



Dragonflies and damselflies (Insecta: Odonata) collected during the Lindberg expedition to the Cape Verde Islands, 1953-54

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ABSTRACT

In this paper, 47 specimens of dragonflies and damselflies collected by H. Lindberg and his assistant S. Panelius in the Cape Verde Islands in 1953-1954 and identified by K.J. Valle and K.F. Buchholz, are presented. The damselfly *Agriocnemis exilis* Selys, 1872, collected in Boa Vista Island in February 1954, is added to the list of Odonata known from the archipelago. The collection also includes specimens from another damselfly, *Ischnura senegalensis* (Rambur, 1842), which was previously recorded in Cape Verde on only two occasions, in 1898 and 2000.

RESUMO

Apresentam-se, neste texto, 47 exemplares de libélulas e libelinhas das ilhas de Cabo Verde. Os exemplares foram recolhidos em 1953-54 por H. Lindberg e pelo seu assistente S. Panelius e foram identificados por K.J. Valle e K.F. Buchholz. A libelinha *Agriocnemis exilis* Selys, 1872, capturada na ilha da Boa Vista em Fevereiro de 1954, constitui um novo taxon na lista de espécies de Odonata do arquipélago. A colecção também inclui exemplares de uma outra libelinha, *Ischnura senegalensis* (Rambur, 1842), que até então apenas tinha sido observada em Cabo Verde em duas ocasiões, em 1898 e 2000.

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INTRODUCTION

The Cape Verde Islands have a small but peculiar fauna of Odonata, with the number of resident species being equal to that of accidental species. The geographical position of the archipelago in the eastern Atlantic Ocean, between latitudes 15-17°N, 500-700 km off continental West Africa, the scarcity of surface freshwater bodies, accentuated by prolonged periods of drought, and winds that almost invariably blow both during the nine months dry season and the three months wet season, are limiting factors that apparently prevent the establishment of a more diverse odonate assemblage.

Compiling a complete list of resident species does not require much effort and this task has essentially been achieved during the last decade (e.g. Aistleitner *et al.* 2008, Martens *et al.* 2013). Although some questions remain unanswered, no big surprises are to be expected. As for accidental species, however, the number of questions remaining unanswered is considerable - the checklist is not yet a done deal and the number of records, both of species and individuals, is small. This is partly a consequence of the scant survey effort and the inaccessibility of some of the terrain, while the environmental conditions that propitiate the arrival of migrants and vagrants remain largely unknown.

With field survey effort falling short, museum collections become a valuable resource for obtaining faunistic data, in particular on accidental species. A recent paper on two historical collections (Martens *et al.* 2013) brought to light two new taxa for the archipelago, i.e. *Anax rutherfordi* McLachlan, 1883 and *Anax tristis* Hagen, 1867. The current paper presents data on yet another historical collection of odonates from Cape Verde, brought together by the Finnish naturalist Håkan Lindberg (1898-1966) and his assistant Samuel Panelius (1934-) between November 1953 and March 1954. In doing so, a new taxon is added to the list of odonate species known from the Cape Verde archipelago.

Lindberg conducted a four-months zoological expedition to the Cape Verde Islands with the aim of increasing knowledge of the invertebrate terrestrial fauna of the archipelago (Lindberg 1958). Lindberg and Panelius visited the islands of São Vicente, Santa Luzia, São Nicolau, Santo Antão, Sal, Boa Vista, Maio, Santiago, Fogo, Brava and three of the Rombos islets, and collected specimens of different animal groups, as well as vascular plants. Special attention was given to insects, but other arthropods, molluscs and lizards were also collected.

MATERIAL AND METHODS

Odonate specimens were collected by Håkan Lindberg and Samuel Panelius and are kept at the Zoologisches Forschungsmuseum Alexander Koenig (ZFMK), Bonn, Germany. The collection includes 38 larvae preserved in ethanol and nine adults stored dry in envelopes. Almost all of the specimens have metadata labels on which the collector gave locality and date of capture. Names of those who identified specimens are also given. Adult specimens – but not the larvae – have museum catalogue numbers. Although most of the collection has never been published, the specimens were studied and identified by Kaarlo Johannes Valle (1887-1956), a Finnish odonatologist, and by Karl Friedrich Buchholz (1911-1967), Curator of Herpetology at ZFMK. Valle published several papers on odonates from Madeira, Azores and Canary Islands (Weihrach 2011), based on Lindberg's collections from

these islands. I examined all Cape Verde specimens and did not find any problematical identifications. Special attention was given to the new taxon for the Cape Verde archipelago reported herein, using Pinhey's (1974) key. Whenever a specimen's condition allowed, larvae were measured using a digital calliper. Geographical coordinates given in the list of collecting localities were assigned by the author, based on the 1:25,000 topographical maps published during the 1960s by the Serviço Cartográfico do Exército, Portugal, and on Google Earth imagery, using the list of collecting localities given in Lindberg (1958). However, coordinates must be viewed with caution, since data on the specimen labels are limited. Brief descriptions of habitats in the following are derived from Lindberg (1958).

COLLECTING LOCALITIES

SANTO ANTÃO

(1) Ribeira do Brás (rendered 'Rb. Braz' on label), Sinagoga; brook with halophyte vegetation: 17°10'30"N, 25°01'50"W, 28-xii-1953.

(2) Tarrafal de Monte Trigo (rendered 'Tarrafal' on label); sparse vegetation along brook (supposedly 'Ribeira do Tarrafal'): 16°57'30"N, 25°18'30"W, 12-iii-1954.

SÃO NICOLAU

(3) Ribeira Brava; brook with orchards along

banks, abundant vegetation in valley and sparse vegetation on slopes and hill sides: 16°37'30"N, 24°17'45"W, 6-8 and 19-xii-1953.

BOA VISTA

(4) Sal-Rei; dunes, sandy fields and salt-pans, *Phoenix atlantica* orchards: 16°10'55"N, 22°54'55"W, (a) 29-i-1954, (b) 1-ii-1954.

(5) Rabil; riparian vegetation along almost desiccated 'Ribeira do Rabil': 16°07'50"N, 22°52'45"W, 31-i-1954.

SPECIMENS COLLECTED

Agriocnemis exilis Selys, 1872

BOA VISTA: (4b) 1 adult male [ZFMK cat. no. ODO 2008/5], H. Lindberg coll., K.F. Buchholz det. First record for the Cape Verde archipelago (Fig. 1-3).



Fig. 1. *Agriocnemis exilis*, head, thorax and legs (partim) of ZFMK ODO 2008/5. Photograph by the author.



Fig. 2. *Agriocnemis exilis*, wings of specimen ZFMK ODO 2008/5. Photograph by the author.



Fig. 3. *Agriocnemis exilis*, abdomen (partim) of specimen ZFMK ODO 2008/5. Photograph by the author.

Ischnura senegalensis (Rambur, 1842)

BOA VISTA: (5) 1 adult, sex indeterminable as abdomen is fragmented and incomplete [ZFMK cat. no. ODO 2009/741-1], H. Lindberg coll., K.F. Buchholz det.; (5) 1 adult female [ZFMK cat. no. ODO 2009/741-2], H. Lindberg coll., K.F. Buchholz and K.J. Valle det.

Anax imperator Leach, 1815

SANTO ANTÃO: (1) 1 larva, H. Lindberg coll., K.J. Valle det., total length 19 mm.

SÃO NICOLAU: (3) 23 larvae, S. Panelius coll., K.J. Valle det., total length ranging from 10 to 38 mm. First records for the island.

BOA VISTA: (4a) 1 adult male [ZFMK cat. no. ODO 2010/1477], S. Panelius coll., K.J. Valle det.

Crocothemis erythraea (Brullé, 1832)

SÃO NICOLAU: (3) 1 adult female [ZFMK cat. no. ODO 2010/2397], H. Lindberg coll., K.J. Valle det.; (3) 1 larva, S. Panelius coll., K.J. Valle det.

LOCALITY UNKNOWN: 1 adult male [ZFMK cat. no. ODO 2010/2398], collector and date not

given, K.J. Valle det.; 1 adult female [ZFMK cat. no. ODO 2010/2399], collector and date not given, K.J. Valle det.

Orthetrum trinacria (Selys, 1841)

SÃO NICOLAU: (3) 1 larva, S. Panelius coll., K.J. Valle det.

Pantala flavescens (Fabricius, 1798)

SÃO NICOLAU: (3) 9 larvae, S. Panelius coll., K.J. Valle det. First record for the island.

Trithemis annulata (Palisot de Beauvois, 1807)

SANTO ANTÃO: (2) 1 adult male [ZFMK cat. no.

ODO 2011/521], H. Lindberg coll., K.F. Buchholz and K.J. Valle det.

SÃO NICOLAU: (3) 3 larvae, S. Panelius coll., K.J. Valle det.

Zygonyx torridus (Kirby, 1889)

SÃO NICOLAU: (3) 1 adult male [ZFMK cat. no. ODO 2011/644], H. Lindberg coll., K.F. Buchholz and K.J. Valle det. This is the only specimen from the Lindberg Cape Verde odonate collection that has previously been published (cf. Aistleitner *et al.* 2008).

DISCUSSION

The Lindberg collection from Cape Verde contributes one new taxon to the archipelago's list of Odonata, i.e. *Agriocnemis exilis*, collected at Sal-Rei, Boa Vista, 1 February 1954. The two records of *Ischnura senegalensis*, collected at Rabil, Boa Vista, are also noteworthy because of the rarity of zygopterans in Cape Verde. The specimens of larvae include two new taxa - *Anax imperator* and *Pantala flavescens* - for São Nicolau. Adding the new data to the checklist recently published by Martens *et al.* (2013), the number of odonate species known from Cape Verde increases to 17, being four zygopterans and 13 anisopterans. While seven of the anisopterans are residents (Loureiro *et al.* 2013, Martens *et al.* 2013), all zygopterans appear to be accidental visitors.

A. exilis, the newly recorded taxon, is a small odonate, widespread throughout sub-Saharan Africa except in rainforest regions. In West Africa, it is known from Senegal to Nigeria and Chad. It is a sedentary species occurring in swamps, swampy pools and rivers (Clausnitzer *et al.* 2010). Despite its minute size, *A. exilis* managed to reach the Cape Verde Islands, probably aided by favorable winds, and the possibility that the species occasionally reproduces in the archipelago cannot be excluded. The wide distribution of the species in Africa, possibly due to prevailing air currents, was remarked upon by Pinhey (1984). The presence of another zygopteran specimens - *I. senegalensis* - in the Lindberg collection, taken on the same island and one day before the other, is interesting and contributes to the hypothesis that there exists a genuine connection between favorable winds and the occasional occurrence of accidental dragonflies and damselflies in the

Cape Verde archipelago, particularly in the easternmost island of Boa Vista.

Movements of the desert locust *Schistocerca gregaria* (Forskål, 1775), which occasionally plagues Cape Verde, are monitored by the Food and Agriculture Organization of the United Nations (cf. FAO 2014). Locust movements from continental West Africa (Mauritania, Western Sahara, Senegal) to the Cape Verde Islands, as well as between islands within the archipelago, are facilitated by favorable winds that could also carry accidental odonate visitors. Possibly, the movements of *S. gregaria* can be used to better understand the origin and pathway of odonates that have only occasionally been reported from Cape Verde.



Fig. 4. *Agriocnemis exilis*, female, collected aboard ship, ca. 100 nm off West Africa in November 1893.

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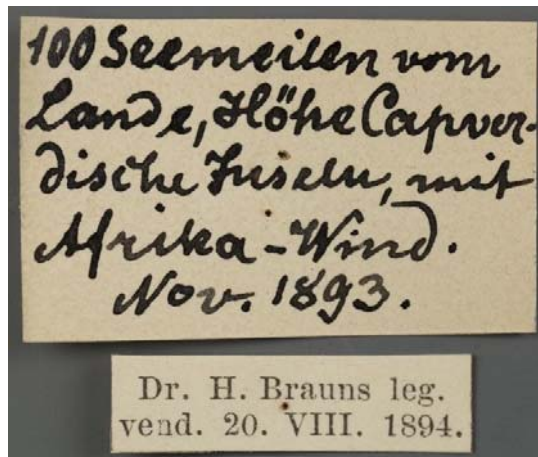


Fig. 5. Labels of *Agriocnemis exilis* collected aboard ship, ca. 100 nm off West Africa in November 1893.
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Saraiva (1962) mentioned two severe invasions of *S. gregaria*, the first one in 1893 and the second in 1949. Fea (1898) also reported that a large locust invasion had occurred in Boa Vista during the 1890s. The first record of *I. senegalensis* in Cape Verde is of a specimen collected in Boa Vista in 1898 (Aistleitner *et al.* 2008). The second record of *I. senegalensis* and the first of *A. exilis* are both from 1954 (this paper). Interestingly, a female *A. exilis* (without number) in the collections of the Zoologisches Museum Hamburg, Germany, was collected aboard ship ca. 100 nm off the West African coast, at the latitude of the Cape Verde Islands, in November 1893 (Fig. 4, 5). It may not be by chance only that locust invasions more or less coincide with the occurrence of damselflies in the Cape Verde Islands.

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Dijkstra confirmed the taxonomic identity of the *Agriocnemis exilis* specimen in Bonn. Wolfgang Schneider brought the offshore record to light and Kai Schütte (Zoologisches Museum Hamburg) kindly provided a photograph of the specimen. Andreas Martens made valuable suggestions that helped improve an earlier version of the manuscript.

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