

**NEW SPECIES AND NEW RECORDS
OF *CULICOIDES* (DIPTERA, CERATOPOGONIDAE)
FROM LESBOS AND RHODES, GREECE**

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SUMMARY. Descriptions of three new species of *Culicoides* from Rhodes, Greece, and notes on four other species from the Islands of Rhodes and Lesbos.

Key-words: *Culicoides*. Rhodes. Lesbos.

Nouvelles espèces et nouvelles localisations des *Culicoides* (Diptera, Ceratopogonidae) de Lesbos et de Rhodes, Grèce.

RÉSUMÉ. Descriptions de trois espèces nouvelles de *Culicoides* de Rhodes, Grèce, et remarques sur quatre autres espèces rencontrées aux îles de Rhodes et Lesbos.

Mots-clés : *Culicoides*. Rhodes. Lesbos.

During investigations on the vectors of bluetongue virus on the Greek islands of Lesbos and Rhodes (Boorman and Wilkinson, 1983 ; Boorman, 1986) and subsequent light-trap catches on Rhodes (unpublished data), three new species of *Culicoides* biting midges were taken. It is the purpose of this paper to describe these and to record species not previously noted from these islands.

All of the specimens were preserved in 1-2 % formalin and slide-mounted in phenol-balsam (Wirth and Marston, 1968). BMNH refers to the collection of the British Museum (Natural History), London, U. K. All measurements are in microns. The antennal ratio (AR) is the combined length of the apical five segments divided by the combined length of the basal eight. The H/P ratio is the distance between the inter-ocular seta and the tormae divided by the distance from the tormae to the tip of the proboscis. The costal ratio (CR) is the length of the costa divided by the wing length, both measured from the basal arculus.

C. denisoni n. sp. (fig. 1-7).

A small pale species without wing markings, described from two males and one female slide-mounted in phenol balsam.

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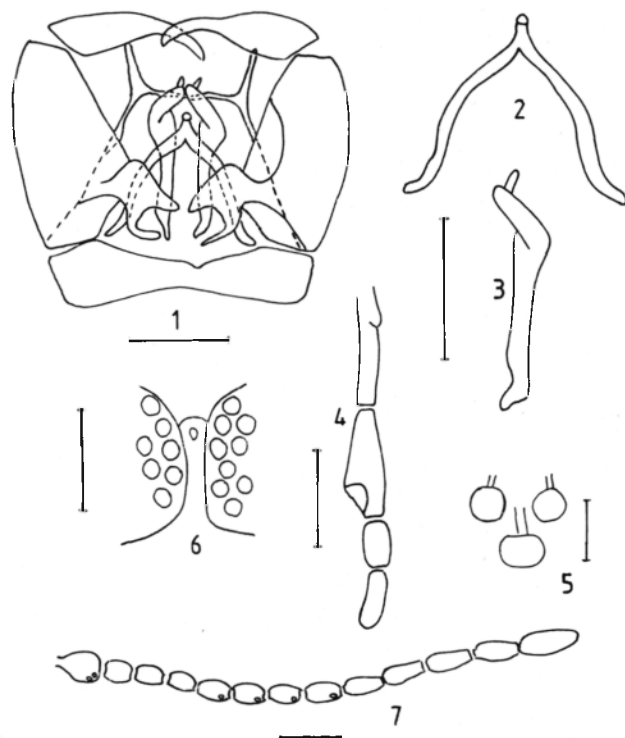


FIG. 1-7. — 1-3, male; 4-7, female *C. denisoni*: 1, terminalis; 2, aedeagus; 3, paramere; 4, palp; 5, spermathecae; 6, eyes; 7, antenna. Scale, 50 microns.

Material: Holotype: male: Paradision, Rhodes, 36°25' N, 24°34' E, at light, August 1985, J. Boorman; slide no. F. 8182, in BMNH. Paratypes: 1 male, 1 female, same data as holotype but dates 24 July 1985 and 29 July 1985 respectively, slides nos. F. 8243 and 8214, in BMNH.

Male.

Head: eyes dark, contiguous for about the length of one facet. Distribution of antennal sensilla coeloconica on segments 3 to 15, 2.0/0/0/0/0/1.0/1.0/1.0/0/0/0/0/0 (n = 3).

Thorax: Mesonotum brown, rather darker at the sides, otherwise unmarked. Wings without markings, even under dark field illumination; mean wing length 871, breadth 346 μ ; CR 0.50 (n = 2).

Terminalia: Ninth tergite broad, with long, slender and slightly divergent processes, the posterior margin almost straight. Aedeagus stirrup-shaped, the arms gently curved, the central process short. Parameres very characteristic, separated, almost parallel-sided, the posterior part twisted spirally, and with a beak-like projection at the ends. Basistyle with a basal rectangular plate-like

extension bearing two well sclerotised curved processes. Ninth sternite with a shallow excavation, the membrane bare.

Female.

Head: Eyes bare, separated by almost the width of one facet. Basal antennal segments slightly longer than broad, mean lengths 36/22/22/24/23/26/28/30/31/35/38/39/53 μ , mean AR 0.93 (0.91-0.94, $n = 2$). Antennal sensilla distribution 2.0/0/0/0.5/1.0/1.0/1.0/0/0/0/0 ($n = 2$). Third segment of palp slightly swollen, with a single rather shallow sensory pit, PR 2.75 ($n = 1$).

Thorax: Mesonotum brown, without markings. Wings without markings as in the male, and with abundant macrotrichia. Mean length 868, breadth 417 μ , CR 0.54 ($n = 2$).

Abdomen: Three lightly sclerotised sub-spherical functional spermathecae, 26 \times 39, 26 \times 25 and 26 \times 32 microns; no ring of spermathecal duct visible.

Etymology: I have pleasure in naming this species for my colleague Mr. E. Denison, in recognition of his expert assistance in this and other studies.

Diagnosis: The presence of three spermathecae, clear wings, female antennal sensilla on segments 3.7-10 and the general form of the male terminalia place this species in the subgenus *Pontoculicoides* Remm 1968: 840 (*in* Remm and Zhogolev, 1968). The Palearctic representatives of this subgenus are *ibericus* Dzhafarov 1964: 355 (recorded from Italy, Turkey and USSR), *saevus* Kieffer 1922: 506 (recorded from Cyprus, Greece, Spain, Turkey and USSR), *sejjadine* Dzhafarov 1958: 247 (recorded from Greece, Italy, Rhodes, Sicily and USSR) and *tauricus* Gutsevich 1959: 677 (recorded from USSR). The male of *denisoni* differs from the males of all of these in the form of the parameres, which are twisted and have a terminal beak-like projection, but are gently curved and blade-like in all the other Palearctic species. The females are separable by the form of the spermathecae. In *ibericus* the spermathecae have a curved, finger-like anterior extension; in *tauricus* they are kidney-shaped and in *sejjadine* they are sac-like. In both *saevus* and *denisoni* they are small and sub-spherical, but *denisoni* differs from *saevus* in having the eyes separated by the width of one facet only instead of at least two facets as in *saevus*. Neither sex of *saevus* was taken on Rhodes during this study.

C. kolymbiensis n. sp. (*fig. 8-14*).

A small pale yellowish midge, without wing markings; described from one male and two females slide-mounted in phenol-balsam.

Material: Holotype: male: Kolymbia, Rhodes, Greece, 36°25' N, 28°14' E, 9 September 1985, at light, J. Boorman, slide no. F. 8908, in BMNH. Paratypes, 2 females, same data as holotype but the dates 23 September 1985 and 14 October 1985, slides nos. F. 8901 and F. 8903, in BMNH.

Male.

Head: Pale yellow, the eyes black, contiguous. Distribution of antennal sensilla coeloconica 2.0/0/0/0/1.0/0/1.0/0/1.0/2.0/0, $n = 2$.

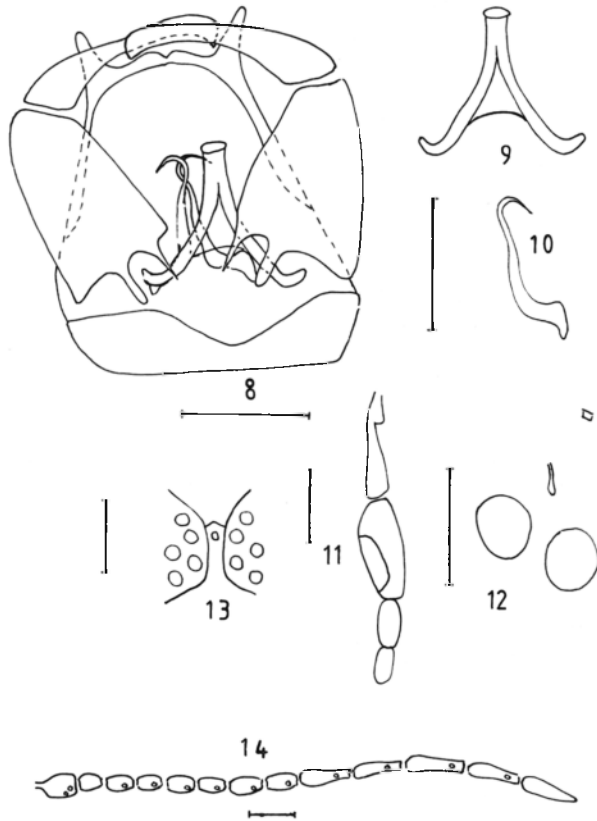


FIG. 8-14. — 8-10, male; 11-14, female *C. kolymbiensis*: 8, terminalia; 9, aedeagus; 10, paramere; 11, palp; 12, spermatheca; 13, eyes; 14, antenna. Scale, 50 microns.

Thorax: Mesonotum yellow, without markings. Wing pale, without markings even under dark field illumination. Mean wing length 825, breadth 339 μ ; CR 0.50 ($n = 2$).

Terminalia: Ninth tergite broad at the base, tapering posteriorly, the posterior margin with a shallow central notch, the lateral processes thorn-like and divergent. Aedeagus triangular, the arms straight and moderately sclerotised, joined half-way along their length with a membrane; central process moderately long. Parameres slender, tapering to a point and turned outwards at their tips, the base angular. Basistyle with the ventral root short and pointed; the dorsal root finger-like. Dististyle fairly long, gently curved. Ninth sternite with a deep excavation, the membrane bare.

Female.

Head: Basal antennal segments about twice as long as broad; mean lengths 32/29/27/30/34/33/34/36/59/64/66/63/70 μ ; mean AR 1.26 (1.24-1.28, $n = 2$).

Antennal sensilla coeloconica distribution 3.0/0.5/1.0/1.0/1.0/0.7/1.0/1.0/1.0/1.0/1.0/1.0/0, $n = 4$. H/P ratio 1.31; third segment of palp moderately swollen, PR 2.17 ($n = 1$).

Thorax: Mesonotum yellow, without markings. Wing without markings, even under dark field illumination. Mean wing length 1,046, breadth 502 μ ; mean CR 0.61 (0.60-0.62, $n = 2$).

Abdomen: Two functional and one rudimentary spermathecae 29×32 , 25×27 and $14 \times 5 \mu$; ring of duct barely visible, $3 \times 5 \mu$.

Etymology: Named after the type locality, a small village about 1 km from the sea near the north-east tip of the island.

Diagnosis: *C. kolymbiensis* is distinguished from other Palaearctic species of *Culicoides* by its small size and its clear, pale yellow colour. It could possibly be mistaken for a small *C. sergenti* Kieffer 1921: 113; however, the female *sergenti* has antennal sensilla on segments 3-10 (they are present on 3-14 or 3, 5-14 in *kolymbiensis*). The males differ in the terminalia. In *kolymbiensis* the parameres lack the distal teeth which are present in *sergenti*, and the ventral root of the basistyle is simple (it is foot-shaped in *sergenti*). *C. sergenti* has been recorded from North Africa, Cyprus, Egypt, Iran, Iraq, Israel, USSR and the Arabian Peninsula; for a description of the neotype and a discussion of its synonymy with *citrinellus* Kieffer 1923: 674, *mosulensis* Khalaf 1957: 339 and *turkmenicus* Gutsevich 1959: 678 see Szadziewski, 1984. The affinities of *kolymbiensis* with other species of *Culicoides* are not clear; it does not appear to fit readily into any of the recognised species-groups.

C. paradisionensis n. sp. (fig. 15-17).

A medium-sized greyish midge with two indistinct pale wing spots; described from ten males slide-mounted in phenol-balsam.

Material: Holotype: male: Paradision, Rhodes, Greece, 36°25' N, 24°34' E, at light, 29 July 1985, J. Boorman, slide no. F. 8217 in BMNH. Paratypes, 9 males, same data as holotype but dates 24 July 1985-14 August 1985, slide nos. F. 8216, 8218-19, 8224-25, 8233, 8238-40, in BMNH. Other specimens, not part of the type series, 13 males, Paradisi, Rhodes, 24 July 1985-14 August 1985, in BMNH.

Male.

Head: Eyes contiguous, bare. Antennal sensilla coeloconica distribution 2.0/0/0/0/0/0/0/0/0/1.0/1.9/1.0, $n = 18$.

Thorax: Mesonotum pale brown, unmarked except for a narrow, darker anterior band. Wing greyish, with a moderate number of macrotrichia on the distal half; two very indistinct pale spots, one just beyond the second radial cell and the other over the cross-vein but not reaching the costa. The pale spots appear slightly more visible under dark field illumination. Mean wing length 898, breadth 345 μ ; mean CR 0.51 (0.48-0.53, $n = 10$).

Terminalia: Ninth tergite broad, tapering posteriorly, the posterior margin with a prominent central notch; the lateral processes long, narrow and divergent.

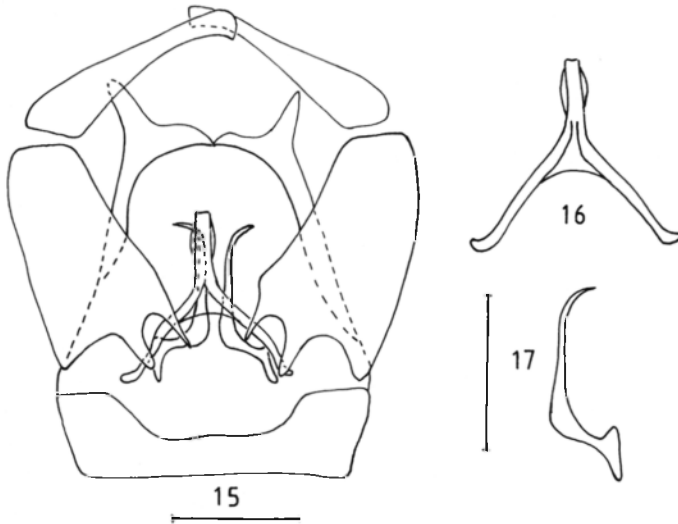


FIG. 15-17. — Male *C. paradisionensis*:
15, terminalia; 16, aedeagus; 17, paramere. Scale, 50 microns.

Aedeagus with the lateral arms linked by a small membrane, the central process long and blunt at the tip. Parameres lightly sclerotised, tapering to a fine point which is bent outwards. Basistyle with the ventral root moderately long, tapering and pointed; the dorsal root well developed and straight. Dististyle straight, tapering and hooked at the tip. Ninth sternite with a deep, wide excavation, the membrane bare.

Female. Unknown.

Etymology: Named after the type locality, near the airport at the north-west tip of the island.

Diagnosis: This species most closely resembles *C. pallidicornis* Kieffer 1919: 46, *C. achrayi* Kettle and Lawson 1955: 37 and *C. heteroclitus* Callot and Kremer 1965: 333. All of these have greyish wings with two more or less well-defined pale spots, but *paradisionensis* differs from these in the form of the terminalia. In *heteroclitus* the dististyle is swollen at the base and has a tuft of hairs distally; the parameres are fused. In *paradisionensis*, *achrayi* and *pallidicornis* the dististyle is of normal form, slender and the parameres are separate. In *achrayi* and *pallidicornis* the parameres are short and stout, the aedeagus has a short triangular central process and the membrane is spiculate; in *paradisionensis* the parameres are long and slender, the central process of the aedeagus is very long and slender and the membrane is bare.

Although a number of female *Culicoides* with wing markings similar to those of the males were present in catches from which the males were taken, I am unable to assign any with certainty to this species. In the absence of females, and informa-

tion on the distribution of their antennal sensilla, the relationship of *paradisionensis* to other species of the genus must remain in doubt.

Notes on other species from Lesbos and Rhodes.

C. indistinctus Khalaf 1961: 461.

17 males reported previously from Lesbos (Boorman and Wilkinson 1983) as « species A » have been provisionally identified as *C. indistinctus*. The terminalia of these are identical to those of the holotype and paratype males of *indistinctus* in the BMNH. The parameres are characteristic, broad and parallel-sided, blunt-ended; the distal half is only lightly sclerotised and is difficult to see in most specimens. The males from Lesbos differ from those from Iraq only in the distribution of antennal sensilla coeloconica: 2.0/0.8/0.9/0.6/0/0/0/0/0/0.8/3.7/0, $n = 17$; the holotype and 2 paratypes of *indistinctus* from Iraq have sensilla on 3, 4, 6, 10 and 13-15. The pale wing markings described by Khalaf are present, and only slightly more visible in dark field illumination than by transmitted light. The mean wing length of the Lesbos specimens was 1,107, mean breadth 406 μ ; mean costal ratio 0.51 (0.50-0.53, $n = 10$). These specimens are in the BMNH.

Although a number of unidentified female *Culicoides* were taken with these males and have similar wing markings, I have been unable to identify any with certainty as *indistinctus*. A female of *indistinctus* in the BMNH collected by Khalaf at Sharanish, Iraq, and identified by him, appears to be *C. odiatius* Austen 1921: 112; the palps are typical of *odiatius* and there are sensilla coeloconica on segments 3-14. The synonymy of *odiatius* with *lailae* Khalaf 1961: 458 has been discussed by Boorman (1974); *lailae* has been placed in synonymy with *kurektschaicus* Dzhafarov 1964: 304 and *conicus* Remm, in Remm and Zhogolev 1968: 839 by Gutsevich 1973: 193.

C. heteroclitus Callot and Kremer 1965: 333.

More than 300 males of this species were taken at light at Paradision, Rhodes, near the airport on the north western coast of the island from 17 July 1985 to 4 November 1985, together with a large number of female *Culicoides* which presumably included *heteroclitus*.

C. shaklawensis Khalaf 1957: 345.

About a hundred of both sexes of this species were taken at light at Paradision from 17 July 1985 to 18 November 1985.

C. longipennis Khalaf 1957: 348.

About ten of each sex were taken at light at Paradision from 21 August 1985 to 23 September 1985, but were absent from subsequent catches up to 26 March 1986.

Discussion

The new species described here, and the new records, bring the total species known from Rhodes to 21. The total from Lesbos remains at 17. Despite the proxi-

mity of the catch sites on both Rhodes and Lesbos to the Turkish mainland (10-40 km), *C. shultzei* group was not taken in these catches, although Jennings *et al.*, 1983 reported it as common in Turkey in Antalya, Aydin and Denizli Provinces (the species reported is probably *C. oxystoma* Kieffer 1910: 193 (Boorman, unpublished). This suggests that the windborne spread of *Culicoides* from the mainland, and the consequent risk of introduction of midge-borne viruses such as bluetongue and Akabane, may be the exception rather than the rule. *C. imicola* Kieffer has been found in previous catches (and has presumably been responsible for the transmission of bluetongue virus of sheep during outbreaks) on both islands.

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