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Front cover | Capa: Magnificent frigatebird | Fragata *Fregata magnificens* Mathews, 1914, female, Ilhéu de Curral Velho, Boavista, 12 February 2005 (Pedro López-Suárez).

Seventh report on birds from the Cape Verde Islands, including records of nine taxa new to the archipelago

Cornelis J. Hazevoet ¹

Keywords: Aves, Cape Verde Islands, distribution, migration, vagrancy, endemics, breeding.

ABSTRACT

Recent data on status and distribution of resident and migrant birds in the Cape Verde Islands are presented, including records of nine taxa new to the archipelago, viz. *Ixobrychus sturmii*, *Botaurus stellaris*, *Butorides striatus*, *Circus cyaneus*, *Porzana pusilla*, *Fulica atra*, *Chlidonias niger*, *Acrocephalus schoenobaenus* and *Hippolais polyglotta*. Also presented are data on a number of breeding taxa, including the first record of the endemic Raso lark *Alauda razae* outside the islet of Raso. The alarming situation of the magnificent frigatebird *Fregata magnificens*, of which probably only two individuals remain in Cape Verde, constituting the entire population in the East Atlantic, is highlighted. During the past decade, breeding populations of common moorhen *Gallinula chloropus* appear to have become well-established on the islands of Santiago and Boavista. Following its expansion through Northwest Africa and the Canary Islands, Eurasian collared dove *Streptopelia decaocto* has now also colonized the Cape Verde Islands.

RESUMO

São apresentados dados sobre o estado e distribuição de aves residentes e migratórias nas ilhas de Cabo Verde, incluindo registos de nove novos taxa no arquipélago, viz. *Ixobrychus sturmii*, *Botaurus stellaris*, *Butorides striatus*, *Circus cyaneus*, *Porzana pusilla*, *Fulica atra*, *Chlidonias niger*, *Acrocephalus schoenobaenus* e *Hippolais polyglotta*. São igualmente disponibilizados dados sobre taxa nidificantes, incluindo o primeiro registo da espécie endémica calhandra-do-ilhéu-Raso *Alauda razae* fora do ilhéu Raso. É destacada também a situação alarmante da fragata *Fregata magnificens* da qual provavelmente apenas restam dois indivíduos em Cabo Verde, constituindo a totalidade da população em todo o Atlântico Leste. Durante a última década, populações nidificantes de galinha-de-água *Gallinula chloropus* parecem ter-se estabelecido de forma permanente nas ilhas de Santiago e Boavista. Na sequência da sua expansão através do Noroeste Africano e ilhas Canárias, a rola-turca *Streptopelia decaocto* também coloniza agora as ilhas de Cabo Verde.

¹ Instituto de Investigação Científica Tropical - Jardim Botânico Tropical, Unidade de Zoologia, Rua da Junqueira 14, 1300-343 Lisboa, Portugal; e-mail cjhazevoet@gmail.com

INTRODUCTION

This is the seventh supplement to *The Birds of the Cape Verde Islands* (Hazevoet 1995). For previous instalments, see Hazevoet (1997, 1998, 1999, 2003, 2010) and Hazevoet *et al.* (1996). Most data in the current report concern the years 2010-2012 (up to 1 April), but records from earlier years that came to light after the publication of previous supplements are also included.

During the past few years, the Cape Verde Islands continued to be an increasingly popular destination amongst bird watchers, especially those in search of endemics and vagrants. The watershed at Poilão has again produced an amazing number of vagrant ducks, herons and rails, several of them new to the islands, and some of the herons, formerly considered rare vagrants, are now present there during almost every month of the year. This demonstrates that the presence of standing water is quickly discovered and utilized by many migrating birds from Eurasia, Africa and North America, a circumstance

that also applies to that other ‘hotspot’ for vagrants in Cape Verde, the sewage ponds in São Vicente. With the construction of several more watersheds being planned on Santiago, as well as on Santo Antão, we can only guess what ornithological surprises await us in the future. The grand total of species level taxa recorded in the archipelago now stands at 220, an increase of 76 since the publication of the 1995 check-list (not counting a number of introduced taxa that may or may not have established a permanent population or that have disappeared since being introduced).

Unless stated otherwise, general data on distribution, status, number of records, etc. in the following are taken from Hazevoet (1995, 1997, 1998, 1999, 2003, 2010) and Hazevoet *et al.* (1996). In the taxon accounts, islands are listed in clockwise order, starting with the main island of Santiago. Records of rare taxa were scrutinized by the author, with the assistance of Nils van Duivendijk, Jan van der Laan and C.S. Roselaar.

ABBREVIATIONS: AC – Andy Clifton; AML – Alexis & Mariana de Lespinay; BG – Mauro Bailo & Arturo Gargioni; DC – Dirk Colin; EB – Eric Bos; ED – Eric Didner; GBH – Gerry & Béatrice Hinchon; HJ – Henk de Jong; HM – Harro Müller; JH – Jamie Hooper; JLE – John Lee; JLI – John Lines; KM – Keith Moir; KDR – Kris De Rouck; KM – Killian Mullarney; KR – Panu Kunttu & Sanna-Mari Rivasto; LS – Laurens Steijn;

MD – Menno van Duijn; MG – Mike Greenfelder; PLS – Pedro López-Suárez; MC – Maria Camacho; PAC – Pierre-André Crochet *et al.*; PD – Paul Donald; RB – Richard Bonser; RT – Roderick Thorne; RV – Rinse van der Vliet; RW – Richard White; SB – Simon Baliteau; SM – Samir Martins; SP – Steve Payne; RBT – Rubén Barone Tosco; TS – Teet Sirotkin; UF – Ulrich Filbrandt; YC – Yann Coatanéa.

BREEDING BIRDS

In this section, additional data on Cape Verde breeding birds are presented, including range expansions within the archipelago, new

breeding sites, new or rare records for a particular island and other noteworthy observations.

Magnificent frigatebird *Fregata magnificens* Mathews, 1914

SAL: one offshore from the Morabeza Beach Bar, 4 February 2010 (JLI), was the only report away from Boavista, where the only breeding site is situated. Three frigatebirds were reportedly seen at ilhéu de Baluarte (a former breeding site) during the summer of 2011 (Anon. *per* PLS), but no sign of frigatebirds was found there in January 2012

(PLS). In December 2011, the total population in Cape Verde consisted of one male and one female (PLS), compared to two females and two or three males in 2006 (López Suárez *et al.* 2007).

The development of the tourist industry along Boavista’s southern coast has given rise to increased disturbance of the seabird colony

at ilhéu de Curral Velho, a Nature Reserve protected by law and now the only breeding site of frigatebirds in Cape Verde, while vandalism by local inhabitants, targetting brown booby *Sula leucogaster* and red-billed

tropicbird *Phaethon aethereus* at the islets of Baluarte and Curral Velho, as well as elsewhere on the island, continues uninhibited and without any repercussion from the side of those who are supposed to uphold the law.

Black kite *Milvus migrans* (Boddaert, 1783)

SÃO VICENTE: six at Monte Verde, 6 March 2011 (SB). This is the first record of black kite from São Vicente since the early 1980s, save for the sighting of an unidentified kite *Milvus* sp. there in March 2000 (cf. Hazevoet 2003). Most recent records of black kite are from the eastern islands of Boavista and Maio

and the occurrence of six birds on São Vicente in 2011 comes as a surprise. It is as yet unclear whether the black kites seen in Cape Verde are local breeding birds or Palearctic migrant visitors. Very little information on breeding of black kite in the Cape Verde Islands exists.



Fig. 1. Black Kite *Milvus migrans*, Monte Verde, São Vicente, 6 March 2011 (Simon Baliteau).

Common moorhen *Gallinula chloropus* (Linnaeus, 1758)

SANTIAGO: a breeding population has become established at Barragem de Poilão, with adults, immatures and downy chicks being observed on many occasions during the years 2007-2012. During May-September 2011, a maximum of 44 birds was counted there, 7 August 2011 (UF). BOAVISTA: five (including a colour-ringed adult, the

provenance of which remains as yet unresolved) at Monte Trigo, 14-20 May 2010 (PLS, MC), and one there, 16 March 2011 (GBH).

Barragem de Poilão (Santiago) and Monte Trigo (Boavista) are the only known breeding sites of moorhen in the Cape Verde Islands. Although as yet of unknown origin,

the presence of a colour-ringed bird demonstrates that migrants from (presumably) Europe at least occasionally reach the islands (assuming that the bird on Boavista was not colour-ringed in Cape Verde, which seems a reasonable guess as no such ringing scheme is known to be conducted there). From 1969 to 1998, there were no records of moorhen in

Cape Verde, followed by single records in 1999 and 2001. The construction of the Barragem de Poilão has changed the situation dramatically. However, it seems possible that a small population existed all along on Boavista, as the breeding site at Monte Trigo was seldom visited during the intervening years.

Rosy-faced lovebird *Agapornis roseicollis* (Vieillot, 1818)

SANTO ANTÃO: a pair nesting under a roof at Pedracin Village tourist resort, Boca de Coruja, 2 February 2012 (HJ). Doubtlessly either escaped or purposefully introduced, this

could possibly signal the onset of a feral population of this popular cagebird. Its natural range extends from southern Angola through Namibia into northwestern South Africa.

Grey-headed kingfisher *Halcyon leucocephala* (P.L.S. Müller, 1776)

MAIO: a small population appears to have become established over the past few years and the kingfisher has now been reported from localities in the south (Ponta Preta, Casas Velhas), southwest (Morro) and east (Pedro Vaz) of the island (SM). First reported

from Maio in 2008, it is as yet unclear whether birds reached the island by themselves or were purposefully introduced there. Elsewhere in Cape Verde, the kingfisher is widespread and common in Santiago, Fogo and Brava.

Black-crowned finch lark *Eremopterix nigriceps* (Gould, 1841)

SAL: a flock of *ca.* 60 birds was present near the Riu Hotel in December 2006, while six were seen near the Vila Verde Resort in January 2010 (JLE); 10 at the Santa Maria sewage works, 31 January 2012, and 12 there, 5 February 2012 (JLI); all of these localities are in the southwest of the island. This follows reports of singing males on Sal in October 1998 and November 1999 and the

presence of several flocks there in November 2006. Black-crowned finch lark is a locally common breeding birds on Santiago, Fogo, Boavista and Maio, and there are also records from Brava, São Vicente, Raso and São Nicolau. Due to its nomadic habits, the finch lark's occurrence on different islands and at different locations is often erratic and unpredictable.

Bar-tailed desert lark *Ammomanes cinctura* (Gould, 1841)

SANTA LUZIA: at least 30 pairs at the western end of the island, many of which singing and one apparently carrying food to a nest, 8 March 2012 (PD). This is only the third record of bar-tailed desert lark for Santa Luzia, the previous being of *ca.* 10 in the easternmost part, 2 November 1990, and two

seen, 20 January 2003. However, the lack of observations may reflect a lack of observers on this uninhabited island rather than a lack of larks. Elsewhere in Cape Verde, bar-tailed desert lark is widespread and common in Sal, Boavista and Maio, and locally common in Santiago, Fogo and São Nicolau.

Hoopoe lark *Alaemon alaudipes* (Desfontaines, 1789)

SANTIAGO: two between Moia Moia and São Francisco/Achada Ponta Bomba, 30 January 2011 (UF). Previously, there was only a single record from Santiago, i.e. two at Praia airport, 11 July 2005. SAL: several records were received, predominantly from the south-

western part of the island, and hoopoe lark now appears to be well-established there. It was first reported from Sal in 1995. Elsewhere in the archipelago, hoopoe lark is restricted to Boavista and Maio, where it is widespread and common.



Fig. 2. Raso lark *Alauda razae*, Ponta do Barril, São Nicolau, 16 March 2009 (Jamie Hooper).

Raso lark *Alauda razae* (Alexander, 1898)

SÃO NICOLAU: a male near Ponta do Barril (in the western part of the island), 16 March 2009 (JH). This is the first record outside Raso, to which islet the entire population of this endemic lark is supposedly restricted. As the sighting concerned a single bird and there have as yet not been follow up records from the area, its occurrence in São Nicolau may concern the rare instance of a lone lark gone astray, nevertheless demonstrating its potential capacity for natural range expansion. Population estimates during the 1980s and

1990s varied from 150 to 250 birds (Ratcliffe *et al.* 1999), but following a number of successful rainfall-related breeding seasons during the past decade, the population had increased to 1,490 birds in 2011 (Brooke *et al.* 2012), which may explain the unexpected appearance of a Raso lark in São Nicolau. In order to monitor possible occurrences there in the future, the arid westernmost parts of São Nicolau clearly deserve the attention from population biologists, conservationists and bird watchers alike.

Blackcap *Sylvia atricapilla* (Linnaeus, 1758)

BOAVISTA: a total of eight (of which three singing) in bushes along Ribeira do Rabil, 7 October 2011 (HM). Prior to records in the years 1995-2006, the existence of a local

population on Boavista was uncertain. Previous reports were all from the eastern part of the island and this is the first from a western location.

MIGRANT VISITORS AND VAGRANTS

In the following, the numbers in brackets at the beginning of each entry indicate 1) the number of records up to 1 January 1980 and 2) the number of records since that date. When the number of records before 1 January 1980 is uncertain this is indicated as (--). Taxa new to the archipelago are marked with an asterisk. Records of taxa, previously included in these reports, of which there are now more than 20 records since 1 January 1980 (viz. *Egretta*

gularis, *Platalea leucorodia*, *Circus aeruginosus*, *Charadrius dubius*, *Calidris alpina*, *Philomachus pugnax*, *Gallinago gallinago*, *Limosa lapponica*, *Tringa totanus*, *T. glareola*, *Chroicocephalus ridibundus*, *Larus michahellis*, *Oenanthe oenanthe*) are included only when an observation represents a new island record or when there are otherwise remarkable circumstances (e.g. unusual numbers or date, ringing recovery).

Eurasian wigeon *Mareca penelope* (Linnaeus, 1758)

(0, 2) SÃO VICENTE: one male at the sewage ponds, 1-2 March 2012 (PAC). The only previous record was of one in Maio in December 2004-January 2005. In West Africa,

wigeon is a scarce to uncommon Palearctic winter visitor from Mauritania and northern Senegal eastward to Chad (Borrow & Demey 2001).

Common teal *Anas crecca* Linnaeus, 1758

(2, 16) SANTIAGO: three males at Barragem de Poilão, 20 February 2011 (UF), and one there, 10 February 2012 (AML). SÃO VICENTE: two males at the sewage ponds, 11 February 2010 (KR). SAL: a female at Ribeira da Madama, 11 November 2010 (RBT, TS). BOAVISTA: two at the Curral Velho lagoon, 2 February 2012 (AML). Common teal has been recorded from Santiago (3), São Vicente (7), Sal (3) and Boavista (5). All records are from October to March. As in

previous years, it cannot be excluded that some records in fact concerned Nearctic green-winged teal *A. carolinensis* (of which there is a single record in Cape Verde) and records are here accepted as *A. crecca sensu lato*. In West Africa, common teal is a scarce to locally common Palearctic winter visitor from Mauritania and Senegambia eastward to Chad and the Central African Republic, rare further south (Borrow & Demey 2001).



Fig. 3. Common teal *Anas crecca* and northern pintail *A. acuta*, Ribeira da Madama, Sal, 11 November 2010 (Stefan Cherrug).

Northern pintail *Anas acuta* Linnaeus, 1758

(0, 5) SÃO VICENTE: a male at the sewage works, 11 February 2010 (KR). SAL: a female at Ribeira da Madama, 11 November 2010 (RBT, TS). Northern pintail has been recorded (November, December, February) from São Vicente (1), Sal (3) and Maio (1). In West Africa, it is a Palearctic winter visitor

from Mauritania and Sierra Leone east to Chad and the Central African Republic, common to locally very common south to Senegal, Mali, northern Nigeria and Chad, uncommon to scarce further south (Borrow & Demey 2001).

Blue-winged teal *Anas discors* Linnaeus, 1766

(0, 4) SANTIAGO: one female at Barragem de Poilão, 25 February-4 March 2012 (PAC). SÃO VICENTE: three males and four females at the sewage works, 11 February 2010 (KR).

This Nearctic migrant has been recorded (December-March) from Santiago (2) and São Vicente (2). In West Africa, it has been recorded in Senegal (Borrow & Demey 2001).

Ring-necked duck *Aythya collaris* (Donovan, 1809)

(0, 4) SANTIAGO: one male and 7-8 females at Barragem de Poilão, 8 November 2009 to 21 March 2010 (EB, KM, UF). A Nearctic migrant, which has now been recorded

(November-March) from Santiago (1), São Vicente (2) and Sal (1). There appear to be as yet no records from the West African mainland (cf. Borrow & Demey 2001).



Fig. 4. Cory's shearwater *Calonectris borealis*, between São Nicolau and Raso, 9 November 2010 (Stefan Cherrug).

Cory's shearwater *Calonectris borealis* (Cory, 1881)

(--, 12) CAPE VERDE SEAS: two between São Nicolau and Raso, 9 November 2010 (RBT, TS); one between São Vicente and Santo Antão, 19 November 2011 (YC). Probably a regular passage migrant, but

reports are few and *C. borealis* is easily overlooked amongst the locally common Cape Verde shearwater *C. edwardsii*, especially in autumn when numbers of the latter are high. Moreover, the scarce reports seldom

distinguish between Cory's and Scopoli's shearwater *C. diomedea*. There are records (*borealis* and/or *diomedea*) in November, December, February and March. Probably a rare to not uncommon passage migrant and

winter visitor off West Africa, but status inadequately known as observers seldom distinguish between *borealis*, *diomedea* and *edwardsii* (Borrow & Demey 2001, Dubois *et al.* 2009).

Great shearwater *Puffinus gravis* (O'Reilly, 1818)

(2, 7) CAPE VERDE SEAS: one between São Nicolau and Raso, 9 November 2010 (RBT, TS). Probably a not uncommon passage migrant in Cape Verde seas, the presence of which likely remains largely undetected due to its pelagic habits. Recorded in September

(2), October (1), November (3), December (2) and February (1). Off West Africa, it is a rare migrant visitor to offshore waters (Borrow & Demey 2001, Dubois *et al.* 2009). Breeds on islands in the Southern Ocean.



Fig. 5. Great shearwater *Puffinus gravis*, between São Nicolau and Raso, 9 November 2010 (Stefan Cherrug).

White-tailed tropicbird *Phaethon lepturus* Daudin, 1802

(0, 2) CAPE VERDE SEAS: an adult at approximately 14°58'N, 23°53'W (off western Santiago), 3 May 2011 (LS). The only previous record of white-tailed tropicbird was of one at ilhéu de Curral Velho, Boavista, 20 February 1999. Furthermore, there are a

few extralimital pelagic records not far from the Cape Verde Islands (cf. Hazevoet 1995). In West Africa, it breeds on islands in the Gulf of Guinea and has been recorded as a vagrant off Ghana and Liberia (Borrow & Demey 2001).

Red-footed booby *Sula sula* (Linnaeus, 1766)

(0, 6) CAPE VERDE SEAS: an immature at 17°14,9'N, 21°54,9'W, 14 April 2011 (MG, RW). Red-footed booby has been recorded in April (2), July, August, October and November. There is also a record (October) from the Atlantic, just extralimital of the

geographical area considered here. Breeds on tropical islands in most oceans, including the Caribbean and western Atlantic, but not in the eastern Atlantic. There appear to be as yet no records off continental West Africa (cf. Borrow & Demey 2001).



Fig. 6. White-tailed tropicbird *Phaethon lepturus*, off western Santiago, 3 May 2011 (Laurens Steijn).



Fig. 7. Red-footed booby *Sula sula*, 17°14,9'N, 21°54,9'W, 14 April 2011 (Richard White).

Little bittern *Ixobrychus minutus* (Linnaeus, 1766)

(1, 3) SANTIAGO: an adult at Barragem de Poilão, 16 March 2010 (EB). Previous records are of an immature collected on Brava in October 1969, an immature at Barragem de Poilão in March 2007 and again one there (age unknown) in March 2008. The possibility remains that (some of) the records at Barragem de Poilão concerned the same long-staying individual. In West Africa, it is both an uncommon breeding resident and a Palearctic winter visitor (Borrow & Demey 2001).

***Dwarf bittern** *Ixobrychus sturmii* (Wagler, 1827)

(0, 1) SANTIAGO: one at Barragem de Poilão, 12 June 2011 (ED, PAC), and still present there, 17 July 2011 (UF). This is the first record of dwarf bittern for the Cape Verde Islands. In West Africa, this Afrotropical taxon is an uncommon to scarce intra-African migrant, occurring during the wet season in suitable habitat throughout most of the region; movements are poorly understood due to its secretive habits (Borrow & Demey 2001).



Fig. 8. Dwarf bittern *Ixobrychus sturmii*, Barragem de Poilão, Santiago, 12 June 2011 (Pierre-André Crochet).

***Eurasian bittern** *Botaurus stellaris* (Linnaeus, 1758)

(0, 1) SANTIAGO: one at Barragem de Poilão, 6 March 2011 (UF). This is the first record of Eurasian bittern for the Cape Verde Islands. In West Africa, it is a rare winter visitor from Europe and perhaps North Africa (Borrow & Demey 2001).

Black-crowned night heron *Nycticorax nycticorax* (Linnaeus, 1758)

(1, 16) SANTIAGO: four at Barragem de Poilão, 16 March 2010 (EB), a juvenile there, 6-7 November 2010, and a juvenile at Pedra Badejo lagoon, 7 November 2010 (RBT, TS); up to 15 at Barragem de Poilão, 16 January-15 April 2011 (DC, GBH, KDR, UF), and again up to 15 there, 7 August 2011-4 March 2012 (AML, PAC, UF). BOAVISTA: an adult at Monte Trigo, 15 May 2010 (PLS, MC); a juvenile at Ribeira do Rabil, 26 September 2011 (BG). Black-crowned night heron has been recorded (August-May) from Santiago (10), São Vicente (1), Raso (1) and Boavista (5). In West Africa, migrants from Europe occur alongside residents during the northern winter (Borrow & Demey 2001).

***Green-backed heron** *Butorides striatus* (Linnaeus, 1758)

(0, 1) SANTIAGO: two at Barragem de Poilão, 7 February 2012 (AML). This is the first record of green-backed heron for the Cape Verde Islands. In West Africa, it is a common resident throughout, except in the arid north (Borrow & Demey 2001).

Squacco heron *Ardeola ralloides* (Scopoli, 1769)

(2, 11) SANTIAGO: singles at Barragem de Poilão, 6 June and 18 July 2009 (UF), are considered to have been the same bird(s) present there, 21 March-7 April 2009 (cf. Hazevoet 2010); up to seven at Barragem de Poilão, 18 November 2009-2 April 2010 (EB, UF); up to 10 there, 6 November 2010-29 May 2011 (DC, GBH, KDR, LS, MD, RBT, TS, UF), and up to seven at that locality, 24 September 2011-18 March 2012 (AML, BG, PAC, UF). Squacco heron has now been recorded in all months except August. Records are from Santiago (10), São Nicolau (1), Sal (1) and Boavista (1). In West Africa, migrants from Europe occur alongside residents during the northern winter and may outnumber them in most areas (Borrow & Demey 2001).



Fig. 9. Squacco heron *Ardeola ralloides*, Barragem de Poilão, Santiago, 22 March 2011 (Béatrice Hinchon).

Cattle egret *Bubulcus ibis* (Linnaeus, 1758)

SANTIAGO: 1,355 birds counted at a roost at Prainha, Praia, 5 February 2011 (UF), was the largest number reported so far. Previously, the highest count of roosting birds was 1,344 at

Barragem de Poilão, Santiago, 1 March 2008 (Hazevoet 2010). In the Cape Verde Islands, cattle egret is a common migrant visitor and a rare breeding bird.

Black heron *Egretta ardesiaca* (Wagler, 1827)

(0, 5) SANTIAGO: 1-2 at Barragem de Poilão, 16 January-29 May 2011 (AC, DC, GBH, KDR, LS, MD, RB, UF), and again 1-2 there, 22 January-4 March 2012 (AML, PAC, UF). SÃO VICENTE: one at Ribeira da Vinha, 11 February 2010 (KR). Black heron has been

recorded (January-May) from Santiago (2), São Vicente (1), Raso (1) and Boavista (1). In West Africa, it is an uncommon to locally common resident, but local movements have been recorded (Borrow & Demey 2001).



Fig. 10. Black heron *Egretta ardesiaca*, Barragem de Poilão, Santiago, 4 March 2012 (Eric Didner).

Western reef heron *Egretta gularis* (Bosc, 1792)

SANTO ANTÃO: one (dark morph) at Tanque, Ribeira Grande, 19 February 2011 (SB). SÃO VICENTE: one (dark morph) at the sewage ponds, 11 February 2010 (KR). This is the first record for Santo Antão and the

second for São Vicente. A regular Afro-tropical migrant visitor in small numbers, western reef heron is most often reported from Santiago and Boavista and there are also a few records from Raso and Maio.



Fig. 11. Intermediate egret *Egretta intermedia*, Barragem de Poilão, Santiago, 22 March 2011 (Béatrice Hinchon).



Fig. 12. Great white egret *Casmerodius albus* (showing characters of American great white egret *C.a. egretta*), sewage ponds, São Vicente, 1 March 2012 (Pierre-André Crochet).

Intermediate egret *Egretta intermedia* (Wagler, 1829)

(1, 15) SANTIAGO: 1-5 at Barragem de Poilão, 19 March-7 August 2011 (AC, DC, ED, GBH, KDR, LS, MD, PAC, RB, UF), and one there, 8 February-4 March 2012 (AML, PAC). SAL: one at the edge of the swimming pool at the Morabeza Hotel, Santa Maria, 31 January 2012 (JLI). BOAVISTA: one at Praia

de Ervatão, 10 October 2011 (HM). Intermediate egret has been recorded in all months except September from Santiago (5), Santo Antão (2), São Vicente (3), Sal (2), Boavista (4). Uncommon to common throughout West Africa, except the arid north (Borrow & Demey 2001).

Great white egret *Casmerodius albus* (Linnaeus, 1758)

(0, 4) SANTIAGO: one at Barragem de Poilão, 6 June and 18 July 2009 (UF), is taken to have been one of the birds already present there during March-April of the same year (cf. Hazevoet 2010). SÃO VICENTE: one at the sewage ponds, 1-2 March 2012 (PAC), showed characters of American great white egret *Casmerodius albus egretta*, i.e. relatively small size (in comparison with little egrets *Egretta garzetta* present at the site), compact build and very dark upper tibia. BOAVISTA: one (together with five grey herons *Ardea cinerea*) at a pool near Praia das Gatas, 3 February 2012 (AML). The only

previous record of great white egret was of one on Boavista in March 1999. Great white egret is a common to not uncommon resident (*melanorhynchos*) throughout West Africa, except the arid north, and there are also a few records of European migrants (*albus*), which, however, probably remain largely undetected amongst the resident population (Borrow & Demey 2001). The possibility of vagrants from the Americas (*egretta*) occasionally reaching the Cape Verde Islands cannot be excluded, but the possible record from São Vicente listed here has as yet not been formerly accepted as such.

Black-headed heron *Ardea melanocephala* Vigors and Children, 1826



(0, 1) SANTIAGO: presumably the same bird, first seen at Barragem de Poilão in March-April 2009 (cf. Hazevoet 2010), was still present there, 16 March 2010 (EB), 21-22 March 2011 (GBH), 15 April 2011 (DC, KDR), 30 April 2011 (AC, RB), and 7 February 2012 (AML). Black-headed heron is an uncommon to common resident throughout West Africa, avoiding the most arid areas, moving north with the rains and south during the dry season (Borrow & Demey 2001).

Fig. 13. Black-headed heron *Ardea melanocephala*, Barragem de Poilão, Santiago, 22 March 2011 (Béatrice Hinchon).

Grey heron *Ardea cinerea* Linnaeus, 1758

SANTIAGO: a maximum of 22 at Barragem de Poilão, 16 January-6 March 2011 (UF), up to 40, 22 March-15 April 2011 (DC, GBH, KDR), and a maximum of 29 there, 11-18 March 2012 (UF). In Cape Verde, grey heron

is a not uncommon migrant visitor, which has bred on Santo Antão in 2000-2001 (cf. Palacios & Barone 2001, Hazevoet 2003). Largest group size so far was 16 on Boavista, 18 September 1988 (Hazevoet 1995).

Purple heron *Ardea purpurea* Linnaeus, 1766

(2, 9) SANTIAGO: an adult at Barragem de Poilão, 12 June 2011 (ED, PAC); two there, 2 March 2012 (PAC). SAL: a juvenile at pools near the Riu Hotel, west of Santa Maria, 27 September 2010 (SP). Purple heron has been recorded (September, December, January,

March, April, June, July) from Santiago (3), São Vicente (3), Sal (1) and Boavista (4). In West Africa, it is an uncommon to common resident and European migrant visitor throughout the region.

Glossy ibis *Plegadis falcinellus* (Linnaeus, 1766)

(1, 7) SANTIAGO: four at Barragem de Poilão, 7 November 2010 (RBT, TS), and 1-3 there, 13 February-15 April 2011 (DC, GBH, KDR, UF). Glossy ibis has been recorded (October-December, February-April) from Santiago (5), Boavista (2) and Maio (1). In

West Africa, it is a not uncommon to rare, locally sometimes common, resident and European migrant, widespread, mainly in the Sahel and northern savanna zones (Borrow & Demey 2001).



Fig. 14. Eurasian spoonbills *Platalea leucorodia*, Monte Trigo, Boavista, 20 May 2010 (Maria Camacho). The colour-ringed bird was marked as a nestling at Beveren, Belgium, 10 June 2008.

Eurasian spoonbill *Platalea leucorodia* Linnaeus, 1758

SANTIAGO: 23-29 at Barragem de Poilão, 16 January-6 March 2011 (UF), 36 on 21 March 2011 and 50 there the next day (GBH), were the largest group sizes recorded so far. A spoonbill colour-ringed as a nestling at Lac de Grand-Lieu, Loire Atlantique, France (47°5.968', 01°41.048'W), 13 May 2010, was present at Barragem de Poilão from 19 January to at least 17 July 2011 (LS, UF); a second colour-ringed bird was seen there in January and March 2011, but its rings could not be read properly (UF). SANTO ANTÃO: an immature at Tanque, Ribeira Grande, 19 February 2011 (SB), was the first record for the island. BOAVISTA: 3-8 at Monte Trigo, 14-20 May 2010 (PLS, MC), including one that was colour-ringed as a nestling at Beveren, Belgium (51°15'N, 04°12'E), 10 June 2008; this is the same bird observed at Monte

Trigo, 9-14 April 2009, previously thought to have been colour-ringed in The Netherlands (cf. Hazevoet 2010), the photograph taken in 2010 now allowing for the bird's colour code being read correctly. A colour-ringed bird seen on Boavista, 21 April 2011, and subsequently photographed at Ribeira do Norte, 2 December 2011 (PLS), was ringed as a nestling at Lac de Grand-Lieu, Loire Atlantique, France, 17 May 2010 (ringing data courtesy Working Group Spoonbills International).

Thought to be a rare visitor in the past, spoonbill is now known to be a regular migrant visitor in small numbers. Most records are from Santiago and Boavista, with smaller numbers reported from São Vicente and Sal, to which Santo Antão can now be added.

***Hen harrier** *Circus cyaneus* (Linnaeus, 1766)

(0, 1) SANTIAGO: an adult female at Barragem de Poilão, 4 December 2011 (UF). This is the first record of hen harrier for the Cape Verde Islands. Hen harrier is not known

to winter south of the Sahara and in West Africa there are apparently no confirmed records from Mauritania or Senegal (cf. Borrow & Demey 2001).

Montagu's harrier *Circus pygargus* (Linnaeus, 1758)

(0, 6) RASO: a female, 6 March 2012 (PD). Montagu's harrier has been recorded (September, November, December, March) from Raso (2), Sal (1), Boavista (2) and Maio (1). In addition, there are five records of

unidentified Montagu's/pallid harrier *C. pygargus/macrourus*. In West Africa, Montagu's harrier is an uncommon or scarce to locally not uncommon Palearctic migrant (Borrow & Demey 2001).

Booted eagle *Hieraetus pennatus* (Gmelin, 1788)

(0, 3) SANTIAGO: a pale morph adult at Barragem de Poilão, 21 March 2011 (GBH). Booted eagle has been recorded (February-March) from Santiago (2) and Santo Antão (1).

In West Africa, it is an uncommon Palearctic migrant to the Sahel zone, rarer in the savanna belt (Borrow & Demey 2001).

***Baillon's crane** *Porzana pusilla* (Pallas, 1776)

(0, 1) BOAVISTA: an adult male at Monte Trigo, 1 April 2012 (PLS). This is the first record of Baillon's crane for the Cape Verde Islands. In West Africa, it is a scarce

Palearctic winter visitor to the Senegal river delta (Borrow & Demey 2001), probably overlooked due to its skulking habits.

Spotted crane *Porzana porzana* (Linnaeus, 1766)

(0, 3) SANTIAGO: one at Barragem de Poilão, 22 February-4 March 2012 (PAC). Spotted

crane has been recorded (January-March) from Santiago (2) and São Vicente (1). In

West Africa, it is a generally rare winter visitor from the Palearctic in Mauritania and

Senegal, locally common in the Senegal river delta (Borrow & Demey 2001).

***Eurasian coot** *Fulica atra* Linnaeus, 1758

(0, 4) SANTIAGO: one at Barragem de Poilão, 20 February-6 March 2011 (UF), and 1-2 there, 26 November 2011-4 March 2012 (PAC, UF). SAL: one at Ribeira da Madama, 11 November 2010 (Barone *et al.* 2012). BOAVISTA: one at Rabil lagoon, 24

November 2011 (RT). These are the first records of Eurasian coot for the Cape Verde Islands. In West Africa, it is a rare to locally common Palearctic winter visitor to desert oases and Sahel, and it has bred in northern Senegal (Borrow & Demey 2001).



Fig. 15. Booted eagle *Hieraaetus pennatus*, Barragem de Poilão, Santiago, 21 March 2011 (Béatrice Hinchon). Fig. 16. Spotted crake *Porzana porzana*, Barragem de Poilão, Santiago, 4 March 2012 (Eric Didner).



Fig. 17. Baillon's crake *Porzana pusilla*, Monte Trigo, Boavista, 1 April 2012 (Pedro López-Suárez).

Eurasian oystercatcher *Haematopus ostralegus* Linnaeus, 1758

(2, 12) SANTIAGO: singles along the shore at Praia, 5 February and 3 April 2010, and at ilhéu Santa Maria, 21 February 2010 (UF), are considered to refer to the same long-staying bird and are counted as a single record. Oystercatcher has been recorded (August-April) from Santiago (2), ilhéu de Cima (1),

Santo Antão (1), São Vicente (4), Santa Luzia (1), ilhéu Branco (1), São Nicolau (1), Sal (1) and Boavista (2). A Palearctic migrant visitor to West African coasts, locally common in Mauritania and Senegambia, uncommon to rare south to Nigeria (Borrow & Demey 2001).

Semipalmated plover *Charadrius semipalmatus* Bonaparte, 1825

(0, 9) SANTO ANTÃO: one at Ponta do Sol, 22-23 March 2010 (EB). SÃO VICENTE: one at the sewage works, 1-2 March 2012 (PAC). SAL: one at the Santa Maria salt pans, 3-4 February 2010 (JLI). This North American vagrant has been recorded (October-

November, February-April) from Santiago (3), Santo Antão (1), São Vicente (3) and Sal (2). There appear to be as yet no records from the West African mainland (cf. Borrow & Demey 2001).

American golden plover *Pluvialis dominicus* (P.L.S. Müller, 1776)

(3, 10) SANTO ANTÃO: a first winter bird and an adult at Porto Novo, 23 November 2011 (YC). American golden plover has been recorded (October-April) from Santiago (2),

Santo Antão (2), São Vicente (8) and Raso (1). In West Africa, it is a rare Nearctic migrant visitor (September-May) (Borrow & Demey 2001).

Red Knot *Calidris canutus* (Linnaeus, 1758)

(1, 12) BOAVISTA: one in almost full summer plumage at a pond near the Riu Lacacão hotel (along the southern coast), 25 September 2011 (BG). Red Knot has been recorded (September-January, March-April,

July) from Santiago (2), São Vicente (2), Sal (2), Boavista (6) and Maio (1). A locally common to very common migrant visitor along West African coasts (Borrow & Demey 2001).



Fig. 18-19. American golden plover *Pluvialis dominicus*, first winter and adult, Porto Novo, Santo Antão, 23 November 2011 (Yann Coatanéa).



Fig. 20. Semipalmated plover *Charadrius semipalmatus*, Ponta do Sol, Santo Antão, 23 March 2010 (Eric Bos). Fig. 21. White-rumped sandpiper *Calidris fuscicollis*, Sal Rei, Boavista, 13 November 2010 (Stefan Cherrug).

White-rumped sandpiper *Calidris fuscicollis* (Vieillot, 1819)

(0, 7) BOAVISTA: a juvenile at the salt pans near Sal Rei, 13 November 2010 (RBT, TS), and an adult at Praia de Ervatão, 10 October 2011 (HM). White-rumped sandpiper has now been recorded (October-January) from Santiago (1), São Vicente (2), Sal (2) and Boavista (2). In West Africa, there are records of this North American migrant wader from Ivory Coast and Ghana (Borrow & Demey 2001).

Ruff *Philomachus pugnax* (Linnaeus, 1758)

SAL: a female, colour-ringed near Workum, province of Fryslân, the Netherlands (52°59'28"N, 05°24'08"E), 25 April 2011, was sighted at Santa Maria, 30 October 2011, and again there, 31 January and 5 February 2012 (JLI; ringing data University of Groningen).

Black-tailed godwit *Limosa limosa* (Linnaeus, 1758)

(2, 8) SANTIAGO: two at Barragem de Poilão, 22 February-11 March 2012 (PAC, UF). BOAVISTA: one at Praia de Ervatão, 10 October 2011 (HM). Black-tailed godwit has been recorded (August-October, December-March) from Santiago (1), São Vicente (2), Sal (1), Boavista (4) and Maio (2). In West African, it is a common passage migrant and visitor throughout, mainly September-April (Borrow & Demey 2001).

Eurasian curlew *Numenius arquata* (Linnaeus, 1758)

(0, 9) SANTIAGO: singles along the shore at Praia, 24 & 26 February and 31 March 2010 (UF), are here counted as a single record, the first since 2002. SAL: one at the Pedra de Lume salt pans, 19 September 2011 (BG). Eurasian curlew has been recorded (November, January-April) from Santiago (1), Santo Antão (1), Raso (1), Sal (2), Boavista (3) and Maio (1). In West Africa, it is a common to scarce coastal passage migrant and visitor, rare to locally uncommon inland (Borrow & Demey 2001).

Spotted redshank *Tringa erythropus* (Pallas, 1864)

(0, 12) BOAVISTA: 2-4 at the lagoon near Curral Velho, 2 February 2012 (AML). Spotted redshank has been recorded (September, November-March) from Santiago (1), São Vicente (5), Sal (1), Boavista (4) and Maio (1). In West Africa, it is a not

uncommon to scarce Palearctic passage migrant and visitor (mainly October-April) from Mauritania to Liberia east to Chad (Borrow & Demey 2001).

Redshank *Tringa totanus* (Linnaeus, 1758)

SANTIAGO: one at Achada Fazenda, 23 September 2011 (MB). Although regularly reported from São Vicente (sewage ponds) and Sal (Pedra de Lume salt pans), this is only the second record for Santiago. In addition, there are records from Fogo (Barone & Hering 2010), Boavista and Maio.

Lesser yellowlegs *Tringa flavipes* (Gmelin, 1789)

(0, 15) SÃO VICENTE: one at the sewage ponds, 1-2 March 2012 (PAC). BOAVISTA: one at the lagoon near Curral Velho, 2 February 2012 (AML). Lesser yellowlegs, a Nearctic migrant, has been recorded (September-April) from Santiago (3), São Vicente (4), Sal (5) and Boavista (3). All records are since 1999. In West Africa, there are records from The Gambia, Ghana and Nigeria (Borrow & Demey 2001).

Green sandpiper *Tringa ochropus* Linnaeus, 1758

(2, 21) SANTIAGO: singles were seen at Barragem de Poilão on several occasions from 18 July 2009 to 2 April 2010, with three there, 7 March 2010 (EB, UF), these are here counted as a single record; again 1-4 at Barragem de Poilão, 22 January-17 July 2011 (DC, GBH, KDR, UF), 1-3 there, 22 February-18 March 2012 (PAC, UF), and two at Pedra Badejo, 22 February-4 March 2012 (PAC). SAL: 1-3 at the sewage works near Santa Maria, 1-14 February 2010, and one there, 1-6 February 2011 (JLD). BOAVISTA: 2-3 at the lagoon near Curral Velho, 2 February 2012 (AML). Green sandpiper has been recorded (July-April) from Santiago (12), São Vicente (3), São Nicolau (1), Sal (2), Boavista (4) and Maio (1). In West Africa, it is a common to not uncommon Palearctic passage migrant and visitor throughout, mainly September-April (Borrow & Demey 2001). With 21 records since 1980 (and many more individuals involved), it is clear that green sandpiper is a regular migrant visitor to the Cape Verde Islands and, except for unusual records, it will not be included in future reports anymore.



Fig. 22. Spotted sandpiper *Actitis macularius*, Pedra Badejo, Santiago, 2 March 2012 (Frédéric Jiguet).

Spotted sandpiper *Actitis macularius* (Linnaeus, 1766)

(0, 9) SANTIAGO: one at Pedra Badejo, 2 Antão (2) and São Vicente (5). In West Africa, there is a record from coastal Cameroon (Borrow & Demey 2001).
 March 2012 (PAC). A migrant from North America, spotted sandpiper has been recorded (October-March) from Santiago (2), Santo

Pomarine skua *Stercorarius pomarinus* (Temminck, 1815)

(--, 7) SANTIAGO: an adult pale morph off Achada Grande Traz, Praia, 24 January 2012 (UF). This is the first record of pomarine skua since April-May 1996, when a few were seen off Sal. There were a few sightings in Cape Verde seas in October 1973 and April 1976, including groups of up to eight birds, but the total number of pre-1980 records is unclear. The main wintering area is in the Senegal upwelling zone between latitudes 08° and 20° N, but apparently rarely occurs west of longitude 20° W.

Long-tailed skua *Stercorarius longicaudus* Vieillot, 1819

(1, 1) CAPE VERDE SEAS: two between Fogo and Brava, 2 May 2011 (RV). There was only a single pre-1980 record of one at sea south of Boavista, 25 April 1976. This Holarctic migrant winters mainly off Namibia and western South Africa and passes (mainly August-September, March-April) at sea off West Africa; due to its highly pelagic habits, migration routes are poorly known (Borrow & Demey 2001).

Great skua *Stercorarius skua* (Brünnich, 1764)

(3, 13) BOAVISTA: one off Curral Velho, 13 November 2010 (RBT, TS). In addition, one off Ponta do Barril, São Nicolau, 27 February 2012 (PAC), was presumably *S. skua*, but the possibility of *S. maccormicki* or another southern hemisphere taxon could not be ruled out with certainty. A Palearctic passage migrant and visitor, great skua winters (mainly September-March) in the Atlantic, south to West Africa, being uncommon off Mauritania and rare further south (Borrow & Demey 2001).



Fig. 23. Great skua *Stercorarius skua*, Curral Velho, Boavista, 13 November 2010 (Stefan Cherrug).

Black-legged kittiwake *Rissa tridactyla* (Linnaeus, 1758)

SANTIAGO: one at Praia, 7 and 11 March 2009 (UF). CAPE VERDE SEAS: one between São Nicolau and Raso, 15 March 2009 (JH). These are the first records since 1998 and the first for March, all others being from December-February. Although probably a regular winter visitor to Cape Verde seas, records are scarce and far between. The prolonged presence of up to 10 birds at Tarrafal bay, São Nicolau, in February 1998 (Hazevoet 1998), demonstrates that the paucity of records cannot be exclusively ascribed to the kittiwake's predominantly pelagic habits.

Gull-billed tern *Gelochelidon nilotica* Gmelin, 1789

(0, 7) SANTIAGO: two at ponds near Achada Fazenda, 22-24 September 2011 (BG). BOAVISTA: one at Rabil lagoon, 12-13 October 2011 (HM). Gull-billed tern has now been recorded (September, October, December, January, April) from Santiago (1), Boavista (2) and Maio (4). In West Africa, it is locally common to rare Palearctic winter visitor (mainly September-April), both inland and on the coast; breeds coastal Mauritania and northern Senegal (Borrow & Demey 2001).

Sandwich tern *Thalasseus sandvicensis* (Latham, 1787)

(1, 23) SANTIAGO: one at Praia, 21-27 March 2010 (UF), and again one there, 30 June 2011 (UF). BOAVISTA: one at Sal Rei, 15 March 2011 (GBH), and again one there, 8 October 2011 (HM); two at Praia de Chave, 5-6 February 2012 (AML). Sandwich tern has been recorded (October-March, June) from Santiago (4), São Nicolau (3), Sal (2), Boavista (8), Maio (4) and at sea (3). In West Africa, it is a common Palearctic winter visitor along the entire coast (Borrow & Demey 2001). With 23 records since 1980, it is clear that sandwich tern is a regular migrant winter visitor to Cape Verde seas and coasts and, except for unusual records, this is the last of these reports in which the taxon is included.

Common tern *Sterna hirundo* Linnaeus, 1758

(2, 14) SANTIAGO: one off Tarrafal bay and five off Praia lighthouse, 1 May 2011 (RB); one off Praia lighthouse, 12 June 2011 (ED, PAC). In addition, a flock of *ca.* 70 'commic terns' *S. hirundo/paradisaea* was seen off Praia lighthouse, 1 May 2011 (RB). Common tern has been recorded (October, December, January, April-June) from Santiago (4), Santo Antão (1), Sal (6), Boavista (3), Maio (1) and at sea (1). In West Africa, it is a common resident, intra-African migrant and Palearctic winter visitor along the entire coast (Borrow & Demey 2001). Birds seen in Cape Verde seas are presumably Palearctic migrants.

Little tern *Sternula albifrons* (Pallas, 1764)

(0, 17) BOAVISTA: two at Rabil lagoon, 12 November 2010 (RBT, TS); 2-3 at Rabil lagoon, 5-12 October 2011 (HM). The first record of little tern for Cape Verde was from Maio in 1988, but all subsequent records have been from Rabil lagoon, Boavista, and the nearby shore, where a few appear to be present annually from October to April. In West Africa, it is a common to uncommon Palearctic winter visitor along the entire coast and a locally common to uncommon breeding resident (Borrow & Demey 2001).

***Black tern** *Chlidonias niger* (Linnaeus, 1758)

(0, 1) CAPE VERDE SEAS: two between Fogo and Brava, 2 May 2011 (MD, RV). This is the first record of black tern for the Cape Verde Islands. In West Africa, it is a common Palearctic passage migrant (mainly September-October and March-May) and winter visitor along the entire coast (Borrow & Demey 2001).

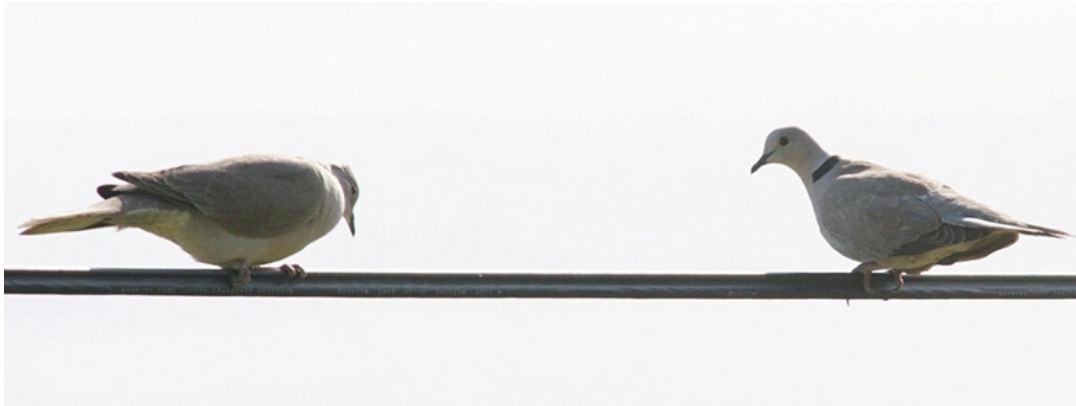


Fig. 24. Eurasian collared doves *Streptopelia decaocto*, Cidade Velha, Santiago, 18 November 2011 (Yann Coatanéa).

European turtle dove *Streptopelia turtur* (Linnaeus, 1758)

(2, 11) SAL: four near Santa Maria, 19 September, and one there, 21 September 2010 (SP), are here counted as a single record. European turtle dove has been recorded (August-October, February) from Santiago (2), São Vicente (3), Sal (5), Boavista (2) and Maio (1). In West Africa, it is a common Palearctic winter visitor to the Sahel belt and a vagrant further south (Borrow & Demey 2001).

Eurasian collared dove *Streptopelia decaocto* (Frisvoldsky, 1838)

(0, 10) SANTIAGO: one at Pedra Badejo lagoon, 7 November 2010 (RBT, TS); >10 at Achada Fazenda, 1 May 2011 (RV), 6-8 there, 12 June 2011 (ED, PAC), again 1-2 there, 22 September 2011, and two along the road a few km south of Achada Fazenda, 23 September 2011 (BG); at least two at Cidade Velha, 18 November 2011 (YC); two near the Pedra Badejo lagoons, 22 February-4 March 2012 (PAC). BOAVISTA: two near Rabil village, 2 February 2012 (AML). First recorded in the Cape Verde Islands in 2006 (Sal) and 2009 (São Nicolau), Eurasian collared dove now appears to be well-established at several locations on Santiago and probably breeds there. This is the first record for Boavista. Since the 1990s, it also has become established in the Canary Islands, Morocco and Western Sahara (e.g. Bergier 2000, Ramos 2008).

European bee-eater *Merops apiaster* Linnaeus, 1758

(1, 6) BOAVISTA: two along Via Pitoresca (south of Sal Rei), 19 February 2012 (PLS). European bee-eater has been recorded (August-September, December-May) from São Vicente (1), São Nicolau (1), Sal (2) and Boavista (3). In West Africa, it is a locally common to scarce Palearctic passage migrant and winter visitor (Borrow & Demey 2001).

Hoopoe *Upupa epops* Linnaeus, 1758

(1, 6) SAL: two near Ponta Preta, 15 September 2010 (SP); one at Santa Maria, 14 February 2012 (HJ). Hoopoe has been recorded (August, September, January, February, April) from São Vicente (1), Santo Antão (1), Sal (3) and Boavista (2). In West Africa, it is a not uncommon Palearctic passage migrant and winter visitor south of the Sahara (Borrow & Demey 2001).



Fig. 25. European bee-eater *Merops apiaster*, Via Pitoresca, Boavista, 19 February 2012 (Pedro López-Suárez).

Greater short-toed lark *Calandrella brachydactyla* (Leisler, 1814)

(0, 3) RASO: four on the islet, 23 March 2007 (KM). SAL: two in dunes near the Riu Hotel, west of Santa Maria, 17 December 2006 (JLE). There was a single record from São Nicolau in April 2001. In West Africa, greater short-toed lark is an uncommon to locally common Palearctic winter visitor in the Sahel belt (Borrow & Demey 2001).

Sand martin *Riparia riparia* (Linnaeus, 1758)

(2, 19) SÃO NICOLAU: 2-10 at Ponta do Barril, 19-21 September 2011, and ca. 10 between Preguiça and the airport, 20 September 2011 (BG); one at Ponta do Barril, 26 February 2012 (PAC). Sand martin has been recorded (August-October, February-April) from Santiago (2), São Vicente (5), Raso (1), São Nicolau (5) and Sal (8). In West Africa, it is an uncommon or rare to locally common Palearctic passage migrant and winter visitor, mainly in the Sahel zone (Borrow & Demey 2001).

Red-rumped swallow *Cecropis daurica* (Laxmann, 1769)

(0, 16) SÃO VICENTE: 4-5 at the sewage ponds, 2 March 2012 (PAC). Red-rumped swallow has been recorded (December-April) from Santiago (2), São Vicente (5), Branco (1), São Nicolau (3), Sal (4) and Boavista (1). In West Africa, it is an uncommon to locally common resident, partially intra-African migrant and Palearctic migrant in the Sahel and savanna zones (Borrow & Demey 2001). Birds seen in the Cape Verde Islands are presumably Palearctic migrants.

Red-throated pipit *Anthus cervinus* (Pallas, 1811)

(0, 8) SAL: one at the sewage works near Santa Maria, 5-6 February 2011, and again one there, 1-5 February 2012 (JLI). Red-throated pipit has been recorded (December-

March) from São Vicente (3) and Sal (5), with all records being from the sewage works on either island. In West Africa, it is a common

to scarce Palearctic passage migrant and winter visitor, mainly in the Sahel and savanna belts (Borrow & Demey 2001).



Fig. 26. Red-throated pipit *Anthus cervinus*, Santa Maria, Sal, 6 February 2011 (John Lines).

Fig. 27. Red-throated pipit, Santa Maria, Sal, 1 February 2012 (John Lines).

Yellow wagtail *Motacilla flava* Linnaeus, 1758

(0, 7) SANTIAGO: one at Barragem de Poilão, 3 May 2011 (MD). SAL: one behind the Riu Hotel, west of Santa Maria, 16 September 2010 (SP). Yellow wagtail has been recorded (September-November, March-May) from

Santiago (2), Raso (1), Sal (3) and Boavista (1). In West Africa, it is a common to very common Palearctic passage migrant and winter visitor throughout (Borrow & Demey 2001).

White wagtail *Motacilla alba* Linnaeus, 1758

(1, 21) SAL: one near the Dunas del Sal Hotel, 16 December 2006 (JLE); one at the Santa Maria sewage works, 31 January 2012 (JLI); one behind the Morabeza Hotel, 9 February 2012 (AML). White wagtail has been recorded (July, October-March) from Santiago (3), São Vicente (8), Raso (2), São Nicolau (2) and Sal (7). In West Africa, it is a common to uncommon Palearctic passage

migrant and winter visitor, mainly in the Sahel and savanna belts (Borrow & Demey 2001). With 21 records since 1989, it is clear that white wagtail is a regular migrant visitor to the Cape Verde Islands and, apart from new island records or exceptional numbers or circumstances, the taxon will not be included in future reports any further.

***Sedge warbler** *Acrocephalus schoenobaenus* (Linnaeus, 1758)

(0, 1) SAL: one near Santa Maria, 16 September 2010 (SP). This is the first record of sedge warbler for the Cape Verde Islands.

In West Africa, it is a locally common Palearctic winter visitor (September-May) throughout (Borrow & Demey 2001).

***Melodious warbler** *Hippolais polyglotta* (Vieillot, 1817)

(0, 1) SAL: one at the Tortuga Beach Holiday complex at Ponta Preta, 18 September 2010 (SP). This is the first record of melodious warbler for the Cape Verde Islands. In West

Africa, it is common to uncommon Palearctic passage migrant and winter visitor (August-April), mainly in the west of the region (Borrow & Demey 2001).



Fig. 28. Sedge warbler *Acrocephalus schoenobaenus*, Santa Maria, Sal, 16 September 2010 (Steve Payne).



Fig. 29-30. Melodious warbler *Hippolais polyglotta*, Ponta Preta, Sal, 18 September 2010 (Steve Payne).

African desert warbler *Sylvia deserti* (Loche, 1858)

(1, 1) RASO: one present, 28 February 2012 (PAC). This is only the second record of desert warbler for the Cape Verde Islands, the other being of one collected on Sal, 9 March 1924. In West Africa, African desert warbler is an uncommon to rare resident in Mauritania, northern Mali and northern Niger (Borrow & Demey 2001).

Willow warbler *Phylloscopus trochilus* (Linnaeus, 1758)

(0, 9) BOAVISTA: one in bushes along the lagoon near Curral Velho, 10 October 2011 (HM). Willow warbler has been recorded (September, October, December, January, March) from São Vicente (1), Raso (1), São Nicolau (3), Sal (1) and Boavista (3). In West Africa, it is a common Palearctic passage migrant and winter visitor (August-April) throughout (Borrow & Demey 2001).



Fig. 31. African desert warbler *Sylvia deserti*, Raso, 28 February 2012 (Eric Didner).

Pied flycatcher *Ficedula hypoleuca* (Pallas, 1764)

(1, 4) BOAVISTA: a female at Rabil lagoon, 12 October 2011 (HM). This is the first record since 1988, when single birds were observed at three different locations on Boavista, 19-22 September. The pre-1980 record is of one

collected on Sal in 1901. In West Africa, it is a not uncommon to scarce Palearctic passage migrant and winter visitor (August-May) throughout (Borrow & Demey 2001).

Woodchat shrike *Lanius senator* Linnaeus, 1758

(0, 2) SANTO ANTÃO: a male near Ponta do Sol, 23 March 2010 (EB). The only previous record of woodchat shrike was of one on Sal,

9 March 2004. In West Africa, it is a widespread and common Palearctic migrant visitor (Borrow & Demey 2001).

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Reproduction of mosquitoes (Diptera: Culicidae) in Santa Cruz, Santiago island, Cape Verde Islands

Elves Heleno Duarte^{1,2}, Edson Eugénio Correia¹, Caetano Eane Varela³ & António Varela³

Keywords: Diptera, Culicidae, mosquitoes, vectors, dengue, Cape Verde Islands

ABSTRACT

Mosquitoes are dipterous insects with an important role in the transmission of diseases like malaria and dengue. During a dengue fever outbreak in the Cape Verde Islands in 2009, several studies were undertaken to support vector control. The present study was carried out in the district of Santa Cruz, Santiago island, to evaluate previous measures taken to control mosquito populations. Results show that mosquitoes use domestic water containers to breed. Barrels, drums and pots were all used. Of these, drums were most frequently found being infested with mosquito larvae or pupae. Morphological identification showed that *Anopheles arabiensis* and *Aedes aegypti* were present in the study area. *Ae. aegypti* was the commonest of the two and the only one found throughout the study area. Results show that socio-economic factors influence container positivity.

RESUMO

Os mosquitos são insectos dípteros que têm um papel importante na transmissão de doenças como o paludismo e a dengue. Durante uma epidemia da dengue em Cabo Verde em 2009, foram desenvolvidos estudos no sentido de dar suporte ao controlo vectorial. Este estudo foi desenvolvido no Concelho de Santa Cruz, ilha de Santiago, para avaliar o efeito das medidas de controlo tomadas sobre populações de mosquitos presente na área. Os resultados mostraram que os mosquitos utilizam recipientes domésticos para a reprodução. Dentre esses, os mais frequentes foram os barris, os bidões e os potes, mas os bidões foram os que mais se apresentavam com presença de larvas ou pupas dos mosquitos. A identificação morfológica mostrou que *Anopheles arabiensis* e *Aedes aegypti* está presente na área de estudo, embora somente *Ae. aegypti* foi encontrado em todas as localidades de estudo. Supomos que factores socio-económicos têm um papel importante na positividade dos recipientes.

¹ Departamento de Ciências e Tecnologias, Universidade de Cabo Verde, Praia, Republic of Cape Verde; e-mail ehelgam@gmail.com

² Corresponding author

³ Delegacia de Saúde de Santa Cruz, Pedra Badejo, Republic of Cape Verde

INTRODUCTION

Mosquitoes are dipterous insects with potentially important medical implications. They belong to the Culicidae, which include three subgroups, viz. Anophelinae, Culicinae and Toxorhynchitinae (Consoli & Oliveira 1994). In the Cape Verde Islands, the first mosquito species, *Anopheles gambiae s.l.*, was reported from Santiago island in 1909 (Ribeiro *et al.* 1980). Today, 10 species, belonging to two subgroups (Anophelinae and Culicinae) and four genera (*Anopheles*, *Aedes*, *Culex* and *Culiseta*), are known to be present in the archipelago, of which *Anopheles arabiensis* Patton, 1905, *Aedes aegypti* Linnaeus in Hasselquist, 1762 and the *Culex pipiens* complex are the most important in relation with public health concerns (Alves *et al.* 2010).

In the Cape Verde Islands, malaria and dengue are the main diseases transmitted by mosquitoes. Malaria is one the principal vector-borne diseases, being transmitted by female mosquitoes of the genus *Anopheles*. The World Health Organization (WHO) has estimated that worldwide 3.3 billion people were at risk of acquiring malaria in 2010, while of all geographical regions, human populations in sub-Saharan Africa carry the highest risk of acquiring malaria (WHO 2011). Dengue fever is a mosquito-borne infection (arbovirose) that in recent decades has become a major international public

health concern and its frequency has grown dramatically around the world. Two species (*Ae. aegypti* and *Ae. albopictus*) have been identified as the major vectors of dengue and it is currently estimated that there may be 50 million dengue infections worldwide every year (WHO 2012).

The first dengue epidemic in Cape Verde occurred in 2009 and started at the same time as an outbreak of pandemic influenza A (H1N1). After virus confirmation, the Cape Verde government established a ministerial committee on dengue control and clinical management. Vector control and social mobilization were the main measures taken to bring the dengue outbreak under control (WHO 2009). Vector control was based on treatment of mosquito breeding sites with Temephos (organophosphate) and adult longevity reduction by using indoor residual spraying (IRS). In October 2009, a team from WHO's Regional Office for Africa arrived to support the Cape Verde authorities in investigating the outbreak. Several studies were carried out in the archipelago to understand the transmission cycle of dengue and to support vector control. The present study was carried out in the Santa Cruz district of Santiago island in order to evaluate measures previously implemented in vector control (larvae control and adult longevity reduction) in mosquito populations.

METHODS

The study was carried out at five localities of the district of Santa Cruz: Achada Bel-Bel, Cancelo, Santa Cruz, Achada Fazenda and Renque Purga (Fig. 1). Santa Cruz district is a municipality located in the eastern part of Santiago island with around 32,965 inhabitants and an area of *ca.* 150 km², i.e. *ca.* 205 hab/km² (Instituto Nacional de Estatística 2010). The seat of the municipality is in the town of Pedra Badejo. The district is generally arid and no natural standing surface fresh-water is present.

During May 2010, a variety of water containers (both indoors and outdoors) at human and animal dwellings was inspected and categorized as barrel, drum, fountain, pot,

tank, vase or 'other' (Table 1). When present, mosquito larvae and pupae were collected using standard methods, stored in tubes and labeled with date, locality, container type and placement (indoors or outdoors human or animal dwelling). Adults were collected using manual aspirators and stored in individual tubes and labeled as for larvae and pupae. Before identification, larvae were killed using alcohol 70°. Adults collected or emerged from pupae were killed at low temperatures (~ -3°C). Morphological identification was conducted at the *Núcleo de Pesquisas em Ciências Aplicadas* of the University of Cape Verde in Praia according to Ribeiro *et al.* (1980).

Localities visited during the study (Santa Cruz, Santiago island)

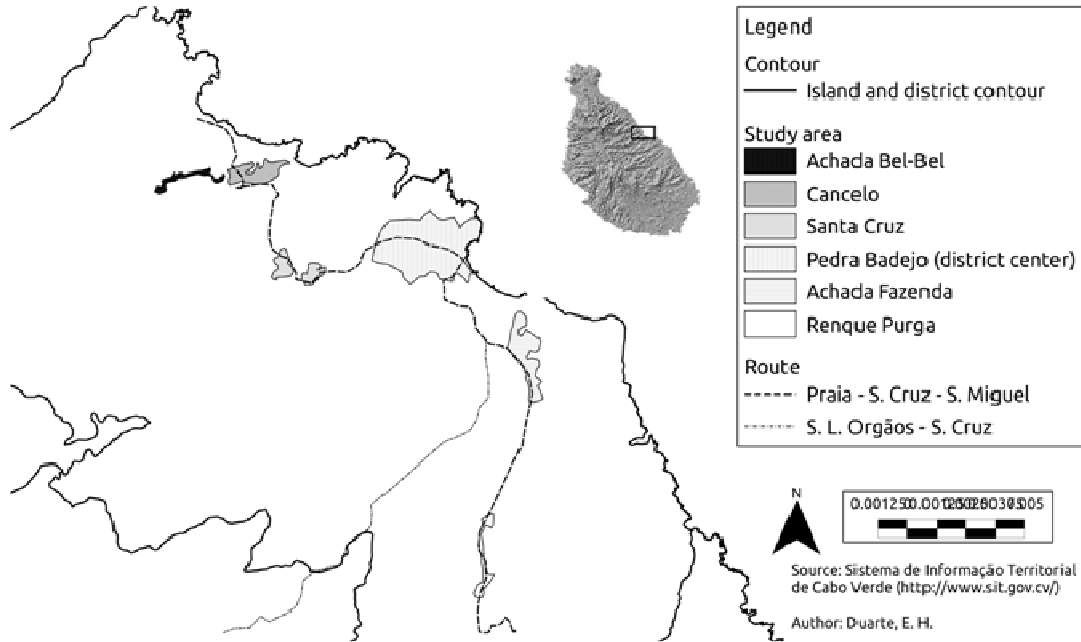


Fig. 1. Santa Cruz district, Santiago island, Cape Verde Islands. The study area is located to the north and south of the town of Pedra Badejo.

	Water container						
	Barrel	Drum	Fountain	Pot	Tank	Vase	Other
Volume (in litres)	~200	~200	~1	5	2,000	<1	2-3
Characteristics	Plastic	Iron	For domestic animals			For flowers	

Table 1. Types of water containers found during this study and some of their characteristics.

Observed frequencies were compared using goodness of fit tests. To model the effect of different parameters in container positivity, a logistic regression was used. Larvae and pupae density was summarized as present (at least one larva or pupa per container) or absent (no larvae or pupae recorded). The probability to record at least one larva or pupa per container was measured using as response variable the number of human residents per habitation, the number and type of water containers, their placement (indoors or out-

doors human or animal dwellings), the locality within the study area and their interactions. The final model was written as $\log(p/1-p) = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n$, where b_0 represent the intercept of the model, b_1, b_2 and b_n the regression coefficients and x_1, x_2 and x_n the response variables. Significant differences were established at 0.95 confidence level ($\alpha=0.05$). Statistical analysis was carried out using R version 2.13.1 (R Development Core Team 2010).

RESULTS

During this study, 110 dwellings were visited and 345 water containers inspected (Table 2). Barrel (39.13%), drum (27.83%) and pot (17.68%) were the containers most frequently found and a significant difference was observed between their observed frequencies ($\chi^2=312$; $df=6$; $p<0.001$). Half (50.72%) of the water containers were located at Renque Purga and Achada Fazenda in southern Santa Cruz and a significant difference was found in frequency of water containers in different parts of the study area ($\chi^2=22$; $df=4$; $p<0.001$). In 7.54% ($n=26$) of the water containers

inspected, mosquito larvae or pupae were present, with drums being positive most frequently. Breeding sites of mosquitoes were located mostly indoors (57.69%) at human and animal dwellings, although without significant difference ($W=8153$; $p>0.05$). *Ae. aegypti* was the taxon most frequently encountered and the only one found throughout the study area (Fig. 2). *An. gambiae s.l.* was only found in Santa Cruz and Cancelo. Other Culicinae (not *Ae. aegypti*) were registered at three localities (Fig. 2), but these were not identified as to species.

Locality	Number of inspected dwellings	Number of water containers	% Positive container (n)
Achada Bel-Bel	20	68	2.94 (2)
Achada Fazenda	30	81	8.64 (7)
Cancelo	20	59	3.39 (2)
Renque Purga	20	94	13.83 (13)
Santa Cruz	20	43	4.65 (2)
Total	110	345	7.54 (26)

Table 2. Water containers with mosquito larvae and pupae in the study area.

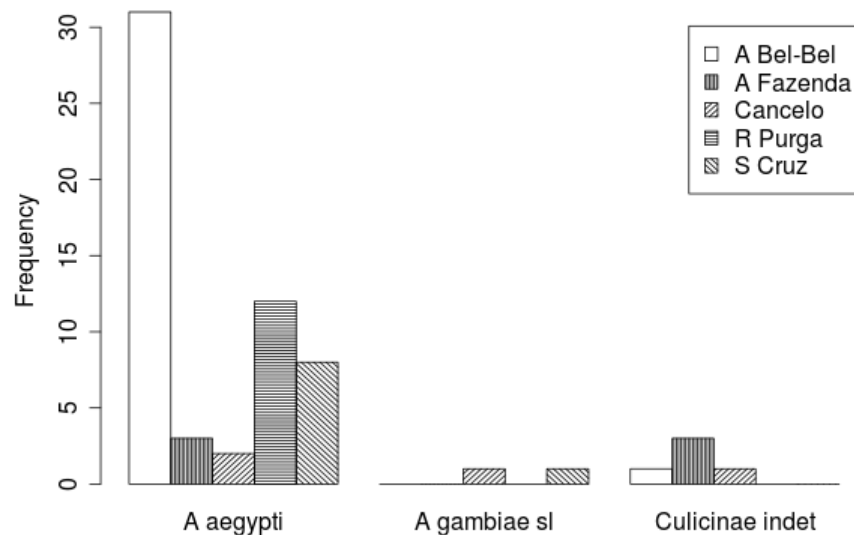


Fig. 2. Frequency of mosquito species collected at different localities based on identification of larvae, pupae and adults.

Table 3. Logistic regression for container positivity using different parameters and their interaction. The best model was selected using Akaike Information Criterion (* no data recorded, ** not estimated).

	Estimate	OR	CI	p-value
Intercept	-1.71	**	**	>0.05
Container number	-0.47	0.13	0.03 – 0.51	<0.05
Container localization	-0.47	0.28	0.06 – 6.78	>0.05
Container type				
Fountain	-18.2	<0.001	**	>0.05
Drum	1.21	3.36	0.77 – 14.71	>0.05
Others	-18.5	<0.001	**	>0.05
Pot	-79.4	0.45	0.04 – 4.73	>0.05
Tank	1.28	3.6	0.22 – 59.53	>0.05
Vase	2.57	13.03	0.69 – 244.7	>0.05
Locality				
A. Fazenda	-0.81	2.25	0.31 – 16.37	>0.05
Cancelo	0.01	1.01	0.11 – 9.01	>0.05
R. Purga	2.85	17.21	2.62 – 112.85	<0.05
S. Cruz	-0.34	0.71	0.08 – 6.45	>0.05
Interaction				
Fountain	*	**	**	**
Drum	2.16	8.67	0.52 – 142.75	>0.05
Others	0.94	2.56	**	**
Pot	-0.16	<0.001	<0.001	>0.05
Tank	-0.18	<0.001	<0.001	>0.05
Vase	-0.19	<0.001	<0.001	>0.05

Table 3 summarizes the logistic regression modeling the effect of different parameters in container positivity. Container number and type, locality within the study area and

relation between container type and locality were the parameters which affected container positivity.

DISCUSSION

The commensal existence of some mosquito species within the human environment is well-known. Commensal taxa usually breed in water containers used by man in his daily activities. Many types of containers have been reported as potential breeding sites for mosquitoes (cf. Consoli & Oliveira 1994, Natal 2002). During the present study, no abandoned water containers were found. The absence of these could be the result of the clean-up operations carried out in 2009 (one of the measures included in social mobilization) or simply due to the lack of rain during the study period. This result suggests that a continuous transmission cycle can be maintained by mosquito populations by breeding in domestic containers. For an effective control of these mosquitoes, at least two spraying programmes per year need to be

conducted. Although barrels were the most frequent water container, drums were the most used as breeding site. Drums were often found to be the container type in an advanced state of degradation (Fig. 3) and conservation status of the container may be correlated with their positivity as a breeding site for mosquitoes, a hypothesis to be confirmed or rejected in future studies.

Indoor breeding sites were more frequent than outdoor sites, although no significant difference was observed at the 0.95 confidence level ($W=8153$, $p>0.05$). However, elsewhere in Cape Verde, outdoor breeding sites were more frequent than indoor sites (E.H. Duarte *et al.* unpublished data). We presume that these differences in placement are related to the locally prevailing social and cultural customs.

During this study, 63 specimens (57 larvae and six adults) were morphologically identified. Due to the limited number of adult specimens, larvae and adults were pooled in the results. *Ae. aegypti* was the only species found throughout the study area (Fig. 2). Adaptation of this species to the human environment is well documented (cf. Ribeiro *et al.* 1980, Consoli & Oliveira 1994, Natal 2002). By breeding in artificial containers, this species consolidates a good transmission cycle (Natal 2002). *An. gambiae s.l.* was only found in Santa Cruz and Cancelo (Fig. 2). *An. arabiensis* is the only member of the *An. gambiae* complex known to be present in Cape Verde (Cambournac *et al.* 1982). This species is the main malaria vector in sub-saharan Africa and in Cape Verde it has been identified as vector of lymphatic filariasis in Santiago island (Franco & Menezes 1955).

Three possibilities may explain the distribution of taxa found in this study: i) insufficient sampling effort (i.e. number of inspected dwellings; Table 2); ii) breeding

sites of *An. arabiensis* were not inspected (cf. Ribeiro *et al.* 1980); iii) the species is really absent at other localities. Other species were found at some localities, but not identified at the species level and these are given as Culicinae indet. (Fig. 2). As these bred in domestic containers, we suppose that they represent (at least in part) members of the *Cx. pipiens* complex, a species-group well-adapted to the human environment (Ribeiro *et al.* 1980).

Only two parameters evaluated in the logistic regression did not present any effect in container positivity. Container placement, when tested alone, showed no effect in container positivity (ANOVA, $p > 0.05$), but in interaction with container type, a moderate significant effect was demonstrated ($p < 0.05$). This interaction augments the drums odds-ratio (OR) of 3.36 to 8.67, when compared with barrels (OR=1). We believe that this interaction is caused by socio-economic factors, because this interaction represents the number of containers indoors or outdoors of



Fig. 3. Degraded drums, Achada Bel-Bel, Santa Cruz, Santiago, 11 December 2010 (António Varela).

dwellings. It was noted that the presence of outdoor containers was correlated (not statistical tested) with the presence of domestic animals, remodelling of the dwellings and other social concerns. As mentioned by Arunachalam *et al.* (2010), vector breeding and reproduction of *Ae. aegypti* are influenced by a complex interplay of factors. Some of these factors were taken into account during this study, but the influence of socio-economic factors was not tested. Although our results provide evidence for an important role of socio-economic factors in container positivity, more con-

clusive studies are needed to support this hypothesis.

In conclusion, the lack of data from before the 2009 dengue epidemic fever outbreak makes it difficult to evaluate the methods employed herein in relation to reproduction in mosquito populations. However, our results indicate the continuing breeding of mosquitoes in domestic containers after control measures had been implemented. Future studies should investigate why and how mosquitoes are able to use these containers as breeding sites even after control measures have been taken.

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Bibliography of the land and freshwater molluscs of the Cape Verde Islands, with a historical synopsis of malacological exploration in the archipelago and an annotated check-list

Klaus Groh¹

Keywords: Mollusca, Gastropoda, land snails, Cape Verde Islands, history, bibliography, check-list

ABSTRACT

A bibliography (including an author index) of the literature on the land and freshwater molluscs of the Cape Verde Islands is presented, encompassing 81 entries, of which 61 are directly related to land and freshwater molluscs, while another 20 deal with marine Pulmonata and/or brackish and saltwater inhabiting Hydrobiidae. A historical synopsis of the exploration of the land and freshwater mollusc fauna of the Cape Verde archipelago is presented. An annotated check-list of the land-bound gastropods of the Cape Verde Islands is also included, differentiating between freshwater, land and marine species and completed by a list of taxa that have been erroneously mentioned for the archipelago due to misidentification or confusion about the location of origin.

RESUMO

Apresenta-se uma bibliografia sobre moluscos terrestres e de água-doce de Cabo Verde, incluindo um índice de autores. A bibliografia compreende 81 entradas directamente associadas a moluscos terrestres e de água-doce e 21 entradas relacionadas com Pulmonata marinhos e/ou Hydrobiidae de águas salgadas e salobras. Uma sinopse histórica sobre a exploração dos moluscos terrestres e de água-doce no arquipélago de Cabo Verde é igualmente apresentada. Inclui-se ainda um lista anotada de gastrópodes de base terrestre de Cabo Verde, organizada segundo espécies de água-doce, terrestres e marinhas, e completada com uma lista de taxa que foram erroneamente atribuídos a Cabo Verde devido a deficiente identificação ou a malentendidos na localização.

¹ Mainzer Straße 25, D-55546 Hackenheim, Germany; e-mail klaus.groh@conchbooks.de

1. HISTORY OF MALACOLOGICAL EXPLORATION

The earliest known records of terrestrial molluscs in the Cape Verde Islands were reported by Férussac (1827) in his *Catalogue des espèces des mollusques terrestres* [criticized by other early malacologists, such as Dohrn (1869) and Wollaston (1878)], in which he briefly reported on the collections made by the French navy officer Sanders Rang on his journey to the Caribbean. Four species were mentioned from 'La Praya, l'île du Cap Verd', of which three were *nomina nuda* and another only mentioned under a generic name. It took until the 1980s that Férussac's questionable report of the occurrence of *Carychium minus* in the 'Insulis Promotorii' could be confirmed by Jochen Gerber in the collections of the Landesmuseum Wiesbaden, even though only the label was left and the specimens were destroyed due to the acidic glass-tube in which they had been kept. Férussac's report of the North African species *Helix* [= *Levantina*] *gyrostoma* was certainly erroneous, as this species was never found in the Cape Verde Islands.

The first valid description of a terrestrial mollusc species with the Cape Verde Islands as its *terra typica* was given by King & Broderip (1831) for *Pupa subdiaphana* [= *Zootecus insularis subdiaphanus*] from 'Portum Praya', collected between 1826 and 1830 by the crew of the English research vessels HMS *Beagle* and HMS *Adventure* while on their way to South America.

During the following two decades, four further land snails were described from the Cape Verde Islands without or with a wrong locality in the works of Webb & Berthelot (1833), Pfeiffer (1851) and Shuttleworth (1852). However, it remains unclear who collected the three endemic helicoid species and *Zootecus insularis*, the latter already mentioned by Férussac (1827) under the name *Bulimus bamboucha*. Three of these came from Pauline Terver (who most probably did not collect them and whose collection was later acquired by the French naturalist Alfred Moquin-Tandon), another came from an unknown source. The suggestion by Rossmässler (1835) about the occurrence of *Limnaeus palustris* in the Cape Verde Islands probably does not refer to a *Stagnicola* species but to a species of *Radix*, probably

already mentioned by Férussac (1827) under the name *Limnaeus* sp.

In his *Index molluscorum*, Dunker (1853) mentioned two species from the Cape Verde Islands which were apparently collected by the German Africa explorer Georg Tams on São Vicente in 1841. Of these, the taxon described as *Melania tamsii* by Dunker (1845) proved to be a synonym of the circum-tropically distributed *Melanoides tuberculata*, which was subsequently reported as a variety of *Melania tuberculata* from São Nicolau by Wollaston (1878).

During the years 1851-52, the German botanist Carl Bolle collected two helicoid species on either the island of São Vicente or São Nicolau, which were described by Albers (1854) under the name *Helix bollei* [= *Leptaxis bollei*] and *H. sarta* [= *Eremina advena sarta*].

Benson (1856) described three further tiny endemic species, viz. *Achatina spiculum* [= *Ceciloides* cf. *acicula*], *Bulimus* [*Pupoides*] *gemma* and *Pupa* [*Gastrocopta*] *acarus*, which the English officer E.L. Layard had collected on São Vicente during a stopover on his homebound journey from South Africa.

The first faunal list of the molluscs found in the Cape Verde Islands was published by Reibisch (1865). This was mainly based on the findings of the German geologist Alphons Stübel on the islands of Santo Antão, São Vicente, São Nicolau and Boavista in 1863. In this list, comprising 108 taxa, 11 land and freshwater snails are mentioned, 10 of which indeed originated from the Cape Verde Islands. Two lymnaeid taxa were described as varieties new to science, nowadays believed to represent endemic subspecies of two *Radix* species.

Together with the three species described by Benson (1856), of which Reibisch (1865) had no knowledge, only 13 species of terrestrial molluscs had been recorded from the Cape Verde Islands up to 1865. However, during the following decade, knowledge of the land and freshwater molluscs of the Cape Verdes increased significantly. The German naturalist Heinrich Dohrn, who visited Cape Verde from December 1864 to March 1865 while exploring the islands of Santo Antão, São Vicente, São Nicolau and Santiago, was

the first in a series of explorers working in the archipelago. In January-March 1864 the renowned British scientists John E. Gray and Richard T. Lowe visited the archipelago and on a second trip in January-February 1866 they were joined by Thomas V. Wollaston. They collected (mainly plants, insects and molluscs) on Santo Antão, São Vicente, Santiago, Fogo and Brava and generously offered their material of land and freshwater snails to Dohrn for study, forming the basis of his *Die Binnenconchylien der Capverdischen Inseln* (Dohrn 1869). Herein, 29 species were listed, 12 of them new to science. Until today, his *Pupa* [= *Truncatellina*] *molecula* from Santo Antão (cf. Hutterer & Groh 1991) and the *Vitrina* sp. mentioned by him (most probably an endemic *Plutonia*) have not been found again, while his *Ancylus milleri* was only collected again during the late 1990s (Rosa *et al.* 1999).

Two terrestrial molluscs were collected around Porto Grande, São Vicente, by the crew of the English oceanographic HMS *Challenger* during the winter of 1872-73, which were accounted for by Smith (1884).

Further important collections were made by the French naturalists Aimé Bouvier and Pierre de Cessac in 1870 (and by the latter again in 1874) on the islands of Santo Antão, São Vicente, São Nicolau, Boavista, Maio and Santiago. Morelet (1873) reported on their findings and described one Recent and two fossil helicoid taxa new to science, i.e. *Helix bouvieri* [= *Keraea gorgonarum*], *H. primaeva* [probably a species of *Eremina*] and *H. atlantidea* [probably a species of *Leptaxis*]. In his listing of 40 species, one of which is a marine pulmonate, two do certainly not belong to the Capeverdean fauna (the Australian *Helix* [*Thersites*] *corneo-virens* and the Madeiran *Glandina* [*Cochlicopa*] *maderensis*), and another two are highly questionable (*Helix draparnaldi* [= *Oxychilus draparnaudi*] and *Bulimus ventricosus* [= *Cochlicella acuta*, *fide* Germain 1927]).

Apart from the introduction of a replacement name for Dohrn's (1869) preoccupied *Pupa milleri* with *Pupa dohrni* [= *Lauria cylindracea anconostoma*] by Pfeiffer (1877), two outstanding monographs on the terrestrial molluscs of the Cape Verde Islands, Wollaston's (1878) *Testacea Atlantica* and Rochebrune's (1881) *Materiaux pour la faune de l'archipel du Cap Vert*, dealt

with material collected during the preceding decade. Wollaston (1878) added one new species name (*Helix subroseotincta* [= *Leptaxis bollei* var.]) and four varieties to Morelet's (1873) list. Wollaston (1878) reported 40 'land and freshwater' molluscs from the Cape Verdes, two of them marine, two others fossil and at least another two (*Helix corneovirens*, *Cochlicopa lubrica* var. *maderensis*) in error. Rochebrune (1881) also described a single species (*Xerophila antoniana* [= *Xerotricha apicina*]), but it is doubtful if this was indeed collected in the Cape Verde Islands. European *Cyclostomus* [*Pomatias*] *elegans* and Caribbean *Amphibulima* [*Brachyspira*] *tigrina* were wrongly attributed to the Cape Verde Islands and only specimens of *Xerophila* [*Theba*] *pisana* seem to be reliably referable to that archipelago. Additionally, *Helix ahmarina* [= *Otala lactea*], collected in the Cape Verde Islands by Bouvier and described without details of the collecting locality by Mabilie (1883), for a long time appeared to be doubtful, but was finally confirmed by specimens found during the 1980s.

Towards the end of the 19th century, a total of 37 land and freshwater molluscs and two marine pulmonates were known to exist in Cape Verde, while records of *ca.* 17 species were highly doubtful or wrongly attributed to the islands. These numbers did not change after two species had been found on the islet of Branco by the crew of the French RV *Talisman* in 1883 (Fischer 1884). Moreover, neither the Portuguese museum collector Francisco Newton, who worked on the islands of Santo Antão, São Nicolau, Boavista, Santiago and Brava in 1883, nor the chemist João Cardoso, who collected throughout the archipelago as an officer of the Portuguese army between 1893 and 1905, added new taxa to the terrestrial malacofauna of the Cape Verde Islands. The material of these two collectors was published by Nobre (1909) in his work on the molluscan fauna of the Portuguese possessions in West Africa. Another significant collection was made by the Italian naturalist Leonardo Fea in 1897 on the islands of São Vicente, São Nicolau, Boavista, Fogo and Brava, as well as on the islets of Branco, Raso and the Rombos group (see Germain 1927).

After that, it took three decades until the French botanist Auguste Chevalier collected

on all the islands in the archipelago in 1934. He reported on eight of the molluscs he had found (Chevalier 1935), but most of his not very extensive samples were only studied almost 50 years later (Groh 1983). A small collection assembled by the French naturalist Jean Cadenat on the islands of Santo Antão, São Vicente, Sal and Santiago in 1950 was also studied and published by Groh (1983).

A considerable contribution to our knowledge of the land and freshwater molluscs of the Cape Verde Islands was made by the Finnish zoological expedition under Håkan Lindberg of the University of Helsinki, especially through the extensive collecting of his assistant Samuel Panelius, who visited all islands (except Branco and Raso) from November 1953 to March 1954. In his work *The Land and Freshwater Molluscs of the Cape Verde Islands* (Panelius 1958), he combined his own findings with data from the literature into a compilation that encompassed 50 taxa, two of them marine and nine first records for the archipelago. Of these, several proved to be synonyms and at the end of the 1950s an objective total of 41 species of land and freshwater snails was known from the Cape Verdes. Also in the 1950s, the German geologist Karl Krejci-Graf brought back a number of land snails from his visits to Sal and Maio in 1957 and 1959, but it then took almost two decades before European malacologists paid attention to the Cape Verde Islands again.

Cruz e Silva (1974), in a paper on parasitology, presented data on the distribution of the freshwater snail *Radix natalensis stuebeli* [sub *Lymnaea natalensis*], based on his investigations on the island of Santiago in 1972. During the mid 1970s, an Ibero-German group began new explorations of the malacofauna of the Cape Verde Islands, at first initiated by collectors of marine molluscs, such as the Portuguese Luís Pisani Burnay, Henrique Lichtenstein and António Monteiro, the Spanish physician Emilio Rolán, later joined by German malacologist Rudo von Cosel and lawyer Dieter Röckel. All of them, except António Monteiro, were members of the first and/or second Ibero-German expedition to the Cape Verde Islands, organized by the German botanist Wolfram Lobin and carried out during December 1978 and January 1979, with a second expedition in the winter of 1979-80, again for one month.

The present author and his wife Christina were members of both of these expeditions and visited all islands except Maio, Santa Luzia and the islets of Branco and Raso, collecting land and freshwater snails as well as material of other animal groups. The results of these two expeditions, which subsequently gave rise to a number of research projects in different European countries, were published in several volumes of the *Courier Forschungsinstitut Senckenberg*. The findings on terrestrial molluscs, based on the author's own collections and material received from Wolfram Lobin, Ursula Winter, Brigitte Kegelmann and Hans-Hermann Schleich, were presented in numerous articles by the author (Groh 1982 ff.), the most significant of which was the *Revision der Land- und Süßwassergastropoden der Kapverdischen Inseln* (Groh 1983). Herein, based on a revision of all accessible material in European museums and material mentioned above, 43 Recent and two fossil species and subspecies of land and freshwater snails were presented, while four species were mentioned for the first time for the archipelago. In addition, two marine hydrobiids, two siphonariids, two ellobiids and one trimusculid from different sources were reported. A Red List of non-marine molluscs of the Cape Verde Islands was published by Groh (1996).

Rosa *et al.* (1999) published the results of their collecting activities on the island of Santiago, in which they presented data on the distribution of six freshwater snails. One of these was *Ancylus milleri*, recorded for the first time since it was found by Dohrn in 1864-65, and another one under the name of the marine species *Hydrobia acuta* [= *Pseudamnicola* sp.].

Since 1983, the author has occasionally received samples of land and freshwater molluscs from the Cape Verde Islands via Wolfram Lobin and Emilio Rolán and pictures of shells from Alain Bertrand. As a result, it was possible to add several species to the check-list of Cape Verde land and freshwater molluscs compiled for an INTERREG-programme of the EU (Groh & Garcia 2005). The author also contributed to Rolán's (2005) *Malacological Fauna from the Cape Verde Archipelago*, in which four marine and seven land-dwelling species of 'continental' gastropods new to the Cape Verdes were introduced. The number of 'continental'

molluscs known from the Cape Verde Islands now stands at 11 marine, 10 freshwater and 43 land-dwelling species, with two of the latter being only known as fossils. This is a surprisingly high diversity for a small oceanic island group such as the Cape Verdes. Hopefully, the large number of unidentified species in the check-list presented below will

stimulate new interest in this still poorly investigated group of highly interesting animals, leading to a much needed revision of the 'continental' malacofauna of this archipelago. More and freshly collected material, preferably preserved in alcohol, is much needed.

2. BIBLIOGRAPHY OF THE LAND AND FRESH WATER MOLLUSCS OF THE CAPE VERDE ISLANDS

The bibliography includes 88 entries, of which 81 provide specific information on terrestrial and freshwater molluscs of the Cape Verde Islands, 61 give special or occasional attention to land and freshwater snails and another 20 include data on marine

pulmonates. Table 1 and Figs. 1 and 2 show how publication activity changed over time, demonstrating that the most productive periods were between 1850 and 1900 and 1975 and 2000. Fig. 3 shows the increase of taxa known from the Cape Verdes over time.

Period	Mainly or partly on land and freshwater molluscs	On marine molluscs only, but including pulmonates	Total
Before 1850	8	1	9
1851-1875	10	1	11
1876-1900	13	3	16
1901-1925	2	1	3
1926-1950	3	1	4
1951-1975	5	1	6
1976-2000	17	10	27
After 2000	3	2	5
Total	61	20	81

Table 1. Number of publications on land and freshwater molluscs of the Cape Verde Islands in 25-year periods.

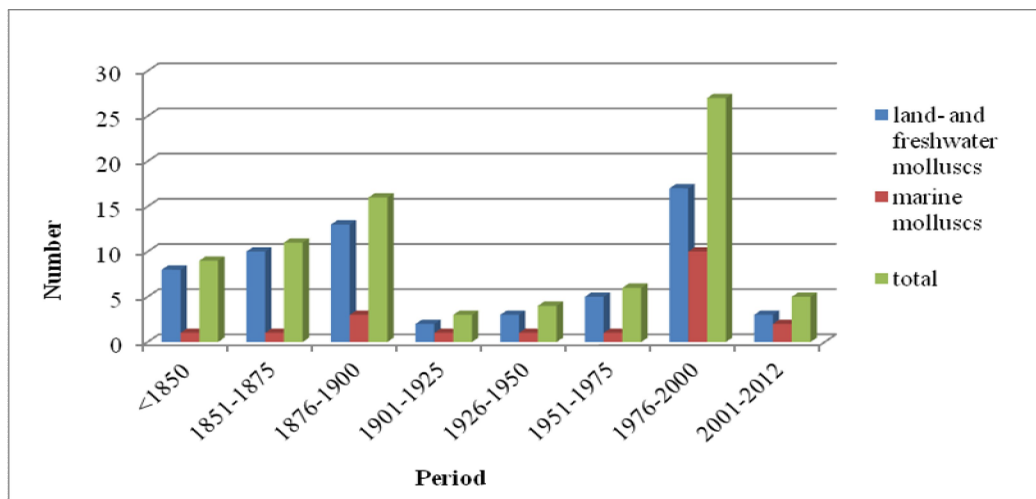


Fig. 1. Number of publications on land and freshwater molluscs of the Cape Verde Islands in 25-year periods (individual data). 'Marine molluscs' indicates marine pulmonates and hydrobiids.

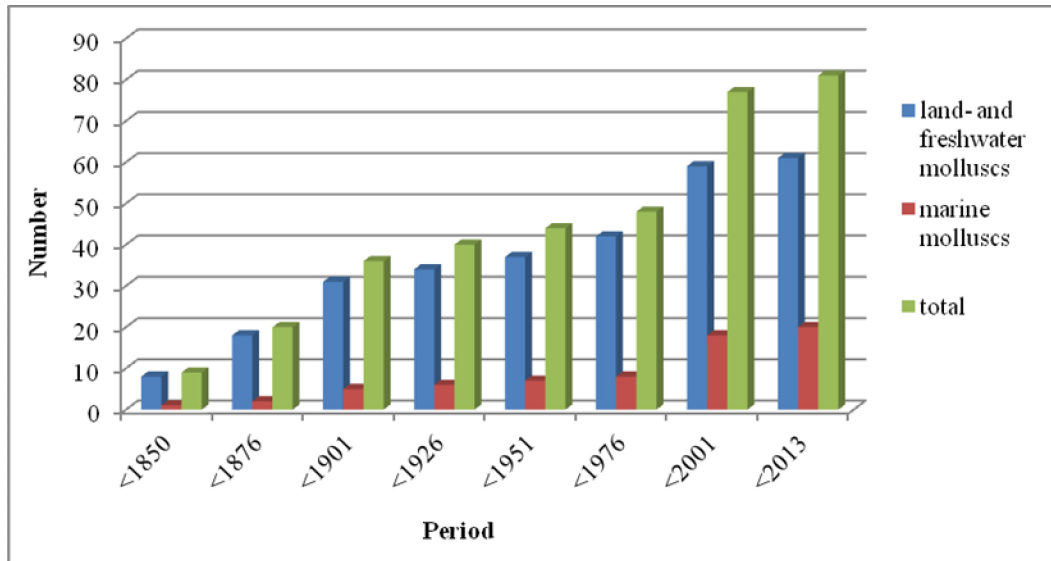


Fig. 2. Number of publications on land and freshwater molluscs of the Cape Verde Islands in 25-year periods (cumulated data). ‘Marine molluscs’ indicates marine pulmonates and hydrobiids.

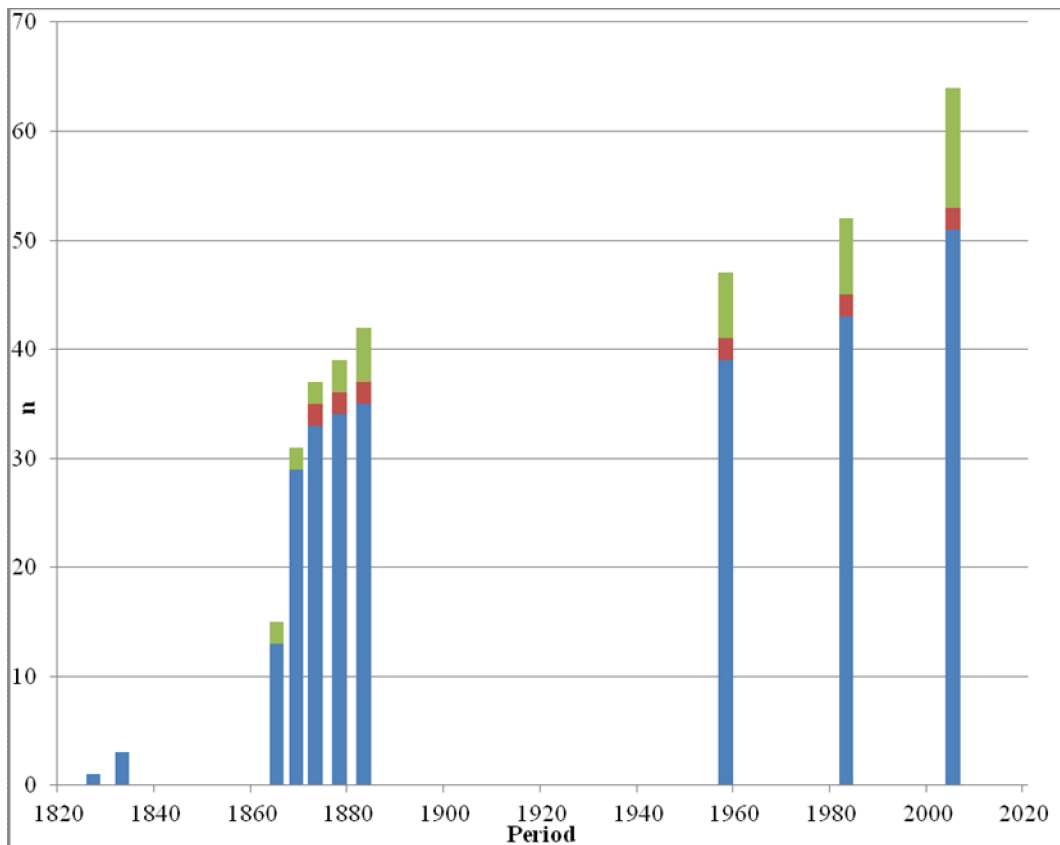


Fig. 3. Increase over time of the number of land and freshwater molluscs known from the Cape Verde Islands. Blue: Recent land and freshwater molluscs; Red: Fossil land and freshwater molluscs; Green: Marine Pulmonata and Hydrobiidae.

Symbols used in the bibliography:

- * = on marine molluscs only, but contains information on marine pulmonates or hydrobiids.
- † = contains information, exclusively or partly, on fossil terrestrial molluscs.
- = general source, containing malacologically relevant articles or contributions by different authors.

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3. CHECK-LIST OF THE LAND AND FRESHWATER MOLLUSCS OF THE CAPE VERDE ISLANDS

Abbreviations used to indicate status:

E	= endemic	NP	= probably native
NE	= not endemic	NO	= possibly native
IS	= surely introduced, not invasive	cf.	= confer to, similar to
II	= surely introduced, invasive	gen.	= genus
IP	= probably introduced	indet.	= not determined
NS	= surely native	sp.	= species, undetermined
		?	= correct generic status not verifiable

Table 2. Species of land and freshwater molluscs (including marine pulmonates and hydrobiids) documented to occur in the Cape Verde Islands.

Family	Species	Endemism	Origin	Validity
FRESHWATER				
Hydrobiidae	<i>Pseudamnicola</i> sp.	E?	NP	Valid, to be determined
Lymnaeidae	<i>Radix auricularia ribeirensis</i> (Reibisch, 1865)	E	NS	Valid
Lymnaeidae	<i>Radix natalensis stuebeli</i> (Reibisch, 1865)	E	NS	Valid
Planorbidae	<i>Afrogyrus coretus</i> (Blainville, 1824)	NE	NP	Valid
Planorbidae	<i>Ancylus milleri</i> Dohrn, 1869	E	NS	Valid
Planorbidae	<i>Bulinus forskalii</i> (Ehrenberg, 1831)	NE	NO	Valid
Planorbidae	<i>Gyraulus parvus</i> (Say, 1819)	NE	IP	Valid
Planorbidae	Planorbidae gen. et sp. indet.	E?	NO	Valid, to be determined
Planorbidae	<i>Planorbis moquini</i> (Requien, 1848)	NE	NP	Valid
Thiaridae	<i>Melanoides tuberculata</i> (O.F. Müller, 1774)	NE	NO	Valid

Table 2 continued

TERRESTRIAL				
Agriolimacidae	<i>Deroceras laeve</i> (O.F. Müller, 1774)	NE	IS	Valid
Agriolimacidae	<i>Deroceras reticulatum</i> (O.F. Müller, 1774)	NE	IS	Valid
Carychiidae	<i>Carychium</i> cf. <i>tridentatum</i> (O.F. Müller, 1774)	NE	IP	Valid, to be determined
Cochlicellidae	<i>Cochlicella acuta</i> (O.F. Müller, 1774)	NE	IP?	Valid
Discidae	<i>Keraea bertholdiana</i> (L. Pfeiffer, 1852)	E	NS	Valid
Discidae	<i>Keraea gorgonarum</i> (Dohrn, 1869)	E	NS	Valid
Ferussaciidae	<i>Cecilioides acicula</i> (O.F. Müller, 1774)	NE	IP	Valid
Ferussaciidae	<i>Conollya</i> sp.	E?	NO	Valid, to be determined
Ferussaciidae	<i>Ferussacia</i> sp.	E?	NO	Valid, to be determined
Ferussaciidae	<i>Hohenwarthia</i> sp.	E?	NO	Valid, to be determined
Ferussaciidae	<i>Sculptiferussacia</i> sp.	E?	NO	Valid, to be determined
Gastrocoptidae	<i>Gastrocopta acarus</i> (Benson, 1856)	E	NS	Valid
Gastrodontidae	<i>Zonitoides</i> cf. <i>jaccetanicus</i> (Bourguignat, 1870)	NE	IP	Valid, to be confirmed
Helicidae	<i>Eremina advena advena</i> (Webb & Berthelot, 1833)	E	NS	Valid
Helicidae	<i>Eremina advena fogoensis</i> (Dohrn, 1869)	E	NS	Valid
Helicidae	<i>Eremina advenaserta</i> (Albers, 1854)	E	NS	Valid
Helicidae	<i>Eremina myristica</i> (Shuttleworth, 1852)	E	NS	Valid
Helicidae	? <i>Eremina primaeva</i> (Morelet, 1873)	NE	NS	Valid, fossil
Helicidae	<i>Otala lactea lactea</i> (O.F. Müller, 1774)	NE	IS	Valid
Helicidae	<i>Theba pisana pisana</i> (O.F. Müller, 1774)	NE	IS	Valid
Hygromiidae	<i>Candidula</i> cf. <i>intersecta</i> (Poiret, 1801)	NE	IS	Valid, to be determined
Hygromiidae	? <i>Leptaxis atlantidea</i> (Morelet, 1873)	E	NS	Valid, fossil
Hygromiidae	<i>Leptaxis bollei</i> (Albers, 1856)	E	NS	Valid
Hygromiidae	cf. <i>Xeropicta</i> sp.	NE	IS	Valid, to be determined
Hygromiidae	<i>Xerotricha apicina</i> (Lamarck, 1822)	NE	IS	Valid
Hygromiidae	<i>Xerotricha conspurcata</i> (Draparnaud, 1801)	NE	IS	Valid
Lauriidae	<i>Lauria cylindracea</i> (E.M. da Costa, 1778)	NE	NS	Valid
Milacidae	<i>Milax gagates</i> (Draparnaud, 1801)	NE	IP	Valid
Punctidae	<i>Paralaoma servilis</i> (Shuttleworth, 1852)	NE	NP	Valid
Pupillidae	<i>Pupilla fontana gorgonica</i> (Dohrn, 1869)	E	NS	Valid
Pupillidae	<i>Pupoides coenopictus senegalensis</i> (Morelet, 1848)	NE	IP	Valid
Pupillidae	<i>Pupoides gemmula</i> (Benson, 1856)	E	NS	Valid
Streptaxidae	<i>Gulella capitata</i> (Gould, 1852)	NE	II	Valid
Subulinidae	<i>Lamellaxis gracilis</i> (Hutton, 1834)	NE	IP	Valid
Subulinidae	<i>Opeas hannensis</i> (Rang, 1831)	NE	IP	Valid
Subulinidae	<i>Opeas micra</i> (d'Orbigny, 1835)	NE	IP	Valid
Subulinidae	<i>Pseudopeas saxatile</i> (Morelet, 1885)	NE	IP	Valid
Subulinidae	<i>Rumina decollata</i> (Linnaeus, 1758)	NE	NP	Valid
Subulinidae	<i>Zootecus insularis subdiaphanus</i> (King, 1831)	E	NS	Valid
Succineidae	<i>Quickia concisa wollastoni</i> (Dohrn, 1869)	E	NS	Valid
Succineidae	<i>Quickia? lowei</i> (Dohrn, 1869)	E	NS	Valid
Trissexodontidae	<i>Caracollina lenticula</i> (A. Férussac, 1821)	NE	NO	Valid
Valloniidae	<i>Vallonia pulchella</i> (O.F. Müller, 1774)	NE	IP	Valid
Vertiginidae	<i>Truncatellina molecula</i> (Dohrn, 1869)	E	NS	Valid

Table 2 continued

MARINE				
Ellobiidae	<i>Melampus monile</i> (Bruguière, 1789)	NE	NS	Valid
Ellobiidae	<i>Pedipes pedipes</i> (Bruguière, 1792)	NE	NS	Valid
Ellobiidae	<i>Pedipes dohrni</i> d' Ailly, 1896	NE	NS	Valid
Ellobiidae	<i>Pseudomelampus exiguus</i> (R.T. Lowe, 1832)	NE	NS	Valid
Hydrobiidae	<i>Hydrobia</i> sp. of Panelius 1958 = sp. 1 of Groh 1983	E?	NP	Valid, to be determined
Hydrobiidae	<i>Ventrosia ventrosa</i> (Montagu, 1803)	NE	NS	Valid
Onchidiidae	<i>Onchidella</i> cf. <i>celtica</i> (Cuvier, 1817)	NE	NS	Valid, to be confirmed
Onchidiidae	<i>Onchidella</i> sp.	E?	NS	Valid, to be determined
Siphonariidae	<i>Siphonaria pectinata</i> (Linnaeus, 1758)	NE	NS	Valid
Siphonariidae	<i>Williamia gussoni</i> (O.G. da Costa, 1829)	NE	NS	Valid
Trimusculidae	<i>Trimusculus mammilaris</i> (Linnaeus, 1758)	NE	NS	Valid

Table 3. Species of land and freshwater molluscs that have been reported erroneously as occurring in the Cape Verde Islands. A: by misidentification; B: by confusion about the location of origin.

Agriolimacidae	<i>Deroceras agreste</i> (Linnaeus, 1758)	A
Camaenidae	<i>Thersites corneovirens</i> (L. Pfeiffer 1851)	B
Gastrodontidae	<i>Zonitoides nitidus</i> (O.F. Müller, 1774)	A
Helicidae	<i>Levantina gyrosoma</i> (J. Férussac, 1821)	B
Oxychilidae	<i>Oxychilus draparnaudi</i> (Beck, 1837)	B
Planorbidae	<i>Gyraulus laevis</i> (Alder, 1838)	A
Pomatiidae	<i>Pomatias elegans</i> (O.F. Müller, 1774)	B
Succineidae	<i>Brachyspira tigrina</i> (J. Férussac, 1821)	B
Succineidae	<i>Cochlicopa lubrica</i> (O.F. Müller, 1774)	B
Succineidae	<i>Levantina gyrostoma</i> (J. Férussac, 1821)	B

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Short note | Nota breve

A stranding of pygmy killer whale *Feresa attenuata* Gray, 1874 on Boavista during February 2012: first record for the Cape Verde Islands

Pedro López-Suárez, Carolina Oujo, Matthew Acre & Cornelis J. Hazevoet

Keywords: Cetacea, Delphinidae, *Feresa*, Cape Verde Islands, stranding

On 10 February 2012, at 0845 UTC, a mass stranding involving seven (six adults and a juvenile) pygmy killer whales *Feresa attenuata* Gray, 1874 occurred at Praia de Boa Esperança (16°12'26"N, 22°52'00"W), along the northern coast of Boavista island, Cape Verde Islands. The event was witnessed by a group of kite-surfers, who managed to move three animals (two adults and a juvenile) back to the sea. No re-strandings were noted. At 1330 UTC, staff of the Protected Areas Department visited the site and recorded four specimens (two alive and two dead). At 1700 UTC, only two carcasses were found on the beach, the others apparently having been washed out to sea. During the morning of 11 February 2012, necropsies of both specimens (registered as BV01/2012 and BV02/2012) were performed. Both individuals were identified as adult lactating females (milk exuded from the nipples and came out profusely when the mammary gland was severed during necropsy procedures). External examination revealed good body condition and no evidence of human or fishery interactions. Both carcasses showed bite scars of cookiecutter sharks *Isistius* sp. on the ventral areas. Specimen BV01/2012 had several slightly bleeding scratches on the head and sides, likely caused by collision with nearby rocks. No macroscopic lesions were found in the internal organs. Specimen BV01/2012 showed a heavy nematode

infestation in the fore-stomach. A few nematodes were also present in the main stomach of specimen BV02/2012. *Phyllobothrium* occurred in the genital area of both whales. Stomach contents were abundant in both specimens (heads, jaws, otoliths and other bones of a small schooling fish species), while one whale's stomach also contained the skull of a larger fish species. Skull, skeleton, stomach content and a skin sample of each individual were collected for further study and deposited in the Boavista Reference Collection, maintained by PLS. Morphometrics of both specimens are given in Table 1.

The pygmy killer whale is distributed in tropical to warm-temperate oceanic waters worldwide, but its distribution is generally poorly understood and it remains one of the least known delphinids (Ross & Leatherwood 1994, Mead & Brownell 2005, Brownell *et al.* 2009). This is the first record of pygmy killer whale for the Cape Verde Islands (cf. Hazevoet & Wenzel 2000, Hazevoet *et al.* 2010). A listing (without reference to source) for the Cape Verde Islands (Martin *et al.* 1992) is not considered valid due to the lack of supporting documentation. Elsewhere in West Africa, one was captured off Senegal (Cadenat 1958, Fraser 1960) and another off Ghana (Van Waerebeek *et al.* 2009). An alleged record from the island of Annobon in the Gulf of Guinea (Tormosov *et al.* 1980) is unsubstantiated (cf. Weir 2010).



Fig. 1. Ventral view of pygmy killer whale *Feresa attenuata*, adult female, Praia de Boa Esperança, Boavista, 10 February 2012 (Pedro López-Suárez).

	BV01/2012	BV02/2012
Total length	210	214
Rostrum-gape	21	21
Rostrum-eye	27	26
Rostrum-anterior insertion pectoral fin	42	44
Rostrum-anterior insertion dorsal fin	96	97
Girth posterior pectoral fin	126	130
Girth anterior dorsal fin	127	132
Girth urogenital area	67	80
Dorsal fin height	24	20
Pectoral fin length	40	42
Pectoral fin maximum width	16	16
Tail fluke width	55	56
Tooth counts LL UL LR UR	12 10 12 10	12 10 12 10

Table 1. Morphometrics of two adult female pygmy killer whales *Feresa attenuata* stranded on Boavista, Cape Verde Islands, 10 February 2012. Measurements in cm.



Fig. 2. Head view of pygmy killer whale *Feresa attenuata*, adult female, Praia de Boa Esperança, Boavista, 10 February 2012 (Pedro López-Suárez).

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Pedro López-Suárez, ONG Ilhéu Limpo e Seguro, Sal Rei, Boavista, Republic of Cape Verde;
e-mail curral_velho@hotmail.com

Carolina Oujo, ONG Cabo Verde Natura 2000, Sal Rei, Boavista, Republic of Cape Verde
Matthew Acre, Departamento de Áreas Protegidas, Sal Rei, Boavista, Republic of Cape Verde
Cornelis J. Hazevoet, Instituto de Investigação Científica Tropical – Jardim Botânico Tropical,
Unidade de Zoologia, Rua de Junqueira 14, 1300-343 Lisboa, Portugal

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SOCIEDADE CABOVERDIANA DE ZOOLOGIA



C.P. 177A, São Vicente, Republic of Cape Verde

e-mail evandrobiologia007@gmail.com

website www.scvz.org

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