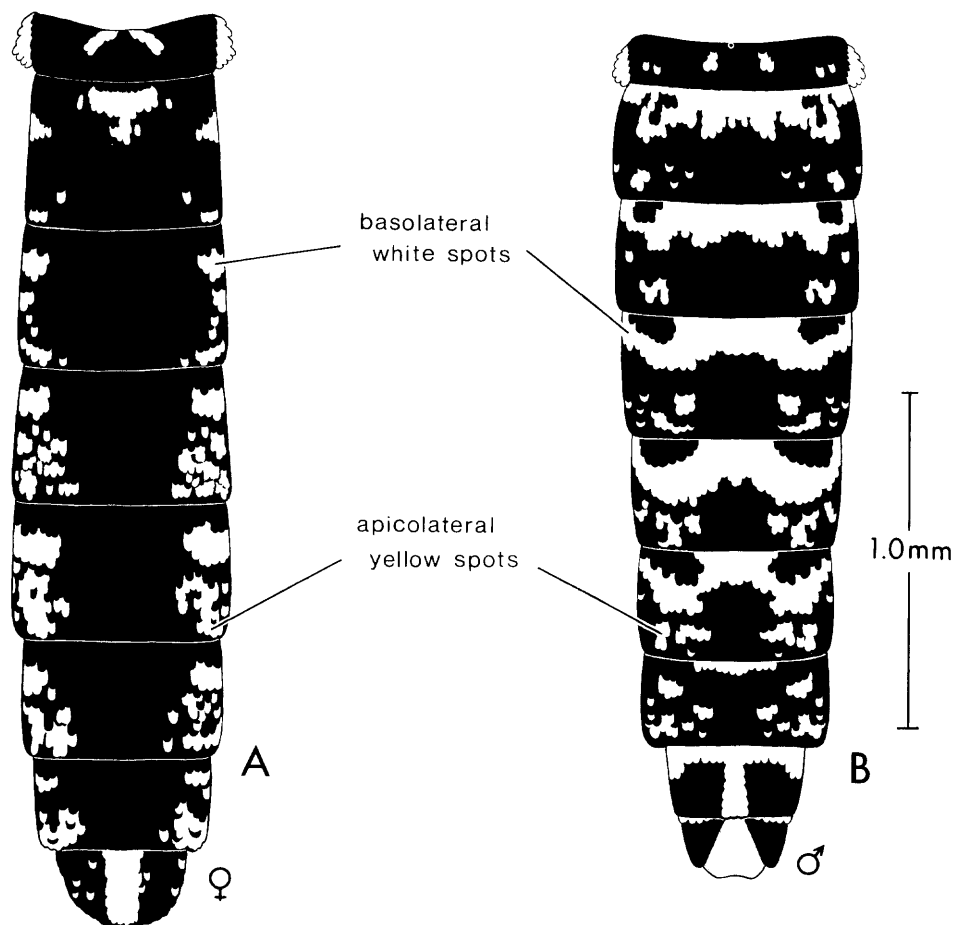
Female.—*Head* (Fig. 1A): Proboscis dark scaled, with white scales scattered and with a distinct white band near middle, about as long as forefemur; maxillary palpus 0.23–0.25 length of proboscis, dark, with a white band at base of palpomeres 3, 4 and a white band at the middle of palpomere 4, sometimes with few white scales scattered on palpomere 4 instead of a white band at middle, or sometimes without scattered white scales; pedicel covered with some white scales on dorsal and ventral areas of inner side; antenna with a small patch of white scales on mesal surface of flagellomere 1; clypeus with a few white scales; erect forked scales, numerous, not restricted to occiput, mainly white, some dark ones on sides; vertex with a large median area of narrow white scales, with broad dark scales on each side interrupted by lateral stripe of broad white scales, followed ventrally by a patch of broad white scales. *Thorax*: Scutum with narrow pale yellow scales, and a distinct patch of narrow dark scales on fossal area, a broad longitudinal stripe of narrow dark scales on posterior dorsocentral area, a lateral patch of narrow dark scales on each side just above the paratergite; prescutellar area with some narrow pale yellow scales; acrostichal, dorsocentral and prescutellar setae well developed; scutellum with broad pale yellow scales on all lobes



*Aedes (Diceromyia) cordellieri* n. sp.

Fig. 1. *Aedes (Diceromyia) cordellieri*. A, Dorsal aspect of the allotype female head. B, Dorsal aspect of the holotype male head.

and a few narrow ones at base of midlobe, with a few broad dark scales at apex of all lobes; anteppronotum with broad and narrow pale yellow scales; postpronotum with broad dark scales and some broad pale yellow scales in middle and ventrally; paratergite with pale yellow scales; postspiracular area with few pale yellow scales; hypostigmal area with small patch of pale yellow scales; patches of broad pale yellow scales on propleuron, subspiracular area, upper and lower portions of mesokatepisternum, and on mesepimeron; lower mesepimeron usually with 2 (1-3) seta; metameron and mesopostnotum bare. *Wing*: With broad dark scales mixed with broad white scales on all veins; cell  $R_{2+3}$  length of  $R_{2+3}$ . *Halter*: With dark scales. *Legs*: Coxae with patches of pale yellow scales; yellow



*Aedes (Diceromyia) cordellieri* n. sp.

Fig. 2. *Aedes (Diceromyia) cordellieri*. A, Dorsal aspect of the allotype female abdomen. B, Dorsal aspect of the holotype male abdomen.

knee-spot present on femora; femora, tibiae, and tarsomeres 1 sprinkled with pale yellow scales; foretarsus with a basal white band on tarsomeres 1-3; midtarsus with a basal white band on tarsomeres 1-4; hindtarsus with a basal white band on tarsomeres 1-5; fore- and midlegs with tarsal claws equal, all toothed; hindleg with tarsal claws equal, both simple. *Abdomen* (Fig. 2A): Tergum I with white scales on laterotergite, with a few white scales on basomedian area; tergum II with a basomedian white band or patch and basolateral white spots which do not connect with the basomedian white band or patch; terga III-VII each with basolateral white spots which are turned dorsomesally; terga II-VII each with yellow scales sprinkled on apicolateral area, those on terga III-VII often form distinct yellow patches; terga III-VII usually each with dorsomedian area dark, sometimes with a few white scales on basomedian area; tergum VIII with a median longitudinal white stripe; sterna II-VI each with a basal white band and with white

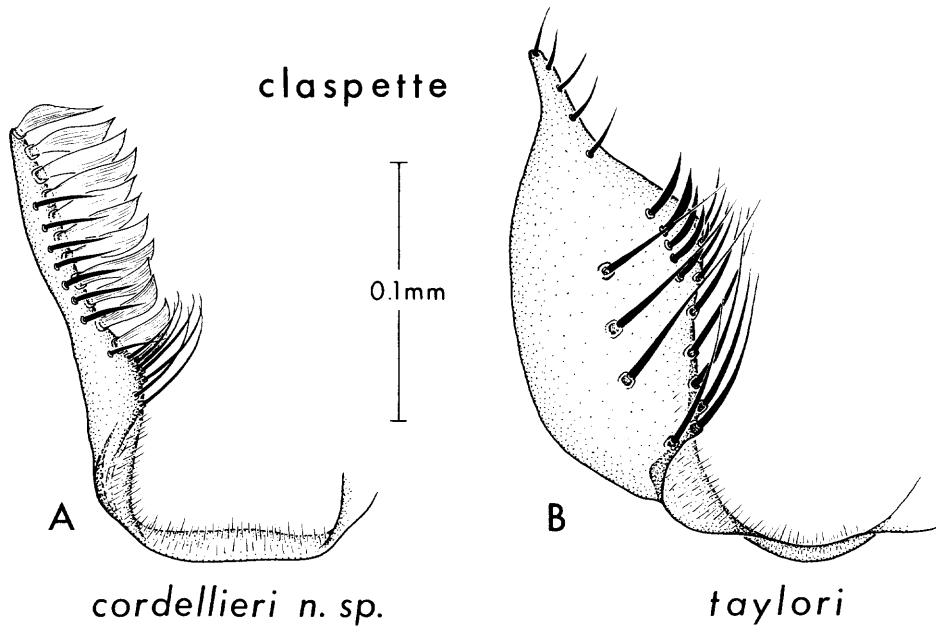
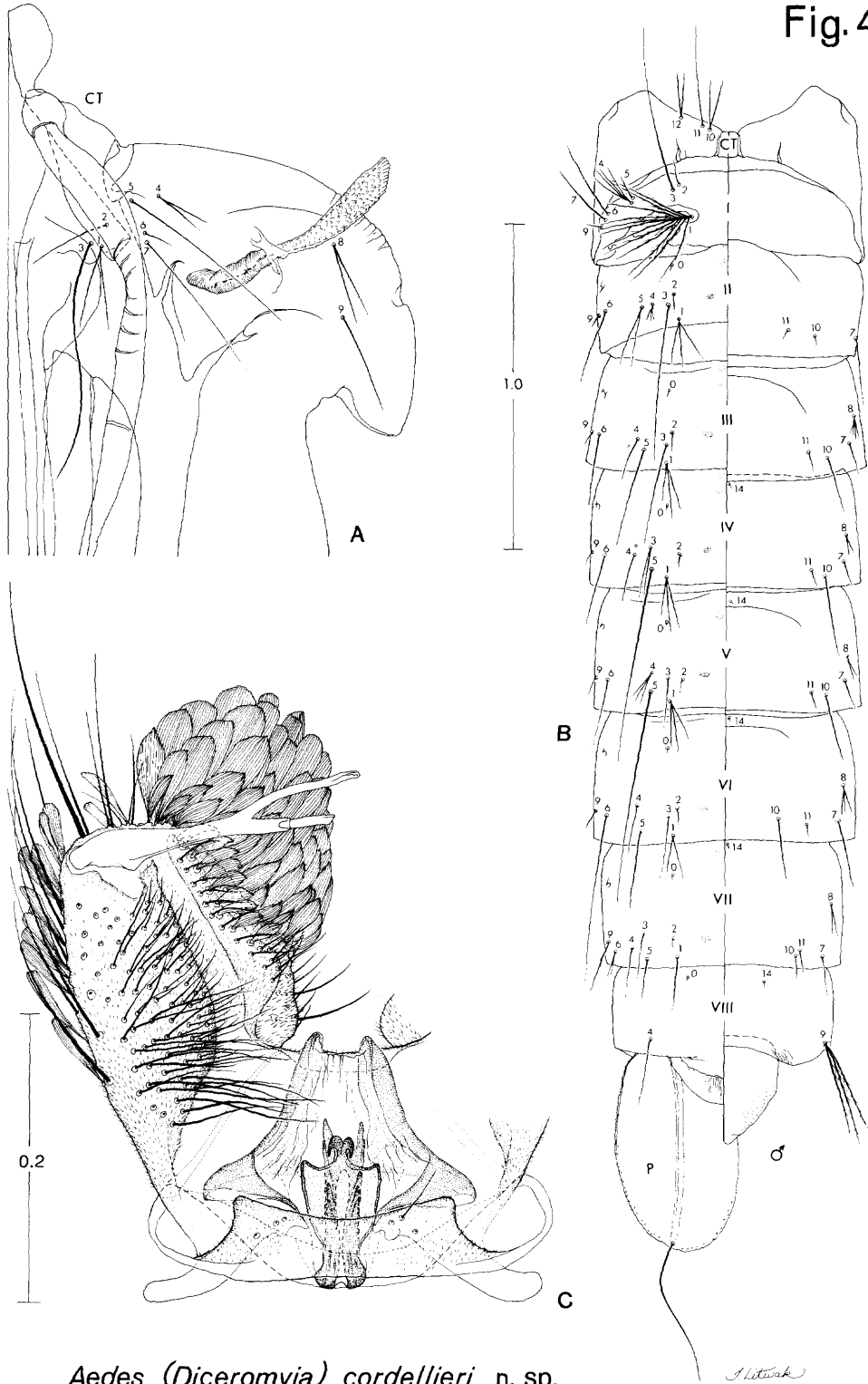


Fig. 3. *Aedes (Diceromyia) cordellieri*. A, Dorsal aspect of the claspette of the male genitalia; *Aedes (Diceromyia) taylora*. B, Dorsal aspect of the claspette of the male genitalia.

scales scattered on remainder; segment VIII not completely retracted. *Genitalia*: Apical margin of sternum VIII without a median notch and without conspicuous rounded lateral lobes; insula longer than wide, with minute setae and with 4 larger setae on apical 0.25; apical margin of tergum IX with a well developed lateral lobe, with 1–2 setae; apical margin of postgenital plate with or without a small notch; cercus short and broad; 3 spermathecae, one larger than the other 2.

Male.—Essentially as in the female, differing in the following sexual characters: *Head* (Fig. 1B): Maxillary palpus, shorter than proboscis, 0.90–0.92 length of proboscis, dark, with a white band at base of palpomeres 2–4 and with white scales scattered on palpomeres 2, 3; palpomere 4 very short and with a few short stiff setae at apex; palpomere 5 minute, with all white scales; antenna plumose, shorter than proboscis. *Wing*: Cell  $R_2$  1.4–1.7 length of  $R_{2+3}$ . *Legs*: Midtarsus with a basal white band on tarsomeres 1–3; fore- and midlegs with tarsal claws unequal, both toothed. *Abdomen* (Fig. 2B): Terga II–VI each with a basomedian white band and basolateral white spots which are dorsomesally turned and connect with the basomedian white band; tergum VII with a basomedian white band and basolateral white spots which do not connect with the basomedian white band; terga I–VII each with yellow scales sprinkled on apicolateral area, those on terga II–VII often form distinct yellow patches; sterna II–VII each with a basal white band and without white scales scattered on remainder, sometimes with a few white scales scattered on sterna II–IV. *Genitalia* (Figs. 3A, 4C): Gonocoxite short and broad, about 1.8 as long as wide (width measured 0.5 from base), truncate at apex, without a projecting lobe bearing numerous long setae on apicomeral area, scales restricted to dorsolateral, lateral and ventral surfaces, with dense scales on mesal margin of ventral surface, with setae scattered on dorsomesal surface,

Fig. 4



*Aedes (Diceromyia) cordellieri* n. sp.



mesal surface membranous; claspette long, reaching to 0.8 of gonocoxite, with a row of scales along the mesal margin from apex to basomesal corner and with a row of short setae along the row of scales, followed by a few long, curved setae along the mesal margin of basal part, and without distinct, stout, long, pointed spines on median area of slightly expanded basal part; gonostylus elongate, slender, about 0.85 length of gonocoxite, bifurcate at about 0.63 from base, upper arm longer than the lower one, with a blunt, stout claw process apically on the shorter one; aedeagus with strongly toothed lateral plates; paraproct without apical teeth, cercal setae absent; apical margin of tergum IX slightly concave medially, with 3 (2–4) setae on each side; sternum IX with 11–12 setae.

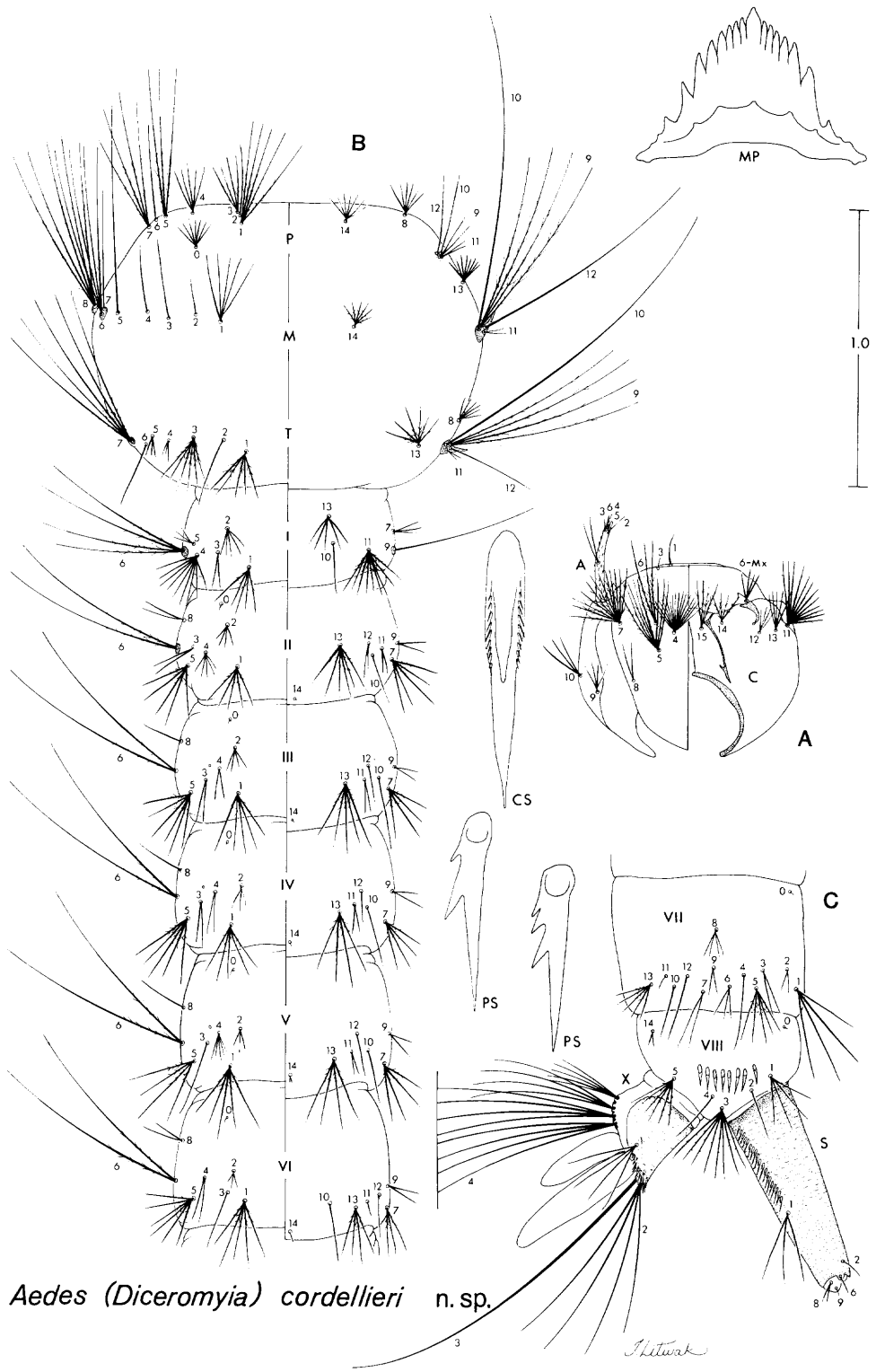
Pupa (Figs. 4A, 4B).—*Cephalothorax*: Trumpet 5.0–6.0 as long as wide (width measured 0.5 from base); seta 1-CT usually double (1–3); 2-CT single; 3-CT usually single (1–2), long, longer than 2-CT; 4-CT usually double (1–3); 5-CT single, long; 6-CT single, short; 7-CT usually single (1–2), long, longer than 6-CT; 8-CT usually double (2–3); 9-CT single; 10-CT usually double (2–3), caudomesad of 11-CT; 11-CT single; 12-CT usually double (1–3). *Abdomen*: Seta 1-I well developed, usually with 12 (12–17) plumose branches; 2-I single, short; 3-I single, long; seta 1-II usually with 3 branches (2–5); 3-II, III usually single (1–2); 1-III, IV usually with 3 branches (2–4); 5-IV, V single, long, reaching beyond posterior margin of following segment; seta 6-VI single, long, reaching beyond posterior margin of following segment; seta 9-I-VI small, single, simple; 9-VII usually single (1–2) and barbed; 9-VII, VIII much longer and stouter than 9-I-VI; 9-VIII usually with 3 branches (3–6) and barbed. *Paddle*: Oval, about 1.6 as long as wide; with small denticles on outer margin and on apical 0.28–0.30 of inner margin; without fringe of long hair-like spicules; apex rounded; seta 1-P single, long.

Larva (Fig. 5).—*Head*: Antenna with spicules; seta 1-A inserted in apical 0.5 of shaft, usually double (2–3); inner mouthbrushes not apically pectinate; seta 4-C well developed, usually with 16 branches (13–22), caudomesad of 6-C; 5-C usually with 8 branches (7–11), barbed; 6-C usually with 3 branches (2–4), barbed; 7-C usually with 12 branches (11–16), barbed; 8-C usually double (1–2); 9-C usually with 4 branches (3–5); 10-C usually with 3 branches (2–4); 11-C usually with 12 branches (12–14), barbed; 12-C usually with 4 branches (4–5); 13-C usually with 5 branches (3–5); 14-C usually with 4 branches (3–6); 15-C usually with 4 branches (3–5); mentum usually with 8 or 9 (7–10) teeth on each side of central tooth, with outer 4–5 teeth widely spaced. *Thorax*: Seta 1-P usually with 5 branches (4–6), barbed; 2-P single; 3-P usually with 4 branches (4–6), barbed; 4-P usually with 5 branches (4–5); 5-P usually with 3 branches (2–4), barbed; 6-P single; 7-P usually with 4 branches (2–6), barbed; 9-P usually double (2–4); 11-P double; 5,7-M single; 6-M usually with 4 branches (4–5), barbed; 8-M usually with 5 branches (3–5), barbed; 9-M usually with 4 branches (4–5), barbed; 10,12-M single, long, and stout; 11-M double, small; 7-T usually with 5 branches (3–7); 9-T usually with 4 branches (4–5), barbed; 10,11-T similar to those on mesothorax; 12-T much reduced, single and simple; basal spine of meso- and metapleural setae long,

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Fig. 4. *Aedes (Diceromyia) cordellieri*. A, Dorsolateral aspect of the cephalothorax of the male pupa. B, Dorsal and ventral aspects of the metathorax and abdomen of the male pupa. C, Tergal aspect of the male genitalia.



*Aedes (Diceromyia) cordellieri* n. sp.

apically pointed. *Abdomen*: Seta 6-I usually with 4 branches (4–6), barbed; 7-I usually single (1–2); 6-II usually double (2–4), barbed; 7-II usually with 5 branches (4–6), barbed; 6-III–VI double, barbed; 1-VII usually with 4 branches (4–5); 2-VII usually double (2–3); 2-VIII distant from 1-VIII; 1-VIII usually with 4 branches (3–5), barbed; 3-VIII usually with 8 branches (7–9), barbed; 5-VIII usually with 6 branches (5–7), barbed; 2,4-VIII single; comb of VIII usually with 8 (6–10) scales in a row, each scale with fine basal lateral fringe; segment X with saddle incomplete, marginal spicules conspicuous; seta 1-X usually with 4 branches (3–5); 2-X usually with 4 branches (4–5); 3-X single; 4-X with 4 pairs of setae of grid, each seta usually with 3 or 4 branches (2–5); no precratal tufts; anal papillae sausage-like, dorsal pair longer than ventral pair. *Siphon*: About 2.5–3.8 as long as wide 0.5 from base, acus absent; usually with 19 (13–26) pecten spines, extending from base to 0.50–0.57 the length of siphon each spine usually with 2–3 basal denticles (1–4); seta 1-S with 3–4 branches, usually inserted beyond apical pecten spine and in 0.56–0.64 from base.

Type data.—Holotype ♂ (SAMP Acc. 1138, IV 380-16) with associated larval and pupal skins on slide, with genitalia on slide (85/314), Dezidougou, M'Bahiakro, *Centre Département*, IVORY COAST, reared from eggs collected from a ♀, biting man, at the ORSTOM study tower, 20 m above ground level, between 1730–1930 h, June 13, 1985, Huang and Pecor [USNM]. Allotype ♀ (SAMP Acc. 1138, IV 380-23) with associated larval and pupal skins on slide, same data as holotype [USNM]. Paratypes: 16 ♂, 11 ♀ and 3 4th instar larvae as follows, (SAMP Acc. 1138): 4 ♂ (IV 380-17, 18, 21, 24) with associated larval and pupal skins on slides, with genitalia on slides (85/192, 85/315, 85/316, 85/317) and 2 ♀ (IV 380-30, 31) with associated larval and pupal skins on slides, with genitalia on slides (85/319, 85/320), same data as holotype [USNM]; 2 ♂ (IV 380-11, 100) with associated pupal skins on slides, with genitalia on slides (85/191, 85/193), same data as holotype [USNM]; 1 ♂ (IV 380-102) with genitalia on slide (85/194) and 2 ♀ (IV 380-28, 101) with genitalia on slides (85/318, 85/195), same data as holotype [USNM]; 5 ♂ (IV 380-19, 20, 26, 33, 35) and 4 ♀ (IV 380-12, 14, 29, 34) with associated larval and pupal skins on slides, same data as holotype [USNM]; 1 ♂ (IV 380-10) with associated pupal skin on slide, same data as holotype [USNM]; 1 ♂ (IV 380-15) and 1 ♀ (IV 380-13) with associated larval and pupal skins on slides [ORSTOM]; 1 ♂ (IV 380-25) and 1 ♀ (IV 380-32) with associated larval and pupal skins on slides (Division of Vector-Borne Diseases, Ministry of Health, Nairobi, Kenya) [DVBD]; 1 ♂ (IV 380-22) and 1 ♀ (IV 380-27) with associated larval and pupal skins on slides [BM]; 3 4th instar larvae (IV 380) [USNM]; same data as holotype.

Other material examined.—IVORY COAST. *Centre Département*: M'Bahiakro: Dezidougou (7°44'N, 4°16'W), May 20, 1985, B. Bouchite, (SAMP Acc. 1138), 6 ♂ (IV 166), 3 ♀ (IV 166), 3 ♂ gen. (85/143, 85/144, 85/145), 2 ♀ gen. (85/159, 85/160) [USNM]; same data except May 22, 1985, 1 ♂ (IV 172), 1 ♂ gen. (85/146)

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Fig. 5. *Aedes (Diceromyia) cordellieri*. A, Dorsal and ventral aspects of the head of the fourth instar larva. B, Dorsal and ventral aspects of the thorax and abdomen of the fourth instar larva. C, Lateral aspect of the terminal abdominal segments of the fourth instar larva.

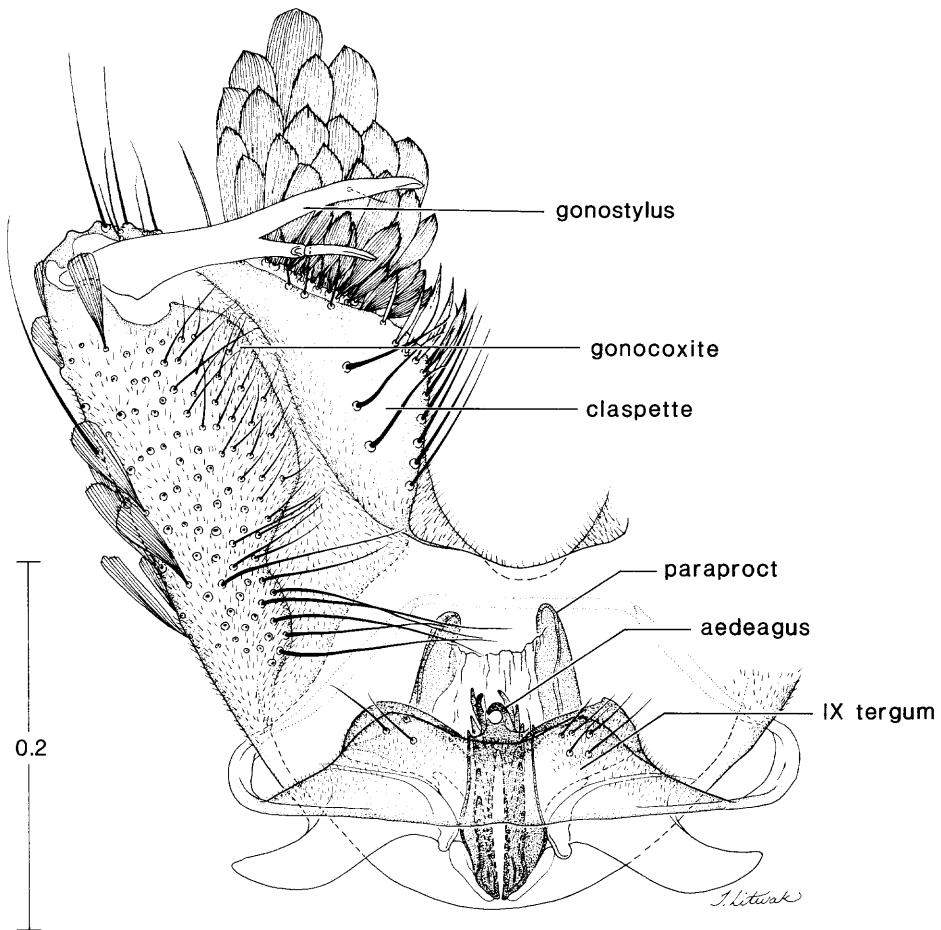
[USNM]; same data except Jun. 12, 1985, 1 ♂ (IV 376) [USNM]; same data except Jun. 13, 1985, 1 ♂ (IV 379), 1 ♀ (IV 380), 1 ♀ (IV 381) [USNM]; same data except Jun. 14, 1985, 3 ♂ (IV 384) [USNM]; Km 2, Jun. 14, 1985, B. Bouchite, (SAMP Acc. 1138), 1 ♂ (IV 385) [USNM]. KENYA. *Coast Region*: Gede (3°18'S, 40°01'E), Apr. 1951, (SEAMP Acc. 111), 1 ♂, 1 ♂ gen. (83/459) [USNM]; *Rift Valley Region*: Kerio Valley (0°45'N, 35°35'E), Apr. 1958, W. E. Graunger, (SEAMP Acc. 111), 1 ♂, 1 ♂ gen. (79/245) [USNM]. TANZANIA (Tanganyika). *Mwanza Region*: Mwanza (2°31'S, 32°54'E), 1945, Hancock, (MEP Acc. 848), 2 ♂, 2 ♂ gen. (83/461, 83/462) [USNM]. UGANDA. *Karamoja District*: Loyoro (3°09'N, 34°12'E), 1955, A. J. Haddow, (SEAMP Acc. 111), 1 ♂ (1955/119), 1 ♂ gen. (79/242) [USNM]. SOUTH AFRICA. *Natal*: Zululand, Dukuduku Forest (28°23'S, 32°19'E), Apr. 1967, (SEAMP Acc. 297), 2 ♂ (M617 A, M516 A), 2 ♂ gen. (79/244, 85/203) [USNM].

Distribution (Fig. 7).—*Aedes cordellieri* is presently known from West Africa (Ivory Coast), East Africa (Kenya, Tanzania, Uganda) and South Africa. Other records of *taylori* from the Afrotropical Region will require confirmation owing to probable confusion with *Ae. cordellieri*.

Etymology.—This species is named to honor Dr. Roger Cordellier, Medical Entomologist, Services Scientifiques Centraux de l'O.R.S.T.O.M. (ORSTOM), and Chief, Medical Entomology Laboratory, ORSTOM-Institut Pasteur, Ivory Coast, in recognition and appreciation of his contributions to our knowledge of the mosquito fauna of Africa.

Taxonomic discussion.—Adults of *Ae. cordellieri* closely resemble those of *Ae. taylori* Edwards in the scutal markings but can be distinguished by the presence of yellowish scales on the apicolateral areas of terga II–VII. This same character state of *cordellieri*, however, is extremely similar to *Ae. furcifer* (Edwards), and when the scutal markings are rubbed off, *cordellieri* can easily be misidentified as *furcifer*. *Aedes cordellieri* can be distinguished from *furcifer* by the absence of pale scales on the dorsomedian areas of terga II–VII. In *furcifer*, there are scattered pale scales on the dorsomedian areas of terga II–VII. In *taylori*, there are no scattered pale, or yellowish scales on the abdominal tergites.

The male genitalia of *Ae. cordellieri* are very similar to those of *furcifer* and *taylori*. However, they can be distinguished easily from those of *furcifer*, as the gonocoxite lacks a projected lobe bearing numerous long setae on the apicomesal area. In this respect, *cordellieri* is the same as *taylori*. The male genitalia of *Ae. furcifer* have the gonocoxite with a distinct projecting lobe bearing numerous long setae on the apicomesal area. *Aedes cordellieri* is most closely related to *Ae. taylori*, with which it shares the following characters: gonocoxite short and broad, more or less truncate at apex, without a projecting lobe bearing numerous long setae on apicomesal area, with dense scales on mesal margin of ventral surface; claspette well developed; gonostylus elongate, slender, bifurcate just beyond middle, upper arm longer than the lower one, with a blunt, stout claw process apically on the shorter one. However, the male genitalia of *cordellieri* differ from those of *taylori* by the claspette, which has long apical part, with a row of scales along the mesal margin from apex to basomesal corner and with a row of short setae along the row of scales, followed by a few long, curved setae along the mesal margin of basal part, and without distinct, stout, long, pointed spines on median area of slightly expanded basal part (Fig. 3A). The male genitalia of *taylori* have a claspette



### *Aedes (Diceromyia) taylora* Edwards

Fig. 6. *Aedes (Diceromyia) taylora*. Tergal aspect of the male genitalia.

with apical part short, narrow towards apex, broadened basally, with 4–5 small, short, pointed spines on mesal margin of apical part, with 2 rows of small, stout, short, pointed spines on basomesal corner, followed by 5–6 distinct, stout, long, pointed spines along the mesal margin of basal part, and with 3 (3–4) distinct, stout, long, pointed spines on median area of expanded basal part (Fig. 3B).

Bionomics.—In the Ivory Coast, the eggs of *Ae. cordellieri* were obtained from a female, biting man, at the ORSTOM study tower, 20 m above ground level, between 1730–1930 h, in Dezidougou; these were subsequently hatched and the larvae individually reared at SAMP. In Kenya, the immature stages of *Ae. cordellieri* have been collected in tree holes, in Gede, Coast Region and in Kerio Valley, Rift Valley Region.

The females of *Ae. cordellieri* were taken biting/landing on man, along with the

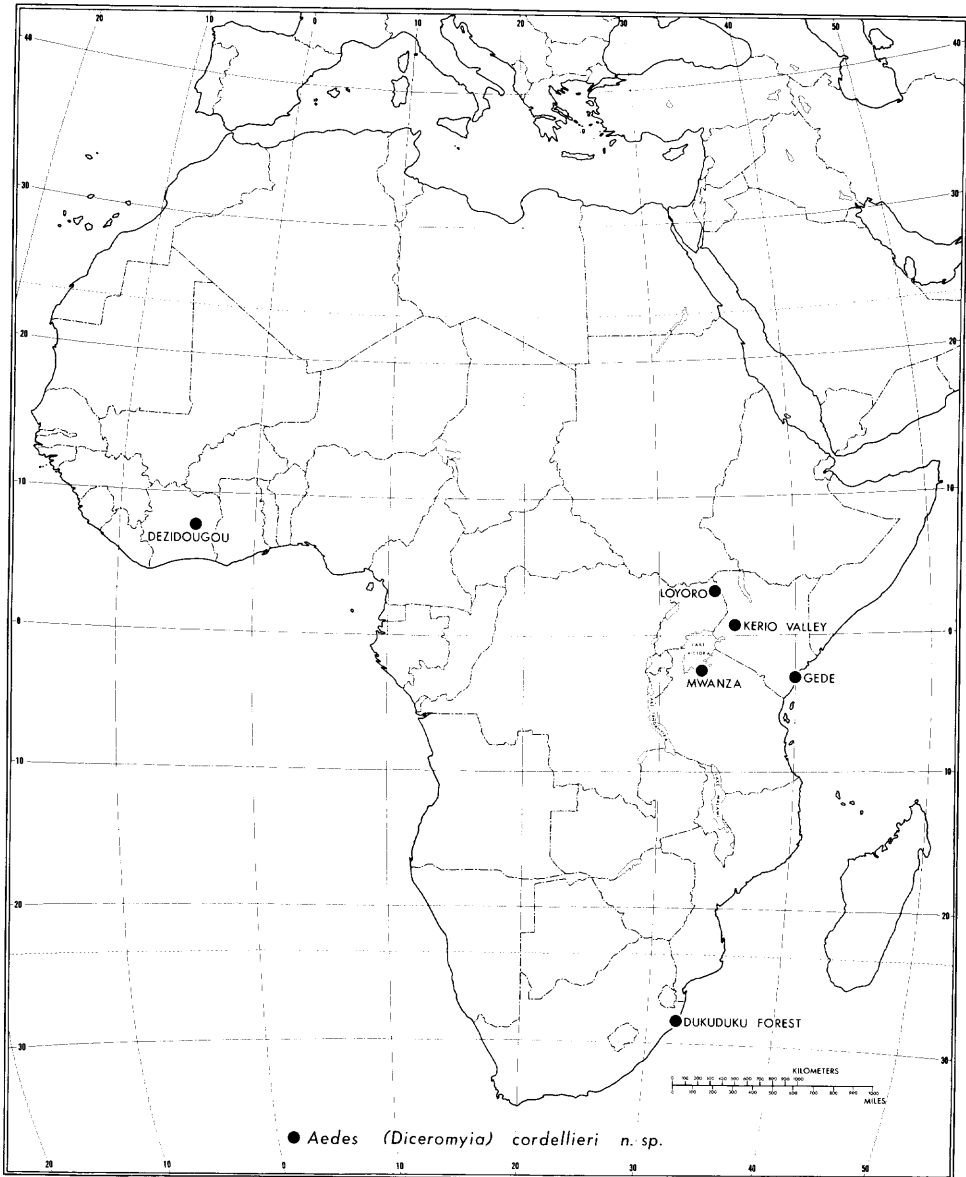


Fig. 7. Distribution of *Aedes (Diceromyia) cordellieri* in Africa.

females of *Ae. furcifer*, at platforms (Dezidougou and Km 2 towers), 20 m and 12 m above ground level, in the evening, in the forest, M'Bahiakro, Centre Département, Ivory Coast.

Medical importance.—Lewis et al. (1942: 37) reported that *Ae. taylori* from Sudan [Anglo-Egyptian Sudan] is capable of transmitting yellow fever virus through biting under laboratory conditions. As *Ae. taylori* is a complex of 2 species, it is impossible to say which species were used in these experiments without examination of the aforementioned specimens. However, the present findings indicate

that the species previously called "*taylori*" in the eastern Africa (Uganda, Kenya and Tanzania) and South Africa (Natal) is *Ae. cordellieri*. The Sudanese material requires confirmation.

***Aedes (Diceromyia) taylori* Edwards**

Figs. 3B, 6

*Aedes (Diceromyia) taylori* Edwards 1936: 55 (♂) or (♂, ♀).

*Aedes (Diceromyia) taylori* Edwards 1941: 216 (♂\*, ♀; lectotype designation).

The description below is based on a topotypical specimen from Gadau, Nigeria, in the USNM [male, with 1 printed label data as "Pres. by/Imp. Inst. Ent./Brit. Mus./1931-500" and 1 hand printed label data as "N. P. Nigeria/gadau/ VIII-X-1931/A. W. Taylor," with associated genitalia on slide (83/458)] and the newly collected specimens from Dabakala, Ivory Coast.

Male.—*Genitalia* (Figs. 3B, 6): Gonocoxite short and broad, about 1.7 as long as wide (width measured 0.5 from base), less truncate at apex, without a projecting lobe bearing numerous long setae on apicomeral area, scales restricted to dorsolateral, lateral and ventral surfaces, with dense scales on mesal margin of ventral surface, with setae scattered on dorsomesal surface, mesal surface membranous; claspette long and broad, narrow towards apex, broadened basally, with 4–5 small, short, pointed spines on mesal margin of apical part, with 2 rows of small, stout, short, pointed spines on basomesal corner, followed by 5–6 distinct, stout, long, pointed spines along the mesal margin of basal part, and with 3 (3–4) distinct, stout, long, pointed spines on median area of expanded basal part; gonostylus elongate, slender, about 0.67 length of gonocoxite, bifurcate at about 0.55 from base, upper arm longer than the lower one, with a blunt, stout claw process apically on the shorter one; aedeagus with strongly toothed lateral plates; paraproct without apical teeth, cercal setae absent; apical margin of tergum IX slightly concave medially with 4 (2–6) setae on each side; sternum IX with 5–8 setae.

Material examined.—42 specimens: 28 adults (18 ♂, 10 ♀), 10 ♂ genitalia, 4 ♀ genitalia from Ivory Coast, Nigeria and Senegal.

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#### LITERATURE CITED

- Bailey, K. P. 1947. A preliminary note on the sylvan mosquitos of Gede. *E. Afr. Med. J.* 24: 38-41.
- Baudon, D., V. Robert, J. Roux, A. Stanghellini, P. Gazin, J. F. Molez, M. Lhuillier, J. L. Sartholi, J. F. Saluzzo, M. Cornet, L. Bibane, L. Some, T. R. Guiguemde, and B. R. Soudre. 1984. Epidemic yellow fever in Upper Volta. *Lancet*, July 7, p. 42.
- Belkin, J. N. 1962. The mosquitoes of the South Pacific (Diptera, Culicidae). University of California Press, Berkeley and Los Angeles. 2 vols., 608 and 412 pp.
- Cordellier, R., M. Germain, and J. Mouchet. 1974. Les vecteurs de fièvre jaune en Afrique. *Cah. O.R.S.T.O.M., Sér. Entomol. Méd. Parasitol.* 12: 57-75.
- Cornet, M., Y. Robin, G. Heme, and M. Valade. 1978. Isolement au Sénégal oriental d'une souche de virus amaril à partir d'un lot d'*Aedes* du sous-genre *Diceromyia*. *C. R. Acad. Sci. Paris*, 287(D) 16: 1449-1451.
- Cornet, M., Y. Robin, R. Chateau, G. Heme, C. Adam, M. Valade, G. Le Gonidec, C. Jan, J. Renaudet, P. L. Dieng, J. F. Bangoura, and A. Lorand. 1979. Isolements d'arbovirus au Sénégal oriental à partir de moustiques (1972-1977) et notes sur l'épidémiologie des virus transmis par les *Aedes*, en particulier du virus amaril. *Cah. O.R.S.T.O.M., Sér. Entomol. Méd. Parasitol.* 17: 149-163.
- Edwards, F. W. 1936. New African culicine mosquitoes (Diptera, Culicidae). *Proc. R. Entomol. Soc. Lond. (B)* 5: 49-55.
- . 1941. Mosquitoes of the Ethiopian region. III. Culicine adults and pupae. *Br. Mus. (Nat. Hist.)*, London, 499 pp.
- Ferrara, L., M. Germain, and J. P. Hervy. 1984. *Aedes (Diceromyia) furcifera* (Edwards, 1913) et *Aedes (Diceromyia) taylori* Edwards, 1936: Le point sur la différenciation des adultes. *Cah. O.R.S.T.O.M., Sér. Entomol. Méd. Parasitol.* 22: 179-183.
- Germain, M., D. B. Francly, L. Ferrara, Y. Sanyang, T. P. Monath, C. Adam, and J. J. Salaun. 1980. Yellow fever in the Gambia, 1978-1979: A complementary entomological survey done in October 1979. *Cah. O.R.S.T.O.M., Sér. Entomol. Méd. Parasitol.* 18: 3-12.
- Haddow, A. J. 1961. Studies on the biting habits and medical importance of East African mosquitos in the Genus *Aedes*. II. Subgenera *Mucidus*, *Diceromyia*, *Finlaya* and *Stegomyia*. *Bull. Entomol. Res.* 52: 317-351.
- Hamon, J. 1963. Les moustiques anthropophiles de la région de Bobo-Dioulasso (République de Haute-Volta). Cycles d'agressivité et variations saisonnières. *Ann. Soc. Entomol. Fr.* 132: 85-144.
- Harbach, R. E. and K. L. Knight. 1980. Taxonomists' glossary of mosquito anatomy. Plexus Publishing, Inc., Marlton, NJ. 415 pp.
- Jupp, P. G. 1980. Studies on *Aedes furcifera* and other mosquitoes in relation to their roll as vectors of Chikungunya virus in South Africa. *Proc. 3rd. Entomol. Congress, Entomol. Soc. South Africa 3rd*: 37-38.
- Lewis, D. J. 1943. Mosquitoes in relation to yellow fever in the Nuba mountains, Anglo-Egyptian Sudan. *Ann. Trop. Med. Parasitol.* 37: 65-76.
- . 1945. Observations on the distribution and taxonomy of Culicidae (Diptera) in the Sudan. *Trans. R. Entomol. Soc. Lond.* 95: 1-24.
- Lewis, D. J., T. P. Hughes, and A. F. Mahaffy. 1942. Experimental transmission of yellow fever by



- three common species of mosquitoes from the Anglo-Egyptian Sudan. *Ann. Trop. Med. Parasitol.* 36: 34-38.
- Mattingly, P. F. 1949. Studies on West African forest mosquitos. Part II. The less commonly occurring species. *Bull. Entomol. Res.* 40: 387-402.
- McIntosh, B. M., H. E. Paterson, G. McGillivray, and J. De Sousa. 1964. Further studies on the chikungunya outbreak in Southern Rhodesia in 1962. I. Mosquitoes, wild primates and birds in relation to the epidemic. *Ann. Trop. Med. Parasitol.* 58: 45-51.
- McIntosh, B. M., P. G. Jupp, and I. dos Santos. 1977. Rural epidemic of chikungunya in South Africa with involvement of *Aedes (Diceromyia) furcifer* (Edwards) and baboons. *S. Afr. J. Sci.* 73: 267-269.
- Muspratt, J. 1955. Research on South African Culicini (Diptera, Culicidae). III. A check-list of the species and their distribution, with notes on taxonomy, bionomics and identification. *J. Entomol. Soc. South. Africa* 18: 149-207.
- Paterson, H. E. and B. M. McIntosh. 1964. Further studies on the chikungunya outbreak in Southern Rhodesia in 1962. II. Transmission experiments with the *Aedes furcifer-taylori* group of mosquitoes and with a member of the *Anopheles gambiae* complex. *Ann. Trop. Med. Parasitol.* 58: 52-55.
- Port, G. R. and T. J. Wilkes. 1979. *Aedes (Diceromyia) furcifer/taylori* and a yellow fever outbreak in the Gambia. *Trans. R. Soc. Trop. Med. Hyg.* 73: 341-344.
- Van Someren, E. C. C., C. Teesdale, and M. Furlong. 1955. The mosquitoes of the Kenya coast: Records of occurrence, behaviour and habitat. *Bull. Entomol. Res.* 46: 463-493.

