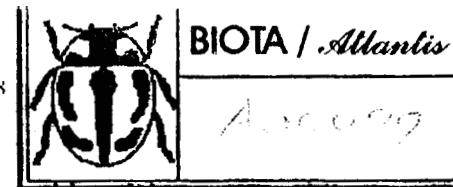


- (1918): Chironomides d'Afrique et d'Asie conservés au Muséum National Hongrois de Budapest. *Annales Historico-Naturales Musei Nationalis Hungarici* 16: 31–136.
- (1919): Chironomides d'Europe conservés au Musée National Hongrois de Budapest. *Annales Historico-Naturales Musei Nationalis Hungarici* 17: 1–160 (December 29).
- (1921a): Chironomides de l'Afrique Équatoriale. *Annales de la Société Entomologique de France* 90: 1–56.
- (1921b): Notes synonymiques. *Bulletin de la Société Entomologique de France* 1921: 7.
- (1922): Étude sur les chironomides de Formose. *Annales de la Société Linnéenne de Lyon* 68: 149–163.
- (1923): Ceratopogonines recueillis au Sahara Constantinois. *Archives de l'Institut Pasteur Algérie* 1: 654–683.
- (1925): 16. Chironomiden der Hochmoore Nordeuropas und des östlichen Mitteleuropas. *Beitrag zur Kunde Estlands* 10: 145–163.
- Linnaeus, C. (1767): *Systema naturae per regna tria naturae*. Ed. 12 (rev.). Vol. 2, Pt. 2, pp. 533–1327. Homiæ [= Stockholm].
- McAlpine, J. F. (1981): 2. Morphology and terminology – adults, pp. 9–63. In *Manual of Nearctic Diptera*. Volume 1. Agriculture Canada Monograph 27. 674 pp.
- Meigen, J. W. (1818): Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Vol. 1. Aachen. xxxvi + 333 pp., pls. 1–11.
- Remm, H. (1962): A survey of species of the genus *Forcipomyia* Meigen (Diptera, Heleidae) from Estonia (in Russian, Estonian and English summary). *Loodusuurijate Seltsi Aastaraamat* 54: 165–195.
- (1967): On the fauna of Ceratopogonidae (Diptera) in the Caucasus (in Russian). *Tartu Riikliku Ülikooli Toimetised* 194: 3–37.
- (1981): New synonyms and new names of the Palaearctic Ceratopogonidae (Diptera). *Eesti NSV Teaduste Akadeemia Toimetised* 30: 27–32.
- (1988): Ceratopogonidae, pp. 11–109. In Soos, A. (Ed.): *Catalogue of Palaearctic Diptera*. Volume 3. Ceratopogonidae – Mycetophilidae. Akadémiai Kiadó, Budapest, 448 pp.
- Santos Abreu, E. (1918): Ensayo de una Monografía de los Tendipedidos de las Islas Canarias. *Memorias de la Real Academia de Ciencias y Artes de Barcelona* 14(2): 159–326, 1 pl.
- Storå, R. (1936): Fam. Ceratopogonidae, pp. 31–38, pl. 6. In Frey, R. (Ed.): *Die Dipterenfauna der Kanarischen Inseln und ihre Probleme*. *Societas Scientiarum Fennica. Commentationes Biologicae* 6(1): 1–237.
- Szadziewski, R. (1983): Ceratopogonidae (Diptera) from Algeria. II. New species, new records and new synonymy in the genus *Forcipomyia* Meig. *Polskie Pismo Entomologiczne* 53: 363–384.
- Tokunaga, M. (1940): Biting midges from Japan and neighbouring countries, including Micronesian Islands, Manchuria, North China and Mongolia (Diptera, Ceratopogonidae). *Tenthredo* 3: 58–100.
- Walker, F. (1848): List of the specimens of Dipterous Insects in the collection of the British Museum. Part 1. British Museum, London. 229 pp.
- Winnertz, J. (1852): Beitrag zur Kenntniss der Gattung *Ceratopogon* Meigen. *Limaea Entomologica* 6: 1–80.
- Wirth, W. W. (1952): The Heleidae of California. *University of California Publications in Entomology* 9: 95–266.
- Wirth, W. W. & Messersmith, D. H. (1977): Notes on the biting midges of the Seychelles (Diptera: Ceratopogonidae). *Proceedings of the Entomological Society of Washington* 79: 293–309.
- Zetterstedt, J. W. (1850): *Diptera Scandinaviae*. Disposita et descripta. Volume 9, pp. 3367–3710. Lundae (=Lund).



## The Ceratopogonidae (Diptera) Described by Santos Abreu from the Canary Islands

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### Abstract

Reexamination of the Ceratopogonidae described by Santos Abreu (1918) from the Canary Islands indicates that a number of his names are synonymous with each other, with other species named from the Canary Islands or with species described from elsewhere.

Lectotypes are designated for all those species or varieties which were yet represented in the Santos Abreu collection. Numerous nomenclatorial changes are included in a table (including new synonyms). A number of the Santos Abreu names are considered *nomina dubia* and these are listed as well. *Dasyhelea canariensis* (Santos Abreu) is a senior homonym of *D. canariensis* Storå (1936) which is renamed *Dasyhelea storåi*. *Dasyhelea luteoscutellata* (Santos Abreu) is a senior homonym of *Dasyhelea luteoscutellata* Carter, Ingram & Macfie (1921) which is renamed *Dasyhelea galbiscutellata*.

Limited analysis indicates that Canary Island Ceratopogonidae have zoogeographic affinities with both the Palaearctic and Afrotropical Regions.

**Key words:** Biting midges, biogeography

### Introduction

The Ceratopogonidae of the Canary Islands have attracted the attention of only a few systematists over the years (Becker, 1908; Clastrier, 1966; Santos Abreu, 1918; Storå, 1936). Fifty-five species in six genera have been named from the islands (Table 1) and a further 24 more broadly distributed species have been previously recognized on the island by these authors to give a total of 79 species (in seven genera). Storå (1936), in the most recent overall appraisal of the ceratopogonid fauna, thought there to be 31 valid species (including 1 new variety) on the islands (he treated many of the Santos Abreu species or varieties as *nomina dubia*) and Clastrier (1966) recognized an additional seven species to give a total of 38. Unfortunately, no worker has provided a recent comprehensive analysis of the fauna and the true number of species and their identity is unclear. Further study, as partially reported here, will likely indicate that a number of the currently recognized names will in fact be synonymous with other species on the islands and/or on the mainland.

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Table 1

Species of Ceratopogonidae named as new from the Canary Islands as recognized before the results reported in this paper.

- Atrichopogon albidipex* (Santos Abreu), 1918: 259 (*Helea*, as variety of *nemestrina*).  
*Atrichopogon distinctus* (Santos Abreu), 1918: 260 (*Helea*, as variety of *nemestrina*).  
*Atrichopogon flavicans* (Santos Abreu), 1918: 259 (*Helea*, as variety of *nemestrina*).  
*Atrichopogon flavihalateralis* (Santos Abreu), 1918: 259 (*Helea*, as variety of *nemestrina*).  
*Atrichopogon fulviventris* (Santos Abreu), 1918: 260 (*Helea*, as variety of *nemestrina*).  
*Atrichopogon montium* Storå, 1936: 34.  
*Atrichopogon nemestrinus* (Santos Abreu), 1918: 257 (*Helea*).  
*flavoscutellatus* (Becker), 1908: 74 (*Ceratopogon*, preoccupied by *Dasyhelea flavoscutellata* (Zetterstedt), 1850)).  
*Atrichopogon nitens* (Santos Abreu), 1918: 260 (*Helea*).  
*Atrichopogon postrema* (Santos Abreu), 1918: 269 (*Helea*).  
*Atrichopogon vicinus* (Santos Abreu), 1918: 262 (*Helea*).  
*Forcipomyia bipunctata* (Linnaeus), 1767: 978 (*Tipula*), Europe.  
*palmensis* Santos Abreu, 1918: 285.  
*Forcipomyia flavicincta* Santos Abreu, 1918: 282.  
*Forcipomyia freyi* Storå, 1936: 32.  
*Forcipomyia fulvescens* Santos Abreu, 1918: 284.  
*Forcipomyia litoralis* Santos Abreu, 1918: 277.  
*Forcipomyia pallidipex* Santos Abreu, 1918: 276 (as variety of *bipunctata*).  
*Forcipomyia praecincta* Santos Abreu, 1918: 279.  
*Forcipomyia pulcherrima* Santos Abreu, 1918: 272.  
*Forcipomyia santosi* Remm, 1981: 32. New name for *obscura*.  
*obscura* Santos Abreu, 1918: 276 (as variety of *bipunctata*, preoccupied by *Forcipomyia obscura* (Walker), 1848).  
*Forcipomyia abdominalis* (Santos Abreu), 1918: 265 (*Helea*, as variety of *murina*).  
*Dasyhelea abdominalis* (Santos Abreu), 1918: 303 (*Culicoides*).  
*Dasyhelea abreu* Kieffer, 1921b: 7. New name for *flaviventris*.  
*flaviventris* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*, preoccupied by *Dasyhelea flaviventris* (Goetghebuer), 1910).  
*Dasyhelea albidipex* (Santos Abreu), 1918: 291 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea albidigaster* (Santos Abreu), 1918: 316 (*Culicoides*, as variety of *hiemalis*).  
*Dasyhelea albohalteratus* (Santos Abreu), 1918: 299 (*Culicoides*, as variety of *sericatus*).  
*Dasyhelea brunnea* (Santos Abreu), 1918: 295 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea canariensis* (Santos Abreu), 1918: 293 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea canariensis* Storå, 1936: 36 (as variety of *flavoscutellata*).  
*Dasyhelea erythrogaster* (Santos Abreu), 1918: 307 (*Culicoides*).  
*Dasyhelea eximia* (Santos Abreu), 1918: 312 (*Culicoides*).  
*Dasyhelea fenestralis* (Santos Abreu), 1918: 293 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea flavimana* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea fratercula* (Santos Abreu), 1918: 305 (*Culicoides*).  
*Dasyhelea guanchense* Clastrier, 1966: 702.  
*Dasyhelea hiemalis* (Santos Abreu), 1918: 314 (*Culicoides*).  
*Dasyhelea immaculata* (Santos Abreu), 1918: 315 (*Culicoides*, as variety of *hiemalis*).  
*Dasyhelea intermedia* (Santos Abreu), 1918: 310 (*Culicoides*).  
*Dasyhelea luteipalpis* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea luteoscutellata* (Santos Abreu), 1918: 300 (*Culicoides*, as variety of *sericatus*).  
*Dasyhelea ornatigaster* (Santos Abreu), 1918: 294 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea pulchripes* (Santos Abreu), 1918: 308 (*Culicoides*).  
*Dasyhelea quinquetactiata* Clastrier, 1966: 699.  
*Dasyhelea tenerifensis* Clastrier, 1966: 694.  
*Dasyhelea tigalatensis* (Santos Abreu), 1918: 303 (*Culicoides*, as variety of *scutellatus*).  
*Dasyhelea turficola* Kieffer, 1925: 152, Estonia.  
*genieri* Clastrier, 1966: 703.

Table 1 (continued)

- Dasyhelea varicornis* (Santos Abreu), 1918: 288 (*Culicoides*).  
*Culicoides analis* Santos Abreu, 1918: 297.  
*Culicoides obsoletus* (Meigen), 1818: 76 (*Ceratopogon*), Europe.  
*Culicoides obscuripes* Santos Abreu, 1918: 297 (as variety of *varius*).  
*Brachypogon clavatus* (Clastrier), 1966: 706 (*Ceratopogon*).  
*Brachypogon rufigastri* (Santos Abreu), 1918: 321 (*Ceratolophus*).  
*Brachypogon singularis* (Santos Abreu), 1918: 317 (*Ceratolophus*).  
*Ceratopogon obscurus* (Santos Abreu), 1918: 323 (*Ceratolophus*, as variety of *rufigastri*).  
*Palpomyia calderana* Storå, 1936: 37.  
*Palpomyia flavitibialis* Santos Abreu, 1918: 325 (as variety of *flavipes*).  
*Palpomyia luteiventris* Santos Abreu, 1918: 326 (as variety of *flavipes*).

Remm (1988) included the Santos Abreu names as part of his Palaearctic catalogue; and, although not cited as such, a number of these were new combinations.

For many years it was thought that the types of Santos Abreu (1918), who described Chironomidae and Ceratopogonidae from the Canary Islands, were lost. However, it recently became apparent that the remnants of the Santos Abreu collection were still in the possession of his grandson in La Palma. The extant Chironomidae types were reexamined by Cranston & Armitage (1988). Through the kind assistance of Dr. Marcos Baez of the Universidad de La Laguna, I was able to examine the Ceratopogonidae and report on them here.

Santos Abreu (1918) named 46 ceratopogonids, either as species or as varieties (Table 1). Of these, one has been previously recognized as a junior synonym and two were renamed because they were homonyms.

Crosskey (1988) analyzed the Simuliidae of the Canary Islands. He included a valuable synopsis of the freshwater lotic habitats and island history that provides an important background to how these aspects may have impacted on the distribution and diversification of the Ceratopogonidae as well.

## Materials and Methods

The specimens were examined, measured and drawn using either a Wild M3 dissecting scope or a Carl Zeiss Jenaval compound scope. Terms for structures follow those used in the Manual of Nearctic Diptera (McAlpine, 1981).

The Santos Abreu Ceratopogonidae were all on pins, either pinned directly through the body (most) or glued on celluloid strips through which the pin was placed. Labels gave only the name of the species and were glued to the bottom of the pinning box. The specimens were pinned through these labels and there were no further clues as to either the place or date of collection or of the identity of the varieties which Santos Abreu (1918) named.

It is important to realize that the designation of lectotypes for varieties is based solely on my estimation of the correspondence between the descriptions given by Santos Abreu (1918) and the specimens themselves, many of which were partially broken, dirty or covered with mould. It is uncertain, therefore, that the lectotypes for these varieties are truly from the specific type localities given by Santos Abreu (1918).

The best specimens from each series were removed from the pins and mounted on microscope slides. Before any further treatment, the wings were removed from the pinned specimen, dipped quickly in acetone (to remove surface tension) and then placed in 15% acetic acid. The remainder of the dried ceratopogonid was then immersed in KOH while yet on the minuten pin and, after clearing, was removed from the pin and further treated as described by Borkent & Bissett (1990). Some of the remaining specimens had their genitalia cleared, studied and stored in glycerine vials.

All the specimens in the Santos Abreu collection studied here will be deposited in the Departamento de Zoología, Universidad de La Laguna, 38206 La Laguna, Tenerife, Islas Canarias, España. The type of *Forcipomyia soranus* is housed in the South African Institute for Medical Research in Johannesburg. The type is in moderate condition; the male genitalia was remounted from badly dried Hoyer's to Canada Balsam. The wings of the type are on a separate microscope slide.

## Results

Of the 60 species or varieties recognized by Santos Abreu (including those previously named by other authors) only 25 were present in the remains of his collection (Table 2). Of these, 23 represented type material of species or varieties Santos Abreu recognized as new. Unfortunately, there remain specimens of *Palpomomyia flavipes* in La Palma but I was unable to examine these. It is uncertain as to which of the two varieties described by Santos Abreu they belong (*P. flavipes flavitibialis* or *P. flavipes luteiventris*) and whether either (or both) of these might be conspecific with *Palpomomyia calderana* Storö. The remainder of the Santos Abreu collection of Ceratopogonidae is considered to have been destroyed (M. Baez, pers. comm.).

Table 2  
Current status of names of Ceratopogonidae proposed or recognized by Santos Abreu (1918).

- Atrichopogon nemestrina* (Santos Abreu), 1918: 257 (*Helea*).  
*flavoscutellatus* (Becker), 1908: 74 (*Ceratopogon*, preoccupied by *Dasyhelea flavoscutellata* (Zetterstedt), 1850).  
*albidipes* (Santos Abreu), 1918: 259 (*Helea*, as variety of *nemestrina*). **New synonymy.**  
*distincta* (Santos Abreu), 1918: 260 (*Helea*, as variety of *nemestrina*). **New synonymy.**  
*flavicans* (Santos Abreu), 1918: 259 (*Helea*, as variety of *nemestrina*). **New synonymy.**  
*flavihalvata* (Santos Abreu), 1918: 259 (*Helea*, as variety of *nemestrina*). **New synonymy.**  
*luteiventris* (Santos Abreu), 1918: 260 (*Helea*, as variety of *nemestrina*). **New synonymy.**  
*Forcipomyia bipunctata* (Linnaeus), 1767: 978 (*Tipula*).  
*palmensis* Santos Abreu, 1918: 285.  
*Forcipomyia fuliginosa* (Meigen), 1818: 86 (*Ceratopogon*).  
*santosi* Remm, 1981: 32. New name for *obscura*. **New synonymy.**  
*obscura* Santos Abreu, 1918: 276 (as variety of *bipunctata*, preoccupied by *Forcipomyia obscura* (Walker), 1848) **New synonymy.**  
*Forcipomyia murina* (Winnertz), 1852: 26 (*Ceratopogon*).  
*abdominalis* (Santos Abreu), 1918: 265 (*Helea*, as variety of *murina*). **New synonymy.**  
*Forcipomyia nitens* (Santos Abreu), 1918: 260 (*Helea*). **New combination.**  
*soranus* de Meillon, 1943: 103. **New synonymy.**  
*Forcipomyia pallidipes* Santos Abreu, 1918: 276 (as variety of *bipunctata*).  
*Ceratopogon kaltenbachii* Winnertz, sensu Santos Abreu.  
*rustica* (Kieffer), 1919a: 19 (*Ceratopogon*). **New synonymy.**  
*cataneii* Kieffer, 1923a: 662. **New synonymy.**  
*Forcipomyia psilonota* (Kieffer), 1911c: 337 (*Ceratopogon*).  
*litoralis* Santos Abreu, 1918: 277. **New synonymy.**  
*Forcipomyia pulcherrima* Santos Abreu, 1918: 272.  
*formosae* (Kieffer), 1922b: 153 (*Lepidohelea*). **New synonymy.**  
*lepidota* Ingram & Macfie, 1924b: 566. **New synonymy.**  
*ornatipes* Kieffer, 1921a: 1 (*Lepidohelea*, preoccupied by *Forcipomyia ornatipes* (Kieffer), 1918a). **New synonymy.**  
*variegata* Goetghebuer, 1933c: 133. **New synonymy.**  
*Dasyhelea albidipes* (Santos Abreu), 1918: 291 (*Culicoides*, as variety of *versicolor*).  
*intermedia* (Santos Abreu), 1918: 310 (*Culicoides*). **New synonymy.**  
*guanchense* Clastrier, 1966: 702. **New synonymy.**

Table 2 (continued)

- Dasyhelea versicolor* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*). **New synonymy.**  
*brunnea* (Santos Abreu), 1918: 295 (*Culicoides*, as variety of *versicolor*). **New synonymy.**  
*fenestralis* (Santos Abreu), 1918: 293 (*Culicoides*, as variety of *versicolor*). **New synonymy.**  
*ornatigaster* (Santos Abreu), 1918: 294 (*Culicoides*, as variety of *versicolor*). **New synonymy.**  
*hiemalis* (Santos Abreu), 1918: 314 (*Culicoides*). **New synonymy.**  
*albidigaster* (Santos Abreu), 1918: 316 (*Culicoides*, as variety of *hiemalis*). **New synonymy.**  
*immaculata* (Santos Abreu), 1918: 315 (*Culicoides*, as variety of *hiemalis*). **New synonymy.**  
*quinquetaeniata* Clastrier, 1966: 699. **New synonymy.**  
*Dasyhelea pulchripes* (Santos Abreu), 1918: 308 (*Culicoides*).  
*tenerifensis* Clastrier, 1966: 694. **New synonymy.**

### Identification of previously named taxa recognized by Santos Abreu (1918)

- Brachypogon clavatus* (Clastrier), 1966: 706 (*Ceratopogon*).  
*Ceratolophus lacteipennis* (Zetterstedt), sensu Santos Abreu.  
*Forcipomyia biannulata* Ingram & Macfie, 1924b: 557.  
*Forcipomyia bipunctata* (Linnaeus), sensu Santos Abreu (in part).

### Nomina dubia (all but the types of *Palpomomyia flavitibialis* and *luteiventris* are probably destroyed)

- Atrichopogon postrema* (Santos Abreu), 1918: 269 (*Helea*).  
*Atrichopogon vicinus* (Santos Abreu), 1918: 262 (*Helea*).  
*Forcipomyia flavicincta* Santos Abreu, 1918: 282.  
*Forcipomyia fulvescens* Santos Abreu, 1918: 284.  
*Forcipomyia praecincta* Santos Abreu, 1918: 279.  
*Dasyhelea abdominalis* (Santos Abreu), 1918: 303 (*Culicoides*).  
*Dasyhelea abreu* Kieffer, 1921b: 7. New name for *flaviventris*.  
*flaviventris* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*, preoccupied by *Dasyhelea flaviventris* (Goetghebuer), 1910).  
*Dasyhelea albohalteratus* (Santos Abreu), 1918: 299 (*Culicoides*, as variety of *seivertatus*).  
*Dasyhelea erythrogaster* (Santos Abreu), 1918: 307 (*Culicoides*).  
*Dasyhelea eximia* (Santos Abreu), 1918: 312 (*Culicoides*).  
*Dasyhelea flavimana* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea fratercula* (Santos Abreu), 1918: 305 (*Culicoides*).  
*Dasyhelea luteipalpis* (Santos Abreu), 1918: 292 (*Culicoides*, as variety of *versicolor*).  
*Dasyhelea luteoscutellata* (Santos Abreu), 1918: 300 (*Culicoides*, as variety of *seivertatus*).  
*Dasyhelea tugalatensis* (Santos Abreu), 1918: 303 (*Culicoides*, as variety of *scutellatus*).  
*Dasyhelea varicornis* (Santos Abreu), 1918: 288 (*Culicoides*).  
*Culicoides analis* Santos Abreu, 1918: 297.  
*Culicoides obscuripes* Santos Abreu, 1918: 297 (as variety of *varius*).  
*Brachypogon obscurus* (Santos Abreu), 1918: 323 (*Ceratolophus*, as *Brachypogon rufigastri*). **New combination.**  
*Brachypogon rufigastri* (Santos Abreu), 1918: 321 (*Ceratolophus*).  
*Brachypogon singularis* (Santos Abreu), 1918: 317 (*Ceratolophus*).  
*Palpomomyia flavitibialis* Santos Abreu, 1918: 325 (as variety of *flavipes*).  
*Palpomomyia luteiventris* Santos Abreu, 1918: 326 (as variety of *flavipes*).

Although *Dasyhelea luteoscutellata* (Santos Abreu) is a nomen dubium, it is almost certainly correctly placed in this genus. It is also a previously unrecognized senior homonym of *Dasyhelea luteoscutellata* Carter, Ingram & Macfie (1921: 191) which is here renamed *Dasyhelea galbiscutellata*, new name.

The labelling of specimens in the Santos Abreu collection allowed only for the identification of species and the many new varieties reported by Santos Abreu (1918) were not labelled as such. Nearly all the distinguishing features recognized for new varieties were slight differences

in colour or colour patterns of pinned specimens. Mounting these on microscope slides and/or examination of genitalia indicated that these differences were superficial in nearly all instances.

Santos Abreu (1918) repeatedly referred to an earlier text named "Apuntes para el estudio de los Dípteros de las Islas Canarias". However, this work was never published and Santos Abreu used the manuscript as the basis for a number of subsequently published papers (M. Baez, pers. comm.).

The species or varieties represented in the Santos Abreu collection are as follows.

*Atrichopogon nemestrinus* (Santos Abreu)

Figs 1A–D

*Ceratopogon flavoscutellatus* Becker, 1908: 74 (preoccupied by *Dasyhelea flavoscutellata* (Zetterstedt), 1850). Santa Cruz, Tenerife, Canary Islands. Not seen.

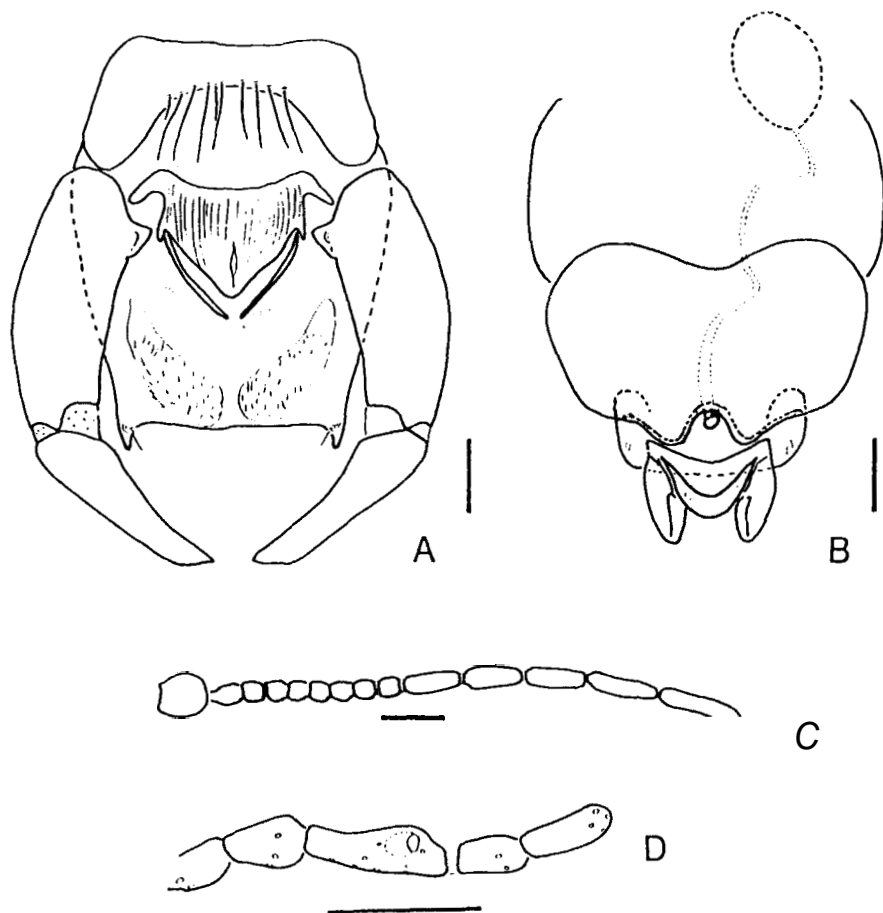


Fig. 1  
Structures of *Atrichopogon nemestrinus*: A Male genitalia in ventral view (lectotype); B Female genitalia in ventral view; C Female antenna; D Female palp. Scales = 0.1 mm

*Helea nemestrina* Santos Abreu, 1918: 257. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Helea nemestrina* Santos Abreu, designated by A. Borkent", "*Atrichopogon nemestrinus*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 4 males, 4 females.

*Helea albidipes* Santos Abreu, 1918: 259 (as variety of *nemestrina*). Lectotype: male, present designation, on pin, labelled "LECTOTYPE *Helea albidipes* Santos Abreu, designated by A. Borkent", "*Atrichopogon nemestrinus*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Helea distincta* Santos Abreu, 1918: 260 (as variety of *nemestrina*). Lectotype: male, present designation, on pin with genitalia in genitalia vial, labelled "LECTOTYPE *Helea distincta* Santos Abreu, designated by A. Borkent", "*Atrichopogon nemestrinus*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Helea flavicans* Santos Abreu, 1918: 259 (as variety of *nemestrina*). Lectotype: male, present designation, on pin with genitalia in genitalia vial, labelled "LECTOTYPE *Helea flavicans* Santos Abreu, designated by A. Borkent", "*Atrichopogon nemestrinus*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Helea flavihaltherata* Santos Abreu, 1918: 259 (as variety of *nemestrina*). Lectotype: male, present designation, on pin with genitalia in genitalia vial, labelled "LECTOTYPE *Helea flavihaltherata* Santos Abreu, designated by A. Borkent", "*Atrichopogon nemestrinus*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Helea fulviventris* Santos Abreu, 1918: 260 (as variety of *nemestrina*). Lectotype: male, present designation, on pin with genitalia in genitalia vial, labelled "LECTOTYPE *Helea fulviventris* Santos Abreu, designated by A. Borkent", "*Atrichopogon nemestrinus*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

Fourteen specimens were present in the series identified as *Helea nemestrina* in the Santos Abreu collection (10 males, 4 females) of which two males and two females have been mounted on microscope slides (lectotype and three of the paralectotypes of *Atrichopogon nemestrinus*). The synonymy of the named varieties with *A. nemestrinus* was based on their designation as lectotypes and the similar male genitalia of each of these (Fig. 1A). The structures of the female antenna, palp and genitalia were also similar to one another (Figs 1B–D).

*Atrichopogon nemestrinus* appears to be endemic to the Canary Islands.

*Forcipomyia biannulata* Ingram & Macfie

*Forcipomyia biannulata* Ingram & Macfie, 1924: 557. Ghana. Not seen.

One of the males in the series identified by Santos Abreu (1918) as *Forcipomyia bipunctata* (see below under *F. fuliginosa*) was actually a specimen of *F. biannulata*. The genitalia compares well with those drawn for this species by Dessart (1963) and Wirth & Messersmith (1977).

The specimen at hand may have come from any one of the following Canary Islands: La Palma, Gomera, Tenerife, or Gran Canaria. Clastrier (1966) has previously identified this species from Tenerife. The species is otherwise broadly distributed in Africa (including northern Africa) and the Oriental Region (Szadziewski, 1983).

*Forcipomyia bipunctata* (Linnaeus)

*Tipula bipunctata* Linnaeus, 1767: 978. Europe. Not seen.

*Forcipomyia palmensis* Santos Abreu, 1918: 285. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Forcipomyia palmensis* Santos Abreu, designated by A. Borkent", "*Forcipomyia bipunctata*, Det. A. Borkent", "Collection of E. Santos Abreu".

Examination of the single male confirms the previous suspicions (Storå, 1936; Remm, 1962) that *F. palmensis* is a junior synonym of *F. bipunctata* (male genitalia as drawn by Remm (1962)). The single available male cannot be considered a holotype (it is designated as lectotype) because Santos Abreu (1918) indicated that he had examined more than one specimen as part of a syntype series (with differing dates of collection).

*Forcipomyia bipunctata* is otherwise broadly distributed in the Holarctic Region and north Africa.

#### *Forcipomyia fuliginosa* (Meigen)

*Ceratopogon fuliginosus* Meigen, 1818: 86. Germany. Not seen.

*Forcipomyia sautosi* Remm, 1981: 32. New name for *obscura*. **New synonymy.**

*Forcipomyia obscura* Santos Abreu, 1918: 276 (as variety of *bipunctata*, preoccupied by *Forcipomyia obscura* (Walker), 1848). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Forcipomyia obscura* Santos Abreu, designated by A. Borkent", "*Forcipomyia fuliginosa*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

There were 7 specimens identified as *F. bipunctata* in the Santos Abreu collection (3 males mounted on microscope slides, 3 pinned males with genitalia in glycerine, 1 badly damaged pinned specimen missing its head and abdomen and of undetermined sex). Of these, one male was *F. fuliginosa*, one male was *F. biannulata*, 4 males were *F. pallidipes* and the badly damaged specimen was not identified.

One of the males, here designated as the lectotype of *F. obscura*, had genitalia indistinguishable from some *F. fuliginosa* from North America (pers. obs.) and from those illustrated by Dessart (1963), Wirth (1952, as *brookmani*) and Remm (1962). Twenty-two other names are recognized as synonyms of *F. fuliginosa* (Borkent and Wirth, in press), which is presently considered to have a worldwide distribution. It is important to note, however, that this species exhibits significant morphological variation, especially in features of the male genitalia, and it seems likely that the name represents more than one species. Further study is needed of what is probably a complex of species.

#### *Forcipomyia murina* (Winnertz)

*Ceratopogon murina* Winnertz, 1852: 26. Europe. Not seen.

*Helea abdominalis* Santos Abreu, 1918: 265 (as variety of *murina*). Lectotype: female, present designation, on microscope slide, labelled "LECTOTYPE *Helea abdominalis* Santos Abreu, designated by A. Borkent", "*Forcipomyia murina*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 1 male, 2 females. **New synonymy.**

The series identified as *Helea murina* from the Santos Abreu collection was composed of 2 males and 4 females.

*Forcipomyia murina* has nine other synonyms (Borkent and Wirth, in press) and is a broadly distributed in the Holarctic and Afrotropical Regions. Its presence in the Canary Islands was previously correctly recognized by Santos Abreu (1918) as based on the identification here of a slide-mounted male, a pinned male with its genitalia in glycerine and two females (lectotype and paralectotypes of *abdominalis*) mounted on microscope slides. Two additional pinned females, here identified as *F. murina* (i.e. not paralectotypes) were missing their genitalia.

Santos Abreu (1918) recognized the new variety *Helea murina abdominalis* based on a female(s). Designation of a female lectotype from his series of *Helea murina* and the similarity of this variety with other *Forcipomyia murina* females confirms the recognition of *abdominalis* as a new junior synonym.

#### *Forcipomyia nitens* (Santos Abreu) **New combination**

Fig. 2A

*Helea nitens* Santos Abreu, 1918: 260. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Helea nitens* Santos Abreu, designated by A. Borkent", "*Forcipomyia nitens*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotype: 1 male.

*Forcipomyia soranus* de Meillon, 1943: 103. Onderstepoort, Transvaal, South Africa. Male holotype, on two microscope slides, labelled "LECTOTYPE *Forcipomyia soranus* Type ♂ DeM., Det. B. deM. '42", "Locality Onderstepoort Transvaal. Date 10.XI.1942. *Forcipomyia nitens* Det. A. Borkent", "S. A.

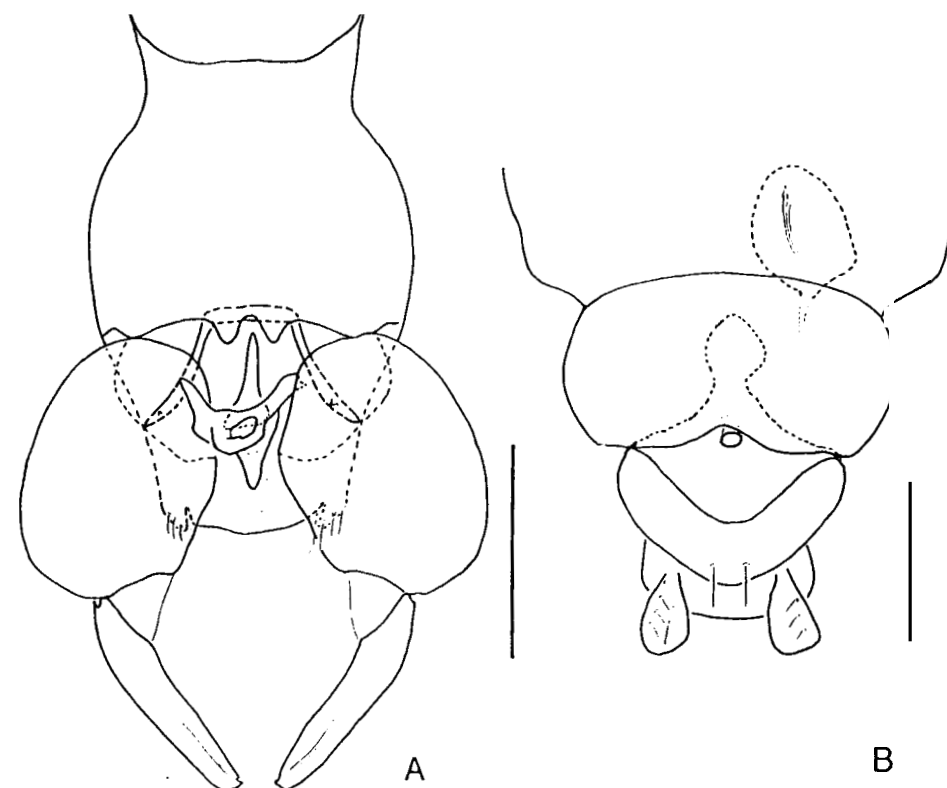


Fig. 2  
A Male genitalia of *Forcipomyia nitens* in ventral view (lectotype); B Female genitalia of *Dayshela albidipes* in ventral view. Scales = 0.1 mm

I. M. R. Collection C10/42 Collector and No. Rene du Toit" (South African Institute for Medical Research in Johannesburg). **New synonymy.**

Two male specimens were present in the series identified as *Helea nitens*. Unfortunately the single male paralectotype was damaged and was missing its antennae, most legs and most of the abdomen (including the genitalia).

The synonymy of *E. nitens* and *E. soranus* is based on a comparison of the lectotype of *E. nitens* and the holotype of *E. soranus*. An additional male of *E. soranus* from the type locality was also examined. In particular, the genitalia of *E. nitens* is very similar to that of *E. soranus* even though the aedeagus of the lectotype was in a somewhat distorted position (Fig. 2A). The structure which is directed anteriorly from the aedeagus in Fig. 2A actually lies dorsal to the aedeagus and is the fused paramere. Although not shown by de Meillon (1943), the holotype of *E. soranus* also have a fused, slender paramere. The lectotype of *E. nitens* is somewhat larger than the type of *E. soranus*, with a wing length of 1.7 mm, as compared to that of 1.4 mm for *E. soranus* ( $n = 2$ ).

The genitalia of the holotype of *E. soranus* was in dried Hoyer's and because it was remounted in Canada Balsam, could be examined from a number of aspects, allowing for more detailed comparisons with the lectotype of *E. nitens*.

*Forcipomyia nitens* (Santos Abreu), as a new combination becomes a senior homonym of *E. nitens* (Kieffer, 1919). Because *E. nitens* (Kieffer) is currently considered to be a junior synonym of *E. velox* (Winnertz), it is not renamed here.

The records of this species on the Canary Islands and from South Africa strongly suggest that the species is more broadly distributed than current records indicate.

#### *Forcipomyia pallidipes* Santos Abreu

*Forcipomyia pallidipes* Santos Abreu, 1918: 276 (as variety of *bipunctata*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Forcipomyia pallidipes* Santos Abreu, designated by A. Borkent", "*Forcipomyia pallidipes*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 3 males.

*Ceratopogon rustica* Kieffer, 1919: 19, Hungary, Croatia. Not seen. **New synonymy.**

*Forcipomyia canarii* Kieffer, 1923: 662, Algeria. Not seen. **New synonymy.**

The male lectotype of *Forcipomyia pallidipes* is similar in all respects to males of *Forcipomyia rustica* as described by Remm (1962) and Szadziewski (1983). This species is known from northern Africa (Algeria) and from southern Europe (Croatia, Bulgaria, Hungary, the Crimea and Caucasus).

Of the three paralectotypes of *E. pallidipes*, one was mounted on a microscope slide and two were on pins with their genitalia in glycerine. Otherwise, the series identified as *E. bipunctata* included specimens of *E. biannulata* and *E. fuliginosa*.

Santos Abreu (1918) recognized the European species *E. kaltenbachii* (Winnertz) from La Palma and Gomera. Reexamination of four males identified as such in his collection shows that at least two of these are actually specimens of *E. pallidipes* (two males on microscope slides). Two other males on pins were missing their genitalia but are also likely to be specimens of *E. pallidipes* (similar size, colouration, wings).

This species is widely distributed in north Africa and Europe. Remm (1988) previously noted the presence of this species on the Canary Islands (as *E. rustica*).

#### *Forcipomyia psilonota* (Kieffer)

*Ceratopogon psilonota* Kieffer, 1911: 337, Seychelles. Not seen.

*Forcipomyia litoralis* Santos Abreu, 1918: 277. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Forcipomyia litoralis* Santos Abreu, designated by A. Borkent", "*Forcipomyia psilonota*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 2 males. **New synonymy.**

*Forcipomyia psilonota* has 13 other recorded synonyms (Borkent and Wirth, in press) and is a broadly distributed species in Africa (including northern Africa) (Dessart, 1963; Szadziewski, 1983).

The two male paralectotypes are glued to celluloid strips which are on pins. One of the specimens had its genitalia removed to a glycerine vial. The other is missing its genitalia.

#### *Forcipomyia pulcherrima* Santos Abreu

*Forcipomyia pulcherrima* Santos Abreu, 1918: 272. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Forcipomyia pulcherrima* Santos Abreu, designated by A. Borkent", "Collection of E. Santos Abreu". Paralectotype: 1 female.

*Lepidohela ornaticipes* Kieffer, 1921a: 1 (preoccupied by *Forcipomyia ornaticipes* (Kieffer), 1918). Cameroon. Not seen. **New synonymy.**

*Lepidohela formosae* Kieffer, 1922: 153, Taiwan. Not seen. **New synonymy.**

*Forcipomyia lepidota* Ingram & Macfie, 1924: 566, Ghana. Not seen. **New synonymy.**

*Forcipomyia variegata* Goetghebuer, 1933: 133, Zaire. Not seen. **New synonymy.**

Two specimens, a male and female, were present in the type series of *E. pulcherrima*. The similarity of the lectotype, especially of the genitalia, to published descriptions of *E. lepidota* (Clastrier, 1956; Dessart, 1963) and *E. formosae* (Remm, 1967; Tokunaga, 1940), confirms the synonymy. Szadziewski (1983) first recognized the synonymy of *E. formosae* and *E. lepidota*.

This species is broadly distributed in north Africa (Algeria), Caucasus, Japan and in the Afrotropical and Oriental Regions (de Meillon & Wirth, 1991: 69, see under *lepidota*; Szadziewski, 1983).

#### *Culicoides albipes* (Santos Abreu)

Fig. 2B

*Culicoides albipes* Santos Abreu, 1918: 291 (as variety of *versicolor*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides albipes* Santos Abreu, designated by A. Borkent", "*Dasyhelea albipes*, Det. A. Borkent", "Collection of E. Santos Abreu".

*Culicoides intermedius* Santos Abreu, 1918: 310. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides intermedius* Santos Abreu, designated by A. Borkent", "*Dasyhelea albipes*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 3 males, 1 female. **New synonymy.**

*Dasyhelea guanchense* Clastrier, 1966: 702, Puerto de la Cruz, Tenerife, Canary Islands. Not seen. **New synonymy.**

The specimens examined here were indistinguishable from those in the excellent description of *D. guanchense* by Clastrier (1966).

The type series of *Culicoides intermedius* was composed of four males and one female, all of which were members of *Dasyhelea albipes*. One male paralectotype is mounted on a microscope slide and the remaining two males and one female were left on the pin with their genitalia cleared and in genitalia vials. The female of this species has not been previously

described and differs from those of the other known species of *Dasyhelea* on the Canary Islands (Clastrier, 1966) in the shape of sternite 9 (Fig. 2B).

This species appears to be endemic to the Canary Islands.

#### *Dasyhelea canariensis* (Santos Abreu)

*Culicoides canariensis* Santos Abreu, 1918: 293 (as variety of *versicolor*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides canariensis* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu".

*Culicoides brunneus* Santos Abreu, 1918: 295 (as variety of *versicolor*). Lectotype: male, present designation, on celluloid strip on pin, labelled "LECTOTYPE *Culicoides brunneus* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Culicoides fenestralis* Santos Abreu, 1918: 293 (as variety of *versicolor*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides fenestralis* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Culicoides ornatigaster* Santos Abreu, 1918: 294 (as variety of *versicolor*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides ornatigaster* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Culicoides hiemalis* Santos Abreu, 1918: 311. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides hiemalis* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 2 males. **New synonymy.**

*Culicoides albidigaster* Santos Abreu, 1918: 316 (as variety of *hiemalis*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides albidigaster* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Culicoides immaculatus* Santos Abreu, 1918: 315 (as variety of *hiemalis*). Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides immaculatus* Santos Abreu, designated by A. Borkent", "*Dasyhelea canariensis*, Det. A. Borkent", "Collection of E. Santos Abreu". **New synonymy.**

*Dasyhelea quinqueteniata* Clastrier, 1966: 699. Puerto de la Cruz, Tenerife, Canary Islands. Not seen. **New synonymy.**

The series of specimens identified by Santos Abreu (1918) as *Culicoides versicolor* (Winnertz) was represented by five males which included two species of *Dasyhelea*: *D. canariensis* and *D. albidipes*. Santos Abreu (1918) named eight new varieties of his *C. versicolor* and I have correlated five of these with the five specimens in his collection. The remaining three varieties are **nomina dubia** but are likely to be members of *D. canariensis* as well: *Dasyhelea flavimana*, *Dasyhelea luteipalpis*, *Dasyhelea flaviventris*.

*Culicoides flaviventris* has been previously recognized as a member of *Dasyhelea* where it is a junior homonym and was renamed as *Dasyhelea abreu* by Kieffer (1921b).

The specimens examined here were indistinguishable from the excellent description of *D. quinqueteniata* by Clastrier (1966). The species appears to be endemic to the Canary Islands.

The two paralectotypes of *Culicoides hiemalis* were on pins, with their genitalia in genitalia vials.

*Dasyhelea canariensis* (Santos Abreu) is a senior homonym of *D. canariensis* Storå (1936) which is here renamed *Dasyhelea storå*. **New name.**

#### *Dasyhelea pulchripes* (Santos Abreu)

*Culicoides pulchripes* Santos Abreu, 1918: 308. Lectotype: male, present designation, on microscope slide, labelled "LECTOTYPE *Culicoides pulchripes* Santos Abreu, designated by A. Borkent", "*Dasyhelea pulchripes*, Det. A. Borkent", "Collection of E. Santos Abreu". Paralectotypes: 2 males.

*Dasyhelea tenerifensis* Clastrier, 1966: 694. Puerto de la Cruz, Tenerife, Canary Islands. Not seen. **New synonymy.**

The specimens examined here were indistinguishable from the excellent description of *D. tenerifensis* by Clastrier (1966).

Three males were present in the series identified in the Santos Abreu collection as *Culicoides pulchripes*. One of the two paralectotypes is mounted on a microscope slide. The remaining paralectotype is on a pin but is missing its genitalia; otherwise it looks similar to the others in the type series and it is likely correctly identified.

The species appears to be endemic to the Canary Islands.

#### *Brachypogon clavatus* (Clastrier)

*Ceratopogon clavatus* Clastrier, 1966: 706. Puerto de la Cruz, Tenerife, Canary Islands. Not seen.

Two male specimens were present in the series identified by Santos Abreu (1918) as *Ceratolophus luteipennis* (Zetterstedt). Both of these, as discussed by Borkent & Grogan (1995: 21), are actually members of *Brachypogon clavatus*. Borkent & Grogan (1995) also point out that *Ceratolophus rufigastris* and *Ceratolophus singularis* were likely to be members of *Brachypogon* and they placed them there as new combinations. However, neotypes are required to establish the true identity of these names. *Ceratolophus obscurus* (originally described as a variety of *Ceratolophus rufigastris*) is also considered to be a new combination here.

*Brachypogon clavatus* appears to be endemic to the Canary Islands.

## Discussion

Santos Abreu (1918) studied Ceratopogonidae as pinned specimens and it is hardly surprising that some of his species were actually a combination of taxa and that others, which he considered distinct, were actually conspecific. My reexamination of his types indicates that the number of Ceratopogonidae previously thought to be on the Canary Islands is overestimated (Table 2). Of the 25 named taxa in the Santos Abreu collection only 13 valid species were actually present.

Even though a comprehensive study of the Canary Island Ceratopogonidae is needed to better understand the species present and their true affinities with mainland taxa or lineages, the present study indicates that, of the taxa present in the Santos Abreu collection, five species are endemic (*A. nemestrinus*, *D. albidipes*, *D. canariensis*, *D. pulchripes*, and *B. clavatus*) although readers should keep in mind that Afrotropical *Dasyhelea*, in particular, are poorly known. Eight other Canary Island species are more broadly distributed. Of these non-endemic species, one has a worldwide distribution (*E. fuliginosa*, which may be a species complex); three are otherwise distributed in north Africa, Europe and, for some, are more broadly distributed in the Holarctic Region (*E. bipunctata*, *E. murina*, *E. pallidipes*); one is broadly distributed in Africa,

including north Africa (*F. psilonota*); one is otherwise known only from South Africa (*F. nitens*); one is otherwise broadly distributed in Africa and the Palaearctic and Oriental regions (*F. pulcherrima*); and one is broadly distributed in Africa and the Oriental region (*F. biannulata*).

Other species which are likely to be correctly identified from the Canary Islands by Clastrier (1966) and Storå (1936) are *Atrichopogon montium* Storå (endemic to the Canary Islands), *Dasyhelea turficola* Kieffer (identified as *D. grenieri* Clastrier by Clastrier (1966); otherwise distributed in Europe), *Culicoides obsoletus* (Meigen) (otherwise broadly distributed in the Holarctic, north Africa), and at least one species each of *Palpomyia* and *Bezzia*.

Some Canary Island ceratopogonids appear, therefore, to have zoogeographic connections with north Africa/Europe and others with the Afrotropical region. Studies of the fauna of the Canary Islands indicates that other aquatic groups present on the islands have most of their zoogeographic connections with the Palaearctic mainland (e.g. Crosskey, 1988, Simuliidae; Cranston & Armitage, 1988, Chironomidae). The Simuliidae are restricted to lotic habitats and the Chironomidae, on the whole, to permanent waters. The adaptation of many ceratopogonids (especially in *Atrichopogon*, *Forcipomyia*, *Dasyhelea* and *Culicoides*) to breeding in very small water bodies, decaying moist vegetation and other similar wet habitats, is likely to make them less susceptible to local extinction induced by drying conditions (natural or anthropogenic) and may explain why some Afrotropical zoogeographic connections are yet present among the Ceratopogonidae fauna of the Canary Islands.

Borkent (1991), in an analysis of Ceratopogonidae which occur on oceanic islands worldwide, pointed out that virtually all islands have representatives of *Forcipomyia* and *Dasyhelea* and that many also have species of *Atrichopogon* and *Culicoides*. The broad distribution of these genera probably reflects the superior dispersal capabilities of the included species and is correlated with their presence in temporarily wet habitats. Only those islands of continental origin, or those close to continents, have further generic representation. The Canary Islands have all four of these afore mentioned genera as well as species of *Brachypogon*, *Bezzia* and *Palpomyia*. These additional genera likely reflect the close proximity of the islands to the continental mainland (Fuerteventura Island is less than 100 km from the mainland).

There are other species identified or described by Storå (1936) on the Canary Islands which are presently of uncertain status. It would be invaluable to our understanding of Canary Island Ceratopogonidae to reexamine and interpret his collection (probably housed in the Helsinki Museum).

## Resumé

La revisión de los Ceratopogónidos de las Islas Canarias descritos por Santos Abreu (1918) reveló que un determinado número de los nombres propuestos son sinónimos unos de otros, sinónimos de otras especies descritas de las Islas Canarias, o bien son sinónimos de otras especies descritas de otras áreas.

Se designan lectotipos de todas las especies y variedades que estaban aún representadas en la colección de Santos Abreu. Los numerosos cambios nomenclaturales son incluidos en una tabla (con sinónimos nuevos). Un número de nombres descritos por Santos Abreu son considerados como *nomina dubia* y listados. *Dasyhelea canariensis* (Santos Abreu) se considera homonimia de *D. canariensis* Storå, cuyo nombre es sustituido por *Dasyhelea storåi*. *Dasyhelea luteoscutellata* (Santos Abreu) se considera homonimia de *Dasyhelea luteoscutellata* Carter, Ingram y Macfie (1921), cuyo nombre es sustituido por *Dasyhelea galbiscutellata*.

Un análisis limitado indica que los Ceratopogónidos de las Islas Canarias tienen afinidades zoogeográficas tanto con la región Paleártica como con la Afrotropical.

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## References

- Becker, T. (1908): Dipteren der Kanarischen Inseln. *Mitteilungen aus dem Zoologischen Museum* 4: 1–180.
- Borkent, A. (1991): The Ceratopogonidae (Diptera) of the Galápagos Islands, Ecuador with a discussion of their phylogenetic relationships and zoogeographic origins. *Entomologica Scandinavica* 22: 97–122.
- Borkent, A. & Bissett, B. (1990): A revision of the Holarctic species of *Seromyia* Meigen (Diptera: Ceratopogonidae). *Systematic Entomology* 15: 153–217.
- Borkent, A. & Grogan, W. L. (1995): A revision of the genus *Ceratopogon* Meigen with a discussion of phylogenetic relationships, zoogeography, and biometric divergence (Diptera: Ceratopogonidae). *Memoirs of the Entomological Society of Washington* 15: 1–198.
- Borkent, A. & Wirth, W. W. (in press): The World Species of Ceratopogonidae (Diptera). *Bulletin of the American Museum of Natural History*.
- Carter, H. F. (1921): A revision of the genus *Leptoconops*, Skuse. *Bulletin of Entomological Research* 12: 1–28.
- Carter, H. F., Ingram, A. & Macfie, J. W. S. (1921): Observations on the ceratopogonine midges of the Gold Coast with descriptions of new species Part IV. *Annals of Tropical Medicine and Parasitology* 15: 177–212.
- Clastrier, J. (1956): Notes sur les Ceratopogonidés. I. - Quatre espèces du groupe *Forcipomyia* d'Algérie et de Tunisie. *Archives de l'Institut Pasteur Algérie* 34: 496–512.
- (1966): Cératopogonidés des Iles Canaries (Dipt.Nematocera). *Annales de la Société de France* 2: 693–710.
- Cranston, P. S. & Armitage, P. D. (1988): The Canary Islands Chironomidae described by T. Becker and by Santos Abreu (Diptera, Chironomidae). *Deutsche Entomologische Zeitschrift* 35: 341–354.
- Crosskey, R. W. (1988): Taxonomy and geography of the blackflies of the Canary Islands (Diptera: Simuliidae). *Journal of Natural History* 22: 321–355.
- De Meillon, B. (1943): New records and new species of Nematocera (Diptera) from the Ethiopian Region. *Journal of the Entomological Society of Southern Africa* 6: 90–113.
- De Meillon, B. & Wirth, W. W. (1991): The genera and subgenera (excluding *Culicoides*) of the Afrotropical Biting Midges (Diptera: Ceratopogonidae). *Annals of the Natal Museum* 32: 27–147.
- Dessart, P. (1963): Contribution à l'étude des Ceratopogonidae (Diptera) VII. Tableaux dichotomiques illustrés pour la détermination des *Forcipomyia* africains. *Mémoires Institut Royal des Sciences Naturelles de Belgique* (2) 72: 1–151, pls. 1–16.
- Goetghebuer, M. (1910): Description de diptères chironomides nouveaux. *Revue Mensuelle de la Société Entomologique Namuroise* 10: 96–97.
- (1933): Ceratopogonidae et Chironomidae du Congo Belge. *Revue de Zoologie et de Botanique Africaines* 24: 129–151.
- Ingram, A. & Macfie, J. W. S. (1924): Notes on some African Ceratopogonidae - species of the genus *Forcipomyia*. *Annals of Tropical Medicine and Parasitology* 18: 533–593.
- Kieffer, J. J. (1911): The Percy Sladen Trust Expedition to the Indian Ocean in 1905. Under the leadership of Mr. J. Stanley Gardiner. Vol. 3. No. XV. - Diptera. Chironomidae der Seychelleninseln, aus der Sammlung von Mr. H. Scott. *Transactions of the Linnean Society of London* (2nd Ser.) 14: 331–366.