



Culex chrysothorax (Newstead & Thomas, 1910) (Diptera: Culicidae), preoccupied by *Cx. chrysothorax* (Peryassú, 1908) and recognized as a subjective synonym of *Cx. trigeminatus* Clastrier, 1970

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Abstract

Culex chrysothorax (Newstead & Thomas, 1910) (Diptera: Culicidae) is recognized as the junior secondary homonym of *Culex chrysothorax* (Peryassú, 1908). Both nominal species are currently regarded as *nomen dubium* (Pecor *et al.* 1991; Harbach 2018; Wilkerson *et al.* 2021). Based on critical examination of the lectotype female, the former nominal species, which was treated as *species inquirenda* by Forattini & Sallum (1989), is no longer regarded as a doubtful species, and is found to be conspecific with *Cx. trigeminatus* Clastrier, 1970. Because it is preoccupied by *Cx. chrysothorax* (Peryassú, 1908), it is placed in synonymy with *Cx. trigeminatus*, which is transferred from the Educator to the Atratus Group of the subgenus *Melanoconion* based on morphological features of the female. *Culex chrysothorax* (Peryassú, 1908) is retained in the Educator Group as a *nomen dubium*. Because the original description of *Cx. chrysothorax* (Newstead & Thomas) likely included misidentified specimens of *Cx. theobaldi* (Lutz, 1904), a more precise description of the lectotype female is provided.

Key words: Atratus Group, junior homonym, *nomen dubium*, revalidation, taxonomy

Introduction

Culex chrysothorax (Peryassú, 1908) (original combination *Melanoconion chrysothorax*) was described and named based on specimens collected in Copacabana, Rio de Janeiro municipality (formerly Guanabara State, the old municipal region that included the capital of colonial Brazil), Rio de Janeiro State, Brazil. The description was based on a female and male that are deposited in the collection of the Instituto Oswaldo Cruz in Rio de Janeiro. The male was designated as the lectotype by Belkin *et al.* (1971). The specimen was later examined by Forattini & Sallum (1993), who corroborated its status as a *nomen dubium* proposed by Sirivanakarn (1983). Unfortunately, the specimen was covered with fungi, making a species appraisal problematic. The genus *Melanoconion* Theobald, 1903 was reduced to a subgenus of the genus *Culex* Linnaeus, 1758 by Dyar (1918), and the species described by Peryassú became known as *Culex (Melanoconion) chrysothorax*.

Culex chrysothorax (Newstead & Thomas, 1910) (original combination *Neomelanoconion chrysothorax*) was described from specimens collected in Iquitos, Peruvian Amazon, as well as specimens from the suburbs of the municipality of Manaus, including Inner Flores swamp, Pensador, Amazonas State, Brazil. Bonne & Bonne-Wepster (1921) examined the type specimens and revalidated the species, retaining it in the genus *Neomelanoconion*. A year later, Gordon & Evans (1922) described and illustrated the male genitalia of specimens identified as *Cx. (Neomelanoconion) chrysothorax* (Newstead & Thomas) that were collected near Manaus, Brazil, and compared them to the genitalia of *Cx. chrysonotum* Dyar & Knab, 1908. Bonne & Bonne-Wepster (1925) adopted *Choeroporpa* Dyar, 1918 as a subgenus of *Culex* and recognized the nominal species of Newstead & Thomas as *Cx. (Choeroporpa)*

chrysothorax. Subsequently, Dyar (1928) formally synonymized *Neomelaniconion chrysothorax* with *Culex* (*Mochlostyrax*) *theobaldi* (Lutz, 1904) (in Bourroul, 1904, original combination *Melanoconion theobaldi*). In a review of type specimens of New World mosquitoes in European museums, Belkin (1968) designated the “only remaining specimen of the type series” of *Neomelaniconion chrysothorax*, a female, as the lectotype, and indicated it was “Possibly conspecific with *theobaldi* (Lutz, 1904)”. Subsequently, Belkin *et al.* (1971) formally recognized *Neomelaniconion chrysothorax* as being conspecific *Cx. theobaldi*.

Because *Neomelaniconion chrysothorax* was transferred to the genus *Culex*, it became a junior secondary homonym of *Cx. chrysothorax* (Peryassú, 1908). Based on examination of the type specimens of *Cx. theobaldi* and *Neomelaniconion chrysothorax*, Forattini & Sallum (1989) noticed that the type of the latter nominal species shared similarities with species of the Atratus Group and considered it as *species inquirenda* until additional information became available. The recent review of the Atratus Group by Sá *et al.* (2020) provided morphological information that allowed us to confirm that *Neomelaniconion chrysothorax* is a distinct species of the Atratus Group of the subgenus *Melanoconion* of *Culex*; however, it happens to be conspecific with *Cx. trigeminatus* Clastrier, 1970.

When two species names are congeneric, in this case *Melanoconion chrysothorax* Peryassú, 1908, which remains a valid name even though it is a *nomen dubium*, and *Neomelaniconion chrysothorax* Newstead & Thomas, 1910, the junior homonym is invalid (Article 59.1 of the *International Code of Zoological Nomenclature*) and must be replaced either by an available and potentially valid synonym or a new replacement name (Article 60.1–3). In this case, a valid synonym, albeit a senior synonym, is available; hence, *Cx. chrysothorax* (Newstead & Thomas, 1910) is hereby formally recognized as a subjective synonym of *Cx. trigeminatus* Clastrier, 1970. Because it is likely that the original description of *Cx. chrysothorax* (Newstead & Thomas) included misidentified specimens of *Cx. theobaldi* (Lutz, 1904), a detailed description of the lectotype female is provided here. Sá *et al.* (2020) should be consulted for a complete description of *Cx. trigeminatus*, including both adult sexes, the pupa and larva, and a morphological comparison with other species of the Atratus Group.

Material and methods

This study is based on careful examination of type specimens and comparisons with species of the Atratus and Educator Groups of the subgenus *Melanoconion*, accomplished by Sá *et al.* (2020). The morphological terminology used in the species description is defined in the Anatomical Glossary of the online Mosquito Taxonomic Glossary (<https://mosquito-taxonomic-inventory.myspecies.info/node/11027>). Abbreviations used herein are as follow: ♀, female; ♂, male; ♂G, male genitalia; info., information; L, larva; MNHP, Muséum National d’Histoire naturelle, Paris; NHM, Natural History Museum, London; tax., taxonomy.

Culex (*Melanoconion*) *trigeminatus* Clastrier, 1970

1910. *Neomelaniconion chrysothorax* Newstead & Thomas, 1910: 107, 108 (♂, ♀). Type-locality: Inner Flores swamp, near Pensador, Manaus municipality, Amazonas State, Brazil (NHM). NEW SYNONYMY.

1970. *Culex* (*Melanoconion*) *trigeminatus* Clastrier, 1970: 473 (♂). Type locality: Forêt du Gallion, French Guiana (MNHP).

Neomelaniconion chrysothorax of Bonne-Wepster & Bonne 1921: 20 (♂); Townson 1990: 60 (tax., type info.); Pecor *et al.* 1992: 57 (as *nomen dubium*, type info., references); Wilkerson *et al.* 2021: 1067 (catalog, as *nomen dubium*, type info., references).

Culex (*Choeroporpa*) *chrysothorax* of Bonne & Bonne-Wepster 1925: 183, 286, 295, 296 (in keys, adults, ♂G).

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

Culex (*Melanoconion*) *theobaldi* in part (as synonym) of Edwards 1932: 214 (catalog, authorship of *Cx. chrysothorax* incorrectly attributed to Newstead & Carter); Rozeboom & Komp 1950: 97; Foote 1954: 92; Stone *et al.* 1959: 276 (catalog, type info.); Knight & Stone 1977: 265 (catalog, type info.); Belkin *et al.* 1971: 25 (type info.); Ward 1992: 200.

Culex chrysothorax of Senevet 1937: 373 (♂G, L); Harbach 2018 (lexicon, as *nomen dubium*). Note: Pecor *et al.* 1992 incorrectly credited Senevet (1937) with synonymy of this species with *Cx. chrysonotum* Dyar & Knab, 1908 when in fact he provisionally treated it as a valid species.

Culex (*Melanoconion*) *chrysothorax* of Belkin (1968: 14, lectotype designation, type info.); Forattini & Sallum (1989: 207, as *species inquirenda*).

Female. *Head:* Antenna dark, length not measured; flagellum normal, whorls normally with 6 setae. Proboscis mostly dark-scaled, with inconspicuous patch of pale scales on proximal 0.3, length not measured. Maxillary palpus entirely dark-scaled, length not measured. Vertex with dingy white falcate scales in a broad dorsal triangular patch and conspicuous lateral patch of broad white scales; erect forked scales dark; occiput with white falcate scales. Cibarial armature, not examined. *Thorax:* Integument light brown. Scutum with narrow falcate scales, these brown with reddish-brown or golden reflections on scutal fossa, median anterior acrostichal area and posterior dorsocentral area, scales golden on other scutal areas; scutal setae prominent, brown with golden or reddish reflections, acrostichal setae absent. Scutellar scales golden; lateral scutellar lobes each with 3 setae, median lobe with 6 setae (some missing, alveoli present). Anteprenotum without scales, with evenly dispersed golden setae. Postpronotum with dark falcate scales, with 3 dark setae on dorsoposterior margin. Pleural integument brown on postspiracular area, upper mesokatepisternum, prealar knob and mesepimeron, yellowish on proepimeron, proepisternum, lower mesokatepisternum, mesomeron and metepisternum. Pleural setae golden, except prealar setae brown. Pleura with scales on mesokatepisternum only: a patch of white spatulate scales on upper corner and small patch of white scales on lower posterior border. *Wing:* Length not measured. Dorsal scaling mostly dark, with white scales at proximal end of costa and proximally on vein R, appressed spatulate scales on costa, subcosta, R, R₁, R₄₊₅, M₃₊₄, CuA and proximal 0.5 of 1A; linear plume scales on R_s, R₂₊₃, proximally on R₂ and R₃ and on M; inclined narrow spatulate scales on R₂, R₃ and distal 0.5 of 1A. Remigium with appressed white and dark spatulate scales and 2 distal dark setae. Ventral scaling: appressed spatulate scales on costa, subcosta, R_s, R₂₊₃, proximally on R₂ and R₃, on M and proximal 0.3 of M₁₊₂; linear plume scales on proximal 0.5 of R₁, proximal 0.5 of R₄₊₅, on M₃₊₄, CuA and middle of 1A; inclined narrow spatulate scales on distal 0.5 of R₁, on R₂₊₃, R₄₊₅, distally on M₁₊₂, on M₃₊₄ and distally on 1A; scales missing from CuA and proximal 0.5 of 1A. *Halter:* Scabellum, pedicel and capitellum pale. *Legs:* Anterior surface of forecoxa dark-scaled; anterior surfaces of midcoxa with a stripe of dark scales; anterior surface of hindcoxa with a stripe of colorless scales. Anteroventral surface of foretrochanter dark-scaled, posteroventral surface pale-scaled, mid- and hindtrochanters pale-scaled. Femora with white knee spots. Fore- and midfemora mainly dark-scaled, posterior surface of forefemur with indistinct longitudinal stripe of dingy pale scales, posteroventral surface of midfemur with dingy pale scales; hindfemur with complete dark dorsal stripe gradually widening distally, expanded over whole of anterior and posterior surface at apex. Tibiae mostly dark-scaled, with small patch of white scales on apex and base. Tarsomeres predominantly dark-scaled with small patches of white scales basally. *Abdomen:* Tergum I with posteromedian patch of dark scales; terga II–VII dark-scaled with basolateral patches of white scales; tergum VIII dark-scaled. Sterna II–VII with broad basal white bands, dark apically, sternum VIII white-scaled.

Type examined. *Neomelaniconion chrysothorax* Newstead & Thomas, 1910. Lectotype ♀, in good condition, bearing the following collection data: Flores inner swamp, Pensador, 12-VII-08, Amazon, Manaus (Fig. 1) (NHM); designation by Belkin (1968).

Discussion

Culex chrysothorax (Newstead & Thomas, 1910) was described as a species of the genus *Neomelaniconion* Newstead, 1907 (in Newstead *et al.* 1907), currently a genus of the tribe Aedini Neveu-Lemaire, 1902. Newstead & Thomas based the description of the species on males and females collected in June and July 1906–1907 in Iquitos, Peruvian Amazon and other locations, including the area of an old pumping station at Flores near Pensador and near the Portuguese hospital in Manaus, Amazonas State, Brazil. Later, Gordon & Evans (1922) described the male genitalia of *Cx. chrysothorax* based on five specimens collected in vicinities of Manaus. The male genitalia illustrated by Gordon & Evans share similarities with those of *Cx. eknomios* Forattini & Sallum, 1992, especially in the distal part of the lateral plate of the aedeagus, proximal division of the subapical lobe of the gonocoxite and seta *l* of the distal division of the subapical lobe of the gonocoxite. For this reason, the species described by Gordon & Evans cannot be conspecific with *Cx. chrysothorax*.

The recent revision of the Atratus Group (Sá *et al.* 2020) provided morphological information that allowed *Cx. chrysothorax* (Newstead & Thomas, 1910) to no longer be regarded as *species inquirenda*; thus, as a distinct species with the same name as the earlier described species *Cx. chrysothorax* (Peryassú, 1908). Additionally, based on morphological comparisons of the lectotype female, it became possible to determine that *Cx. chrysothorax* (Newstead & Thomas) belongs to the Atratus Group, based on the following combination of the diagnostic features elucidated



FIGURE 1. Lectotype female of *Neomelanicion chrysothorax* Newstead & Thomas, 1910, subjective synonym of *Cx. trigeminatus* Claesrier, 1970. A, Labels linked to the lectotype; B, general photo showing one label and the lectotype in dorsal view; C, detail of the scutum, dorsal view; D, detail of the lectotype, anteroposterior view; E, detail of the lectotype, left lateral view. Source: Natural History Museum, London, UK.

by Sá *et al.* (2020): Head with narrow decumbent scales on the central area of the vertex and a patch of broad decumbent scales laterally, pleural integument of the thorax with pale and dark areas across the mesokatepisternum and mesepimeron, and a patch of pale scales on the upper corner of the mesokatepisternum. It also became evident that *Cx. chrysothorax* (Newstead & Thomas) is conspecific with *Cx. trigeminatus* Clastrier, 1970 based on having the proboscis with a distinct dorsomedian patch of pale scales, fore- and midfemora with a preapical ring of whitish scales, and the costa and vein R of the wing with whitish scales proximally. Based on this striking similarity, *Cx. chrysothorax* (Newstead & Thomas) is recognized as the subjective synonym of *Cx. trigeminatus* Clastrier.

The above description of the lectotype female of *Cx. chrysothorax* (Newstead & Thomas) clearly indicates that the original description of the species was probably based on more than one species. The erect forked scales of the vertex are pale golden anteriorly and black posteriorly. This color arrangement is characteristic of *Cx. theobaldi*. In addition, the marked demarcation of the golden and dark-brown scales on the scutum is characteristic of *Cx. theobaldi* and *Cx. eknomios*. However, the erect forked scales on the vertex of the latter species are entirely dark (Forattini & Sallum, 1992).

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