

TAXONOMIC STUDY AND REDESCRIPTION OF *CULEX (MELANOCONION) THEOBALDI* (LUTZ, 1904) (DIPTERA: CULICIDAE)

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Based on type examination, *Culex (Melanoconion) theobaldi* (Lutz, 1904) is redescribed. The species *Cx. (Mel.) chrysonotum* Dyar & Knab, 1908, was put back as synonym of *theobaldi*. Besides, examination of *Cx. (Mel.) chrysothorax* (Newstead & Thomas, 1910) type, leads to retiring as synonym of *theobaldi* and considered it as "species inquirenda".

Key words: Insecta – Diptera – Culicidae – *Culex* – *Melanoconion*

The examination of *Culex (Melanoconion) theobaldi* (Lutz, 1904) and of *Cx. (Mel.) chrysothorax* (Newstead & Thomas, 1910) types, leads to establish the correct identification of specimens which were available for study, in our laboratory and in the Entomological Collection of FSP/USP. So we take this opportunity to redescribe *theobaldi* and consider the *chrysothorax* actual taxonomic status.

*Culex (Melanoconion) theobaldi* (Lutz)

1904. *Melanoconion theobaldi* Lutz. In Bourroul 1904: 70 (♀; *Melanoconion*). Type-locality: Lagoão, São Miguel Arcanjo, São Paulo, Brazil (BM).
1908. *Culex chrysonotum* Dyar & Knab, 1908: 57 (♂, ♀). Type-locality: Ancon, Canal Zone, Panamá (USNM). NEW SYNONYM.
1939. *Culex aurilatus* Senevet & Abonnenc: 94 (♂, L). Type-locality: French Guiana. SYNONYM.

*Culex chrysonotum* of Theobald (1910: 615); Howard, Dyar & Knab (1915: 310).

*Culex (Choeroporpa) chrysonotum* of Dyar (1918: 105; 1920: 59; 1928: 326).

*Culex (Choeroporpa) theobaldi* of Dyar (1921: 30); Bonne & Bonne-Wepster 1925: 293.

*Culex (Melanoconion) chrysonotum* of Rozeboom & Komp (1950: 88); Foote (1954: 31); Sirivanakarn (1978: 479; 1982: 279).

*Culex (Melanoconion) theobaldi* of Belkin (1968: 20; info on type); Belkin, Schick & Heinemann (1971: 25; lectotype desig; type-loc. info).

ADULT – A small brown mosquito with distinctive patch of golden scales on scutum.

FEMALE – Body clotted by dark brown and golden scales. *Head*: Antenna dark, length about 1.82 mm; flagellum normal, whorls normally with 6 setae. Proboscis entirely dark-scaled; length about 1.60-1.63 mm, mean 1.61 mm. Maxillary palpus entirely dark-scaled; length about 0.31-0.32 mm, mean 0.31 mm; about 0.2 length of proboscis. Vertex (Fig. 1A) with narrow falcate scales, restricted to central area along coronal suture; lateral patch of broad dingy white scales large; forked scales numerous, golden on large central area, dark laterally; occipital region with some golden falcate scales. *Cibarial armature* (Figs. 1B, C, D; 3): Dorsal surface highly arched. Cibarial bar wide, weakly chitinized with posterior thin and irregular margin; about 6-8 large rectangular cibarial teeth, trending to quadrangular profile; cibarial teeth plate-shaped, borne on the transverse bar where they are attached by arched expansion, posterior margin finely and irregularly serrate. Cibarial dome nearly pentagonal, concave cap entirely built by superficial pointed denticles. *Thorax* (Figs. 1E, F): Integument brown. Scutum with falcate scales, anterior two-thirds

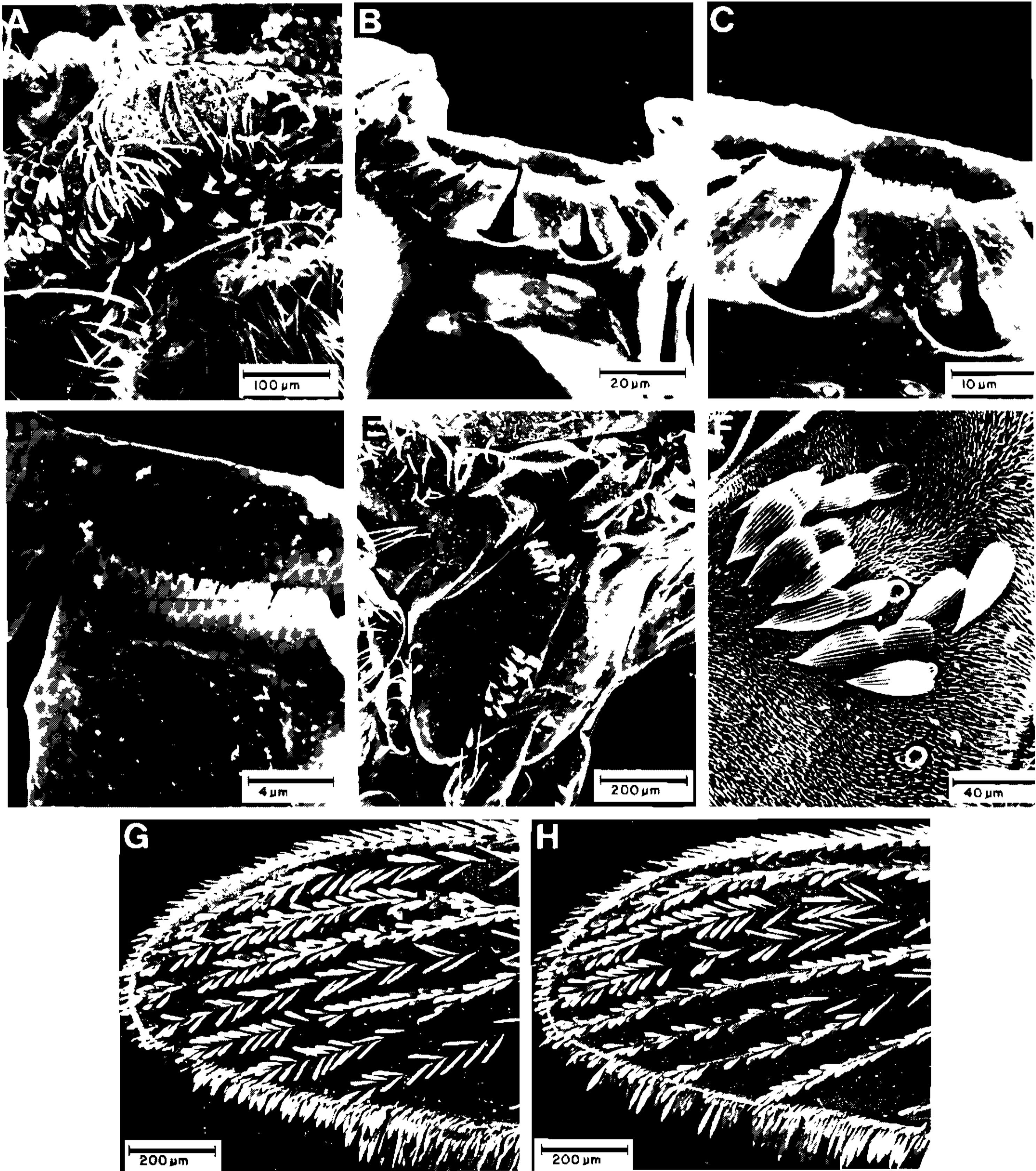
*Cx. (Mel.) theobaldi*

Fig. 1: *Culex theobaldi*, female. A: Posterodorsal aspect of head. B: Dorsal aspect of cibarial armature. C: Detail of figure B, focusing the cibarial teeth. D: Detail of figure B. E: Aspect of lateral left side of thorax, showing pleural scales patches. F: Detail of figure E focusing the upper mesokatepisternal scales. G: Ventral aspect of distal right wing scaling. H: Dorsal aspect of distal left wing scaling.

largely golden scaled, prescutellar and supraalar areas with dark and golden scales; scutal setae conspicuous (acrostichal setae absent), brownish with golden or reddish reflections, median

anterior promontory setae golden. Scutellar scales as scutal scales, these golden on lateral lobes and dark mixed with some golden on median lobe; lateral lobes each with 4 large

setae, median lobe with 8-10 large setae. Antepnotum without scales; with evenly dispersed golden setae. Postpronotum with dark brown scales; with 4 dark setae on posterodorsal margin. Pleural setae golden brown, darker on prealar knob, light golden on upper mesepimeron: about 14,15 upper proepisternal, 7-11 prealar, 6-8 upper mesokatepisternal, 11-14 lower mesokatepisternal, 12-14 upper mesepimeral and 1 lower mesepimeral. Pleura with scales on mesokatepisternum (Figs. 1E, F): a patch of pale spatulate scales on upper corner and other one on lower posterior border; sometimes with 2,3 colorless scales on upper mesepimeron. *Wing*: Length 2.73-2.77 mm, mean 2.75 mm; cell  $R_2$  4.89 of  $R_2 + 3$ ; cell  $M_2$  nearly 0.82 of cell  $R_2$ ; subcosta intersects costa at level of furcation of  $R_2 + 3$ . Dorsal scaling (Fig. 1H): appressed spatulate scales on costa, subcosta,  $R$ ,  $R_1$ ,  $R_4 + 5$ , distal 0.8 of  $M_1 + 2$ ,  $M_3 + 4$ ,  $Cu$ ,  $Cu_1$ ,  $Cu_2$ , proximal 0.7 of  $1A$ ; linear plume scales on  $R_5$ , proximally on  $R_2$  and on  $R_3$ ,  $M$ , proximally on  $M_1 + 2$  and distal 0.3 of  $1A$ ; inclined narrow spatulate scales on distal 0.7 of  $R_2$ , distal 0.7 of  $R_3$  and on distal 0.3 of  $1A$ ; remigium with appressed spatulate scales and 3,4 distal setae. Ventral scaling (Fig. 1G): appressed spatulate scales on costa, subcosta,  $R_5$ ,  $R_2 + 3$ , proximally on  $R_2$  and on  $R_3$ ,  $M$  and on proximal 0.5 of  $M_1 + 2$ ; linear plume scales on proximal 0.5 of  $R_1$ , proximal 0.5 of  $R_4 + 5$ ,  $Cu_1$ ,  $Cu_2$  and on middle of  $1A$ ; inclined, narrow spatulate scales on distal 0.5 of  $R_1$ ,  $R_2$ ,  $R_3$ , distal 0.5 of  $R_4 + 5$ , distal 0.5 of  $M_1 + 2$ ,  $M_3 + 4$  and distally on  $1A$ ;  $Cu$  and proximal 0.5 of  $1A$  devoid of scales. *Halter*: Scabellum, pedicel and capitellum pale. *Legs*: Anterior surface of forecoxa dark-scaled; anterior surfaces of mid- and hindcoxae with longitudinal patch of nearly colorless scales; antero- and posteroventral surfaces of foretrochanter dark-scaled, midtrochanter with anteroventral surface dark-scaled, posteroventral surface pale-scaled, antero- and posteroventral surfaces of hindtrochanter pale-scaled. Fore- and mid-femora mainly dark-scaled, posterior surface of forefemur with indistinct longitudinal stripe of dingy pale scales, posteroventral surface of mid-femur with dingy pale scales; hindfemur with complete dorsal stripe of dark scales distally widening and expanding onto anterior and posterior surfaces at apex; indistinct pale knee spots on mid- and hindfemora. Tibiae and tarsi entirely dark-scaled. *Abdomen*: Tergum I with median posterior patch of dark-scales; terga II-VII dark-scaled with basolateral patches of

white scales; tergum VIII dark-scaled, occasionally with small patch of white scales. Sternum II white-scaled; sterna III-VII with broad basal white bands, sternum VIII white-scaled, with lateral patch of dark scales. *Genitalia* (Fig. 3): Tergum IX narrow at middle, widened at posterolateral margin to produce flat lobe bearing 9-17 setae. Upper vaginal lip narrow, distinct; lower vaginal lip and insula indistinct; insula with about 14 clustered setae. Upper vaginal sclerite distinct, inverted, U-shaped. Postgenital lobe short, nearly trapezoid distally, with 7-9 setae on either side of midline.

**MALE** — Like female except for the following sexual differences as follow. *Head*: Antenna strongly plumose; length about 1.54 mm. Proboscis entirely dark. Maxillary palpus dark, length not measured, extending beyond tip of proboscis by about apical 0.5 of palpomere 4 and all palpomere 5; palpomeres 4 and 5 entirely covered by dark strong setae, palpomere 3 with about 8 setae at apex. *Abdomen*: Tergum II mostly dark-scaled, with a small basolateral white patches; terga III-VI with basolateral white patches; tergum VII not examined; tergum VIII (ventral in position), with basolateral white patches and deep V-shaped median posterior emargination; sternum VIII (dorsal in position), not examined. *Genitalia* (Fig. 2) — Tergum IX lobes, small, round- to cone-shaped, connected by a straight slightly widened bridge, bearing slender setae, mainly on the basal region. Gonocoxite stocky, outer margin convex, inner moderately concave; ventrolateral surface with strongly developed setae, mesal surface with small setae in indistinct rows extending from base to level of subapical lobe, lateral surface with sparse patch of slender setae (1sp) from proximal area to level of subapical lobe, proximal part of ventrolateral surface with scales; subapical lobe distinctly divided, divisions approximated; proximal division with 2 divergent arms, basal arm shorter, each with 1 long apical sinuous seta (*a* and *b* setae); distal division with 8 setae, 1 long hooked seta (*h*), 1 short and 1 long saberlike setae (*s*), 1 foliform seta (*l*) and 4 narrow appressed flat setae (*f*) of different lengths. Gonostylus slender, curved and moderately widened distally on lateral side, with wrinkled crest before apical snout on ventral surface; gonostylar claw short, broadest apically. Phallosome with lateral patches and aedeagal sclerites equivalent in length; aedeagal sclerite narrow and curved in lateral view, with anterior

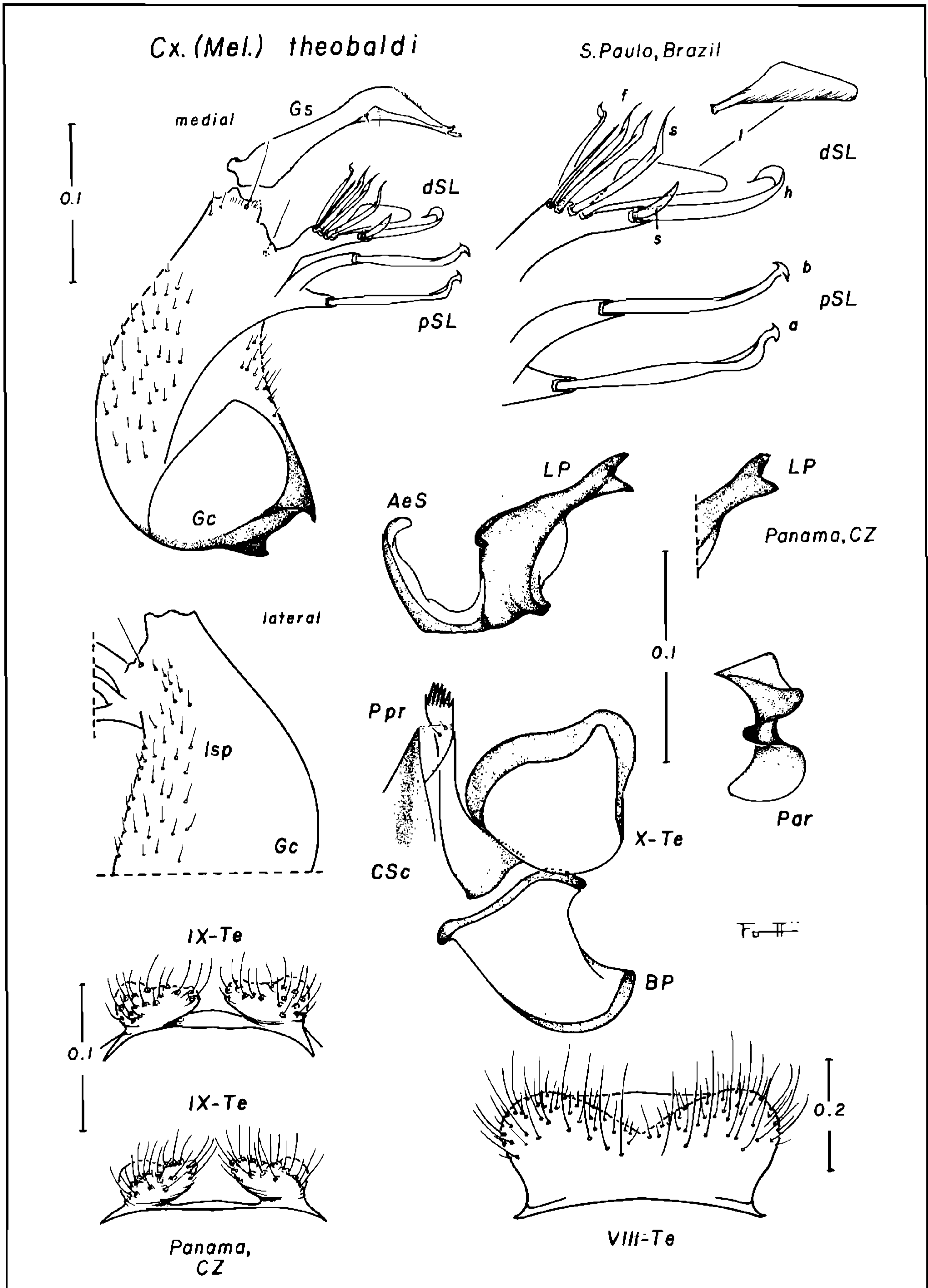


Fig. 2: male genitalia of *Culex theobaldi*. a, seta *a* of pSL. AeS, aedeagal sclerite. b, seta *b* of pSL. BP, basal piece. CSc, cercal sclerite. dSL, distal division of the subapical lobe. f, foliform seta. Gc, gonocoxite. Gs, gonostylus. h, hooked seta of dSL. l, leaf. lsp, lateral setal patch. LP, lateral plate. Par, paramere. Ppr, paraproct. pSL, proximal division of the subapical lobe. s, saberlike seta. VIII-Te, tergum VIII. IX-Te, tergum IX. X-Te, tergum X.

margin thickened and sclerotized, dorsal end narrowly fused to base of lateral plate; distal part of lateral plate with apical, ventral and lateral processes, apical process short, triangular in outline, pointed at apex and bent laterally, ventral process short, curved laterally, lateral process longer, slender, tapered, pointed and dorsolaterally directed, base of lateral plate with stout dorsal process and basally continuous with thickened margin of aedeagal sclerite; aedeagal sclerite not connected by dorsal aedeagal bridge. Proctiger elongate; paraproct distally narrowed, basally expanded, base articulated with posterolateral margin of tergum X and with basal plate, crown with nearly 8,9 short simple blades; cercal sclerite narrow, lightly sclerotized; 2,3 cercal setae. Tergum X large, somewhat triangular, concavo-convex, dorsal surface concave.

**TYPE CONDITION** – *Culex (Melanoconion) theobaldi*: two females on same double mount but on separate micropins. The female next to large pin in better condition: head, scutum, pleuron, right wing and legs in good conditions, abdomen, left wing and some legs are missing. The other one with scutum and wings only. There are the following labels: *Lectotype* (rounded white label, with dark blue ring); *Paralectotype* (rounded white label, with light blue ring). Two Lutz's labels (white): "Lagoa S.P./6-III-04 in China's ink", the other one: "nov sp, Being described, *theobaldi*, Lutz, in pencil". Lane's label (white label): "type selected by J. Lane 10.VI.50". *Lectotype* (rose label): "*Melanoconion* 04, *theobaldi* Lutz, By Belkin, Schick & Heinemann, 1971".

**MATERIAL EXAMINED** – Twenty-two specimens were examined (10 males, 12 females) as follows. Eleven of these specimens (9 males, 2 females) were misidentified as *educator* Dyar & Knab and *spissipes* (Theobald), are deposited in the Entomological Collections of the School of Public Health – USP (n<sup>os</sup> 5941, 5942, 5961 to 5964, 6147, 6148, 6532, 9303 and 9304) (Forattini, Rabello & Cotrim, 1970). Ten females and one male as follows: BRAZIL: Mato Grosso State, Parque Nacional do Xingú, Posto Indígena, 1988, coll. Lourenço de Oliveira, Ricardo, 8 females (2 mounted on slides); Rondonia State, Ariquemes County, Machadinho, May, 1988, coll. Lourenço de Oliveira, Ricardo, 1 female; São Paulo State, Pariquera-Açu County, Pariquera-Mirim, May 8, 1985, coll. Forattini et al. 1 male on slide. COLOM-

BIA: Meta, Villavicencio, June 29, 1965, coll. Mosq. Mid. Amer., 1 female (USNM). Comparison was made with the lectotype female (BRASIL: S. Paulo State, São Miguel Arcanjo County, Lagoão, March 6, 1904, A. Lutz (in BM)).

**DISTRIBUTION** – *Culex theobaldi* is widespread through Central America to Southern Brazil in South America. Its known distribution is that of *Cx. chrysonotum* as previously recorded (Knight & Stone, 1977; Knight, 1978; Heinemann & Belkin, 1978a; 1978b; 1978c; 1979). In addition to that, *Cx. theobaldi* has been collected from several localities in Bolivia and Brazil as recorded in material examined.

**BIONOMICS** – Based on data previously recorded of *Cx. chrysonotum*, the immature stages of *theobaldi* has been collected from a great diversity of breeding places. Permanent and temporary pools of different sizes are included. Water with debris, grassy vegetation and algae were found and even clean water was registered too. Immature stages were found in full sun, partial shade or deep shade places, and in swamp margins with or without low current. Finally artificial container (metal tank) with plant debris, near stream, was recorded too. Adults bionomics are, until now limited to collection data. *Cx. theobaldi* was found in bush and forest at swamp edge and in secondary growth forest too. Some collections were obtained in open land as grazing areas and savannas. About feeding habits, was collected on equine ("burro") baited trap. Besides, light traps were able to collect *theobaldi* at 6-8 meters above ground of forest environment (Heinemann & Belkin, 1977a; 1977b; 1978a; 1978b; 1978c; 1979).

**DISCUSSION** – *Culex theobaldi* was described by Lutz (1904) based on females from Lagoão, São Miguel Arcanjo County, São Paulo State, Brazil. Later, Dyar & Knab (1908) described *Cx. chrysonotum* based on males and females from Ancon, Canal Zone, Panama. After this, Newstead & Tomas (1910) described *Cx. chrysothorax* from males and females collected in Iquitos, Peru and in Flores, near Manaus, Amazonas State, Brazil.

*Culex chrysothorax* was considered as synonym of *chrysonotum* by Dyar (1920), but Bonne-Wepster & Bonne (1921), after comparing specimens they collected in Surinam, with the

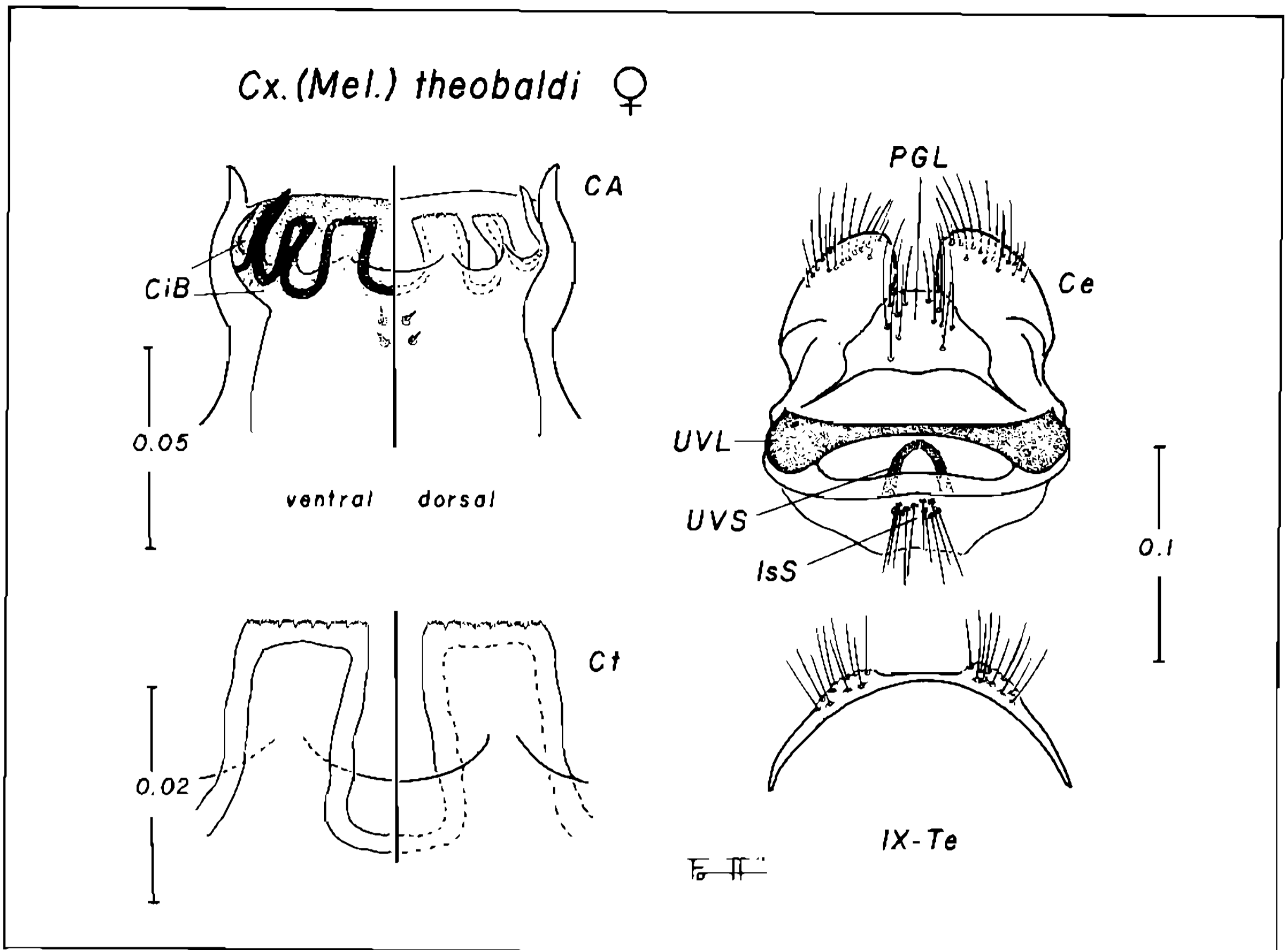


Fig. 3: female cibarial armature and genitalia of *Culex theobaldi*. CA, cibarial armature. Ce, cercus. CiB, cibarial bar. Ct, cibarial tooth. IsS, insular setae. PGL, postgenital lobe. UVL, upper vaginal lip. UVS, upper vaginal sclerite. IX-Te, tergum IX.

type material, considered *chrysothorax* as valid species, and *chrysonotum* as synonym of *theobaldi*. They claimed that *chrysothorax* differs from *chrysonotum* because it presents "broad white apices of its femora and tibiae, and the golden narrow curved scales of the mesonotum are more or less arranged in lines". Following this point of view, Gordon & Evans (1922) described the male genitalia of *chrysothorax*, based on five specimens collected at Bosque, near Manaus, Amazonas State, Brazil. They identified that material because the femora and tibiae apices were "narrowly and faintly pale" as compared with those of *chrysonotum* of Dyar (1920), and so considered *chrysothorax* as a valid species. This opinion was sustained later by Bonne & Bonne-Wepster (1925) who admitted *chrysonotum* as synonym of *theobaldi* too. Dyar (1928) resurrected *chrysonotum* from synonymy of *theobaldi* based on that "this species differs from *chrysonotum* not only in the hypopigium, but in the broader wing scales and less narrow curved scales on the head". Besides put *chrysothorax* as synonym of *theobaldi*.

Komp (1935), studying the *Melanoconion* specimens of Dyar (1928), considered that the material identified as *theobaldi* was *chrysonotum*. Later, Rozeboom & Komp (1950), in their *Melanoconion* revision, sustained *chrysothorax* as synonym of *theobaldi* and *chrysonotum* as valid species. Duret (1953, 1969), following the Rozeboom & Komp (1950) classification, identified as *theobaldi* specimens collected by him in Argentina and Paraguay.

Foote (1954), studying *Melanoconion* immature stages, maintained the point of view of Rozeboom & Komp (1950), and described immature stages of *theobaldi* from material collected in Colombia (larval and pupal skins associated with males).

So, until now the taxonomic situation of these three species remains the same that was established by Rozeboom & Komp (1950). Female lectotype of *Cx. chrysothorax* was designed by Belkin (1968) as the "only remaining specimen of type series", and that of *Cx. theobaldi*, by Belkin, Schick & Heinemann

(1971) for the one selected by J. Lane from the original series and not published.

Comparing adult specimens as recorded in the material examined and formerly identified as *Cx. chrysonotum*, with the lectotype of *Cx. theobaldi*, let shows that they bear remarkable similarity. Former identification of *chrysonotum* specimens was reached through Rozeboom & Komp (1950) key. Moreover, genitalia characters of a male from *chrysonotum* type locality (Panama) are indistinguishable from those of Vale do Ribeira (Ribeira Valley) specimen which belongs to the same biogeographic region of the *theobaldi* type locality. Comparing material from several different collections was unable to found any significant difference. So there are no doubt that *Cx. chrysonotum* is a synonym of *Cx. theobaldi*.

In accordance with the classification system proposed by Sirivanakarn (1982), *chrysonotum* was put in the Chrysonotum Subgroup from the Distinguendus Group, and *theobaldi* belongs to Educator Group. Nevertheless, as *chrysonotum* is a *theobaldi* synonym, a change Chrysonotum Subgroup name to Theobaldi Subgroup is here proposed. Besides, the specimens identified as *Cx. chrysothorax* by Gordon & Evans (1922), together with those identified as *Cx. theobaldi* by Dyar (1928), Rozeboom & Komp (1950), Foote (1954) and Duret (1953; 1969), are considered as belonging to a species unknown until now, and that will be described later.

*Cx. theobaldi* is a rightly differentiated species, exhibiting similar characters to those which are common to members of Distinguendus Group. Adult female is similar to those species because presents narrow decumbent scales on small central area along the coronal suture. Nevertheless it can be separated by the anterior two-thirds of scutum largely golden-scaled. Moreover, *theobaldi* exhibits a patch of broad white upper mesokatepisternal scales, and vertex with forked scales, golden dorsally and dark-posterolaterally. Cibarial armature of *chrysonotum* was figured by Sirivanakarn (1978).

The male genitalia of *theobaldi* bears similarity to the species of Distinguendus Group, through the shape of lateral plate with the apical and lateral processes elongated, the

former short and triangular-shaped. Add to that, other male genitalia features can differentiate *theobaldi* from other species, through a set of characters as, the cone-shaped of IX tergum lobes, the presence of the asymmetric leaf (1) on the distal division of the subapical lobe (dSL), and the proximal division (pSL) with divergent arms.

As larval and pupal exuviae were no available, Foote (1954) description of *Cx. chrysonotum* was considered.

*Culex (Melanoconion) chrysothorax* (Newstead and Thomas). SPECIES INQUIRENDA

1910. *Neomelanoconion chrysothorax* Newstead and Thomas, 1910: 147-148 (♂, ♀) Type-locality: Flores, near Manaus, Amazonas, Brazil (BM).

*Neomelanoconion chrysothorax* of Bonne-Wepster & Bonne, 1921: 20.

*Culex (Choeroporpa) chrysothorax* of Bonne & Bonne-Wepster, 1925: 296.

*Culex (Choeroporpa) theobaldi* (in part) of Dyar 1928: 327.

*Culex (Melanoconion) chrysothorax* Belkin 1968: 14 (lectotype desig; type-loc. info).

*Culex (Melanoconion) chrysothorax* Belkin, Schick & Heinemann 1971: 25 (syn. with *theobaldi*).

Examining the female lectotype of *Culex chrysothorax* (Newstead & Thomas) showed that morphological characters are very similar to those of other females of the Atratus Group of the Melanoconion Section, as Sirivanakarn (1982) classification. Almost all the species of this Group are actually hardly distinguished by morphological females features. Perhaps in the future, morphological studies of the cibarial armature may provide good tools. So, as far as it is actually know, this species must be considered as "species inquirenda".

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