Redescription of *Culex (Melanoconion) portesi* Sénevet & Abonnenc, 1941, with notes on synonymy (Diptera: Culicidae)

S. Sirivanakarn and N. Dégallier

ABSTRACT. Based on an analysis of the original and subsequent descriptions of *Culex (Melanoconion) portesi* Sénevet & Abonnenc, 1941 and *Cx. (Mel.) cayennensis* Floch & Abonnenc, 1945, study of topotypic material and re-examination of male paratypes of *cayennensis*, the following actions are taken to stabilize the nomenclature: (1) synonymy of *cayennensis* with *portesi*, and (2) description of all known stages of *portesi*. The taxonomic references, including current synonymy are given. The male genitalia and hitherto unknown pupa and larva from Cayenne (type-locality), French Guiana, are illustrated. Literature on bionomics and medical importance is summarized.

RÉSUMÉ. L'analyse des descriptions d'une part, l'étude de spécimens topotypiques et de paratypes d'autre part, permettent de confirmer la synonymie de *Cx. (Mel.) cayennensis* et *Cx. (Mel.) portesi*. Les stades préimaginaux de *Cx. portesi* sont décrits et les affinités de cette espèce avec *Cx. vomerifer* sont discutées. Une analyse bibliographique résume les connaissances sur la bioécologie et l'importance médicale de cette espèce.

INTRODUCTION

*Culex (Melanoconion) portesi* Sénevet & Abonnenc, 1941 was originally described from French Guiana and was subsequently reported from Trinidad and Belém, Brazil (Aitken & Galindo, 1966) and Surinam (Panday, 1975a,b). In Trinidad, Aitken & Galindo noted that it was a common, dominant species in Bush Bush forest, an island in the Nariva swamp on the east coast and that it was a major vector of arboviruses. In French Guiana, its involvement in arbovirus cycles is also well established (Déglallier et al., 1978, 1979).

In spite of its medical importance, the taxonomy of *portesi* has been very inadequately known, and its nomenclature is currently in a state of great confusion. The history of these nomenclatural changes can be summarized as follows:

1941: description of *portesi* by Sénevet & Abonnenc (adult male)

1945: description of *Cx. (Mel.) cayennensis* by Floch & Abonnenc (adult male)

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2Medical Entomology Project, Smithsonian Institution, Washington, DC 20560, U.S.A.

3O.R.S.T.O.M., B.P. 893, Bangui, Republique Centrafricaine
1947: Floch & Abonnenc synonymized *Cx. cayennensis* with *Cx. portesi*

1953: Lane synonymized *portesi* (and *cayennensis*) with *Cx. (Mel.) vomerifer* Komp, 1932

1965: Floch & Kramer resurrected *portesi* and *cayennensis* from synonymy, provided notes on the differences in the male genitalia of the 3 species, and made unjustified restrictions of the type-localities of the two nominal taxa: "Ile de Cayenne (Cabassou, Montagne Tigre)" for *portesi* and "La Comté (Bief)" for *cayennensis* whereas in the original descriptions, there were no specified type-localities whatever for the holotypes except "Cayenne" for *cayennensis*

1966: Aitken & Galindo examined 4 male paratypes and topotypic material of *cayennensis*, gave arguments to separate *portesi* from *vomerifer* and to confirm the previous synonymy of *cayennensis* with *portesi* by Floch & Abonnenc (1947).

Contrary to the last statement by Aitken & Galindo, both names: *portesi* and *cayennensis* have subsequently been listed as two separate taxa (Fauran & Pajot, 1974; Knight 1978), following Floch & Kramer's paper.

In a recent study by the senior author of numerous adults collected from several localities in French Guiana by J. Castrier (see Heinemann & Belkin, 1978) and reared specimens recently collected from the same territory by the junior author, it has become evident that only a single species is represented in all of the *portesi-cayennensis* material from French Guiana. In addition, study of a male paratype (no. 285) at the USNM (see Aitken & Galindo, op. cit.:199, footnote) and of another male specimen (see thereafter) also cited after the original description of *cayennensis* enabled us to confirm that it is conspecific with the rest of the *portesi-cayennensis* material.

The male holotypes of *portesi* and *cayennensis* were apparently lost or destroyed (Aitken & Galindo, op. cit.; Belkin, 1968:53; Dr. Tabet-Derraz, Pasteur Institute of Algier, pers. comm.; Dr. Rhodain, Pasteur Institute of Paris, pers. comm.) but the figures in the original description of Sénévet and Abonnenc (1941) are valid and except for specific details, are applicable to the determination of the identity of this species. The male genitalia of the paratypes of *cayennensis* and the description and figure of this species by Floch & Abonnenc (1945) agree in all aspects with Sénévet & Abonnenc's description and figures of *portesi*. We found no differences whatever between the two nominal taxa as noted by Floch & Kramer (1965).

On this basis, we are convinced that both taxa are conspecific and we here synonymize *cayennensis* with *portesi*.

*Culex (Melanoconion) portesi* Sénévet & Abonnenc
(Figs. 1-2)

*Culex (Melanoconion) portesi* Sénévet and Abonnenc, 1941:41-4. TYPE. Holotype: male (61, 227 Ab2) with genitalia on slide, exact locality not specified, FRENCH GUIANA (LPPM, considered to be non-existent by Belkin 1968:53).

Culex sp. no. 9: Aitken (1960); Aitken et al. (1963 in Aitken & Galindo, 1966).


Culex B9: Belém Virus Laboratory Reports (since 1962, in Woodall, 1967).

Culex (Melanoconion) cayennensis Floch & Abonnenc, 1945:4. Type locality: Cayenne (Guyane Francaise). Type material: HOLOTYPE: a male (No. 286) with genitalia mounted on same slide, Cayenne, 17 Janvier 1940 (in PIP, after Belkin, 1968: 14; later reported to be lost by Harrison, 1973:279\(^3\)). PARATYPES: (1) a male with genitalia (No. 285) in USNM, (2) a male (only the slide-mounted genitalia) labelled "Bief (Conté) 26-3-41 (adulte disparu)" deposited in MNHN, Paris. NEW SYNONYM.

Culex (Melanoconion) cayennensis: Floch & Kramer (1965\(^6\):4-5); Belkin (1968:14); Harrison (1973:279); Fauran & Pajot (1974:103); Knight (1978:56).

Culex (Melanoconion) vomarifer: Lane (1953:430); Stone, Knight & Starcke (1959:276); Belkin, Schick & Heinemann (1965:25).

FEMALE. Wing: 2.52 mm. Proboscis: 1.6 mm. Forefemur: 1.2 mm. Abdomen: 1.7 mm. In general, small, brownish to blackish species without distinctive ornamentation on palpus, proboscis, thorax, legs and wing. Head. Decumbent in broad central area of vertex narrow, crescent-shaped, dark anteriorly, pale yellowish posteriorly; broad scales pale gray, restricted to sides of eyes; erect scales slender, entirely blackish. Palpus and proboscis dark scaled; palpus about 0.16 of proboscis length. Antenna slightly longer than proboscis, weakly plumose. Cibarial Armature. Cibarial teeth 16,17; median 8-10 teeth flattened, columnar with hollow or transparent area on axis at bases; lateral teeth narrower, with or without hollow area at bases; apical margin of teeth truncate with 1,2 distinct or indistinct lateral spicules; cibarial dome broad, oval, strongly imbricate with numerous coarse denticles. Thorax. Mesonotal integument dark brown; scales narrow, entirely dark brown to nearly black on all parts of disc, including prescutellar space and scutellar lobes. Pronotum same color as mesonotum; apn with a row of

\(^4\) Description of egg.

\(^5\) The junior author failed to find this holotype in the collections of PIP, Faculty of Medicine (Paris), ORSTOM (Bondy), MNHN (Paris) and in Mr. Abonnenc's own collection (pers. comm.).

\(^6\) Not 1966 as cited by Knight (1978:56,80).
about 10 setae on anterior lateral surface; ppm with or without a few narrow, dark scales on uppermost surface, posterior part with 4 bristles and variable number of short, weak bristles cephalad. Pleuron pale beige or yellow, contrasting sharply with mesonotum and pronotum, no pattern of dark spots on stp and mep; ppl with 1 strong, dark and 2,3 weak setae; upper corner of stp with a row of 5,6 strong and 1,2 weak seta, widely spaced, continuous with a row of 2 strong, dark and 8-10 weak setae on posterior lower border, latter also with a small patch of loosely packed, pale scales; 1 lower mep bristle present. Legs. Coxal integument pale; femora, tibiae and tarsi dark scaled or without any conspicuous ornamentation. Wing. Scales on all veins entirely dark and moderately dense; plume scales on R2, R3 and R4+5 broad, ovate. Abdomen. All tergites entirely dark on dorsal surface, lateral surface with distinct basolateral pale spots; sternites with distinct basal pale bands on posterior segments.

MALE. In general resembles female except for the following. Head. Palpus long, slender, exceeding proboscis by about the full length of segment 5; segment 3 with 5,6 strong apical setae; segments 4,5 weakly to moderately plumose. Antennal flagellum strongly plumose. Abdomen. Tergites II-VII with distinct basal transverse pale bands of variable width.

MALE GENITALIA (Fig. 1). Segment VIII. Caudal margin of tergite VIII shallowly emarginate and with 2,3 rows of several strong setae. Segment IX. Lobes of IX tergite rounded or ovoid, widely separated, densely covered with 40 or more, long, sinuous setae. Sidepiece. Short, ovoid, about 0.24 mm in length; scales absent; several strong setae present on lateral outer surface; inner tergal surface with 2 long setae at about middle on convex surface and several minute setae distad to level of subapical lobe; tergomesal margin ventrad of subapical lobe practically bare. Subapical Lobe. Proximal and distal divisions represented by large, elongate, columnar processes, projecting mesad; stem of proximal division not divided distally, bearing 1,2 minute setae at base and 2 stout, proximally angulate and apically hooked rods (a,b) on apex; stem of distal division not divided, bearing 1 long fine seta (h) near base, 1 long hooked rod, 1 short and 1 long blades, 2,3 flat, apically blunt foliforms and 1 very large, asymmetrical leaf on apex. Clasper. Simple, about 0.7 of sidepiece length, median portion gently curved, distal portion tapered into a recurved truncate apex; dorsal margin with a characteristic hump toward base and a distinct crest of several minute spicules on pre-apical portion: seta a (spiniform) distally broad, apically rounded or truncate; seta b spiniform, seta c tiny, rather inconspicuous. Phallosome. Lateral plate of aedeagus in lateral aspect with a broad, apically rounded basal hook, distal part with a long, straight, pointed, apical tergal process and a shorter sternal process, latter apically hooked. Proctiger. Apical crown dark, comblike, consisting of 8,9 flat, apically blunt spicules; paraproct and cercal sclerite narrow, cercal setae 3, minute; basolateral sclerotization broad, triangular.

PUPA (Fig. 1). Abdomen: 2.3 mm. Paddle: 0.61 mm. Trumpet: 0.35 mm., index 4.4. General outline and complete chaetotaxy as figured. Pigmentation of integument variable from uniformly pale whitish, with or without dark areas on cephalothorax and abdomen. Cephalothorax. Seta 1-C usually 4 branched (3,4); 2-C 4 branched; 3-C usually triple (2-4); 5-C 5,6 branched; 6-C usually double (2-3); 7-C double or triple; 8-C usually 6 branched (4-7) 9-C 4,5 branched. Trumpet. Short, funnel-shaped, dark pigmented; pinna widened, its
length, including slit about 0.5 of total length. **Metanotum.** Seta 10-C 8-10 branched; 11-C double; 12-C with 1 characteristic long branch and 1 short branch. **Abdomen.** Segment I-III: seta 4-I, strong, 4 branched; 1-II 17-22 branched; seta 1-III 8-12 branched; 3-I-III double, sometimes single; segments IV-VIII: 1-IV 6-12 branched; 1-V usually 8 branched (6-9); 1-VI 3,4 branched; 1-VII usually triple (3-4); 5-IV 6-8 branched; 5-V 4-8 branched; 5-VI 3-5 branched; 6-III-VI 3-5 branched; 9-VII 3,4 branched; 9-VIII usually 4 branched (3-4), placed at caudolateral angle of segment. **Paddle.** Broad, pale whitish; basal buttress and midrib distinct, lightly or strongly infuscate; 1,2-P minute.

**LARVA (Fig. 2).** Head: 0.72 mm. Siphon: 1.44 mm., index (length/basal width) 8. Saddle: 0.25 mm.; siphon/saddle 5,6. General outline and complete chaetotaxy as figured. **Head.** Pigmentation variable; seta 1-C dark, spiniform, variable in length; 3-C present, minute; 4-C forked into 4,5 branched; 5-C strong, 8-10 branched; 6-C single, very long; 7-C 8-11 branched; 10-C usually triple (2-5); 11-C 6 branched; 12-C 15-22 branched; 13-C 8-12 branched. Mental plate with 6,7 lateral teeth on each side of median tooth. **Antenna.** Shaft entirely dark pigmented; spicules strong, numerous; seta 1-A 20-28 branched; 2,3-A dark, bristlelike, situated apically. **Thorax.** Spiculation absent or very poorly developed. **Prothorax.** Seta 3-P 8-12 branched; 4-P double; 7-P 5-7 branched; 8-P 3,4 branched. **Mesothorax:** Seta 1-M minute, single; 2-M 4,5 branched, 3-M usually double (1-3); 4-M usually 4 branched, sometimes triple; 8-M 5,6 branched; 9-M 5-7 branched. **Metathorax:** 1-T minute, single; 2-T long, 4-6 branched; 3-T 5,6 branched; 4-T triple; 7-T 8-10 branched; 9-T 8,9 branched; 13-T 6-9 branched. **Abdomen.** Segments I-VI: seta 1,2-I,II minute single; 6-I,II triple; 7-I double; 1-III-VI 5,6 branched; 6-III-V 6-8 branched; 6-VI usually 6 branched, sometimes 5 or 7. Segment VII: 1-VII 7,8 branched; 4-VII 3,4 branched; 7-VII 2-4 branched; 10-VII 5,6 branched; 13-VII usually 6 branched (5-8). Segment VIII: 1-VIII 6,7 branched; 2-VIII 4 branched; 3-VIII 7,8 branched; 5-VIII 1,5 branched. Comb scales numerous, 40-50, scales on anterior rows short, small, those on posterior rows elongate and enlarged, all with apical fringe of evenly fine spicules. **Siphon.** Slender, moderately long; pigmentation yellowish with variable amount of brownish tinge; pecten teeth 9-12, with lateral barb of numerous fine denticles; siphonal tufts composed of 4,5 prominent subventral pairs and 2 weak subequal dorsolateral pairs; subventral pairs 4-6 branched, most proximal 4,5 times as long as siphonal width at point of attachment, next 3 distal pairs gradually shorter; 1st dorsolateral pairs triple, situated slightly beyond middle; 2nd dorsolateral pair, single, placed close to apex; seta 2-S hooked, spiniform with 1 accessory submedian spine; median caudal filament of spiracular apparatus well developed, as long as seta 2-S. **Anal Segment.** Saddle same color as siphon, posterior caudal margin without spinelike spicules; seta 1-X 5 branched, sometimes 7,8; 2-X 4,5 branched; 4-X with 6 pairs of branched setae; anal gills slender, as long as saddle.

**DISTRIBUTION.** Trinidad and Tobago, Guyana, Surinam, French Guiana and Brazil (Belém, Para). 1156 specimens examined; 710 F, 379 M, 9 pupae, 58 larvae; 16 individual rearings (15 larval, 1 pupal).

**MATERIAL EXAMINED.** TRINIDAD AND TOBAGO. **Nariva:** "Nariva Swamp", Bush Bush Forest, near sea level (Trinidad Regional Virus Laboratory, TRVL). **St. Andrew,** near Gaico, "Turure Forest" (F. Powdher, T. H. G. Aitken).
GUYANA. Demerara, nearest town, Georgetown, Hyde Park (L. E. Rozeboom).


FRENCH GUIANA. Ile de Cayenne: Cayenne, Rémine, Montjoly (E. Abonnenc; T. H. G. Aitken, A. Guerra and R. Martinez); "Forêt de Cabassou", "Forêt du Rorota", Rémine, Matoury (J. Clastrier); Réina: Réina, Kaw (J. Clastrier). Gallion, route nationale no. 2 (N. Dégallier).


The limits of this distribution westward in Guyana and southward in Brazil are not well known. However, we are perhaps dealing with a species characteristic of the guyanian biogeographical faunal ensemble (Müller, 1972).

TAXONOMIC DISCUSSION. Cx. portesi Sènevet and Abonnenc is closely related to Cx. vomerifer Komp. The latter was originally described from Panama and was subsequently recorded from French Guiana (Floch and Kramer, 1965) and Trinidad (Aitken and Galindo, 1966). On the basis of the male genitalia and larval characters, both species evidently fall into a distinct complex or subgroup of the Culex spissipes group of Galindo (1969). Within this group, their affinity is apparent closest to the other complex which includes pedroi Sirivanakarn and Belkin, 1980, epanastasis Dyar, 1921 and crybda Dyar, 1924, as currently interpreted (Sirivanakarn and Belkin 1980).

The male genitalia of portesi and vomerifer are extremely similar in nearly every feature except for the lobes of IX tergite which are strikingly different in shape and size and in the number and length of the setae on these lobes. These characters are shown here for portesi and were illustrated for vomerifer in Rozeboom and Komp (1950:113, Pl. XV, Fig. 89) and Aitken and Galindo (1966:198-208). In the adults, the only characters found to be reliable for separating the two species are the presence of conspicuous dark spots on the sternopleuron (stp) and mesepimeron (mep) in vomerifer, whereas these characters are absent in portesi. In the immature stages, comparison of the pupae and larvae from French Guiana and Trinidad revealed no significant difference in the chaetotaxy between the two species.

BIONOMICS. Culex portesi is a common inhabitant of lowland swamp forests at an elevation ranging from near sea level to about 30 meters. Thus, it seems to be absent from inland primary forest (Digoutte et al., 1979; Dégallier & Clautre, 1980).

In Trinidad, Surinam, French Guiana and Brazil, adult females were frequently collected in great numbers from human bait, mammal-baited traps and light traps (Aitken et al., 1968; Tikasingh, 1975; De Haas & De Kruijf, 1971; De Kruijf, 1972; Panday, 1975a; Sérié et al., 1968; Dégallier et al., 1978b; Dégallier, 1979; Davies et al., 1971). Although it feeds on a great variety of warm-blooded vertebrates it shows a marked preference for rodents and marsupials (Davies, 1978; Dégallier, unpublished).
Females are nocturnal biters showing peaks of activity just after sunset and again before dawn (Aitken et al., 1968; De Kruijf, 1970; Dégallier et al., 1978a). However, the activity cycle may show much variation in relation with the intensity of moonlight (Davies, 1975a; Dégallier et al., 1978a).

*Cx. portesi* seems to bite at the same rate at ground level and in the canopy (Aitken et al., 1968; De Kruijf, 1970, 1972; Davies et al., 1971; BVL, 1969).

Aitken *et al.* (1968), Davies (1972, 1975), De Kruijf (1972), Panday (1974), Dégallier *et al.* (1978b), BVL (1967) and Davies *et al.* (1971) studied the seasonal pattern of abundance of this species and seasonal variations of the parous rate in relation with the rain. *Cx. portesi* shows maximum density and parous rate at the beginning and at the end of the rainy season. These characteristics, allied with a long gonotrophic cycle (De Kruijf, 1970; Davies, 1972; Dégallier, 1979) and an important longevity (in laboratory colonies: Davies & Martinez, 1970; in the field: Dégallier, unpublished) make this species a very good vector of enzootic or epizootic rodent-associated arboviruses.

Larvae "proved extremely elusive despite special efforts to find them" (Aitken *et al.*, 1968:258). However some larvae were found in "the deep shade of tree buttresses, root caves, and leafy swamp margins in water with pH varying from 4.4 to 5.9" (Aitken *et al.*, loc. cit.). Most of the larval specimens examined (except 3 in collection of the Mosquitoes of Middle America Project, Belkin & Heinemann, pers. comm.) were obtained from rearing egg rafts laid by wild or colonized females.

Other biological data that have been published include laboratory colony maintenance and life cycle (Takahashi, 1968; Davies & Martinez, 1970), development of ovaries following a blood meal and egg retention capacity under normal conditions (Davies, 1972; Dégallier, 1979), ability to penetrate small apertures and to traverse burrows (Davies, 1975b), and fungal parasitization (Davies *et al.*, 1971).

In conclusion, larval biotopes and population regulation remain very poorly known and need more field studies.

**MEDICAL IMPORTANCE.** Numerous arboviruses have been isolated from *Cx. portesi* in each part of its recorded range (except Guyana). Some of these arboviruses may be pathogenic to man or domestic animals (Table 1).

Some epidemiological aspects have been studied by Aitken *et al.* (1969) and Dégallier *et al.* (1978b, 1979) but more studies are needed especially concerning the role of *Cx. portesi* as a reservoir during the enzootic cycle.

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LITERATURE CITED


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Fig. 2

Culex (Melanoconion) portesi Senevet & Abonnenc