Zootaxa 3926 (4): 561–575
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3926.4.6
http://zoobank.org/urn:lsid:zoobank.org:pub:BD4442E0-DDAD-4065-B616-97CAB3500A37

New species of mayflies (Ephemeroptera) from Cape Verde

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Abstract

To date, no mayflies have been described from Cape Verde, an archipelago of volcanic islands in the Atlantic Ocean. Based on the material collected on two islands, Santo Antão and Santiago, two species of the genus *Cloeon* Leach, 1815 (Ephemeroptera: Baetidae) are described based on larvae and imagines. *Cloeon morna* **sp. n.**, collected in Santo Antão, and *C. sidadi* **sp. n.**, collected in Santiago, have 3-segmented maxillary palps and tapered labial palps of larvae. The new species can be distinguished from each other and from other West-African species of the genus mainly according to details of the lateral spines on larval abdominal segments and characteristic colourations of vitta and terga in female imagines and colours of male turbinate eyes. Affinities to the West African species of the genus are discussed.

Key words: Cape Verde, Macaronesia, West Africa, *Cloeon*, Baetidae, new species

Introduction

Cape Verde is an archipelago of ten volcanic islands in the central Atlantic Ocean, which is located 570 kilometres off the coast of Western Africa (Senegal and the Gambia). The islands cover a combined area of slightly over 4,000 square kilometres. Three islands (Sal, Boa Vista and Maio) are fairly flat, sandy and dry; the others (mainly Santo Antão, São Nicolau, Santiago, and Fogo) are generally mountainous with more vegetation. The biota of Cape Verde is relatively well-known, particularly due to an extensive list of species summarised by Arechavaleta *et al.* (2005), which includes fungi, bryophytes, vascular plants and terrestrial animals. Despite the title of this work, it includes also several groups of aquatic insects, including Odonata, aquatic Heteroptera (Gerromorpha and Nepomorpha), Trichoptera, aquatic Coleoptera, and aquatic Diptera. Ephemeroptera have never been reported from there to date.

Therefore, we visited four islands (Santo Antão, São Vicente, Santiago, and Fogo) in May 2013 to investigate aquatic habitats and search for mayflies. At this dry season, we did not find any aquatic habitats in Fogo, where all water flowed in pipes or was stored in closed cisterns. In São Vicente and Santiago, we found only a few open cisterns for storing of water; a few levadas (narrow concrete canals) for irrigation in Santiago were closed. The only permanently flowing little brooks, irrigation systems and open levadas occurred in Santo Antão. The aims of this study are to describe two new mayfly species of the genus *Cloeon* Leach, 1815 (Ephemeroptera: Baetidae) found in two Cape Verdean islands and to provide information on their biology, distribution and affinities.

All material was collected by T. Soldán and J. Bojková and is deposited in the collection of Biological Centre, Czech Academy of Sciences, Institute of Entomology, České Budějovice, Czech Republic.

Accepted by L. Jacobus: 5 Feb. 2015; published: 9 Mar. 2015

colouration of the turbinate eyes and the ornamentation of the female's abdominal terga, as well as in the colouration of the vitta (Table 1). The colouration of the vitta of the new species, i.e. the subcostal area being brown throughout the whole length and the costal area being unpigmented or only slightly pigmented in its basal part, was not similar to any other West Afrotropical species (cf. Gillies 1985: 138–139, Figs 1–8).

The two newly described species were collected from different islands ca. 250 km and are highly dissimilar. Colourations of the female imago of each species are completely different; *C. morna* **sp. n.** has two narrow submedial longitudinal violet-brown stripes on the head and thorax and wide violet-brown lateral stripes on the terga (Fig. 1C), in contrast to the colourful *C. sidadi* **sp. n.** which has a characteristic dark red pattern on the body, forming distinct submedial and lateral stripes on the head and thorax and medial and wide lateral stripes on the abdomen (Fig. 5A). Subcostal fields of the female forewings differ as well. *Cloeon morna* **sp. n.** has a dark brown subcostal field in the basal half and is yellowish-brown in the distal half, but *C. sidadi* **sp. n.** has a brown subcostal field along the whole length of the forewing. The male subimago of each species differs from its counterpart in the colour of the compound eyes, which is light yellow in *C. morna* **sp. n.** but distinctly orange in *C. sidadi* **sp. n.** The male imago of the latter species is not yet known; thus, it is not possible to compare genital plates.

In larvae, besides different colourations of terga, which we note is variable in *C. morna* **sp. n.**, both species are clearly distinguishable according to the number of lateral spines on abdominal segments VIII and IX (Fig. 4A, C) and according to details of the posterior margins of abdominal terga. Larvae of *C. morna* **sp. n.** have wide and robust teeth along the tergal margins, but larvae of *C. sidadi* **sp. n.** have narrower and elongated teeth there (Fig. 4B, D). Several distinguishing characteristics of mouth parts are apparent. The labra of both species have pectinate setae along the posterior margin, but the postero-lateral margins have simple setae in *C. sidadi* **sp. n.** and pectinate setae in *C. morna* **sp. n.** Mandibles have the same number of teeth on the incisors but differ in the length of teeth in the outer incisors group (cf. Figs 2, 6). The maxillae and labia are similar in both species, with only minor differences in the setation of glossae and paraglossae; and the hypopharynx is slightly different in the shape of the apical parts of lingua and superlingua; however, the variability of this last character was not explored by us. Slight differences are apparent in the shape of gills and spines on the surface of the fore femora. *Cloeon sidadi* **sp. n.** has wider and more oval ventral lamellae of gills I–VI than *C. morna* **sp. n.**, and the proximal half of its femora are more densely covered by spines than in *C. morna* **sp. n.** (cf. Figs 3, 7).

All aquatic habitats in Cape Verde, where mayflies occurred, were strongly modified by humans and used for irrigation of fields of taro, sugarcane, banana, cassava, sweet potatoes and mango trees or coco palms (e.g. Fig. 8B, E). There is a strong trend there to close any water source into cisterns or pipes to reduce loss of water, so that habitats available for aquatic organisms are rapidly disappearing. We did not find any open water in São Vicente and Fogo, and only a few open irrigation cisterns in Santiago. One could suppose that some mayfly species have already been extirpated from these islands. However, our collecting was restricted to only four of ten main islands and conducted during one (dry) season. Some other mayflies may occur on other less human-impacted islands with water sources (e.g. São Nicolau).

Acknowledgements

We are grateful to Kateřina Bláhová (Biology Centre AS CR, České Budějovice), who prepared drawings, and to Jan Sychra (Department of Botany and Zoology, Masaryk University, Brno) for identification of water beetles. Our thanks are due to the consulate of the Republic of Cape Verde in Prague for consultations and comments and to two anonymous reviewers for critical comments on the manuscript.

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