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Recognition of *Lasioconops* Theobald, 1903 and *Oculeomyia* Theobald, 1907 as separate subgenera of the genus *Culex* Linnaeus, 1758 (Diptera: Culicidae)

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In a series of studies on the pupal stage of mosquitoes that occur in Japan, Tanaka (2004) resurrected *Oculeomyia* Theobald, 1907 from synonymy with *Culex* Linnaeus, 1758 for *Cx. bitaeniorhynchus* Giles, 1901a and *Cx. sinensis* Theobald, 1903a, members of the "*Bitaeniorhynchus* Subgroup" of Sirivanakarn (1976). Based on descriptions and figures of larvae in the works of Hopkins (1952), Belkin (1962), Bram (1967) and Sirivanakarn (1976), Tanaka tacitly included 14 other species in the subgenus: *Cx. albinervis* Edwards, 1929; *Cx. annulioris* Theobald, 1901; *Cx. cornutus* Edwards, 1922; *Cx. epidesmus* (Theobald, 1910); *Cx. ethiopicus* Edwards, 1912 (synonymized with *bitaeniorhynchus* by Harbach 1988); *Cx. geminus* Colless, 1955; *Cx. infula* Theobald, 1901; *Cx. kinabaluensis* Sirivanakarn, 1976; *Cx. longicornis* Sirivanakarn, 1976; *Cx. luzonensis* Sirivanakarn, 1976; *Cx. pseudosinensis* Colless, 1955; *Cx. selangorensis* Sirivanakarn, 1976; *Cx. squamosus* (Taylor, 1914); and *Cx. starckeae* Stone & Knight, 1958. The Bitaeniorhynchus Subgroup, based on equivalence with the "*bitaeniorhynchus* series" of Edwards (1932), also includes the Afrotropical *Cx. aurantapex* Edwards, 1914, *Cx. giganteus* Ventrillon, 1906 and *Cx. poicilipes* (Theobald, 1903a), and the Oriental *Cx. samoaensis* (Theobald, 1914). Tanaka did not specifically mention those four species except to say that "*Culex poicilipes* may belong to a different group." In agreement with Tanaka, Harbach (1988) explicitly excluded *Cx. poicilipes* from the Bitaeniorhynchus Subgroup and provisionally included it in the Sitiens Subgroup ("*sitiens* subgroup" of Sirivanakarn 1976; "*sitiens* series" of Edwards 1932). There is no denying that taxonomic acts are sometimes overlooked or forgotten, and this is the vexatious reason why *Cx. poicilipes* was subsequently listed by Harbach (2011) as a member of the Bitaeniorhynchus Subgroup, and its recognition as a species of the subgenus *Oculeomyia* in the lexicon of Harbach (2018), the catalog of Wilkerson *et al*. (2021) and the online Mosquito Taxonomic Inventory (Harbach 2023). It is noteworthy that Edwards (1941) implied that *Cx. poicilipes* was not a member of the Bitaeniorhynchus Subgroup when he stated "*Culex bitaeniorhynchus* typifies a small group of species which are in most respects similar to *C. poicilipes* as described above, but lack the rows of small pale spots on the femora and tibiae".

Oculeomyia was originally proposed as a distinct genus by Theobald (1907), with *Oculeomyia sarawaki* Theobald, 1907, a subjective junior synonym of *Culex infula* Theobald, 1901, as the type species (by monotypy). Edwards (1911) synonymized *Oculeomyia sarawaki* with *Taeniorhynchus ager* Giles, 1901b and later (Edwards 1913) synonymized both with *Cx. bitaeniorhynchus*, thus relegating *Oculeomyia* to synonymy with *Culex*. *Oculeomyia* remained in synonymy with *Culex sensu stricto* until Tanaka (2004) resurrected it from synonymy and validated it as a subgenus, with *Cx. infula* as the valid taxonomic type species. *Oculeomyia* was subsequently understood to include *Cx. poicilipes* and the other 18 species listed above.

Berlov & Kuberskaya (2023) recently published a paper in which they pointed out errors in the Taxonomic Catalog of Culicidae, Part Three of the *Mosquitoes of the World* (Wilkerson *et al*. 2021, Volume 2). The authors noted that *Cx. poicilipes* (Theobald, 1903a) is the type species of the nominal genus *Lasioconops* Theobald, 1903b, which was published earlier than *Oculeomyia* Theobald, 1907, and therefore replaced *Oculeomyia*. When Tanaka (2004) resurrected *Oculeomyia* from synonymy with *Culex* and validated it as a subgenus for species of the Bitaeniorhynchus Subgroup, he cited Harbach (1988) in his discussion of the pupa of *Cx. bitaeniorhynchus* but he apparently overlooked the fact that Harbach had removed *Cx. poicilipes* from the Bitaeniorhynchus Subgroup, otherwise he probably would have explicitly excluded it from *Oculeomyia*. Since *Cx. poicilipes* was not included as a member of the Bitaeniorhynchus Subgroup when Tanaka raised it to subgeneric status, the subgeneric name *Oculeomyia* should not have been replaced by *Lasioconops*. Harbach (1988) removed *Cx. poicilipes* from the Bitaeniorhynchus Subgroup and provisionally included it in the Sitiens Subgroup (Bram 1967) based on morphological similarities of the adults, male genitalia and larvae with the aberrant *Culex whitmorei* (Giles, 1904).

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Tanaka (2004) noted that "the subgenus *Oculeomyia* is best characterized in the larval stage" and emphasized characteristics of the mandibles and maxillae of *Cx. bitaeniorhynchus* and *Cx. sinensis* observed by Tanaka *et al*. (1979) in his description of the subgenus. Since the mouthparts of other species of the subgenus had not been studied, Tanaka's implicit inclusion of the species noted above, and his reluctance to include *Cx. poicilipes*, was based on "the size of the head, fused labrum [median labral plate], peculiar mentum plate [dorsomentum] and pecten". As the information in Table 1, extracted from the descriptions and illustrations of Barraud (1934), Edwards (1941), Hopkins (1952), Belkin (1962), Brunhes (1967), Sirivanakarn (1976) and Harbach (1988), demonstrably shows, *Cx. poicilipes* is very dissimilar to the other 18 species included in *Oculeomyia*. Additionally, it is noteworthy that the larva of *Cx. poicilipes* exhibits an unusual behaviour associated with its modified siphon. Pronounced forward curvature of the siphon is associated with feeding from an inverted position, whereby the siphon points forward toward the head and the curvature may help to prevent damage to the spiracular apparatus while the long posterior elements of seta 1-S prevent the siphon from coming into contact with the substrate (Lewis 1949). The lobes of the spiracular apparatus are exceptionally large and apparently allow the larva to obtain oxygen from bubbles on the surface of submerged plant parts (Hopkins 1952).

TABLE 1. Striking morphological differences between *Cx. poicilipes* and the other species currently placed in the subgenus *Oculeomyia*.

Life stage	**Characteristics**	***Cx. poicilipes***	**Species of *Oculeomyia*** (excluding *Cx. poicilipes*)
Larvae	Clypeolabral suture	Present, median labral plate distinctly separated from dorsal apotome	Absent, median labral plate indistinguishably fused with dorsal apotome
	Dorsomentum	Broadly triangular with relatively few distinct teeth	In the shape of an equilateral or isosceles triangle with numerous minute teeth on each side
	Setae 4–6-C	Inserted posterior to mid-length of head capsule, relatively distant from seta 7-C	Inserted anterior to mid-length of head capsule, relatively close to seta 7-C
	Seta 2-VI	Inserted lateral to seta 3-VI	Inserted mesad of seta 3-VI
	Seta 1-III–VIII	Strongly developed, multi-branched and distinctly longer than half length of segment	Weakly developed, with few branches and much shorter than half length of segment
	Siphon	Short, stout, with pronounced forward curvature, index 3.5–4.7 (mean 4.2)	Long, slender, more or less straight, index 5.4–20.0 (mean 9.3)
	Pecten	8-14 spines (mean 11) borne on basal 0.33 of siphon	3–12 spines (mean 4 or 5) borne within basal 0.25 of siphon, usually < 0.15
	Seta 1-S	5 setae, 4 inserted at posterior midline, considerably longer than diameter of siphon, fifth seta inserted far lateral to 2 middle posterior setae	3-5 setae inserted in posterolateral row (penultimate seta may be slightly out of line), no longer than diameter of siphon, usually shorter
	Spiracular lobes	Unusually large	Normal, not unusually large
	Anal papillae	Either dorsal or ventral pair shorter than the other pair, longer pair no longer than saddle	Dorsal and ventral pairs same length, as long as or longer than saddle, usually longer
Pupae	Trumpet	More or less cylindrical, pinna short, 0.1–0.2 length of trumpet	Strongly flared, funnel-shaped, pinna long, about 0.4 length of trumpet
	Setae 6-V,VI	With 3–6 branches	Single
Adults	Legs	Anterior surfaces of femora and tibiae with row of pale spots	Anterior surfaces of femora and tibia entirely dark-scaled or more often with speckling of pale scales

The results of the phylogenetic study of Harbach *et al*. (2012) provide further evidence that *Cx. poicilipes* is distinct from the other members of the subgenus *Oculeomyia*. The authors explored the relationships among the genera and

subgenera of the tribe Culicini using 169 morphological characters scored for 86 species, including *Cx. bitaeniorhynchus*, *Cx. infula* and *Cx. poicilipes*. Thirteen "generally well-supported and stable" clades were recovered in three separate analyses. One of the clades included the three species in a sister relationship to species of the Mimeticus Subgroup ("*mimeticus* series" of Edwards 1932), with *Cx. poicilipes* as the sister of *Cx. bitaeniorhynchus* + *Cx. infula*.

As a result of the recent revisionary study of Harbach & Wilkerson (2023), the subgenus *Oculeomyia* now also includes *Cx. consimilis* Newstead, 1907 (in Newstead *et al.* 1907), *Cx. ellinorae* Ovazza, Hamon & Neri, 1956, *Cx. jinjaensis* Edwards, 1941 and *Cx. major* Edwards, 1935. *Culex consimilis* was previously recognized as a subspecies of *Cx. annulioris*, *Cx. ellinorae* and *Cx. jinjaensis* as subspecies of *Cx. aurantapex*, and *Cx. major* as a synonym of *Cx. consimilis*.

Based on information provided above and the morphological distinctions listed in Table 1, it is obvious that the 23 species presently included in the subgenus *Oculeomyia* belong to two separate phyletic lines. Since it appears that *Cx. poicilipes* is unrelated to the other species presently placed in *Oculeomyia*, as well as to species of the subgenus *Culex*, *Cx. poicilipes* is hereby formally recognized as the monotypic member of a distinct subgenus: *Lasioconops* Theobald, 1903b **stat. nov.**, denoted by the three-letter abbreviation *Lsi*. The genus- and species-group names included in the subgenera *Lasioconops* and *Oculeomyia* as a result of this action are summarized in the following lists.

Lasioconops Theobald, 1903b

TYPE SPECIES: *Lasioconops poicilipes* Theobald, 1903b.
SYNONYMS:
Pseudoheptaphlebomyia Ventrillon, 1905 (type species: *P. madagascariensis* Ventrillon, 1905; synonymy with *Culex quasigelidus* Theobald, 1903a by Edwards 1911; synonymy of *Cx. quasigelidus* with *Cx. poicilipes* by Edwards 1932).
Aporoculex Theobald, 1907 (type species: *A. punctipes* Theobald, 1907; synonymy with *Cx. quasigelidus* by Edwards 1911; synonymy of *Cx. quasigelidus* with *Cx. poicilipes* by Edwards 1932).
INCLUDED SPECIES: *Culex poicilipes* (Theobald, 1903b).

Oculeomyia Theobald, 1907

TYPE SPECIES: *Oculeomyia sarawaki* Theobald, 1907 (synonymy with *Culex infula* Theobald, 1901 by Sirivanakarn 1976).
SYNONYM:
Trichopronomyia Theobald, 1905 (type species: *T. annulata* Theobald, 1905; synonymy with *Culex squamosus* (Taylor, 1914) by Edwards 1924).
INCLUDED SPECIES: *Culex albinervis* Edwards, 1929; *Cx. annulioris* Theobald, 1901; *Cx. aurantapex* Edwards, 1914; *Cx. bitaeniorhynchus* Giles, 1901a; *Cx. consimilis* Newstead, 1907; *Cx. cornutus* Edwards, 1922; *Cx. ellinorae* Ovazza, Hamon & Neri, 1956; *Cx. epidesmus* (Theobald, 1910); *Cx. geminus* Colless, 1955; *Cx. giganteus* Ventrillon, 1906; *Cx. infula* Theobald, 1901; *Cx. kinabaluensis* Sirivanakarn, 1976*; Cx. longicornis* Sirivanakarn, 1976; *Cx. luzonensis* Sirivanakarn, 1976; *Cx. major* Edwards, 1935; *Cx. pseudosinensis* Colless, 1955; *Cx. samoaensis* (Theobald, 1914); *Cx. selangorensis* Sirivanakarn, 1976; *Cx. sinensis* Theobald, 1903a; *Cx. squamosus* (Taylor, 1914); *Cx. starckeae* Stone & Knight, 1958.

With the exclusion of *Cx*. (*Lsi*.) *poicilipes* (Theobald, 1903a), the subgenus *Oculeomyia* now includes 22 species. However, it should be noted that Lee *et al*. (1989), without explanation, listed *Cx. samoaensis* as a species of the Sitiens Group without placement in a subgroup. Despite being known from only three adult females (one lost), Belkin (1962) noted that "*C. samoaensis* seems to be a distinct species" but it was "possible that *samoaensis* is the Samoan representative of *albinervis*, which it closely resembles." However, until proven otherwise, *Cx. samoaensis* should continue to be classified as a species of the subgenus *Oculeomyia*.

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