

New data on Hesperioidea and Papilionoidea (Lepidoptera) from the Cape Verde Islands, with a review of previous records

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ABSTRACT

Butterflies of the superfamilies Hesperioidea and Papilionoidea collected in the Cape Verde Islands and deposited in the Instituto de Investigação Científica Tropical, Lisbon, Portugal, were studied. Some novelties are reported at the insular level and one Palearctic species of Nymphalidae is reported for the first time in the islands. The identification of the only species of *Colias* (Pieridae) present in the Cape Verde Islands and its biogeographical affinities are discussed.

RESUMO

Este artigo apresenta resultados de um estudo de amostras de lepidópteros das superfamílias Hesperioidea e Papilionoidea, provenientes de ilhas de Cabo Verde e em depósito no Instituto de Investigação Científica Tropical, Lisboa, Portugal. Referem-se algumas novidades faunísticas a nível insular e uma espécie de Nymphalidae de distribuição paleártica é assinalada pela primeira vez no país. Corrige-se a determinação da única espécie do género *Colias* (Pieridae) conhecida de Cabo Verde e discutem-se as suas afinidades biogeográficas.

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INTRODUCTION

The butterflies of the Cape Verde Islands (an oceanic archipelago, situated off West Africa between 14°48', 17°22'N and 22°44', 25°22'W) have been the subject of a number of papers (e.g. Riley 1893, Aurivillius 1910, Berio 1941, Nyström 1958, Riley 1968, Traub & Baur 1982, Mück & Traub 1987, van Harten 1988, Mück *et al.* 1990, Báez & García 2005, Vieira 2008). Ackery *et al.* (1995) referred to Bacelar (1948) as being the

only Portuguese publication on Lepidoptera from the Cape Verde Islands. However, despite mentioning Cape Verde in the introduction, Bacelar (1948) included no information whatsoever on the butterflies of these islands, but only on other African territories. Bibliographies on Capeverdean Lepidoptera were presented by Báez (1988) and van Harten (1993).

MATERIAL AND METHODS

The present paper deals with 'rhopaloceran' butterflies (Hesperioidea and Papilionoidea) from the Cape Verde Islands present in the collections of the *Instituto de Investigação Científica Tropical / Jardim Botânico Tropical – Zoologia* (formerly *Centro de Zoologia*). The material consists of two series with independent registration numbers. One was collected during the years 1960, 1961 and 1965 by the late Alberto Coutinho Saraiva (herein abbreviated as CS), then at the *Missão de Estudos Agronômicos do Ultramar*, the other resulted from the *Missão de Estudos Zoológicos do Ultramar* and was collected by the late Lívio Paulos (herein abbreviated as CZ), technician at the Centro de Zoologia, during the years 1969, 1970 and 1972. With few exceptions, specimens were obtained by sweep netting during day-time. The CZ material of *Vanessa cardui* had already been

identified by A. Bacelar, but the data were never published.

Only Apterygota and Orthopteroidea were included in Saraiva's (1961) revision of the Cape Verde entomofauna, as his premature death prevented completion of his *Conspectus*. In the present contribution, data on 15 species of butterflies, represented by more than 380 specimens, are presented, bringing the number of 'rhopalocerans' known to occur in Cape Verde to 25 species. Some are reported as new for individual islands and one species of Nymphalidae with a Palearctic distribution, previously unknown from the country, is reported from Santiago island. The correct identification and geographical affinities of the Capeverdean 'clouded yellow butterfly' (Pieridae, genus *Colias*) were established through detailed study of specimens.

TAXONOMIC PART

Superfamily HESPERIOIDEA
 Family HESPERIIDAE
 Subfamily COELIADINAE

***Coeliades forestan forestan* (Stoll, 1782)**

C. f. forestan occurs throughout sub-Saharan Africa, except the Cape Province, and also in Madagascar, Mauritius, Reunion and the Seychelles. Riley (1968) suggested that its presence in Cape Verde must be due to accidental introduction by man. It was reported by Nyström (1958 sub

Rhopalocampta) from Santo Antão and São Nicolau, but no material was collected. In Cape Verde, caterpillars on *Terminalia catappa* (Combretaceae), one of the known host plants (Ackery *et al.* 1995), were assigned to this species by Mück & Traub (1987 sub *Rhopalocampta*).

Subfamily HESPERIINAE

Borbo borbonica borbonica (Boisduval, 1833)

Material examined – SANTIAGO: Posto Agrícola de São Jorge (São Jorge dos Orgãos), on shrubs and herbs, 12.12.60, 1 ♂ (CS-251). FOGO: near S. Filipe, road to Monte Vara, 02.03.61, 1 ♀ (CS-216). No locality, no date, 1 ♂ (CS-464).

B. borbonica was known from Santiago, Fogo, Brava, Santo Antão, São Vicente and São Nicolau (Aurivillius 1910, Nyström 1958, Traub & Bauer 1982, all sub *Parnara*). The

nominal subspecies occurs in sub-Saharan Africa and another in Madagascar. It has also been reported from Morocco and Algeria (Tennent 1996). Although known to be a migrant, there are as yet no records from the Canaries, Selvagens and Madeira. In Cape Verde, caterpillars were reported on Poaceae (Mück & Traub 1987 sub *Parnara*), including sugar-cane, one of the known host plants (Ackery *et al.* 1995).

Superfamily PAPILIONOIDEA

Family PAPILIONIDAE

Papilio demodocus demodocus Esper, 1798

Material examined – SANTIAGO: Posto Agrícola de São Jorge (São Jorge dos Orgãos), flying in orchard, 09.01.61, 4 ♂♂ 2 ♀♀ (CS-133); idem, over herbs, 13.05.61, 1 ♀ (CS-239); São Francisco, Matão, 14.07.61, 1 ♂ (CS-168); São Francisco, Mulher Branca, 25.07.61, 1 ♂ (CS-171); Boa Entrada, 08.09.69, 3 ♂♂ 2 ♀♀ (CS-3582); between São Jorge and Santa Catarina, 20.09.69, 3 ♂♂ 1 ♀ (CS-3589); Santa Catarina, Entre Picos, 22.09.69, 1 ♂ (CS-3591); Cidade da Praia, 24.11.69, 1 ♂ (CS-3625); Santa Catarina, Nhangar, 03.10.69, 1 ♂ (CS-3600). FOGO: near Lomba, Mira-Mira, 8 km from Monte Vara, flying over herbs and bean fields, 28.03.61, 1 ♀ (CS-208). SANTO ANTÃO: Ponta do Sol, Chã, at night, 20.03.61, 1 ♂ 1 ♀ (CS-101); Ribeira das Patas, 20.10.72, 1 ♂

(CZ-3755). SÃO NICOLAU: Caldeira, 29.10.70, 2 ♂♂ (CZ-3675). BOAVISTA: Monte Redondo, in bean fields, 21.11.61, 4 ♂♂ 2 ♀♀ (CS-34). MAIO: Morro da Calheta, near Calheta, over herbs, 01.11.60, 1 ♀ (CS-271).

P. demodocus, known from Santiago, Fogo, Brava, Santo Antão and São Nicolau (Aurivillius 1910, Berio 1941, Nyström 1958, Traub & Bauer 1982, van Harten 1988), is here reported for the first time from Boavista and Maio. Occurs throughout sub-Saharan Africa, with another subspecies described from Socotra. The caterpillars mainly feed on Rutaceae (Ackery *et al.* 1995) and were found in Cape Verde on *Ruta chalepensis* (Mück & Traub 1987).

Family PIERIDAE

Subfamily COLIADINAE

Catopsilia florella (Fabricius, 1775)

Material examined – FOGO: near Lomba, Mira Mira, 8 km from Monte Vara, flying over herbs and bean fields, 28.03.61, 1 ♂ (CS-208). SÃO NICOLAU: Queimada, 23.10.70, 1 ♂ (CZ-3663). BOAVISTA: João Galego, flying over maize and bean fields, 24.11.61, 1 ♀ (CS-278); idem, 21.11.61, 4 ♂♂ (CS-279).

The species has been reported from Santiago, Fogo, Brava, São Nicolau, and Boavista (Aurivillius 1910, Nyström 1958, Traub & Bauer 1982). Abundant throughout

sub-Saharan Africa, extending eastwards possibly to Pakistan and the Indian state of Gujarat. Also occurs in the Canary Islands (Baéz & Martín 2004) and Madeira (Maravalhas 2003, Aguiar & Karsholt 2008). The caterpillars feed on *Cassia*, *Sesbania* (Fabaceae) and possibly *Gossypium* (Malvaceae) (Ackery *et al.* 1995) and were reported in Cape Verde on *Cassia occidentalis* (Mück & Traub 1987).

Colias croceus (Geoffroy in Fourcroy, 1785)

Material examined – SANTIAGO: Santa Catarina, Ribeira Mato Fontes, 09.09.69, 1 ♀ f. *helice* (CZ-3583). SANTO ANTÃO: Alto da Lagoa, 1000-1400 m, 27.03.61, 1 ♂ (CS-207); Ribeira Maiamba, 04.04.70, 1 ♂ (CZ-3681); Ribeira da Torre, Ribeira Grande, 28.10.72, 1 ♂ 1 ♀ (CZ-3758). SÃO NICOLAU: Ribeira João, 19.10.70, 1 ♂ (CZ-3631). MAIO: Ribeirão, flying over herbs, 16-17.11.60, 2 ♂♂ (CS-321).

Colias specimens from Santiago, Santo Antão, São Vicente, Santa Luzia and São Nicolau were assigned to *C. electo* (Linnaeus, 1763) by Nyström (1958), Traub & Bauer (1982) and Báez & García (2005). Apparently based on geographical range, Riley (1968) thought the *Colias* species occurring in the Cape Verde Islands to be Afrotropical *C. electo* and not Palearctic *C. croceus*. However, detailed study of the specimens reported herein showed them to be *C. croceus*, common in the Azores (Karsholt & Vieira 2005), Madeira (Aguiar & Karsholt 2008) and the Canary Islands (Báez & Martín 2004), the

latter being the southernmost occurrence known so far. The hind-wing ventral discoidal spots encircled by two rings of dark reddish-brown scales and, in the male genitalia, the shape of the valves and the disposition of the penial spinulets (restricted to the aedeagus apical area) unequivocally point to *C. croceus* (cf. Jarvis 1953). The nearest known population of *C. electo* is at submontane level (1,300+ m) in the Cameroon-Nigerian Mountains (T. Larsen *in litt.*, 17 August 2009).

The species' host plants in Cape Verde remain unknown. In North Africa, the caterpillars feed on Fabaceae (*Acanthylis*, *Anthylis*, *Astragalus*, *Colutea*, *Erophaca*, *Hippocrepis*, *Lotus*, *Medicago*, *Onobrychis*, *Trifolium*, *Vicia*) (Tennent 1996). Of these, *Hippocrepis* (one species), *Lotus* (six species, of which four endemic) and *Medicago* and *Trifolium* (both introduced in Santo Antão) are known from Cape Verde (Sánchez-Pinto *et al.* 2005).

Eurema hecabe solifera (Butler, 1875)

Material examined – SANTIAGO: Santa Cruz, Pedra Badejo, 20.01.61, 1 ♂ (CS-79); Posto Agrícola de São Jorge (São Jorge dos Orgãos), 12.12.60, 3 ♂♂♂ 1 ♀ (CS-251); idem, 17.12.60, 1 ♂ (CS-91); 2 ♀♀ (CS-251); idem, over herbs, 13.05.61, 1 ♂ + 3 ♂♂♂ 3 ♀♀♀ (CS-239); Santa Catarina, Achada do Rincão, 04.06.69, 1 ♂ + 1 ♂ (CZ-3577); São Francisco, Rombada, 14.07.61, 1 ♂ 1 ♀ (CS-169). FOGO: near Lomba, Mira-Mira, 8 km from Monte da Vara, flying over herbs and bean fields, 28.03.61, 3 ♂♂ (CS-208). SANTO ANTÃO: Bardo de Ferro to Corda, 900-1,000 m, flying over herbs, 16.03.61, 1 ♀ (CS-202). SÃO NICOLAU: Ribeira João, 19.10.70, 1 ♂ 1 ♀ (CZ-3631); Ribeira Maiamba, 04.04.70, 3 ♂♂ 1 ♀ + 5 ♂♂ 1 ♀

(CZ-3681). BOAVISTA: João Galego, flying over maize and bean fields, 24.11.61, 1 ♂ (CS-278). No locality, no date, 2 ♂♂ (CS-461).

The species was previously reported from Santiago, Fogo, Brava and Maio (Nyström 1958 as *Terias brenda*, Traub & Bauer 1982) and is here reported for the first time from São Nicolau and Boavista. It is common throughout the Afrotropical Region, except the Cape Province, extending into Asia. The caterpillars, as yet unknown in Cape Verde, have been found on Fabaceae (*Aeschynomene*, *Albizia*, *Caesalpineae*, *Cassia*, *Dichrostachys*, *Entada*, *Lespedeza*, *Lotus*, *Parkia*, *Sesbania*) and Clusiaceae (*Hypericum*) (Ackery *et al.* 1995).

Eurema senegalensis (Boisduval, 1836)

E. senegalensis is a forest species known from West Africa to the Rift (Larsen 2005). It was treated as conspecific with *E. hecabe* by Riley (1968), who considered it a seasonal form. In

Cape Verde, it was reported from Santiago (Nyström 1958 sub *Terias*, cf. Traub & Bauer 1982), most likely a misidentification of *E. hecabe solifera*.

Eurema floricola (Boisduval, 1833)

We consider the only listing of *E. floricola* for Cape Verde (Aurivillius 1910) to be a misidentification of *E. hecabe solifera*, identification of which is often problematic. *E. floricola* is known to occur in Madagascar and the Indian Ocean archipelagos and from the Democratic Republic of Congo (formerly Zaire) to West Africa northwards to Sierra Leone (D'Abrera 1980, Ackery *et al.* 1995, Larsen 2005). Aurivillius (1910) reported one male and two females of *E. floricola* var.

ceres Butler (now considered a synonym of *E. floricola*, cf. Ackery *et al.* 1995) collected in April and May at Orgãos Grandes, Santiago, which was accepted without comment by Traub & Bauer (1982). However, 'var. *ceres*' is exclusive to Mauritius and Reunion. Larsen (2005) reported it to be rare in savannah and more common in the transition zone between savannah and forest, habitat gradients which do not exist in Cape Verde.

Subfamily PIERINAE

Colotis amata calais (Cramer, 1775)

The occurrence of *C. a. calais* in Cape Verde is based on a single and badly preserved female from São Vicente (Riley 1893: 570 sub *Teracolus*); it has not been reported since. It is known throughout sub-Saharan Africa,

especially in dry areas. The caterpillars (unknown in Cape Verde) feed on species of *Capparis* (Capparaceae) and *Salvadora* (Salvadoraceae) (Ackery *et al.* 1995).

Colotis euipe euipe (Linnaeus, 1758)

Like the previous taxon, the occurrence of *C. euipe* in Cape Verde was based on a single and badly preserved specimen (in this case a male) from São Vicente (Riley (1893: 569). Aurivillius (1910) did not identify the species and it has not been reported since. *C. euipe* occurs throughout the Afrotropical Region,

the nominal subspecies being known from The Gambia and Senegal. The caterpillars, unknown from Cape Verde, feed on species of *Cadaba*, *Capparis* and *Maerua* (Capparaceae) and *Cleome* (Cleomaceae) (Ackery *et al.* 1995).

Belenois creona creona (Cramer, 1776)

Riley (1893: 569) reported *Pieris severina* from São Vicente, based on "...fragments of *Pieris*, probably *severina*, collected at Cape Verde...". Aurivillius (1910) noted that it was "the other species" he could not identify (see *Colotis euipe* above). Báez & García (2005) based the occurrence of *B. c. severina* (Stoll, 1781) in Cape Verde on Riley (1893). *B. c. severina* is the eastern and southern African subspecies (Ackery *et al.* 1995, Larsen 2005)

and its presence in Cape Verde seems highly improbable. The nominal subspecies ranges from Senegal to Nigeria and Ethiopia and it is certainly the subspecies that, if Riley's identification were to be correct, would occur in Cape Verde. The caterpillars, unknown from Cape Verde, feed on species of *Boscia*, *Capparis*, *Maerua* and *Niebruhria* (Capparaceae) and *Cleome* (Cleomaceae) (Ackery *et al.* 1995).

Pontia daplidice Klug, 1829

Material examined – SANTO ANTÃO: Ribeira Grande, Chã de Pedra, over different crops, 19.03.61, 1 ♂ 1 ♀ (CS-90); Alto da Lagoa, 1000-1400 m, 27.03.61, 1 ♂ 2 ♀♀ (CS-207).

P. daplidice was known from Fogo, Santo

Antão, Sal and Boavista (Nyström 1958 sub *Leucochloë*, Traub & Bauer 1982). Vieira (2008) summarized earlier data, but did not collect new specimens. D'Abrera (1997) recognized only one subspecies in the Afrotropical Region (i.e. *P. d. aethiops*),

restricted to the highlands of Ethiopia. Ackery *et al.* (1995), who considered the species to be monotypic, noted that it also occurs in North Africa, inland to northern Chad and Niger. The species also occurs in southern Europe (Maravalhas 2003) and the Canary Islands (Baéz & Martín, 2004), but is absent in Madeira and the Azores. Riley (1968)

considered it the only truly Palearctic element in the Capeverdean macrolepidopteran fauna. In Europe, the caterpillars feed on Brassicaceae and Resedaceae (Ackery *et al.* 1995, Vieira 2008), but in Cape Verde they were found on *Quaesus* sp. (Fabaceae) (Mück & Traub 1987).

Pontia glauconome Klug, 1829

Riley (1968) suggested that Nyström's (1958 sub *Leucochloë*) report of *P. glauconome* from Santo Antão and Sal (based on specimens taken in January 1954) needs confirmation, but these records were accepted by Traub & Bauer (1982). Vieira (2008) listed the species as an occasional migrant in desert or semi-desert areas and accepted its occurrence in Cape Verde. The species is said to be restricted to scrub areas in southwestern

Arabia (including Socotra), Somalia, Ethiopia, Kenya, Sudan, Chad, Mauritania and possibly Nigeria (D'Abrera 1977, Ackery *et al.* 1995). Tennent (1996) described its range as being from northern Central Africa through Saudi Arabia to Afghanistan and mentioned its occurrence in the Hoggar (Algeria) and probably also southernmost Morocco and Tunisia.

Family LYCAENIDAE
Subfamily THECLINAE

Deudorix (Virachola) dinomenes diomedes Jackson, 1966

This species was reported from Santiago by Mück & Traub (1987), who reported caterpillars feeding on *Acacia seyal*. Two subspecies have been described, with the nominal one being from eastern and southern Africa and *D. d. diomedes* ranging from West Africa to Cameroon, western Kenya and western Tanzania (Larsen 2005). Ackery *et al.* (1995) and Larsen (2005) reported *Deinbollia* sp. (Sapindaceae) as the food-plant, but Larsen (2005) believed it to be polyphagous. Although it seems well established in Santiago (where it reproduces) and occurs in neighbouring Senegal, Báez & García (2005)

thought the species likely to be introduced in Cape Verde. T. Larsen (*in litt.*, 17 August 2009) considered the presence of this forest butterfly in Cape Verde unlikely, suggesting that the specimens reported by Mück & Traub (1987) probably concerned *Deudorix livia*, a similar species of dry habitats from Senegal to eastern Africa (Egypt, Sudan, Somalia, Djibouti), Arabia and the eastern Mediterranean region, the caterpillars of which are strongly polyphagous and known to feed on Arecaceae, Alliaceae, Fabaceae, Myrtaceae, Punicaceae, Rosaceae, Rubiaceae and Solanaceae.

Subfamily POLYOMMATINAE

Lampides boeticus (Linnaeus, 1767)

Material examined – SANTIAGO: Posto Agrícola de São Jorge (São Jorge dos Orgãos), 17.12.60, 1 ♂ (CS-91); idem, on herbs, 13.05.61, 1 ♂ (CS-239); idem, 14.12.60, 1 ♂ (CS-246); São Francisco, Matão, 19.07.61, 1 ♂ 1 ♀ (CS-164); São Francisco, Mulher Branca and Matão, 19.07.61, 5 ♂♂ 2 ♀♀ (CS-174); São Francisco, Matão to Mulher Branca, 07.07.61,

1 ♂ (CS-186); Santa Catarina, c. 700 m, flying over field of beans, 05.01.61, 4 ♂♂ 2 ♀♀ (CS-234); Santa Cruz, Pedra Badejo, mainly on *Ricinus* and banana-trees, 06.01.61, 4 ♂♂ (CS-245). FOGO: near Lomba, Mira-Mira, 8 km from Monte Vara, 28.02.61, 1 ♂ (CS-210). SANTO ANTÃO: Ponta do Sol, Chã, farm, 17.03.61, 2 ♂♂ 1 ♀ (CS-85); Ribeira Grande, Chã de Pedra, over cultivated

plants, 19.03.61, 1 ♂ 1 ♀ (CS-90); near Ribeira das Patas, hillside with dry grasses, 26.03.61, 1 ♂ (CS-96); Bardo de Ferro to Corda, 900-1,000 m, flying over herbs, 16.03.61, 3 ♂♂ 1 ♀ (CS-202); Ribeira da Torre, Chô-Chô, 13.03.61, 2 ♂♂ (CS-205). MAIO: beach of Calheta, close to the sea, 19.10.60, 2 ♂♂ (CS-41); Ribeirão, 14.11.60, 2 ♂♂ (CS-106); idem, flying over grasses, 16-17.11.60, 1 ♂ 2 ♀♀ (CS-321). No locality, no date, 1 ♂ 1 ♀ (CS-194).

The species has been reported from Santiago, Fogo, Brava, Santo Antão, São Vicente, São Nicolau, Sal, Boavista and Maio (Aurivillius 1910 sub *Cupido*, Nyström 1958, Traub & Bauer 1982, Vieira 2008). Considered monotypical, it occurs in the Palearctic, Afrotropical, Oriental and Australian Regions. In Cape Verde, the polyphagous caterpillars (known to feed on Leguminosae) were seen on *Crotalaria* sp. (Fabaceae) (Mück & Traub 1987).

Leptotes pirithous (Linnaeus, 1767)

L. pirithous was reported from Santiago by Aurivillius (1910, as *Cupido telicanus* var. *plinius*) and from Santiago, Fogo, Brava, Santo Antão and São Vicente by Nyström (1958, as *Cupido telicanus*, cf. Traub & Bauer 1987). It is widely distributed in Africa and Madagascar, much of Asia and reaches south-western Europe. The polyphagous caterpillars

are known from several genera of Fabaceae and also from Ericaceae, Fagaceae, Lythraceae, Plumbaginaceae, Rosaceae and Verbenaceae (Ackery *et al.* 1995, Tennent, 1996). In Cape Verde, they were reported to feed on *Medicago* cf. *sativa* (Fabaceae) (Mück & Traub 1987).

Euchrysops osiris (Hoppfer, 1855)

This species was reported from Brava and Santo Antão (Nyström 1958, cf. Traub & Bauer 1982). It is known from open habitats in sub-Saharan Africa and Madagascar. In Cape Verde, the caterpillars are unknown, but

elsewhere they feed on species of *Rynchosia*, *Vigna* (Fabaceae) and possibly *Becium* (Lamiaceae) (Ackery *et al.* 1995, Larsen 2005).

Azanus jesous (Guérin, 1847)

A. jesous is known from Santiago (Aurivillius 1910, Nyström 1958, both sub *Cupido*) and Fogo (Traub & Bauer 1982). According to D'Abreu (1979) and Larsen (2005), the species lives in arid *Acacia* woodland throughout Africa and is common in West

Africa. In Cape Verde, the caterpillars were reported on *Desmanthus vulgaris* (Fabaceae) (Mück & Traub 1987), while Ackery *et al.* (1995) and Larsen (2005) reported feeding on other genera of the same family (*Acacia*, *Dichrostachys*, *Entada*, *Medicago*).

Azanus mirza (Plötz, 1880)

Common in open habitats (mainly savannah) throughout sub-Saharan Africa, this species was reported from Santiago, Fogo, São Vicente, Boavista and Maio (Nyström 1958 sub *Cupido*, cf. Traub & Bauer 1982). The

caterpillars, unknown in Cape Verde, feed on *Acacia* spp. and *Dichrostachys* spp. (Fabaceae) and in forests on *Allophylus* spp. (Sapindaceae) (Ackery *et al.* 1995)

Azanus moriqua (Wallengren, 1857)

In Cape Verde, *A. moriqua* is only known from Santiago (Aurivillius 1910 sub *Cupido*, cf. Traub & Bauer 1982). It occurs in open habitats throughout Africa and southern

Arabia. The caterpillars, unknown in Cape Verde, feed on *Acacia* spp. (Fabaceae) (Ackery *et al.* 1995, Larsen 2005).

Zizeeria knysna (Trimen, 1862)

Material examined – SANTIAGO: Posto Agrícola de São Jorge (São Jorge dos Orgãos), c. 300 m, 07.10.65, 1 ♂ (CS-23); idem, 14.12.60, 2 ♂♂ (CS-246); idem, 20.12.60, 1 ♂ (CS-312); Santa Catarina, c. 700 m, flying over field of beans, 05.01.61, 1 ♂ (CS-234); Santa Cruz, Pedra Badejo, mainly on *Ricinus* and banana-trees, 06.01.61, 1 ♂ (CS-245). SANTO ANTÃO: Ribeira Grande, Boca da Coruja, 19.03.61, 1 ♂ (CS-36); Ponta do Sol, Chã, farm, 17.03.61, 3 ♂♂ 1 ♀ (CS-85); Ribeira da Torre, Chô-Chô, 13.03.61, 1 ♂ (CS-205). SÃO VICENTE: Ribeira Julião and Seixal, 14.03.61, 2 ♂♂ 1 ♀ (CS-281). No locality, no date, 1 without abdomen (CS-406); 1 ♂ (CS-464).

Previously, the species was reported from Santiago, Fogo, Brava, Santo Antão, São

Vicente, São Nicolau and Sal (Aurivillius 1910 as *Cupido lysimon*, Nyström 1958 as *Zizera lysimon*, Traub & Bauer 1982, Vieira 2008). Occurs throughout tropical Africa and southern Arabia, extending into tropical Asia and Australia. It has also been reported from Palearctic north-western Africa (Tennent 1996), the Iberian Peninsula (Maravalhas 2003) and the Canary Islands (Baéz & Martín 2004), but it is unknown in the Selvagens and Madeira. The caterpillars, in Cape Verde reported on *Amaranthus* (Amaranthaceae) and *Tribulus* (Zygophyllaceae) (Mück & Traub 1987), are polyphagous, feeding mainly on Fabaceae, but also on Amaranthaceae, Chenopodiaceae, Euphorbiaceae, Oxalidaceae and Zygophyllaceae (Ackery *et al.* 1995, Larsen 2005).

Family NYMPHALIDAE

Subfamily DANAINAE

Danaus chrysippus chrysippus (Linnaeus, 1758)

Material examined – SANTIAGO: Santa Cruz, Pedra Badejo, 20.01.61, 1 ♂ (CS-79); Posto Agrícola de São Jorge (São Jorge dos Orgãos), 17.12.60, 1 ♂ (CS-91); idem, over herbs, 13.05.61, 1 ♂ 1 ♀ (CS-239); São Francisco, Vale Cachopo, among sugar-cane, 06.07.61, 3 ♂♂ 2 ♀♀ (CS-151); São Francisco, Mundo Novo, 21.07.61, 2 ♂♂ (CS-165); São Francisco, Matão, 14.07.61, 1 ♂ 1 ♀ (CS-168); São Francisco, Rombada, 14.07.61, 2 ♂♂ 1 ♀ (CS-169); São Francisco, São Tomé, 20.07.61, 1 ♂ (CS-177); São Francisco, Mulher Branca, 21.07.61, 1 ♂ (CS-288); Santa Catarina, Achada do Rincão, 04.09.69, 1 ♂ (CZ-3577); Santa Catarina, Achada Galega, 26.09.69, 3 ♂♂ (CZ-3592). BRAVA: Ribeira do Forno, 10.10.69, 3 ♂♂ (CZ-3604); Vinagre, 14.10.69, 1 ♂ (CZ-3609); Ribeira Fajã de Água, 16.10.69, 6 ♂♂ 2 ♀♀ (CZ-3612). SANTO ANTÃO: Ribeira do Paul, 23.03.61, 1 ♂ 1 ♀ (CS-93); idem, 24.03.61, 2 ♂♂ 1 ♀ (CS-203); Bardo de Ferro to Corda, 900-1,000 m, flying over herbs, 16.03.61, 3 ♂♂ (CS-202); Ribeira da Torre, Chô-Chô, 13.03.61, 1 ♀ (CS-205); Ribeira do Cachugo, 20.10.72, 1 ♂ 1 ♀ (CZ-3574); Ribeira das Patas, 20.10.72, 2 ♂♂ (CZ-3755); Paul, 15.11.72, 1 ♂ 1 ♀ (CZ-3771). SÃO VICENTE: Ribeira Julião to Seixal, 14.03.61,

3 ♂♂ (CS-281). SÃO NICOLAU: Ribeira João, 19.10.70, 2 ♂♂ (CZ-3631); Cachaço, 21.10.70, 2 ♂♂ 1 ♀ (CZ-3633); Ribeira Brava, 21.10.70, 2 ♂♂ 1 ♀ (CZ-3655); Caldeira, 29.10.70, 3 ♂♂ 1 ♀ (CZ-3675); Prainha, 04.11.70, 1 ♂ (CZ-3680); Ribeira Maiamba, 04.04.70, 2 ♂♂ (CZ-3681). BOAVISTA: João Galego, flying over maize and bean fields, 24.11.61, 1 ♂ 2 ♀♀ (CS-279). MAIO: Morro and Calheta, over herbs, 01.11.60, 2 ♂♂ 1 ♀ (CS-271); Barreiro, at night on tall grasses, 22.11.60, 5 ♂♂ 1 ♀ (CS-275); Chico Vaz, Vale de Figueira, 20.11.60, 1 ♂ 1 ♀ (CS-320); Lagoa, 13.08.69, 2 ♂♂ 2 ♀♀ (CZ-3561); Mourinho, 15.08.69, 7 ♂♂ 1 ♀ (CZ-3565); Figueira da Horta, 18.08.69, 2 ♂♂ (CZ-3566); Pilão Cão, 19.08.69, 1 ♂ (CZ-3568); no locality, 28.11.60, 1 ♂ (CS-259). No locality, no date, 1 ♂ 1 ♀ (CS-407).

Danaus chrysippus is known from almost all of the Cape Verde Islands (Aurivillius 1910 as var. *alcippus*, Nyström 1958 sub *Danais*, Traub & Bauer 1982, Vieira 2008) and is here reported from Brava for the first time. It is a migrant species known from the Palearctic, Afrotropical, Oriental and Australian Regions. *D. c. chrysippus* is considered the only subspecies present in Africa (Larsen 2005), although *Danaus*

chrysippus aegyptius (Schreber, 1759) has been recognized by some authors (e.g. Ackery *et al.* 1995, D'Abrera 1997). The caterpillars mainly feed on Asclepiadaceae and in Cape

Verde their presence has been reported on two species of the family, i.e. *Calotropis procera* and *Asclepias curassavica* (Mück & Traub 1987 sub *Danais*).

Subfamily SATYRINAE

Melanitis leda (Linnaeus, 1758)

Material examined – SANTIAGO: Santa Cruz, Pedra Badejo, 20.01.61, 1 ♀ (CS-79); idem, especially over *Ricinus* and banana-trees, 06.01.61, 3 ♂♂ 5 ♀♀ (CS-245); São Francisco, Benfica to Mato Baixo, 07.07.61, 1 ♂ 1 ♀ (CS-188); Posto Agrícola de São Jorge (São Jorge dos Orgãos), 18.01.61, 2 ♂♂ 2 ♀♀ (CS-241); idem, Ribeira da Longueira, 31.12.60, 1 ♂ (CS-349). BRAVA: Vinagre, 14.10.69, 3 ♀♀ (CZ-3609). SANTO ANTÃO: Ribeira Grande, Boca da Coruja, 19.03.61, 3 ♂♂ 2 ♀♀ (CS-36); Ponta do Sol, Chã, farm, 17.03.61, 1 ♂ (CS-85); Ribeira do Paul, 24.03.61, 1 ♂ 2 ♀♀ (CS-203); Ribeira da Torre, Chô-Chô, 13.03.61, 3 ♂♂ 3 ♀♀ (CS-205). SÃO NICOLAU: Cachaço, 21.10.70, 1 ♂ (CZ-3633); Caldeira, 29.10.70, 4 ♂♂ (CZ-

3675); Ribeira Maiamba, 04.04.70, 2 ♂♂ (CZ-3681). No locality, no date, 1 ♀ (CS-469).

This is the first record of *M. leda* for Brava. Previously, it had been reported from Santiago, Santo Antão and São Nicolau (Aurivillius 1910, Nyström 1958, Traub & Bauer 1982). The species is widespread in the Afrotropical, Oriental and Australian Regions. Larsen (2005) considered it to be monotypical, with African *M. l. helena* (Westwood, 1851) no longer being recognized. The caterpillars feed on a diversity of Poaceae (Ackery *et al.* 1995, Larsen 2005), but so far they have not been found in Cape Verde.

Subfamily NYMPHALINAE

Vanessa cardui Linnaeus, 1758

Material examined – SANTIAGO: Santa Catarina, Achada do Rincão, 04.09.69, 1 ♀ (CZ-3577); Boa Entrada, 08.09.69, 1 ♀ (CZ-3582); Santa Catarina, Entre Picos, 22.09.69, 1 ♂ 1 ♀ (CZ-3591); Santa Catarina, Nhangar, 03.10.69, 2 ♂♂ (CZ-3600). BRAVA: Vila Nova Sintra, 13.10.69, 1 ♂ (CZ-3607). FOGO: São Filipe, 02.03.61, 1 ♂ (CS-348). SANTO ANTÃO: Ribeira da Torre, Ribeira Grande, 28.10.72, 1 ♀ (CZ-3758). SÃO VICENTE: Ribeira Julião and Seixal, 14.03.61, 1 ♂ (CS-281). SÃO NICOLAU: Ribeira Maiamba, 04.04.70, 1 ♂ (CZ-3681). MAIO: Morro and Calheta, over herbs, 01.11.60, 2 ♂♂ (CS-271); slope of Monte Batalha, over herbs, 19.10.60, 1 ♂ 1 ♀ (CS-

273); Chico Vaz, Vale de Figueira, strong wind, 20.11.60, 1 ♂ (CS-320).

This is the first record for Maio and the species is now known from all of the Cape Verde Islands (cf. Aurivillius 1910 and Nyström 1958 sub *Pyrameis*, Traub & Bauer 1982, Vieira, 2008). *V. cardui* is a cosmopolitan and migratory species, ranging from New Zealand to Iceland, but not occurring in South America. The caterpillars feed on a variety of host plants. In Cape Verde, they were reported on Malvaceae and *Trichodesma africanum* (Boraginaceae) and a pupa was collected on *Nicotiana glauca* (Solanaceae) (Mück & Traub 1987).

Nymphalis polychloros polychloros Linnaeus, 1758

Material examined – SANTIAGO: Santa Cruz, Pedra Badejo, sugar-cane field, 25.01.61, 1 ♀ (CS-142).

This is the first record of *N. polychloros* for the Cape Verde Islands and represents a

Palaearctic element in the islands' macrolepidopteran fauna. The specimen was obtained along the north-eastern coast of Santiago (app. 15° 09'N, 23° 31'W), almost at sea level. The species is considered to include

two subspecies (D'Abrera 1992, Tennent 1996), the nominal one ranging from southern Europe to the Himalayas and *N. p. erythromelas* Austaut, 1885, a North African endemic, known from Morocco to Tunisia where it occurs at *c.* 1,500-2,000 m altitude. Devoid of any rufous or reddish tint, the

specimen is identical to material from Portugal and other European countries, thus allowing it to be assigned to the nominate subspecies. The caterpillars, unknown in Cape Verde, are gregarious and occur on Salicaceae, Ulmaceae and Rosaceae (Ackery *et al.* 1995, Tennent 1996).

Hypolimnas misippus (Linnaeus, 1764)

Material examined – SANTIAGO: Santa Cruz, Pedra Badejo, sugar-cane field, 25.01.61, 1 ♀ (CS-142); São Francisco, Rombada, 14.07.61, 2 ♀♀ (CS-169); São Francisco, Benfica to Mato Baixo, 07.07.61, 1 ♀ (CS-188); Posto Agrícola de São Jorge (São Jorge dos Orgãos), over herbs, 13.05.61, 1 ♀ (CS-239); idem, 16.01.61, 1 ♀ (CS-241); Santa Catarina, Achada do Rincão, 04.09.69, 1 ♂ 1 ♀ (CZ-3577); Boa Entrada, 08.09.69, 1 ♀ (CZ-3582); Santa Catarina, Ribeira do Mato Fontes, 09.09.69, 1 ♀ (CZ-3583); São Jorge to Santa Catarina, 20.09.69, 1 ♂ 1 ♀ (CZ-3589); Santa Catarina, Entre Picos, 22.09.69, 3 ♂♂ (CZ-3591); Santa Catarina, Achada Galega, 26.09.69, 1 ♀ (CZ-3592); Santa Catarina, 30.09.69, 1 ♂ 2 ♀♀ (CZ-3597); Santa Catarina, Nhangar, 03.10.69, 1 ♀ (CZ-3600); Cidade da Praia, 24.11.69, 1 ♂ 1 ♀ (CZ-3625). FOGO: near Lomba, Mira-Mira, 8 km from Monte Vara, flying over herbs and bean fields, 28.03.61, 1 ♂ (CS-208); Nossa Senhora do Socorro, 04.11.69, 2 ♂♂ 2 ♀♀ (CZ-3619). SANTO ANTÃO: Ribeira do Cachugo, 20.10.72, 3 ♂♂ (CZ-3754); Ribeira das Patas, 20.10.72, 2 ♂♂ (CZ-3755); Paul, 15.11.72, 2 ♂♂ 1 ♀ (CZ-3771). SÃO NICOLAU: Ribeira Brava, 21.10.70, 3 ♂♂ 1 ♀ (CZ-3655); Ribeira João, 19.10.70, 1 ♀ (CZ-3631); Ribeira Maiamba, 04.04.70, 2 ♀♀ (CZ-3681). BOAVISTA:

João Galego, flying over maize and bean fields, 24.11.61, 1 ♂ (CS-278). MAIO: Vila do Maio, 10.11.60, 1 ♂ (CS-260); Calheta, over herbs, 15.10.60, 1 ♂ (CS-268); slope of Monte Batalha, on herbs, 19.10.60, 2 ♂♂ 1 ♀ (CS-273); Chico Vaz, Vale de Figueira, strong wind, 20.11.60, 1 ♀ (CS-320); Mourinho, 15.08.69, 4 ♀♀ (CZ-3565). No locality, no date, 1 ♂ (CS-407); 1 ♂ (CZ- without number).

H. misippus has been reported from all islands, except Santa Luzia and Sal (Riley 1893, Aurivillius 1910, Nyström 1958, Traub & Bauer 1982). The species is widely distributed in the tropical regions of the world. It is common in the Canary Islands (Baéz & García 2005) and has also been collected in Madeira and the Desertas (Maravalhas 2003, Aguiar & Karsholt 2008) and in São Miguel island in the Azores (Karsholt & Vieira 2005), although it appears to be absent in continental north-western Africa (Tennent 1996). The caterpillars are polyphagous and feed on a variety of host plants, i.e. Acanthaceae, Amaranthaceae, Arecaceae, Convolvulaceae, Malvaceae, Portulacaceae and possibly Moraceae (Ackery *et al.* 1995). In Cape Verde, caterpillars were collected on *Portulaca oleracea* (Portulacaceae) (Mück & Traub 1987).

Subfamily BIBLIDINAE

Byblia ilithya (Drury, 1773)

Material examined – SANTIAGO: Santa Cruz, Pedra Badejo, 20.01.1961, 3 ♂♂ 1 ♀ (CS-79); Posto Agrícola de São Jorge (São Jorge dos Orgãos), at night attracted by light, 19.12.1960, 1 ♀ (CS-243). SANTO ANTÃO: Ribeira Grande, Boca da Coruja, 19.03.1961, 1 ♀ (CS-36); Ribeira do Paul, 23.03.1961, 1 ♂ 3 ♀♀ (CS-93); near Ribeira das Patas, hillside with dry grasses, 26.03.1961, 1 ♀

(CS-96). BOAVISTA: João Galego, flying over maize and bean fields, 24.11.1961, 1 ♀ (CS-278). MAIO: Chico Vaz, Vale de Figueira, no date, 1 ♂ (CS-263).

Previously reported from Santiago, Fogo, Santo Antão and São Nicolau (Nyström 1958, Traub & Bauer 1982), the above are the first records for Boavista and Maio. *B. ilithya* is widely distributed in sub-Saharan Africa,

extending into southern Arabia. The caterpillars, unknown in Cape Verde, feed on

species of *Delechia* and *Tragia* (Euphorbiaceae) (Ackery *et al.* 1995).

DISCUSSION

The present study of Cape Verde butterflies in the collection of the *Instituto de Investigação Científica Tropical* and a review of data obtained by previous authors who published on Cape Verde Lepidoptera, leads us to the following conclusions (see also Appendix 1).

One species of Nymphalidae *sensu stricto*, i.e. *Nymphalis p. polychloros* (Linnaeus, 1758), is reported for the first time from Cape Verde. A total of 25 species of ‘rhopalocerans’ is now known from the archipelago (but see note on *Eurema floricola* and *E. senegalensis* below).

Despite the geographical position of the archipelago, the ‘clouded yellow’ occurring in Cape Verde is Palearctic *Colias croceus* and not, as previously suggested, Afrotropical *C. electo*. It is one of the few Palearctic macrolepidopterids in Cape Verde.

The known distribution within the archipelago of several species could be extended, with one record being new for Santiago and Santo Antão, two for Brava, Fogo and São Nicolau, three for Boavista and four for Maio.

Old records of *Eurema floricola* and *E. senegalensis* (both reported once from Santiago) are now thought to concern *E. hecabe solifera*. Identifying *Eurema* spp. remains problematical, even taking into account the tinge of the yellow ground-color of the dorsal surface of the wings, the morphology of the forewing outer margin or even the morphology of the male genitalia (cf. Larsen 1996, 2005).

Riley (1968) suggested that the records of *Pontia glauconome* from Sal and Santo Antão (Nyström 1958) need confirmation. However, even though the specimens are in poor condition (as noted by Nyström 1958), the morphology of the male genitalia confirms the presence of *P. glauconome* in Santo Antão and Sal and *P. daplidice* in Santo Antão and Boavista.

The highest species diversity of ‘rhopalocerans’ in Cape Verde is found in Santiago, where 18 species have now been recorded, i.e. 72% of the number of species known from the archipelago (assuming that

Pontia glauconome does indeed occur and *Eurema floricola* and *E. senegalensis* were misidentified). Macrolepidopterid diversity is also high in Santo Antão (16 species, i.e. 64% of species known in Cape Verde), Fogo (14 species, 56%), Brava (13 species, 52%), São Vicente (12 species, 48%), São Nicolau (13 species, 52%) and Boavista (10 species, 40%). Islands with the lowest butterfly diversity are Sal with five species (20%) and Santa Luzia with two species (8%).

Palaearctic elements – *Pontia daplidice*, *P. glauconome* (if correctly identified), *Nymphalis polychloros* and *Colias croceus*, i.e. 12% – are less common in the archipelago than taxa of African origin (64%). Cosmopolitan species and those that are known from at least two zoogeographical regions (six species) make up the remaining 24%.

One only species, *Vanessa cardui*, is known from all islands. Further research will probably demonstrate that the same applies to cosmopolitan *Lampides boeticus* and *Danaus chrysippus*, not yet reported from Santa Luzia, and *Hypolimnas misippus*, as yet unknown from Santa Luzia and Sal.

Azonus moriqua has been collected in Santiago only and *Colotis amata*, *C. euipe* and *Belenois creona* only in São Vicente. These four taxa are only known from single and poorly preserved imagines, possibly suggesting accidental occurrences without established local populations. The same may eventually be shown to apply to the newly reported *Nymphalis p. polychloros*.

Deudorix dinomenes – or *D. livia* if T. Larsen (*in litt.*) is correct – is only known from Santiago and was suggested to have been introduced to the island. The presence of caterpillars indicates the existence of a local population, possibly imported from Senegal, where the species is known to occur.

Most species occur in both the Leeward (Maio, Santiago, Fogo, Brava) and Windward (Santo Antão, São Vicente, Santa Luzia, São Nicolau, Sal, Boavista) island groups and none is exclusive to Sal and/or Boavista (sometimes considered to constitute a third

island group). At present, four species (*Coeliades forestan*, *Colotis amata*, *Colotis euipe*, *Belenois creona*) are exclusively known from the Windward islands and

another four (*Deudorix dinomenes*, *Azanus jesous*, *A. moriqua*, *Nymphalis polychloros*) are only known from the Leeward islands.

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APPENDIX 1. Distribution of 'rhopalocerans' (Lepidoptera: Hesperioidea and Papilionoidea) in the Cape Verde Islands. A – Santo Antão; V – São Vicente; L – Santa Luzia; N – São Nicolau; S – Sal; Bv – Boavista; M – Maio; T – Santiago; F – Fogo; Br – Brava; O – previous authors; X – new records (this study); * – not reported for more than 100 years and almost certainly not occurring in the archipelago today. # – possibly introduced and a naturalized population may not exist.

	A	V	N	L	S	Bv	M	T	F	Br
Hesperiidae										
<i>Coeliades f. forestan</i>	o	-	o	-	-	-	-	-	-	-
<i>Borbo b. borbonica</i>	o	o	o	-	-	-	-	OX	OX	o
Papilionidae										
<i>Papilio d. demodocus</i>	OX	-	OX	-	-	X	X	OX	OX	o
Pieridae										
<i>Catopsilia florella</i>	-	-	OX	-	-	OX	-	o	OX	o
<i>Colias croceus</i>	OX	o	OX	o	-	-	X	OX	-	-
<i>Eurema hecabe solifera</i>	X	-	X	-	-	X	o	OX	OX	o
<i>Colotis amata calais</i> *	-	o	-	-	-	-	-	-	-	-
<i>Colotis e. euippe</i> *	-	o	-	-	-	-	-	-	-	-
<i>Belenois c. creona</i> *	-	o	-	-	-	-	-	-	-	-
<i>Pontia daplidice</i>	OX	-	-	-	-	o	-	-	o	o
<i>Pontia glauconome</i>	o	-	-	-	o	-	-	-	-	-
Lycaenidae										
<i>Deudorix dinomenes diogenes</i>	-	-	-	-	-	-	-	o	-	-
<i>Lampides boeticus</i>	OX	o	o	-	o	o	OX	OX	OX	o
<i>Leptotes pirithous</i>	o	o	-	-	-	-	-	o	o	o
<i>Euchrysops osiris</i>	o	-	-	-	-	-	-	-	-	o
<i>Azanus jesous</i>	-	-	-	-	-	-	-	o	o	-
<i>Azanus mirza</i>	-	o	-	-	-	o	o	o	o	-
<i>Azanus moriqua</i>	-	-	-	-	-	-	-	o	-	-
<i>Zizeeria knysna</i>	OX	OX	o	-	o	-	-	OX	o	o
Nymphalidae (Danainae)										
<i>Danaus c. chrysippus</i>	OX	OX	OX	-	o	OX	OX	OX	o	X
Nymphalidae (Satyrinae)										
<i>Melanitis leda</i>	OX	-	OX	-	-	-	-	OX	-	X
Nymphalidae s.s.										
<i>Vanessa cardui</i>	OX	OX	OX	o	o	o	X	OX	OX	OX
<i>Nymphalis p. polychloros</i> #	-	-	-	-	-	-	-	X	-	-
<i>Hypolimnas misippus</i>	OX	o	OX	-	-	OX	OX	OX	X	o
<i>Byblia ilithyia</i>	OX	-	o	-	-	X	X	OX	o	-
Total number of species per island	16	12	13	2	5	10	9	18	14	13