

A checklist of the Odonata of the Cape Verde Islands

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Abstract: To date, 14 species of Odonata have been recorded from the archipelago. The checklist is based on previously published records, unpublished details from the historical collection of Leonardo FEA and collections made on 8 trips from 1998 to 2007. The dragonfly fauna comprises species typical for arid conditions, being widespread in Africa and known from several other African islands.

Introduction

Very little seems to have been published on Cape Verde Islands dragonflies. We are aware of only four publications. CALVERT (1893) listed some dragonflies collected from Porto Grande, St. Vincent (Mindelo bay, Sao Vicente) during the U.S. Eclipse Expedition to West Africa 1889–1890. KIRBY (1897) listed two species from the same locality, collected by the Siemens Expedition, S.S. Faraday, in 1895. During that period Porto Grande was an important station for steam ships. MARTIN (1908) reported on dragonfly collected by the Italian naturalist Leonardo FEA for the Municipal Natural History Museum of Genoa 1897 to 1898. More recent records were made by LOBIN (1982). A previous checklist on the Odonata of the Cape Verde Islands has been part of a general checklist on terrestrial arthropods (VAN HARTEN 1993). And another checklist of the part Arthropoda/Odonata in ARECHAVALETA et al. (eds.) (2005) compiled by A. GARCIA, M. BÁEZ & A. CABRETA refers also only to the mentioned old reports of 11 species from 5 islands.

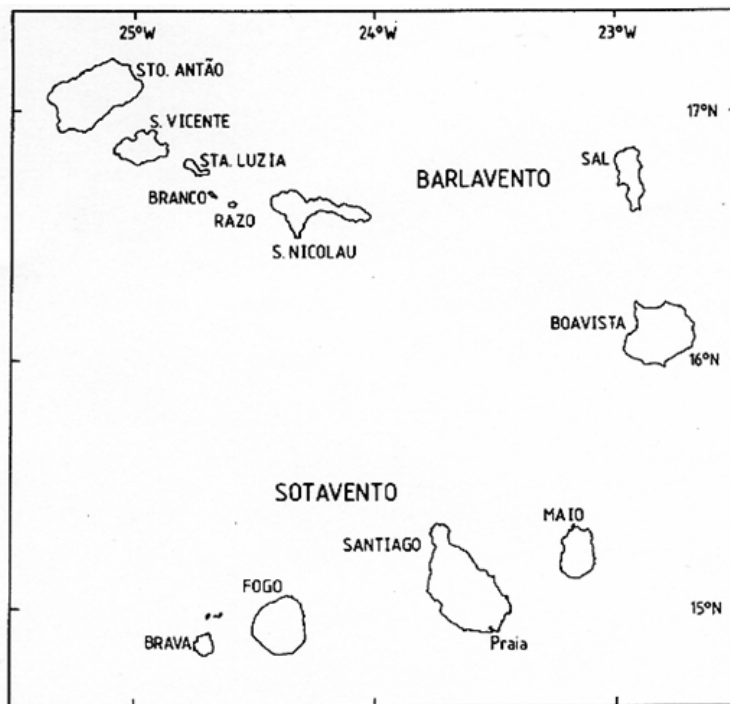


Fig.1: Map of the Cape Verde Islands

From 1998/99 onwards the first author (EA) made a trip each year to the archipelago and is now living there from October until March. Among his rich biological collections there is a total of 11 odonate spp. from 9 islands. In March 2001 the second author (WB) made a trip in order to study Syrphidae and collected Odonata on three islands. Additionally, we try to include the available collecting data of L. FEA from the Museo Civico di Storia Naturale "Giacomo Doria", Genova (MCSN).

The Cape Verde Islands (Fig. 1) form the southernmost archipelago of the North Atlantic "Macaronesia". The ten islands and five islets of the archipelago are situated about 500 km W of the African coast (Senegal) and 1,500 km SW of the Canary Islands. The total surface is about 4000 km². The human population counts at the moment about 300,000.

The islands are of volcanic origin. On Fogo there is an active volcano, Pico de Fogo, its top (2829m) reaches the highest elevation of the archipelago. The geological development of the Cape Verde Islands probably started near the Senegalese coast in the Eocene (BOEKSCHOTEN & MANUPUTTY 1993). But there has never been a connection with the continent (LOBIN & OHM 1987).

All the islands, but especially the Windwards (Barlavento), have been eroded by sand carried by high winds. Sal (216 km²) in the east of the archipelago and São Vicente (227 km²) are marked by enlarged semi-deserts. Santo Antão (779 km²) shows at higher altitudes and in the deep incised dry valleys („Ribeiras“) a somewhat more rich vegetation; the Ribeira Torre and Ribeira do Paul have water throughout the year. Big parts of Cape Verde are or were used agriculturally if possible or are re-afforested yet (BROCHMANN & RUSTAN 1987; GIER & KLUG 1990).

The climate of the Cape Verde Islands is characterized by moderate, stable temperatures and marked aridity. It is determined by the cold Canary Current and the north-east trade wind (about 80 % of the winds), the south-west monsoon (ca. 5 %) and the Harmattan (ca. 6 %). In general, most of the rain is caused by the monsoon and falls between August and October. The amount of the rain may considerably vary from year to year (KNAPP 1973; LOBIN & OHM 1987) because the monsoon does not always reach the Cape Verde Islands.

At Praia on Santiago the average temperature throughout the year is about 25°C, the temperature differs during the year only $\pm 2^\circ\text{C}$ (KNAPP 1973).

List of Localities

Santo Antão (StA)

Santo Antão 1: Ribeira Grande W near Rib. Grande (alt. 30–50 m); 2.i.1999 EA

Santo Antão 2: Ribeira do Paul (alt. 20–100 m); 3.i.1999 EA

Santo Antão 3: Ribeira Grande W near Rib. Grande (alt. 50 m); 5.i.1999 EA

Santo Antão 4: ca. 2 km W Vila Ribeira Grande, alt. ca. 100–150 m, 2.xii.2000 EA+UA

Santo Antão 5: Ribeira da Torre, alt. 100–250 m, 3.xii.2000 EA+UA

Santo Antão 6: Ribeira Mão Para Tras (ca. 1 km E Vila Ribeira Grande), alt. 20–80 m, 4.xii.2000 EA+UA

Santo Antão 7: Ribeira da Garça (near Manta Velha to near Chã de Ingreja), alt. 200–300 m, 7.xii.2000 EA+UA

Santo Antão 8: near Chã de Ingreja, alt. 80–200 m, 7.xii.2000 EA+UA

Santo Antão 9: Ribeira Grande (17°08.447' N, 25°04.174' W, alt. 210 m); stream with numerous ponds in a valley used for agriculture; 12.iii.2001 WB.

Santo Antão 10: Ribeira de Torre (17°08.171' N, 25°04.106'W); brackish pond, floating algae, water level changed with the tide of the sea; (a) 12.iii.2001, (b)17.iii.2001 WB

Santo Antão 11: Ribeira de Torre near Xôxô (17°08.447' N, 25°03.975' W); 17.iii.2001 WB

Santo Antão 12: Ribeira do Torre (17°08.447' N, 25°04.106' W); irrigation canal made with concrete; 17.iii.2001 WB.

Santo Antão 13: Ribeira do Paúl (17°08.634' N, 25°02.400' W); 13.iii.2001 WB.

São Vicente (SV)

São Vicente 1: Praia Grande (near Calhau near to Baia das Gatas), alt. 0–5 m, 13.xii.2000 EA+UA

São Vicente 2: Monte Verde, alt. 400–700 m, 14.xii.2000 EA

São Vicente 3: Mindelho, southwestern outskirts (16°44.238' N / 24°58.663' W, alt approx. 10 m): golf course, no open water; 19.iii.2001 WB.

São Nicolau (SN)

São Nicolau 1: W near Ribeira Brava, alt.100–150 m, 20.–24.xii.2000 EA+UA

São Nicolau 2: aeroporto near Preguiça, alt. 70–100 m, 21.xii.2000 EA+UA

Sal (Sa)

Sal 1: SE of Monte Grande, alt. 50 m, 9.i.2001 EA

Sal 2: near Pedra Lume, Salinas, alt. 0 m, 10.i.2001 EA

Sal 3: Fontona (or Fontana) (17°44.238' N / 22°58.663' W, alt. 10–20 m) dry valley, with date palms, *Parkinsonia*, 1 cottage with vegetable gardening, small livestock, by the sea, 20.iii.2001 WB

Sal 4: Palmeira, southwestern outskirts (16°45.648' N, 22°58.679'W, alt. 31m), no open water; 20.iii.2001 WB

Sal 5: Ribeira de Pahlha Verde, S of Mureira, dry ditch near the road (16°39.887' N, 22°55.611'W, alt. 44 m); 21.iii.2001 WB

São Tiago (ST)

São Tiago 1: São Jorge de Orgãos, alt. 350 m, 14.xii.1998 EA

São Tiago 2: São Jorge de Orgãos, alt. 300 m, 10.vii.2001 EA

São Tiago 3: Ribeira de Mato Sanchez W Assomada, alt. ca. 250 m, 5.ix.2001 EA

São Tiago 4: São Tiago sept., Ribeira Principal, alt. 150 m, 6.ix.2001 EA

São Tiago 5: Assomada- Fundura, alt. 320–430 m, 13.ix.2001 EA

São Tiago 6: São Jorge de Orgãos, alt. 350–450 m, 15.ix.2001 EA

São Tiago 7: São Jorge de Orgãos, alt. 350 m, 29.ix.2001 EA

São Tiago 8: near São de Orgãos, 22.i.2002 EA

Boavista (Bo)

Boavista 1: S near Sal Rei, alt. 10 m, 30.xii.2000 EA+UA

Boavista 2: near Rabil, Ribeira do Rabil, alt. 20–30 m, 2.–3.i.2001 EA+UA

Boavista 3: Ribeira do Rabil (ca. 3 km N Rabil), alt. 20 m, 6.–7.i.2001 EA+UA

Boavista 4: Ribeira do Rabil, alt. 20 m, 12.i.2007 EA

Brava (Br)

Brava 1: Nova–Sintra–Vinagre, alt. ca. 170 m, (a) 21.i.2001 EA

Brava 2: Nova–Sintra–Vinagre, alt. ca. 170 m, (b) 31.i.2001 EA

Brava 3: Sorno SW Nova Sintra, alt. 100–300 m, 21.vii.2001 EA

Brava 4: Ferreiro, alt. 150 m, 17.viii.2001 EA

Brava 5: Faja d'Água, Ribeira, alt. 50 m, 9.xii.2002 EA

Brava 6: Rib. do Sorno, alt. 50 m, 13.xii.2002 EA

Brava 7: Nova Sinora – Lem, Covada, alt. 420–500 m, 20.–30.xii.2002 EA

Brava 8: Brava mer., Ferreiro, alt. 50 m, 23.xii.2002 EA

Brava 9: Rib. do Sorno, alt. 50 m, 30.xii.2002 EA

Brava 10: near Ferreiro, alt. 100 m 14.xi.2003 EA

Brava 11: Faja d'Água, Lagoa, alt. 150 m, at a small creek, 24.ii.2006 EA

Brava 12: Nova Sintra, Sorno, alt. 40–50 m, at a cistern, 6.iii.2006 EA

Brava 13: Nova Sintra, alt. 40 m, 10.ii.2007 at light EA

Maio (Ma)

Maio 1: Vila do Maio, coastal cliff, alt. ca. 10–20 m, 24.i.2002 EA

Maio 2: Vila do Maio, alt. ca. 20 m, 24.–30.i.2002 EA

Fogo (Fo)

Fogo 1: São Filipe, alt. 50 m, 13.i.2006 EA

Fogo 2: São Filipe, in a ditch (Ribeira) filled with building rubbish at the settlement area, 14.i.2006 EA

Fogo 3: Mosteiros–Fajãzinha Ribeira Tagunda, alt. 280 m, 17.i.2006 EA

Checklist

***Lestes pallidus* Rambur, 1842**

Own records: São Vicente 2 (1♀), Sal 3 (1♀), Sal 4 (1♂, 1♀), Sal 5 (1♂), Boavista 1 (1♀),

Remark: New for Cape Verde.

***Ischnura senegalensis* (Rambur, 1842)**

Previous records: Collected by L. FEA on the Cape Verdes, without further data (MARTIN 1908). One specimen of the Leonardo FEA collection (MCSN): Boa Vista, ii.1898.

Own record: São Vicente 1 (1♀)

***Pseudagrion glaucescens* Selys, 1876**

Previous record: St. Vincent, Porto Grande (1♂) (CALVERT 1893).

Remarks: *Pseudagrion glaucescens* is also recorded from Senegal (PINHEY 1972) and Gambia (PRENDERGAST 1998). But in the light of the long lasting confusion on the species-rich and problematic genus *Pseudagrion* (c.f. PINHEY 1964) which is not totally clarified until today, the old record of CALVERT (1893) need further check.

***Pseudagrion* sp.**

Previous record: St. Vincent, Porto Grande (1 uncomplete ♂) (CALVERT 1893).

Remarks: Supposed to be a new species by CALVERT (1893). Further check needed.

***Anax ephippiger* (Burmeister, 1839)**

Own records: Maio 1 (5♂♂, 7♀♀; adults in big numbers at the cliff), Maio 2 (1♀); Boavista 4 (1♂, 3♀♀)

Remark: New for Cape Verde.

Anax imperator Leach, 1815

Previous records: Listed as *Anax formosus* (Vander Linden) for the archipelago, without further data (MARTIN 1908). Santo Antão, Ribeira Grande, 20. to 26.xii.1978 BAUER & TRAUB (LOBIN 1982)

Own records: Santo Antão 1 (2 ♀♀), Santo Antão 3 (1 ♀), Santo Antão 5 (2 ♂♂), Santo Antão 6 (2 ♂♂), Santo Antão 10a (1 ♂), Santo Antão 10b (dead ♂, 1 exuvia), Santo Antão 13 (2 exuviae).

Brachythemis leucosticta (Burmeister, 1839)

Previous record: St. Vincent, Porto Grande (1 ♂) as “*Libellula (Cacergates) unifasciata* Oliv.” (CALVERT 1893).

Remarks: No further records.

Crocothemis erythraea (Brullé, 1832)

Previous records: St. Vincent, Porto Grande, 26.xii.1895, (3 ♂♂, 1 ♀) leg. E. AUSTEN (KIRBY 1897). Collected by L. FEA on the Cape Verdes, no further data (MARTIN 1908), in the Leonardo Fea collection (MCSN): Boa Vista, ii.1898 (2 specimens). Santo Antão, Ribeira Grande, 20.–26.xii.1978, leg. E. BAUER & B. TRAUB, São Vicente, water hole E of Monte Verde, 19.xii.1978, leg. E. BAUER, K. GROH & B. TRAUB; Brava, Fajã de Agua, stream, 26.x.1979, leg. K. GROH & W. LOBIN; Sal, Sta. Maria, cisterns; 4.xi.1979 W. LOBIN (LOBIN 1982).

Own records: São Tiago 8 (1 ♂), São Tiago 1 (1 ♂ juv., 1 ♀), Santo Antão 1 (1 ♂), San Nicolau 1 (1 ♂), Boavista 2 (2 ♂♂), São Tiago 2 (1 ♂), Brava 4 (2 ♂♂), São Tiago 4 (4 ♂♂), São Tiago 5 (1 ♂), Brava 1 (1 ♂, 1 ♀), Santo Antão 4 (1 ♀), S. Nicolau 2 (1 ♀), Brava 1 (1 ♀), São Tiago 3 (1 ♀), Brava 7 (1 ♂, 3 ♀♀), Brava 9 (1 ♂, 1 ♀), Brava 12 (1 ♂), Brava 11 (2 ♂♂), Fogo 3 (1 ♂ + 1 ♀ + 1 exuvia (all fragmentic), Brava 13 (1 ♂ juv.)

Orthetrum trinacria (Selys, 1841)

Previous records: Collected by L. FEA on the Cape Verdes without giving further data (MARTIN 1908). Two specimens of the Leonardo Fea collection in MCSN: Boa Vista, ii.1898. Santo Antão, Ribeira Grande, 24.xii.1978, leg. E. BAUER & B. TRAUB; São Vicente, water hole E of Monte Verde, 19.xii.1978, leg. E. BAUER, K. GROH & B. TRAUB (LOBIN 1982)

Own records: São Tiago 1 (1 ♂), Santo Antão 4 (1 ♂), S. Nicolau 1 (1 ♂), Boavista 3 (3 ♂♂, 1 ♀), Brava 3 (2 ♂♂), São Tiago 4 (1 ♂), Santo Antão 7 (1 ♀), Boavista 2 (1 ♀), Brava 9 (1 ♀ juv.), Brava 12 (1 ♀ + 7 exuviae (4 ♂♂ + 3 ♀♀)), Brava 11 (2 ♂♂).

Pantala flavescens (Fabricius, 1798)

Previous records: St. Vincent, Porto Grande, 26.xii.1895, 1 specimen, leg. E. AUSTEN (KIRBY 1897). Collected by L. FEA on the Cape Verdes without giving further data (MARTIN 1908).

Own records: São Tiago 1 (1 ♂), Santo Antão 8 (1 ♂), Boavista 2 (4 ♂♂, 4 ♀♀), São Tiago 6 (2 ♂♂, 2 ♀♀), Brava 8 (1 ♂), Fogo 1 (1 ♂), Fogo 2 (1 ♂), Boavista 4 (1 ♂)

Sympetrum fonscolombii (Selys, 1840)

Previous records: São Tiago, Tarrafel, 1.i.1979, E. BAUER & B. TRAUB (LOBIN 1982). São Tiago, Pico da Antonia, ii.1989, ♂♂; Sal, Serra Negra, x.1982, ♀♀; São Tiago, Ribeira da Vale Cachopo, x.1982, ♂♂; Sal, Palha Verde, vii–viii.1991, ♀♀; São Nicolau, iii–iv.1992; Santo Antão, Ribeira do Paul, v.1996; Santo Antão, Ribeira Mao Para Tràs, xi.2000, ♂; all data by pers. comm. from M. GEISTHARDT.

Own records: Sal 1 (2 ♂♂), S.Nicolau 1 (2 ♀♀).

Tramea limbata (Desjardins, 1832)

Own records: Boavista 2 (1 ♂), Boavista 3 (2 ♂♂)

Remark: New for Cape Verde.

Trithemis annulata (Palisot de Beauvois, 1807)

Previous records: Listed as *Trithemis rubrinervis* (Selys) for the archipelago without further data (MARTIN 1908). One specimen of the Leonardo Fea collection (MCSN): S. Nicolau, 300–400 m, xi.1898. Santo Antão, Ribeira Grande, 20.–26.xii.1978 E. BAUER & B. TRAUB; Brava, Fajã de Agua, stream, 26.x.1979 GROH & LOBIN (LOBIN 1982).

Own records: Santo Antão 9 (3 exuviae *Trithemis* sp.), Santo Antão 10a (1 ♂), Santo Antão 13 (1 ♂, 1 ♀), São Vicente 3 (1 ♀), São Tiago 8 (1 ♂). São Tiago 1 (6 ♂♂, 2 ♀♀), Santo Antão 1 (2 ♂♂, 2 ♀♀), Santo Antão 2 (1 ♀), Santo Antão 4 (2 ♂♂), Santo Antão 5 (1 ♂), São Tiago 4 (5 ♂♂), S. Nicolau 1 (2 ♂♂), Boavista 2 (1 ♀), São Tiago 2 (1 ♂), Brava 3 (1 ♂), Brava 4 (1 ♂, 1 ♀), São Tiago 3 (1 ♂), São Tiago 7 (1 ♀), Brava 6 (1 ♀), Brava 9 (3 ♂♂ + 1 ♂ juv., 1 ♀ juv.), Brava 12 (2 ♂♂, 1 ♀, 2 exuviae (♀♀)), Brava 11 (2 ♂♂), Brava 10 (1 ♀).

Trithemis arteriosa (Burmeister, 1839)

Previous records: Collected by L. FEA on the Cape Verdes (MARTIN 1908), no further data.

Zygonyx torridus (Kirby, 1899)

Previous records: Collected by L. FEA on the Cape Verdes, listed as *Pseudomacromia torrida* Kirby, no further data added (MARTIN 1908).

S. Nicolau, Ribeira Brava, 8.xii.1953 (1 ♂), leg. H. LINDBERG [in coll. Mus. Alexander Koenig, Bonn – by pers. comm. from S. OBER].

Brava, Faja de Agua 16.x.1979 GROH & LOBIN (LOBIN 1982)

Own records: Santo Antão 6 (1 ♂), Santo Antão 10b (1 exuvia), Santo Antão 11 (2 exuviae), Santo Antão 12 (1 exuvia).

The voucher specimens collected by EA were determined by GL and are stored in his personal collection.

Tab. 1. Known distribution of Odonata on the Cape Verde islands.

	StA	SV	SN	Sa	Bo	Ma	ST	Fo	Br
<i>Lestes pallidus</i>		+		+	+				
<i>Ischnura senegalensis</i>		+			+				
<i>Pseudagrion glaucescens</i>		+							
<i>Anax ephippiger</i>					+	+			
<i>Anax imperator</i>	+		+?						
<i>Brachythemis leucosticta</i>		+							
<i>Crocothemis erythraea</i>	+	+	+	+	+		+	+	+
<i>Orthetrum trinacria</i>	+	+	+		+		+		+
<i>Pantala flavescens</i>	+	+			+		+	+	+
<i>Sympetrum fonscolombii</i>	+		+	+			+		
<i>Tramea limbata</i>					+				
<i>Trithemis annulata</i>	+	+	+		+		+		+
<i>Trithemis arteriosa</i>									
<i>Zygonyx torridus</i>	+		+						+

Discussion

The present knowledge on the Odonata of the Cape Verde Islands is remarkably small compared with other taxa, as Coleoptera, where detailed distributional data are available (GEISTHARDT 1988). Until now, Odonata records are known from 9 of the 12 larger islands (Tab. 1). Three species, *Pseudagrion glaucescens*, *Brachythemis leucosticta* and *Trithemis arteriosa*, have not been confirmed for more than hundred years, and the collection of Leonardo FEA (MARTIN 1908) could be specified in parts only.

The dragonfly species yet known from the Cape Verde Islands are characteristic for arid regions in Africa (c.f. SUHLING et al. 2002), and widely distributed within the Ethiopian region. They are all listed/considered as African migrants. Many of them are reaching Europe, a well known fact already remarked by MARTIN (1908). Because of the climatic similarities one should compare the Odonate fauna of the Cape Verde islands with other dry regions at the West African coast. Except *Zygonyx torridus* all species are known from Mauretania (FRASER 1952; DUMONT 1976, 1978) or the northern Senegal (e.g. PINHEY 1972). However, we expect that *Z. torridus* also will be there. The species is typical for African islands, and is known from dry islands as Soquotra (SCHNEIDER & DUMONT 1996) or the Canary Islands (BAEZ 1985) as well as more humid ones as La Réunion (JACQUEMIN 1988, COUTEYEN & PAPAIZIAN 2002) or Mauritius (PINHEY 1976).

A number of species is to be expected, viz. *Ceriagrion glabrum*, *Orthetrum chrysostigma*, *Diplacodes lefebvreii* and *Tramea basilaris*. On one hand they are successful colonizers of African islands (e.g. SCHNEIDER & DUMONT 1996), on the other hand they are widely distributed in the neighboring continental arid regions (e.g. SUHLING et al. 2003).

There is none endemic dragonfly taxon about the Cape Verde islands yet. Whilst other comparable islands of similar and even of lower age size and isolation conditions partly have them and even though in other groups (like Blattaria or Reptilia) (ARECHAVALETA et al. 2005) they exist on the Cape Verde islands.

The question why dragonflies on the Cape Verde islands do not have endemic species may be answered by the fact of the special climatic conditions. The settlement of stable and durable populations with high

numbers of individuals have to face the problem of highly reduced aquatic habitats, but even more the fact of the changing and uncertain amount of rainfall. (The facts of such conditions on African dragonflies in general are already well discussed by DIJKSTRA 2007.)

This unfavourable local conditions for settlement and ontogenetic development do not only minimize the number of appearing species it is even possible that in extremely dry years in a row the existence of autochthonous species (which usually can handle with this arid climatic conditions) is possibly disturbed. In long run this means that only migrating species can exist and therefore one has to assume also repeated influx from mainland Africa.

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