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Front cover | Capa: Common zebra blue | Cinzentinha *Leptotes pirithous* (Linnaeus, 1767), Brava, Cape Verde Islands, early November 2013. © John Tennent.



## Butterflies of the Cape Verde Islands (Insecta, Lepidoptera)

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Keywords: Lepidoptera, butterflies, Cape Verde Islands, distribution, new records

### ABSTRACT

A survey of butterfly species was carried out on 12 islands of the Cape Verde archipelago (Brava, Cima, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Raso, Santa Luzia, São Vicente, Santo Antão) during almost eight weeks in 2013. Results include the discovery of six species not previously recorded from the islands: *Vanessa atalanta*, *V. vulcania*, *Junonia oenone*, *Danaus plexippus*, *Eurema brigitta* and *Azanus ubaldus*. Known island distribution of some resident species is extended. Status of some long-standing (and questionable) historical records and probable misidentifications are discussed in detail. Data are presented with regard to habitat, habits and host-plants of all taxa, together with a table of species, islands, status and probable original geographical source. Entomological data from Cambridge University ornithological research on Raso between 2006 and 2014 are also included. Comment is made with regard to whether butterfly studies support inclusion of the Cape Verde Islands in 'Macaronesia' *sensu lato*.

### RESUMO

Em 2013, foi desenvolvido durante cerca de oito semanas um levantamento de espécies de borboletas das 12 ilhas do arquipélago de Cabo Verde (Brava, Cima, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Raso, Santa Luzia, São Vicente, Santo Antão). Os resultados aqui apresentados incluem a descoberta de seis espécies anteriormente não registadas: *Vanessa atalanta*, *V. vulcania*, *Junonia oenone*, *Danaus plexippus*, *Eurema brigitta* e *Azanus ubaldus*. Para além disso, expande-se a distribuição de algumas espécies residentes já conhecidas e discutem-se detalhadamente registos históricos há muito aceites (e questionáveis), bem como prováveis identificações erróneas. Os dados são apresentados em relação ao habitat, hábitos e plantas hospedeiras de todos os taxa, sendo igualmente apresentada uma tabela contendo as espécies, ilhas, estatuto e provável origem geográfica. Incluem-se também dados entomológicos resultantes de uma investigação ornitológica em ilhéu Raso, conduzida pela Universidade de Cambridge entre 2006 e 2014. Finalmente, discute-se os estudos de borboletas apoiam ou não a inclusão de Cabo Verde na 'Macaronésia' *sensu lato*.

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“Jan. 16<sup>th</sup>, 1832 – The neighbourhood of Porto Praya, viewed from the sea, wears a desolate aspect. The volcanic fire of past ages, and the scorching heat of the tropical sun, have in most places rendered the soil sterile and unfit for vegetation. The country rises in successive steps of table land, interspersed with some truncate conical hills, and the horizon is bounded by an irregular chain of more lofty mountains. The scene, as beheld through the hazy atmosphere of this climate, is one of great interest ...”

From the journal of Charles Darwin,  
MA Naturalist [Captain’s companion at that time] to H.M.S. *Beagle* (Darwin 1890: 2).

## INTRODUCTION

The authors visited the Cape Verde Islands from 29 October to 18 December 2013, with the intention of making an inventory of butterflies on each of the islands and investigating some historical records. The results were surprising, insofar as six species not previously known from the islands (representing *ca* 25% of the total species recognised as resident or probably resident in this paper) were recorded from the islands for the first time: *Vanessa atalanta* (Linnaeus, 1758) (not formally recorded previously, although mentioned in passing by Baliteau & Baliteau 2011), *V. vulcania* Godart 1819, *Junonia oenone* (Linnaeus, 1758), *Danaus plexippus* (Linnaeus, 1758) (not seen by the authors, but one male collected by David Hall in 2012), *Eurema brigitta* (Stoll, 1780) and *Azanus ubaldus* (Stoll, 1782). Additionally, a species whose occurrence in the Cape Verde Islands had previously been in some doubt (*Pontia glauconome* Klug, 1829) was confirmed and some long standing historical records (several pierids reported by the U.S. Eclipse Expedition in the late 19<sup>th</sup> century) are considered to be almost certainly erroneous. Finally, confusion in the reported presence of both *Azanus moriqua* (Wallengren, 1857) and *A. mirza* (Plötz, 1880) is resolved.

Entomological research in the Cape Verde Islands has tended to concentrate on non-butterfly insect groups (*e.g.* Alluaud 1925, 1936, Basilewsky 1951, Gridelli 1955, Remane 1957, Sabrosky 1957, Chopard 1958, Herting 1958, Lindberg 1958, van Emden 1958, Viette 1958, Saraiva 1962, Hedqvist 1965, Meinander 1966, Mateu 1968, Pires & Klein-Koch 1978, van Harten 1990, 1993, Breitling *et al.* 2011, Loureiro 2013), probably in view of the fact that the total number of butterfly species recorded from the islands is low. Many of the research papers relate to the results of Håkan Lindberg’s

expedition to the Cape Verde Islands in 1953-54. A list of Lepidoptera from the Portugese colonies (Bacelar 1948), listed by Ackery *et al.* (1995) as a Cape Verde butterfly reference, did not include any material from the Cape Verde Islands.

The first account of Cape Verde butterflies was provided by Riley (1894). Charles Valentine Riley (1843-1895) – not to be confused with Norman Denbigh Riley (1890-1979), who also published data on Cape Verde butterflies – was a British-born American entomologist and artist, appointed as Honorary Curator of Insects at the Smithsonian Institute, Washington D.C., at the time he presented scientific results of the U.S. Eclipse Expedition to West Africa (1889-1890). Several of the species he recorded from the Cape Verde Islands (Riley 1894) are questioned in this paper (see section on erroneous records below) and it is recommended that all of his records should be regarded with caution. He was not a Lepidoptera specialist and several of the non-Cape Verde identifications in his paper were incorrect: for example, he recorded the capture of *Papilio demoleus* Linnaeus, 1758 from Sierra Leone and Congo (Riley 1894: 127) and ‘numerous males’ of *Danaus plexippus* from the Congo (Riley 1894: 129). Neither species occurs in Africa (but see below regarding *D. plexippus*). ‘*Papilio demoleus*’ undoubtedly refers to *Papilio demodocus* Esper, 1798, and it is not clear what *plexippus* refers to – perhaps to the superficially similar *D. chrysippus* (Linnaeus, 1758), which is common in Africa. Riley’s historical account has been consulted by almost every subsequent author, none of whom have seriously questioned some of his more unlikely records: *Belenois creona* (Cramer, 1776), *Colotis euippe* (Linnaeus, 1758), *Colotis amata* (Fabricius, 1775).

Following Riley (1894), the next butterfly account was that of Aurivillius (1910), who

incorporated details of butterflies collected by Leonardo Fea in West Africa (including the Cape Verde Islands) between 1897 and 1902. The results of Håkan Lindberg's expedition were presented by Nyström (1958) and, as the title of their paper suggests, Schmutterer *et al.* (1978) dealt with insect pests in the Cape Verde Islands, including two butterflies: *Papilio demodocus* (a potential pest on *Citrus*) and *Leptotes pirithous* Linnaeus, 1767 (as *Syntarucus pirithous*), a potential pest on *Cajanus cajan* L. (pigeon pea) (Fabaceae). Judging from the clouds of *Lampides boeticus* Linnaeus, 1767 the present authors often observed in the vicinity of *C. cajan*, one might consider *L. boeticus* a more serious potential pest than either of the other species.

There followed a series of limited additional butterfly data and occasional checklists comprised largely, but not exclusively, of previous records (Bauer & Traub 1981, Traub & Bauer 1982, Mück & Traub 1987, Mück, *et al.* 1990, van Harten 1993, Libert *et al.* 2011, Baliteau & Baliteau 2011). Norman Riley (1968) published an illustrated list of Cape Verde butterflies, embedded in an ornithological work (Bannerman & Bannerman 1968), and Báez & García (2005) tabulated most butterfly records – including those considered here to be erroneous – offering an opinion as to whether each species was likely to be either resident or accidentally

introduced. Finally, and most recently, Mendes & Bivar de Sousa (2010) reviewed butterfly records to date and presented many new data from two small collections in the Instituto de Investigação Científica Tropical (ICT), Lisbon, Portugal, together with a comprehensive account of previous records.

It was clear from the literature that almost all the previous butterfly records were the result of limited fieldwork, with identifications carried out by non-specialists. The present authors were lucky enough to visit each of the Cape Verde Islands, including Santa Luzia and Raso. The only substantial island not visited was Branco, an uninhabited island of some 3 km<sup>2</sup> (less than half the size of nearby Raso).

A list of butterfly species known from, or recorded from, the Cape Verde Islands follows. The list is presented with historical records first, followed by detailed narrative of our own experience in the islands. Notes regarding larval host-plants, habitat (and taxonomic and other notes) are also included. Historical records are queried, where we consider this is appropriate. The bulk of voucher specimens collected by the authors in the Cape Verde Islands have been deposited in the Natural History Museum (BMNH), London, UK, and a small collection has been deposited at ICT, Lisbon, Portugal.

## TAXONOMIC PART

INSTITUTIONAL ABBREVIATIONS: BMNH – Natural History Museum, London, UK (formerly British Museum (Natural History)); ICT – Instituto de Investigação Científica Tropical, Lisbon, Portugal; INIA – Instituto Nacional de

Investigação Agrária (now Instituto Nacional de Investigação e Desenvolvimento Agrário, INIDA), São Jorge dos Orgãos, Republic of Cape Verde.

### HESPERIIDAE Coeliadinae

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

*Papilio forestan* Stoll, 1782, in P. Cramer & C. Stoll, *De Uitlandsche Kapellen voorkomende in de drie waereld-deelen Asia, Africa en America*, 4 (33): 210, pl. 391, figs E, F, type locality: “Côte de Bengal” [erroneous; *recte*: Africa]

RANGE Nominate *forestan* occurs throughout most of sub-Saharan Africa, including the Cape Verde Islands, but excluding the Western Cape

(Mendes *et al.* 2013); ssp. *arbogastes* Guenée, 1863 (type locality: Réunion Island) occurs on Madagascar, Mauritius, Réunion and perhaps (Larsen 2005) the Seychelles.

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Fogo, Santiago, São Nicolau, São Vicente and Santo Antão.

Nyström (1958) recorded this species (as *Rhopalocampta forestan*) from São Nicolau and Santo Antão. Riley (1968: 65) recorded the

species and noted: “This large African Skipper butterfly must ... owe its presence in the Cape Verde Islands to accidental importation by man ...”. Mück & Traub (1987) recorded it (as *Rhopalocampta forestan*) from Santiago and it was reported from a number of localities on Santo Antão by Baliteau & Baliteau (2011), who also recorded it as rare on São Nicolau. Báez & García (2005) recorded the butterfly (as *Rhopalocampta forestan*) only from Santo Antão and were of the opinion that the species is ‘probably native’.

It is interesting that the present authors recorded *C. forestan* from each of the islands from where it had already been reported, but – like others before – not from the dry, eastern islands of Boa Vista, Sal or Maio. Solitary individuals were seen on Fogo on the main coastal road north of São Filipe, 6 November, and some 2 km from that locality the following day. Also on Fogo, a third was seen feeding at *Lantana camara* (Verbenaceae) by the roadside just below the southern entrance to the caldeira on 8 November at 1,500 m elevation and others were seen the same day on the track leading to Pico Velha. The courtyard of the restaurant at Mosteiros, Fogo, is shaded by a mature *Terminalia catappa* tree, and several adults were seen flying around it, 10 November, with several curled leaves containing the chalky white powder characteristic of previous larval/pupal habitation, and a live pupa was found in one of these leaves. An adult emerged nine days later. A specimen was seen on Santiago, resting on a leaf in the sunshine near the summit of Monte Gâmboa (ca 1,080 m). It was disturbed several times, and on each occasion returned after a short period to or near the same place. On São Nicolau several individuals were seen, 24-26 November, at 1,200 m in cloudy weather on Monte Gordo and others were seen at *Lantana* flowers on the track to Hortelão. It was common in areas of Ribeira João and Água das Patas, at 300-400 m elevation. There were many *Terminalia* trees northwest of Vila da Ribeira Brava and quite large numbers of adults were feeding at flowers in the high branches of a *Eucalyptus* tree. On São Vicente, the species was seen, usually singly at

*Lantana*, at various levels on Monte Verde at the end of November and on Santo Antão, 7-12 December, several were seen on higher parts of the road leading to Caldeira das Patas, in the west of the island. It was common, flying around *Terminalia* trees at Sinagoga, on the north-eastern coast, and occasional elsewhere on the island, e.g. several were seen as we climbed south from Ribeira Grande towards Espungeiro.

**FLIGHT & HABITAT** The butterfly flies at great speed and seems hard to approach, except when obtaining nectar at flowers: perhaps in particular *Lantana*. It is very much a species of open hillsides, and of anywhere where there are *Terminalia* trees, occurring from sea level to the highest parts of the islands. Larsen (2005) confirms that *C. forestan* is known to hilltop in Africa and also visits mud puddles and urine patches. Baliteau & Baliteau (2011) observed an adult obtaining nectar from the flowers of *Mangifera indica* (mango) (Anacardiaceae).

**HOST-PLANTS** Elsewhere, the species is strongly polyphagous and the following list of host-plants is probably incomplete: *Canavalia*, *Cassia*, *Crotalaria*, *Indigofera*, *Lonchocarpus sericeus*, *Milletia*, *Phaseolus*, *Robinia*, *Sesamus*, *Cioclea reflexa* (Fabaceae), occasionally on Cocoa *Theobroma cacao* (Sterculiaceae), *Dregea*, *Marsdenia* (Asclepiadaceae), *Combretum*, *Quiscalis*, *Terminalia* (Combretaceae), *Conchocarpus* (Rutaceae), *Gossypium* (Malvaceae), *Sphedamnocarpus* (Malpighiaceae), *Geranium* (Geraniaceae), *Solanum* (Solanaceae), finally *Pterocarpus santalinoides* (Fabaceae), *Triaspis odorata* (Malpighiaceae) and *Cassipourea congoensis* (Rhizophoraceae) were recorded from Lamto, Cote d’Ivoire (Larsen 2005). In the Cape Verde Islands, *Terminalia catappa* is probably the usual host-plant, although Baliteau & Baliteau (2011) found ova and larvae (and reported parasitism by hymenopterous parasitoids) on *Psidium guajava* (guava) (Myrtaceae), a host-plant family not mentioned by either Larsen (2005) or Mendes *et al.* (2013).

### Hesperiinae

***Borbo borbonica*** (Boisduval, 1833)  
*Hesperia borbonica* Boisduval, 1833,  
*Faune entomologique de Madagascar*,

*Bourbon et Maurice. Lépidoptères*, p. 65,  
 pl. 9, figs 5, 6, type locality: Madagascar [it

is noted that Larsen (2005) has Réunion as the type locality]

RANGE Africa and coastal districts of the Mediterranean to the Middle East. It occurs on many of the oceanic islands, including Aldabra, the Seychelles, Réunion and the Cape Verde Islands. Larsen (2005: 543) said "... recorded from Mauritania, The Gambia, Senegal, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo and northern Nigeria. It has migratory tendencies, so must occur also in Guinea-Bissau, Bénin and Niger ...".

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, São Nicolau, São Vicente and Santo Antão.

Aurivillius (1910) recorded this species (as *Parnara borbonica*) from São Nicolau, and Nyström (1958) (also as *Parnara borbonica*) added the islands of Brava, Santiago, São Vicente and Santo Antão. Riley (1968: 65) recorded *Borbo borbonica* and suggested "Probably imported with leguminous plants". Mück & Traub (1987) recorded this species (as *Parnara borbonica*) from the island of Santiago. Baliteau & Baliteau (2011) recorded it on Santo Antão and noted it was 'regular' on São Nicolau. Báez & García (2005) reported the butterfly (as *Parnara borbonica*) from Brava, Santiago, São Nicolau, São Vicente and Santo Antão and noted that the species was 'probably native'. Mendes & Bivar de Sousa (2010) reported specimens (as *Parnara borbonica*) from Santiago and Fogo in the collections of IICT.

On Brava, only one specimen was seen by the authors, resting on a rock in a goat compound at Fajã de Água – the weather was cold and wet for most of our time on that island. It was frequent in hot places on the road around the island on Fogo and was the first butterfly the authors saw on any of the islands, when two specimens were observed probing bird droppings

with their probosces on a shady path in our hotel grounds in Praia, Santiago. The occasional individual was subsequently seen at various localities on Santiago from sea level to 370 m (botanical gardens at São Jorge dos Orgãos), 800 m (on the road at Rui Vaz) and 880 m (on the road below the summit of Monte Gâmbôa). A solitary specimen on Maio was seen on the vegetated central reservation on the coastal road in Vila do Maio (it was not seen on either Boa Vista or Sal). It was frequent on São Nicolau, including at a garden in the centre of town, and in the areas of Ribeira João and Água das Patas, northwest of Vila da Ribeira Brava. It was also quite common on Santo Antão in various localities, including the road to Caldeira das Patas and northeast of Morro do Campo, both in the west of the island, south of Pontinha da Janela, on the ridge at Delgadim as we climbed south from Ribeira Grande towards Espongeiro and at Chã de Norte on the northern coast.

FLIGHT & HABITAT In sunshine it was seen most frequently on roads, resting on the road itself or nearby rocks, walls or – less frequently – vegetation. It was also often seen feeding at the flowers of *Lantana* (Verbenaceae), *Tridax procumbens* (Asteraceae) and (occasionally) *Heliotropium ramosissimum* (Boraginaceae). An individual was seen feeding at the catkin-like flowers of *Prosopis juliflora* (Fabaceae) at Chã de Norte on Santo Antão. In dull weather, adults sit on the upper surface of roadside leaves, usually near the ground.

HOST-PLANTS In Africa, the host-plants are Poaceae (*Erharta*, *Saccharum*, *Orzyra*, *Pennisetum*, *Leersia*, *Sorghum*, *Zea*) (Larsen, 2005). On Santo Antão, caterpillars were reported on *Saccharum officinarum* (sugar cane) (Panicoideae) by Baliteau & Baliteau (2011).

## PAPILIONIDAE Papilioninae

### *Papilio demodocus* Esper, 1798

*Papilio demodocus* Esper, 1798, *Die ausländische oder die ausserhalb Europa zur Zeit in den übrigen Welttheilen vorgefundene [sic] Schmetterlinge in Abbildungen nach der Natur mit*

*Beschreibungen*, p. 205, pl. 51, fig. 1, type locality: "Aethiopian Region"

*Papilio demodocus* f. *oblongula* Berio, 1941, *Bolletino della Società entomologica Italiana* 73: 91, type locality: Dominga, São Nicolau, Cape Verde Islands

**RANGE** Practically all of sub-Saharan Africa and southwestern Arabia, including Madagascar and most of the islands (Larsen 2005: 77). *P. demoleus* Linnaeus, 1758, is an oriental species, similar in appearance to *P. demodocus*, that almost meets *P. demodocus* in Arabia (Larsen 1983).

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, São Nicolau, Santa Luzia, São Vicente and Santo Antão.

Aurivillius (1910) recorded this species from the islands of Santiago and São Nicolau. Nyström (1958) recorded it from the islands of Fogo, São Nicolau and Santo Antão. Subsequent records were collated by van Harten (1993, citing Aurivillius 1910), Berio (1941), Riley (1968), Schmutterer *et al.* (1978), Bauer & Traub (1981), Mück (1985), Mück & Traub (1987) and Mück *et al.* (1990). Báez & García (2005) listed its occurrence on Brava, Fogo, Santiago, São Nicolau and Santo Antão, suggesting that it was 'probably native'. *P. demodocus* was recorded from a number of localities on Santo Antão by Baliteau & Baliteau (2011), who also reported it as very common on São Nicolau. Mendes & Bivar de Sousa (2010) reported material from localities on various islands, including the first published record from Boa Vista (several specimens collected 'in bean fields' at Monte Redondo, in November 1961).

*P. demodocus* is a large and colourful butterfly that is difficult to miss. It seems to be widespread on most of the islands (apparently not recorded from Sal), but most specimens the authors' observed early in their visit appeared to be merely 'passing through' or seen from a distance. Several were seen on Brava, mostly flying over gardens. It was widespread but not common on Fogo, including inside the caldeira. On Santiago it was seen in several places, including the centre of the capital Praia (see also Flight/habitat notes, below). The few observed on Maio were mainly seen flying aimlessly around non-flowering shrubs in our hotel garden. It was perhaps more frequent on São Nicolau, where it was locally quite common up to 1,100 m elevation on Monte Gordo and occasional in areas of Ribeira João and Água das Patas at 300-400 metres, northwest of Vila da Ribeira Brava. On São Vicente several individuals were seen at various levels on the slopes of Monte Verde and it was also seen in Mindelo town. On Santo

Antão several individuals were seen at various levels on the road to Caldeira das Patas, in the centre of the island and it was quite common along the ridge to Pico da Cruz, in the east of the island. It was also quite frequently encountered on the road as we climbed south from Ribeira Grande towards Espongeiro.

**FLIGHT & HABITAT** Individuals may be seen 'wandering' almost anywhere, as they presumably look for either host-plants or suitable nectar plants. On the road between São Filipe and Mosteiros on Fogo, three specimens were attracted to a damp patch on the road, which they returned to several times after being disturbed by traffic. We first saw the species in numbers on Santiago, in the gardens of Rui Vaz where there were perhaps a dozen specimens attracted to the flowers of poinsettia *Euphorbia pulcherrima* (Euphorbiaceae). An individual would occasionally leave the poinsettia to visit a nearby bougainvillea, but invariably returned to the poinsettia almost immediately. We assume the poinsettia must have been producing significant quantities of nectar. It was also seen commonly on São Nicolau, where numbers of *P. demodocus* were attracted to the small mauve flowers of the endemic *Echium stenosphon glabrescens* (Boraginaceae) growing in profusion outside the Monte Gordo Park offices at 500 m elevation. It was present wherever there were citrus trees and on Santo Antão larvae of all instars were found in profusion on a citrus tree growing against a wall in a small grove of different *Citrus* trees. Larsen (2005: 77) observed that males have a strong hilltopping tendency in West Africa, where "in the dry zone nearly every hilltop will have one, endlessly circling in the updraft and using little energy to stay airborne". Although the present authors visited a number of hilltops on several islands, this behaviour was not encountered in the Cape Verde Islands.

**HOST-PLANTS** Mück & Traub (1987) recorded larvae feeding on *Ruta chalepensis* (Rutaceae) on Santiago, and Baliteau & Baliteau (2011) found early stages on *Citrus bergamia* (Bergamot orange) (Rutaceae) and *Ruta chalepensis* on Santo Antão. In dry areas of Africa and the Middle East, larvae feed on many species of Rutaceae and other plants, including *Pituranthos* (*Deverra*) and *Foeniculum* (Apiaceae) (Larsen, 2005).

NOTES Berio (1941) described from São Nicolau ‘forme *oblongula*’ that was said to have slightly elongated hindwing ocelli, a ground colour brown rather than black and the yellow markings

rather dark. This was based on a specimen that was not fresh. Judging from this description, this was a fairly typical specimen of *P. demodocus* that had been on the wing for some time.

## PIERIDAE Coliadinae

### *Catopsilia florella* (Fabricius, 1775)

*Papilio florella* Fabricius, 1775, *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adjectis synonymis, locis, descriptionibus, observationibus*, p. 479, type locality: Sierra Leone

RANGE Pan African and parts of the Middle East. Apparently a regular migrant further afield, including India. Established in the Canary Islands in the 1960s, although it appears not to have persisted in Madeira following its appearance there in 1993 (Tennent *et al.* 2013). One of the very few butterflies that have been positively recorded from all West African countries, indeed probably all the countries in Africa and most of the islands (Larsen 2005).

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Santa Luzia, São Vicente and Santo Antão.

Aurivillius (1910) recorded two ♂♂ of this species from São Nicolau. Nyström (1958) also recorded it from São Nicolau and Mück & Traub (1987) recorded it from the island of Santiago. Báez & García (2005) recorded *C. florella* from Brava, Fogo, Santiago, Boa Vista and São Nicolau and regarded the species as ‘possibly native’. Recorded from the Cape Verde Islands by van Harten (1993), citing Nyström (1958), Riley (1968), Bauer & Traub (1981) and Mück & Traub (1987). Mendes & Bivar de Sousa (2010) examined material from Fogo, São Nicolau and Boa Vista in ICT. Baliteau & Baliteau (2011) recorded it from a number of localities on Santo Antão and also noted it was rare on São Nicolau.

This is a widespread but only occasionally common species in the Cape Verde Islands. On Brava it was common around Nova Sintra and occasional elsewhere – a very small ♀ specimen was taken at Fajã de Água, on the western coast. On Fogo it was quite common in all habitats, including inside the caldeira, and on Santiago it

was encountered almost everywhere in small numbers, including at 880 m elevation near the summit of Monte Gâmbôa. The species was widespread but not common on Maio and on Boa Vista it was seen occasionally, often (unexpectedly) in situations not associated with *Cassia* (see below). On Sal a small number of individuals were seen in the town of Espargos in the centre of the island. A solitary female seen on a rocky/shrubby slope on Santa Luzia, attracted to low growing yellow flowers, was presumably a vagrant (we saw no *Cassia* on the island). The species was frequent on São Nicolau (Monte Gordo, Tarrafal, on the track to Hortelão, areas near Ribeira João and Água das Patas), São Vicente (Monte Verde and on the road to Calhau) and Santo Antão (Porto Novo, on the road to Caldeira das Patas, and northwest to Ribeira da Cruz, along the ridge to Pico da Cruz and Espongeiro).

FLIGHT & HABITAT *C. florella* may occur almost anywhere there are *Cassia* / *Senna* bushes (Fabaceae: Caesalpinioideae). It may be a pest on ornamental *Cassia*. Most specimens seen by the authors were either associated with these plants, or ‘passing through’ disturbed areas, presumably in search of a mate or a suitable host-plant. Several individuals were nectaring at the flowers of a poinsettia *Euphorbia pulcherrima* inside the caldeira on Fogo and at *Lantana* flowers in and around the botanical gardens at São Jorge dos Orgãos at 370 m on Santiago. On Boa Vista several specimens were closely associated with a substantial *Senna bicapsularis* bush outside the post office in the village of Fundo das Figueiras. Elsewhere on Boa Vista, *C. florella* was seen feeding at the flowers of *Heliotropium ramosissimum* at Santa Monica, west of Curral Velho, along the southern coast. This was unusual – *Heliotropium* is a common nectar source, especially for lycaenid butterflies, throughout the Cape Verde Islands, but this was the only occasion where *C. florella* was seen to visit the plant. Flight is swift – *C. florella* is a renowned migrant and can be expected to take

advantage of suitable conditions locally to temporarily increase its range.

**HOST-PLANTS** Reported in Cape Verde on *Cassia occidentalis* (Mück & Traub 1987). Baliteau & Baliteau (2011) reported early stages on *Cassia italica* and females resting under the leaves of *Wissadula amplissima* (Malvaceae) on Santo Antão. The present authors found larvae on a *Cassia* sp. on Santiago and also near the ferry station in Porto Novo on Santo Antão. Elsewhere, the species utilises many species of *Cassia* (*Senna*), but occasionally *Sesbania* (Fabaceae), and the larvae are often associated with ants (Larsen 2005).

***Colias croceus*** (Geoffroy, 1785)

*Papilio croceus* Geoffroy, 1785, in Fourcroy, *Entomologia Parisiensis*, 2: 250, type locality: Paris

**RANGE** Throughout North Africa, southern and central Europe, and eastwards across western Asia to Iran. Common on the North Atlantic islands: the Azores (see Russell *et al.* 2003), Canaries and Madeira.

**DISTRIBUTION IN CAPE VERDE** The Cape Verde Islands represent the most southerly known populations of *C. croceus*. Recorded from the islands of Santiago, Maio, São Nicolau, Raso, Santa Luzia, São Vicente and Santo Antão.

Apparently overlooked by many visitors to the Cape Verde Islands. There has also been some doubt regarding which *Colias* species occurs there. Most early authors who recorded it regarded it as being *C. electo*, a species which is usually restricted to high or moderately high elevation in parts of Africa, although Larsen (2005) noted its presence in the Kalahari pans in Botswana – an apparently alien habitat. A major habitat in southwestern Arabia is now cultivated fields of alfalfa (Larsen 1983).

Nyström (1958: 6-7) recorded this species (as *Colias electo*) from the islands of São Nicolau (one specimen at Ribeira da Pulga), Santa Luzia (five specimens at Água Doce, 3 December 1953), São Vicente (four specimens at Mindelo, 11 at Monte Verde and two at Ribeira Julião) and Santo Antão (two specimens at Chã de Morte-Lagedo and Porto Novo). He said: “Evidently the butterfly was common in the archipelago. Three specimens were of a pale white variant – all of them ♀♀ – *i.e.* ab. ♀

*aurivillius* Kef. The others were of f. *croceus* Fourcr.” This is very confusing – presumably “f. *croceus*” was taken to be the name of the usual (*i.e.* yellow) female form of *C. electo*. The reason for believing the Cape Verde *Colias* to be *C. electo* seems to have been related to the fact that most of the Cape Verde butterfly fauna was considered to be of African, not Palaearctic origin, as Riley (1968: 63) suggested: “Though generally considered to be the same species as the familiar European Clouded Yellow (*Colias crocea* Fourcroy), recent research has shown fairly conclusively that this view is not tenable. *C. electo* does not occur north of the Sahara, but south of that barrier is common wherever the leguminous crops and native plants grow on which the caterpillar feeds ...”. Báez & García (2005) recorded the species (also as *Colias electo*) from Santiago, São Nicolau, Santa Luzia, São Vicente and Santo Antão, suggesting it was ‘probably native’. It was further noted from the Cape Verde Islands (as *Colias electo*) by van Harten (1993), citing previous authors (Nyström 1958, Riley 1968, Bauer & Traub 1981).

Based on material in ICT, *C. croceus* was correctly identified by Mendes & Sousa (2010: 48), who pointed out that 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)”. ICT specimens comprised six ♂♂ and two ♀♀ (of which one was ♀ f. *helice*) from Santiago (♀ f. *helice*, Santa Catarina, Ribeira Mato Fontes, September 1969), Santo Antão (one ♂, Alto da Lagoa, 1,000-1,400 m, March 1961, one ♂, Ribeira Maiamba, April 1970, one pair, Ribeira da Torre, Ribeira Grande, October 1972), São Nicolau (one ♂, Ribeira João, October 1970), Maio (two ♂♂, Ribeirão, ‘flying over herbs’, November 1960).

S. Davies (in Brooke & Davies 2009) recorded a solitary *C. croceus* on Raso, 24 November 2009, following a period of heavy rain on nearby São Nicolau in September. A large number of *Vanessa cardui* and a few *Danaus chrysippus* were also present. In view of the presence of suitable host-plants on Raso (both *Calotropis procera* and a *Lotus* sp., presumably *L. purpureus*, were present in quantity), it seems likely that *C. croceus* and *D. chrysippus* could survive temporarily on the island, but are unlikely to persist. A combination of a generally very arid environment, lack of nectar plants, and (possibly) the presence of large

numbers of terrestrial lizards, make even short term persistence problematic for most Lepidoptera species on Raso.

The present authors found a small resident colony on Maio on 13-14 November, in a rather unusual habitat (see Flight & Habitat below). At the end of November it was common – locally very common – from *ca* 300 m to the highest point on the road (*ca* 740 m) on Monte Verde on the island of São Vicente. Individuals were in pristine condition, with several pairs seen *in copula*, and as numbers increased we realised this was the beginning of a major emergence. In some of the fields bordering the road to the summit of Monte Verde much of the ground was planted with maize, with lots of cruciferous weeds growing in their midst, providing a ready nectar source for *Colias* and other butterflies. Two males were seen on rough ground at sea level near Baía das Gatas. No host-plant was seen there, although the host-plant was present in the village of Calhau not far away. These appeared to be wandering males utilizing a nectar source well below the usual habitat. One specimen was also seen in the vicinity of São Pedro, east of the airport, in a very dry habitat. The butterfly was still common on Monte Verde, 6 December, with males greatly outnumbering females. On Santo Antão, *C. croceus* was quite common on and after 8 December over a large area at 850-950 m elevation south of Lombo de Figueira, in areas where the presumed host-plant was common – it probably occurred on most of the grassy hills in that region, and also higher, and it was notable that the butterfly was absent wherever *Lotus latifolius* was also absent. We saw no specimens on the track to Pico da Cruz, where there appeared to be very few host-plants, but it was very common in various places on the road to Lagoinha and Lagoa, west of Espongeiro. Near Lagoa, where a large expanse of *Aloe* was haphazardly planted, about 70 males were seen on one hillside, with both sexes present on other hills nearby. A male was seen at 1,500 m elevation northeast of Morro do Campo in the west of the island and another male was seen on the road (track) between Monte Aranhão Perna and Morro Atravessado around 1,350m. Both appeared to be ‘passing through’ – there was plenty of nectar plant present, but hardly any *Lotus* anywhere in this area. It seems that males wander some distance from their habitat in search of females.

We kept a particular look-out for this species on the islands and often came across large areas of host-plant in a habitat which might be considered suitable for *C. croceus*. For example, the salt pans inside the crater at Pedra de Lume on Sal supported what appeared to be the Maio host-plant (see below), together with large swathes of *Sesuvium portulacastrum* and other nectar plants. However, most of Sal is dry and unsuitable and *C. croceus* was not seen there or anywhere else on Sal. Likewise, large quantities of *Lotus* plants grew on both Raso and Santa Luzia, but *C. croceus* was not present – although it is noted that the butterfly has been recorded from both these islands by others. It is considered likely that when conditions are particularly suitable, *C. croceus* (and probably other species) may expand their range temporarily and that a lack of nectar sources, coupled with the large numbers of lizards on these hottest and dry islands, prevent permanent or long-term expansion.

**FLIGHT & HABITAT** In truth, it seemed unlikely to the authors that *C. croceus* would be found on Maio, other than perhaps as an occasional visitor from islands to the west. However, a small but flourishing colony was found near Vila do Maio, between the salt pans and the beach. This is a very hot and at first sight rather barren locality, but on closer inspection it was seen to support extensive expanses of a luxuriant ground-hugging succulent, *Sesuvium portulacastrum* (Aizoaceae). These ‘mats’ of vegetation were patrolled by *Colias* adults, which kept very close to the ground, stopping frequently to probe the tiny pale pink flowers, and were whipped away by the wind when they rose even a few centimetres above the ground. The authors are experienced in observing *C. croceus* in numerous localities across the species’ range, but have never encountered it in such a habitat. *Lotus brunneri*, which grew in small patches on adjacent dunes, seemed the only obvious potential host-plant.

**HOST-PLANTS** Citing Tennent (1996), Mendes & Bivar de Sousa (2010) noted that in North Africa, larvae feed on Fabaceae (*Acanthyllis*, *Anthyllis*, *Astragalus*, *Colutea*, *Erophaca*, *Hippocrepis*, *Lotus*, *Medicago*, *Onobrychis*, *Trifolium*, *Vicia*) and noted that 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. The present authors observed that *Lotus* spp. were invariably present, often commonly, where *C. croceus* occurred. *Lotus* species delimitation in Cape Verde is problematic (Mark Carine *in litt.* 2014), but it can be said with some confidence that (1) the host-plant on Maio is almost certainly *L. brunneri*, the only apparently suitable species present in the *Colias* habitat; (2) on Santo Antão and São Vicente the most likely host-plant is *L. latifolius* at higher levels and *L. purpureus* lower down (the two species intergrade and may be difficult to separate); (3) *L. purpureus* is common at low levels in many places (including Santa Luzia) where the butterfly was not seen by the authors, but where there is potential habitat.

NOTE No tally was kept of the percentage of the pale sex-linked female f. *helice* to 'normal' yellow females seen, but the former was fairly frequent and gave us the impression that *helice* occurred in much the same percentage of the overall population as occurs elsewhere.

***Eurema hecabe*** (Linnaeus, 1758)

*Papilio (Danaus) hecabe* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 470, type locality: "Asia" [China, Canton] (Honey & Scoble 2001: 328)

RANGE A familiar species throughout the Oriental and Indo-Pacific Regions (type locality of *hecabe* is China) and tropical Africa, including most of the major islands. The African subspecies is referred to as ssp. *solifera* Butler, 1875.

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista and São Nicolau.

Nyström (1958) recorded this species (as *Terias brenda*) from Santiago and also recorded *Eurema senegalensis* (as *Terias senegalensis*) from the same island (see erroneous records below). Báez & García (2005) reported *E. hecabe* from Brava, Fogo, Santiago and Maio, suggesting that the species was 'probably native'. Mendes & Bivar de Sousa (2010) recorded the species from Santiago, Fogo, Brava and Maio (citing Nyström 1958 and Traub & Bauer 1982) and reported it for the first time

from São Nicolau and Boa Vista, based on a small number of specimens in IICT.

The present authors found *E. hecabe* commonly on the coast at Fajã de Água, Brava, and it was common on grassy places almost everywhere on Fogo, including inside the caldeira and in the fields and forest en route to Pico Velha. On Santiago, it was very common in the hills below and around Rui Vaz and abundant and active when sun came out at 880 m elevation on the road below the summit of Monte Gâmbôa. It was occasional in dry ribeiras west of the capital Praia, in the area of Porto Gouveia (west of Cidade Velha) and common locally in and around the botanical gardens above São Jorge dos Orgãos at 370 m elevation. We did not see it on any other island and the fact it was present on Santiago at both the beginning and the end of our visit to the Cape Verde Islands, but absent from the northwesterly islands in the middle of our visit, suggest it might be absent from Santo Antão and São Vicente. Records from São Nicolau (Mendes & Bivar de Sousa 2010) refer to a series (8 ♂♂, 2 ♀♀) taken at Ribeira Maiamba in April 1970 and a pair taken in October of the same year at Ribeira João. We did not see the species in the best part of a week on São Nicolau in late November 2013.

FLIGHT & HABITAT *E. hecabe* flies on waste ground, grassy places, agricultural land and shady places in light woodland. It flies with a slow, rather bouncing flight, usually near the ground, and visits flowers, on which individuals sit for long periods, particularly in dull weather. It is closely associated with the ubiquitous *Mimosa* sp. (Fabaceae), on which the larvae feed.

HOST-PLANT In Africa, *E. hecabe* utilises a variety of mainly fabaceous host-plants. Recorded on species of *Mimosa*, *Aeschynomene*, *Albizia*, *Caesalpinia*, *Cassia*, *Dichrostachys*, *Entada*, *Lespedeza*, *Lotus*, *Parkia*, *Sesbania* (all Fabaceae), as well as *Hypericum* (Clusiaceae).

NOTES *Eurema hecabe* is a highly variable species. Sexually and seasonally dimorphic, it occurs in such a bewildering array of phenotypes and intergrades as to make casual positive identification problematic in areas where similar species fly together. In large parts of Asia identification is straightforward, but in Africa, where there are similar *Eurema* species, identification is more difficult. Three species

have been reported previously from the Cape Verde Islands: *E. hecabe*, *E. senegalensis* and *E. floricola*. The subspecific name *solifera* is applied to African populations of *E. hecabe* and some inkling of the potential for confusion is provided by Bridges (1988), who placed *Terias solifera* as a subspecies of *senegalensis* and *senegalensis* as a subspecies of *hecabe*.

With this in mind, the authors collected a larger number of *Eurema* voucher specimens than we might otherwise have done, from every locality where the butterfly was seen. As expected, we experienced a wide variety of phenotypes (in addition to finding a distinctive *Eurema* species not previously reported from the Cape Verde Islands – see *E. brigitta* below) and dissected any specimen that did not obviously fall into the ‘*hecabe*’ mould. In so doing, we feel confident in suggesting that previous (historical) records of *E. senegalensis* and *E. floricola* probably represent misidentifications of *E. hecabe* (see further entries under erroneous records below).

***Eurema brigitta*** (Stoll, 1780)

*Papilio brigitta* Stoll, 1780, in P. Cramer & C. Stoll, *De Uitlandsche Kapellen voorkomende in de drie waereld-deelen Asia, Africa en America*, 4: 82, pl. 331, figs B, C, type locality: Guinea, Africa

**RANGE** Widespread in the Indo-Pacific, the Oriental Region and Africa. The nominate subspecies occurs throughout Africa and also occurs in southwest Arabia.

**DISTRIBUTION IN CAPE VERDE** Recorded from Fogo. This is the first record from the Cape Verde Islands. Three males and one female have been deposited in BMNH.

**FLIGHT & HABITAT** The species was found on the road to Mosteiros from São Filipe, 10 November, flying with much greater numbers of *E. hecabe*. It is smaller than *hecabe* and with a distinct black border on all wings (but lacking the ‘dog-tooth’ of the *hecabe* forewing). Despite the fact that *E. brigitta* is slightly smaller than most *E. hecabe* individuals, the two species were almost inseparable on the wing.

**HOST-PLANTS** Like *E. hecabe* (and some other *Eurema* species), host-plants of *E. brigitta* are mainly Fabaceae, including *Sesbania*, *Albizia*,

*Tephrosia*; in some areas the species prefers *Hypericum* (Clusiaceae) (Larsen, 2005).

***Pontia daplidice*** (Linnaeus, 1758)

*Papilio (Danaus) daplidice* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 468, type locality: Europe, [North] Africa

**RANGE** This is an essentially Western Palaearctic species, with its stronghold in southwestern Europe and North Africa (see also Notes below). In northern Africa, it just reaches Mauritania and the mountains of Niger, probably also occurring in Mali. It is strongly migratory “and may reach further south from time to time, though it could probably not breed there” (Larsen 2005: 101).

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, Fogo, Santiago, São Nicolau, São Vicente and Santo Antão. Records of *P. daplidice* from Boa Vista and Sal (Nyström 1958, Traub & Bauer 1982, Báez & García, 2005, Mendes & Bivar de Sousa 2010) are thought to probably refer to *P. glauconome*. The present authors found the latter to be common on both islands and have seen no reliable records of *P. daplidice* from either of those islands or from Maio.

Nyström (1958) recorded this species from Boa Vista (we believe this may refer to *P. glauconome*) and Santo Antão. Mück & Traub (1987) recorded it from Santiago and Baliteau & Baliteau (2011) reported it from a number of localities on Santo Antão. Báez & García (2005) reported *daplidice* from Brava, Fogo, Boa Vista, Sal and Santo Antão and suggested the species was probably native to the Cape Verde Islands. Mendes & Bivar de Sousa (2010) noted specimens from Santo Antão in IICT.

*P. daplidice* was encountered in all habitats on Fogo, from scrub bordering the sea to the inner slopes of the caldeira. It was common on the road from São Filipe to Mosteiros at the roadside and edges of the numerous small valleys and ravines where crucifers grew commonly and also *en route* from the caldeira to Pico Velha. On Santiago several were seen on a ridge below (ca 900 m) Monte Gâmba and it was quite common on a track on either side of Hortelão (Monte Gordo) on São Nicolau. Judging from the habitat where *Pontia* was seen

at low levels *en route* to and at Calhau on São Vicente, *Pontia* specimens seen may well have been *glauconome* (for the record, there seemed to be plenty of *Capparis*, but little or no crucifer present in this locality), but none were captured. Elsewhere on São Vicente, it was certainly *P. daplidice* that occurred, including a very dry area near São Pedro, east of the airstrip, where *P. daplidice* was found in quite large numbers. Also on São Vicente, it was common around 600-700 m on Monte Verde. On Santo Antão, *P. daplidice* was locally very common, due no doubt to large areas of yellow crucifer, especially away from the roads. Several individuals were seen at various elevations on the road to Caldeira das Patas and down the other side to Ribeira da Cruz, in the west of the island. It was occasional at 850-950 m south of Lombo da Figueira and on the track to Pico da Cruz, from 1,000-1,500 m. Also on Sano Antão, it was very common in various places on the road to Lagoinha and Lagoa, west of Espungeiro, and in one area, where crucifer was abundant, there were well over 100 individuals, mostly in fresh condition. It was present in small numbers on waste ground on the eastern outskirts of Porto Novo, where there was a large expanse of dead crucifers (judging from which we assumed the area was probably a blaze of yellow a short time previously). It was occasional all along the east coast between Vila das Pombas and Ribeira Grande and at various levels as we climbed south from Ribeira Grande towards Espungeiro. It was also common in the area northeast of Morro do Campo in the west of the island. As we progressed between Monte Aranha Perna and Morro Atravessado at  $\pm$  1,500 m elevation, the only butterflies to be seen were large numbers of *P. daplidice* and *V. cardui*, as well as the occasional *L. boeticus*. We did not see *P. daplidice* on Brava, due probably to poor weather conditions during our visit, nor on Maio, Boa Vista, Sal and Santa Luzia.

**FLIGHT & HABITAT** *Pontia daplidice* is a fast flyer most commonly encountered on waste ground, roadsides, ravines and almost anywhere where the common yellow *Diplotaxis* crucifer (Brassicaceae) occurs. It was also seen feeding on the flowers of *Heliotropium ramosissimum* (Boraginaceae), an important nectar source for many of the butterflies in the Cape Verde Islands. Baliteau & Baliteau (2011) noted adults feeding on the flowers of *Diplotaxis* sp. and

*Ipomoea batatas* (sweet potato) (Convolvulaceae).

**HOST-PLANTS** Not specifically reported in the Cape Verde Islands, but almost certainly includes *Diplotaxis glauca*. In North Africa and Europe, the main host-plants are various species of Resedaceae and Brassicaceae.

**NOTES** As with some other genera (*Eurema*, *Azanus*), the authors were aware of the potential for confusion in identification between the two *Pontia* species recorded from the islands and made considerable efforts to confirm (or not) previous records. *Pontia* species are fast flyers and, unless individuals are either collected or observed at close quarters (*i.e.* whilst feeding at flowers), accurate identification may be problematic. For example, *Pontia* butterflies were first seen on the island of Fogo inside the caldeira at 800+ m elevation. This might be expected to be *P. daplidice* and *Pontia* individuals seen on our first day were mostly positively identified as that species. A strong wind inside the caldeira made collection of voucher specimens difficult, but eventually a female was taken when it came to rest briefly on bare ground and we were surprised to find it was *P. glauconome*. Subsequent *Pontia* specimens collected on Fogo, both in and around the caldera and elsewhere, were all *P. daplidice*. Despite a concerted effort to find further specimens of *P. glauconome* inside the caldeira, the only individuals positively identified were *daplidice*. Whether the solitary *glauconome* caught on our first day was an immigrant is not known, but it may be considered unusual (Tennent, pers. obs.) to find the two species flying together. It is also noted that, although not seen in Cape Verde individuals collected by the present authors, seasonal variation in *P. daplidice* and other spring pierids in very hot localities in North Africa and elsewhere results in some very pale ecologically-based underside markings, which may be heavily tinged with yellow (rather than moss-green) and may conceivably result in misidentification of *P. daplidice* (*cf* Tennent 1996: pl. 4).

Based on enzyme data and some minor differences in the male genitalia, this Palearctic (but predominantly Mediterranean) species was split into two genetically distinct taxa (Geiger & Scholl 1985, Geiger *et al.* 1988). The name *daplidice* (the other is *P. edusa* Fabricius, 1777)

is now widely taken to refer to populations from North Africa and southwestern Europe as far east as the Italian region of Liguria (Wiemers 1995). Subsequently, it has been suggested (Porter *et al.* 1997) that *edusa* should be treated as a subspecies of *daplidice*. As Larsen (2005) pointed out, this separation of species is difficult to understand in such a strong migrant. Surprisingly, since suitable habitats and host-plants occur there, the species appears to be absent in the Azores and Madeira, although it is widespread in the Canary Islands.

Riley (1968) considered *P. daplidice* the only truly Palearctic element in the Capeverdean macrolepidopteran fauna. He considered the *Colias* present in the Cape Verde Islands to be the fundamentally African *C. electo* rather than the fundamentally Palearctic *C. croceus*. This paper also reports the presence of two Palearctic vanessid species on the islands.

***Pontia glauconome* (Klug, 1829)**

*Papilio glauconome* Klug, 1829, *Symbolae Physicae, seu Icones et descriptiones Corporum Naturalium novorum aut minus cognitorum*, fol. H, 12, pl. 7, figs 18, 19, type locality: Egypt

**RANGE** From The Gambia across Africa to Somalia and Egypt, through much of Arabia and the dry Middle East to Pakistan and central Asia (Larsen 2005).

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Fogo, Santiago, Maio, Boa Vista, Sal and Santo Antão. The authors question reports from Santiago and Santo Antão (see Notes below).

Nyström (1958) reported a specimen of this species (as *Leucochloë glauconome*) from Porto Novo, Santo Antão, taken 7 January 1954 (but see Note below) and a second specimen from Pedra de Lume on Sal, taken 19 January 1954. Riley (1968) suggested that Nyström's records required confirmation, but they were subsequently accepted by Traub & Bauer (1982) and Vieira (2008). Báez & García (2005) reported *P. glauconome* from Santiago and Santo Antão and suggested the species was 'probably native'.

A female *P. glauconome* taken in the caldeira on Fogo was the only confirmed *glauconome* seen on the island (see *P. daplidice* above). On Maio, where the second author had

observed what were assumed to be *P. daplidice* flying between the salt pans and the ocean near the harbour during a brief visit on 6 December 2011, two specimens of *P. glauconome* were taken in the same locality as *C. croceus* – another was taken on the north side of the salt pans, but no other *Pontia* was seen anywhere on Maio. On both Boa Vista and Sal, *P. glauconome* was common, but local, and *P. daplidice* was not encountered at all. The butterfly was widespread in the dunes and in coastal rocky places in the general area of Curral Velho on Boa Vista, where there was a thriving population. Population density was low, but it was spread over a large area of Curral Velho and the rocky point south of there. Individuals were hard to catch because they keep on the move, flying very close to the ground due to the strong wind and they were difficult to follow with the eye when in flight. However, they stopped fairly often to nectar on the small white flowers of *Heliotropium ramosissimum* (Boraginaceae), when they were quite easy to approach. It was subsequently also found some distance to the west of Curral Velho. On Sal, *P. glauconome* was the commonest butterfly present in most localities. Several specimens were seen in our Espargos hotel grounds almost as soon as we arrived and it was seen subsequently feeding at *Heliotropium ramosissimum* flowers on rough, stony ground on the road between Murdeira and Santa Maria. It was also common in the spectacular crater containing salt pans at Pedra de Lume and at Terra Boa (a small and arid agricultural area) it was the only butterfly seen, with the exception of a solitary *V. cardui*.

**FLIGHT & HABITAT** Unlike its congener, which relies on migrations to survive difficult times, *P. glauconome* is well adapted to eremic conditions. Flight is generally fast and erratic, always close to the ground and the species is often found where few other butterflies occur. The habitat of this butterfly in Pedra de Lume on Sal is perhaps atypical, as the habitat is protected to a large degree by the relatively high rim of the caldeira, which reduces the effect of wind dramatically. Adults were found nectaring on the flowers of *Heliotropium ramosissimum*, which was abundant in most places where the butterflies were seen. Adults were also observed nectaring on the flowers of the succulent *Sesuvium portulacastrum* (Aizoaceae) on Maio and at Pedra de Lume. Like many eremic butterfly

species (particularly pierids perhaps), the species has developed the ability to remain in the pupal stage until conditions favour emergence and subsequent breeding. According to Larsen (2005) the life cycle from egg to pupa can be completed in just over a week to take advantage of short-lived food availability.

**HOST-PLANTS** Ova were present and larvae were found feeding on *Diplotaxis glauca* (Brassicaceae) in the Pedra de Lume crater. Elsewhere the main host-plants are Brassicaceae (*Erucastrum*, *Zilla*, *Moracandia*, *Diplotaxis*), but also Capparaceae (*Dipterygium*), Cleomaceae (*Cleome*), and Resedaceae (*Caylusia*, *Ochradenus*) (Larsen 2005).

**NOTES** Aside from the unexpected capture of a female *glauconome* in the caldeira on Fogo, the habitat in which the authors encountered both *P. daplidice* and *P. glauconome* in the Cape Verde Islands was more-or-less as anticipated – *i.e.* *daplidice* on islands and in circumstances where there is a variety of vegetation and nectar sources as well as available host-plant; *glauconome* in more harsh, windy and stony environments which many butterfly species would find unsuitable. With this in mind, we question Nyström's record of *P. glauconome* from Porto Novo on Santo Antão, whilst acknowledging that his record from Sal was undoubtedly correct, particularly in view of the fact that it came from Pedra de Lume, where a strong population

persists to this day. He conceded (Nyström 1958: 5-6) that “the two specimens mentioned ... are very ragged. However, they are much smaller than *daplidice* L. and agree with the description of *glauconome* Klug ...”. It may be true that *glauconome* is generally rather smaller than *daplidice*, but the latter is extremely variable in size, and specimens from hot localities are often of below average size. Nyström (1958: 6, figs 1-6) also figured the male genitalia of both *Pontia* species. We acknowledge that differences in genitalia may be diagnostic, but Nyström did not provide the sex of either of the two specimens, nor did he say that the figures represented either of the actual specimens he examined.

Riley (1968: 63) said of this species: “Like *P. daplidice* a Mediterranean species, but more restricted in its distribution to truly desertic biotopes. Recorded by Nyström ... on the basis of two specimens taken in January 1954, but not otherwise known west of Libya. The record would seem to need confirmation”. In fact, *P. glauconome* occurs west of Libya - the first author has seen it commonly in the Hoggar Mountains of southern Algeria and suggested it probably also occurred in southern regions of Tunisia and Morocco (Tennent 1996). We do not know the source of the record from Santiago by Báez & García (2005), but we saw no apparently ‘suitable’ (typical) habitat for *P. glauconome* on either Santiago or Santo Antão and regard both these records as unlikely.

## LYCAENIDAE

### Lycaeninae

#### *Euchrysops osiris* (Hopffer, 1855)

*Lycaena osiris* Hopffer, 1855, *Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich-Preussischen Akademie der Wissenschaften zu Berlin*, 1855: 642, type locality: Mozambique

**RANGE** Occurs in suitable habitats throughout Africa, including Madagascar, to southern Arabia. In West Africa, Larsen (2005: 260) said: “... recorded from The Gambia, Senegal, Guinea-Bissau, Burkina Faso, Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Volta, Togo and Nigeria ... almost certainly Mali, Bénin, and Niger ... widespread but not necessarily common in Guinea and Sudan

Savannah, where large numbers of males sometimes aggregate at water ... not an effective coloniser of clear-felled areas in the forest zone, though it penetrates to the Ghana coast through the Dahomey gap”.

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, São Vicente and Santo Antão.

Nyström (1958) recorded this species from Brava (one specimen from Vinagre, 24 February 1954, and two specimens from Achada Favatal, 26 February-3 March). Báez & García (2005) noted its occurrence on Brava and Santo Antão and suggested it was ‘possibly native’. Baliteau & Baliteau (2011) recorded five adults at Ponta do Sol (20 m elevation) on Santo Antão.

The authors took a solitary ♂ at ca 650 m on Monte Verde, São Vicente, and believe a second ♂ was seen at Cova on Santo Antão. No other specimens were seen (see Note below).

**FLIGHT & HABITAT** The only specimen(s) seen by the authors were on disturbed ground near cultivated areas.

**HOST-PLANTS** In Africa the usual host-plants are species of *Rhynchosia* and *Vigna* (Fabaceae).

**NOTES** Very few specimens of this species have been recorded from the Cape Verde Islands. The authors suspected this was probably due at least in part to the presence of other lycaenid species (e.g. *Lampides boeticus*, *Leptotes pirithous*)

likely to be found in large numbers in the same habitat and perhaps difficult to separate on the wing. However, the only specimen collected, on São Vicente, was in a 'typical' disturbed habitat with very large numbers of *Lampides boeticus*, *Zizeeria knysna* and smaller numbers of *Azanus*. Its capture prompted a search of this area for several hours during which many hundreds of lycaenid butterflies were examined. No further *osiris* specimens were seen. Agglomerations of lycaenids in other localities on other islands were also inspected closely, without result. It appears that *E. osiris* is genuinely infrequent in the islands. Perhaps competition issues with the large number of other long-established Fabaceae-feeding lycaenids is a factor.

### Polyommatainae

***Azanus jesous*** (Guérin-Méneville, 1849)

*Polyommata jesous* Guérin-Méneville, 1849, Voyage en Abyssinie, 6: 383, Album, pl. (insectes) 11, figs 3, 4, type locality: Abyssinia

**RANGE** Throughout the dry zones of Africa, northwards to Morocco, Egypt and the Middle East. In West Africa it is widespread (Larsen, 2005). It occurred in southern Spain some years ago, but may not have persisted.

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Fogo, Santiago and Maio. It almost certainly occurs on other islands.

Aurivillius (1910) recorded this species (as *Cupido jesous*) from Santiago, as did Nyström (1958) (also as *Cupido jesous*). Traub & Bauer (1982) added Fogo. Báez & García (2005) suggested the species was 'possibly native'.

The authors found this species on Fogo, where it was quite common on the road east and then north towards Mosteiros and a solitary specimen was seen inside the caldeira. On Santiago, a ♂ was found sitting on a purple flower spike (unidentified plant) in quite cold, misty conditions at 1,080 m elevation on Monte Gâmbôa. It was found in larger numbers on Maio, both in the salt pans and with large numbers of *A. moriqua* in a sheltered valley east of Vila do Maio.

**FLIGHT & HABITAT** Like other *Azanus* species, *A. jesous* is invariably closely associated with *Acacia* growth. On Fogo, it was quite common along several kilometres of road with sparse *Acacia* bushes, feeding at the flowers of *Heliotropium ramosissimum* at the roadside. On Maio, a dozen or so specimens were the only butterflies flying around an *Acacia* bush, mostly dead but with some sprigs of new growth, on sandy soil adjacent to the salt pans. Numbers of the common 7-spot ladybird, *Coccinella septempunctata* L, 1758 (Coccinellidae) were aestivating in several of the split and broken stems (see *Antenna* 38 (2): front cover). Several specimens of *A. jesous* were also found feeding at the flowers of a large *Acacia nilotica* tree, in full bloom in a sheltered valley east of Vila do Maio, with larger numbers of *A. moriqua* and other lycaenids.

**HOST-PLANTS** In Cape Verde, larvae were reported on *Desmanthus vulgaris* (Fabaceae) (Mück & Traub 1987). In West Africa, it feeds on various species of *Acacia*, *Dichrostachys*, *Entada* and *Medicago* (Fabaceae) (Larsen 2005).

***Azanus moriqua*** (Wallengren, 1860)

*Lycaena moriqua* Wallengren, 1860, *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, N.F., 2 (4): 39, type locality: 'Caffraria' (= southern Africa) [usually cited as 1857, but N.F., Vol. 2, No. 4 (for 1857) was published 1860.]

RANGE Open habitats in the dry zones of Africa and southern Arabia (Larsen 2005).

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Santa Luzia, São Vicente and Santo Antão.

There has been some fundamental confusion in the literature between *A. moriqua* and *A. mirza*, probably largely as a result of Nyström (1958) (see below). No *Azanus* species was recorded by Riley (1894) and Aurivillius (1910) seems to have been the first to record any *Azanus* species from the Cape Verde Islands, reporting *A. jesous* (as *Cupido jesous*) and a pair of *A. moriqua* (as *Cupido moriqua*) from Santiago in May (Aurivillius 1910). He did not record *A. mirza*.

Authors since Aurivillius (1910) have taken different views. Nyström (1958) recorded *A. mirza* (but not *moriqua*) from Fogo (one specimen at Espigão), Boa Vista (one specimen at Fundo de Figueiras), Santiago (one specimen at Praia, one specimen at Ribeira do Charco), Maio (one specimen at Ribeira da Lagoa) and São Vicente (a specimen from Mindelo, eight specimens from Ribeiro Julião). This entry, suggesting that *A. mirza* was widespread in the Cape Verde Islands, was accompanied by line drawings of the genitalia. The genitalia drawings are key: they are fairly crudely (but accurately) drawn, and although it might be difficult to make firm identification from his drawings of the ventral view of the whole genitalia, or of the aedeagus (Nyström 1958: 11, figs 21-23), a drawing of 'lateral view, left side' (Nyström, 1958: 11, fig. 20) is diagnostic. Several features of the male genitalia separate *A. mirza* and *A. moriqua*. The most obvious is the shape of the terminal edge of the valve, which is deeply bifurcated in *A. mirza*, but blunt, roughly serrated, with a short, blunt finger-like projection on the outer edge in *A. moriqua*. Nyström's figure clearly illustrates *A. moriqua*, not *A. mirza* as he believed.

Riley (1968: 64) reported both *jesous* and *mirza*, but not *moriqua*. Traub & Bauer (1982) reported *A. mirza* from Fogo ('confirmed'), Santiago, Maio, Boa Vista and São Vicente (all 'from the literature'). They also recorded *A. moriqua* from Santiago, but questioned this record from the literature, presumably on the grounds that this was a historical record (Aurivillius 1910) and that all of the more

modern records were of *A. mirza*. Mück & Traub (1987) reported *A. jesous*, but made no mention of either *mirza* or *moriqua*, whilst van Harten (1993) recorded *mirza* (citing Nyström 1958, Riley 1968, Bauer & Traub 1981) and *moriqua* (citing Aurivillius 1910, Bauer & Traub 1981). Báez & García (2005) recorded *A. mirza* from Fogo, Santiago, Maio, Boa Vista and São Vicente. They also reported *A. moriqua* from Santiago, and regarded both species as 'possibly native'.

Most recently, Mendes & Bivar de Sousa (2010) supported previous authors in suggesting *A. mirza* was widespread in the islands and that *A. moriqua* was known only from Santiago, whilst both Libert *et al.* (2011) and Baliteau & Baliteau (2011) reported *moriqua* but not *mirza* from Santo Antão.

Aware of potential confusion between *A. mirza* and *A. moriqua* and intrigued as to the distribution of both in the Cape Verde Islands, the present authors concentrated on seeking out *Azanus* in as many habitats as possible on every island. This was highly successful, insofar as they were found on every island visited, with the exception of Raso (where we saw no butterflies) and Ilhéu de Cima (where the only butterfly encountered was a solitary *D. chrysippus* larva). What was unexpected is that, with the exception of small numbers of *A. jesous* and two female *A. ubaldus* (previously unrecorded from the islands), every one of the voucher specimens collected was *A. moriqua*. We are confident that Nyström's (1958) widespread records of *A. mirza* (on Fogo, Boa Vista, Santiago and São Vicente), replicated by subsequent authors, were the result of misidentification, as suggested by his illustrations of the male genitalia (Nyström 1958) (see above).

The present authors found adults feeding on the flowers of *Wedelia trilobata* (Asteraceae) on Brava, but did not encounter it anywhere else on the island, quite probably because of cold, wet weather for most of our stay. On Fogo, examination of a large number of *Acacia* trees failed to yield any specimens, but one individual was eventually discovered feeding on *Heliotropium ramosissimum* in company with larger numbers of *A. jesous* on the road to Mosteiros. On Maio, it was abundant in a sheltered valley east of Vila do Maio, flying around a magnificent *Acacia nilotica*, and on Boa Vista several were seen in close association with an isolated *Faidherbia albida* bush in sand

dunes at Gatas. On Sal, *A. moriqua* was common around *Acacia* trees in our hotel grounds and a solitary specimen was taken flying around an *Acacia* just outside Murdeira. On São Nicolau, despite examining a large number of *Acacia* trees, only one specimen was seen on a roadside *Acacia* north of Tarrafal, but some days later it was found commonly on *Prosopis juliflora* bushes and then abundant on *Heliotropium ramosissimum* just west of Juncalinho on the north coast. On Santa Luzia, the only *Acacia* sp. (undetermined) was found at the southern end of the southwestern coast beach near the semi-permanent fishermen's camp – several *Azanus* individuals were flying extremely swiftly around the upper branches of 6-7 trees and only a solitary male *A. moriqua* was secured in almost two hours standing under the trees waiting for the opportunity. On São Vicente, the butterfly was common at ca 120 m elevation on the outskirts of Mindelo. Small colonies were observed at both Calhau and close to Baía das Gatas, in the east of the island, and it was common between 550-650 m elevation on Monte Verde. However, on Santiago very few specimens were seen, due probably to a strong wind and cloudy conditions, but on Santo Antão it was very common on *Acacia* just south of Pontinha de Janela, near Vila das Pombas and at Chã de Norte.

**FLIGHT & HABITAT** *A. moriqua* is the most widespread and common *Azanus* species in the Cape Verde Islands. It occurs at low and moderate elevations in open habitats wherever there are *Acacia* or associated trees. It flies at great speed round these flowering trees, often around the upper branches and in company with – usually – smaller numbers of *L. pirithous*, settling for long periods to obtain nectar from the flowers. The very sharp spines on the trees makes capture problematic, especially in high winds. In addition to *Acacia* flowers, adults are particularly fond of the catkin-like flowers of *Prosopis juliflora* (Fabaceae) and may occur in large numbers on roadside verges where *Heliotropium ramosissimum* (Boraginaceae) and *Launaea arborescens* (Asteraceae) grow in profusion. Adults are also strongly attracted to the bright yellow ball-like *Acacia melanoxylon* (Fabaceae) and *Acacia nilotica*. At 550-650 m elevation on Monte Verde, São Vicente, adults were quite common, associated with the flowers of *Desmanthus virgatus* (Fabaceae). A petiol

station in the centre of Nova Sintra, Brava, had a well-kept low hedge of *Wedelia trilobata* (Asteraceae) (more usually seen as a trailing, mat forming plant), the bright yellow flowers of which attracted numbers of *A. moriqua*, *L. pirithous*, *Z. knysna* and *L. boeticus* throughout the day.

**HOST-PLANTS** Larvae are associated with *Prosopis juliflora* (Fabaceae) on Santo Antão. In Africa the species utilises *Acacia* spp., *Dichrostachys* spp. (Fabaceae) and, in forests, *Allophylus* spp. (Sapindaceae) (Ackery *et al.* 1995). On Boa Vista females were seen apparently ovipositing on *Faidherbia albida* (Fabaceae).

***Azanus ubaldus* (Stoll, 1782)**

*Lycaena ubaldus* Stoll, 1782, in P. Cramer & C. Stoll, *De Uitlandsche Kapellen voorkomende in de drie waereld-deelen Asia, Africa en America*, 4: 209, pl. 390, figs L, M, type locality: India

**RANGE** Across the Sahel (a biogeographic zone of transition between the Sahara Desert and the Sudanian Savannah), Canary Islands (Gran Canaria and Fuerteventura), North Africa, Egypt, the Arabian Peninsula and eastwards to India and Sri Lanka.

**DISTRIBUTION IN CAPE VERDE** Previously unrecorded from the Cape Verde Islands. Reported here from Maio.

**FLIGHT & HABITAT** Fundamentally a species of semi-arid habitats. Two female specimens were taken feeding at the flowers of an isolated *Acacia nilotica*, together with *A. jesous* and far greater numbers of *A. moriqua*, in the vicinity of Figueira da Horta (50 m elevation), Maio, 14 November. No doubt there were other specimens – the tree was huge, and there were large numbers of *Azanus* species flying very swiftly out of reach around the upper foliage.

**HOST-PLANTS** According to Larsen (2005: 267), “The host-plants are *Acacia*, and perhaps *Dichrostachys* (Fabaceae); *Camponotus* and *Prenolepis* ants are in attendance”.

**NOTES** The Cape Verde Islands lie directly west of the Sahel, where *A. ubaldus* is common and has, in part, a similar climate. It is no great

surprise to find the species there – Larsen (2005) knew of no records below 10° N latitude, while Maio lies just north of 15° N. The species is an occasional migrant and was recorded from the Canary Island of Gran Canaria for the first time by Olivier & van der Poorten (1992).

***Chilades evorae*** Libert, Baliteau & Baliteau, 2011

*Chilades evorae* Libert, Baliteau & Baliteau, 2011, *Bulletin de la Société entomologique de France*, 116 (1): 64, figs1-4 (p. 65), type locality: environs of Mesa, Porto Novo, Santo Antão

RANGE Endemic to the Cape Verde Islands.

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Santa Luzia, São Vicente and Santo Antão.

Recorded from a number of localities between 600 and 1,400 m (Alto Mira, Mesa, Porto Novo, Chã de Feijoal, Lombo de Figueiras) on Santo Antão by Baliteau & Baliteau (2011), associated with *Lotus brunneri* (Fabaceae), and *Tribulus* sp. (Zygophyllaceae). A specimen had fallen prey to a crab spider, *Thomisus onustus* (Thomisidae). The species was described from a ♂ holotype and four ♂♂, one ♀ paratypes (Libert *et al.* 2011).

The species was abundant on the uninhabited island of Santa Luzia, where it was very common in and around the ribeiras on the northwestern side of Ponta do Espia in the south of the island, and on the eastern side of Monte Grande, from low levels up to at least 200 m elevation. It was also quite common near the beach at Praia de Roque and occasional in the dry valleys leading inland from the beach east of Ponta de Praia. Since most of the island has similar habitat, it is assumed that *C. evorae* is widespread on Santa Luzia. On Santo Antão, it was also abundant everywhere we stopped on the road to Caldeira das Patas, including at the top of the pass and perhaps less so down the other side to Ribeira da Cruz, in the northwest of the island. It was abundant again south of Lombo de Figueira, on the first part of the track to Pico da Cruz and in various places on the road to Lagoinha and Lagoa, west of Espongeiro. It was occasional northeast of Morro do Campo, in the west of the island, and occasional on the road between Monte Aranho Perna and Morro Atravessado. On São Vicente, a solitary

specimen was taken at *ca* 350 m flying in long grass on the northern slope of Monte Verde. We spent quite a long time in this area and travelled over much of São Vicente, but no other specimens were seen.

FLIGHT & HABITAT Beachside shrub, dry ribeiras and slopes up to at least 1,400 m elevation, where *Lotus* grows in profusion. Flight is fast and on Santa Luzia individuals flew very erratically, close to the ground, stopping suddenly and resting for short periods. They appear very sensitive to movement, probably as a result of substantial numbers of lizards present on the island. On two occasions lizards were observed stalking butterflies feeding on flowers, but came nowhere near success. Butterflies were closely associated with *Lotus purpureus*, but also with cushions of a grey succulent, *Polycarpha nivea* (Caryophyllaceae), which was clearly a valuable nectar source, against which the butterflies were well camouflaged. On Santo Antão, there were large numbers of this species around clumps of *Lotus* (probably *L. latifolius* at upper levels and *L. purpureus* at lower levels: identification is difficult, and the two species may intergrade) and in places almost every clump of *Heliotropium ramosissimum* had several *evorae* of both sexes feeding.

HOST-PLANTS The various *Lotus* species with which the butterflies were associated are almost certainly host-plants. Libert *et al.* (2011) noted eggs laid on a *Lotus* sp. on Santo Antão.

***Lampides boeticus*** (Linnaeus, 1767)

*Papilio boeticus* Linnaeus, 1767, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (2), 12<sup>th</sup> edition, p. 789, type locality: Algeria

RANGE Europe, Africa, Asia, Australia and islands in the Pacific.

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, São Vicente and Santo Antão.

Aurivillius (1910) recorded this species (as *Cupido baeticus* [sic]) from the islands of Santiago, Boa Vista and São Nicolau. Nyström (1958) and Báez & García (2005) recorded the

species from each of the islands, with the exception of Santa Luzia, while the latter authors suggested *L. boeticus* was 'possibly native'.

The present authors also found the species on each of the islands visited, with the exception of Santa Luzia, although it probably occurs there when conditions for local migration from nearby islands are suitable. It was common throughout the islands, sometimes abundant.

**FLIGHT & HABITAT** *L. boeticus* is a renowned migrant that occurs in a wide variety of habitats. We found it on coastal sand dunes at sea level and the tops of the highest hills. It was a common butterfly at roadside flowers, including *Wedelia trilobata* (Asteraceae), *Heliotropium ramosissimum* (Boraginaceae) and was found sometimes in enormous numbers – for example inside the caldeira on Fogo, where there were many thousands of individuals closely associated with *Cajanus cajan* (pigeon pea) (Fabaceae), on which it must surely be a potential pest. It was also occasionally seen feeding at the flowers of *Acacia* and *Prosopis juliflora* (Fabaceae), often in company with other polyommata lycaenids.

**HOST-PLANTS** A wide range of leguminous host-plants.

***Leptotes pirithous* (Linnaeus, 1767)**

*Papilio pirithous* Linnaeus, 1767, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (2), 12<sup>th</sup> edition, p. 790, type locality: Algeria

*Leptotes pirithous capverti* Libert, Baliteau & Baliteau, 2011, *Bulletin de la Société entomologique de France*, 116 (1): 66, figs 5, 6 (p. 65), type locality: Água das Caldeiras, Lombo de Figueira, Porto Novo, Santo Antão

**RANGE** Pan-African, including many of the offshore islands. Distribution includes North Africa, the Canary Islands and Madeira, southern Europe (Iberia, southern France, Italy, etc.), Arabia.

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Santa Luzia, São Vicente and Santo Antão.

Aurivillius (1910) recorded this species (as *Cupido telicanus* var. *plinius*) from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Santa Luzia, São Vicente and Santo Antão, remarking that although the specimens he had available were worn, he was unable to find evidence of hindwing tails (see Notes, below). Nyström (1958) recorded it (as *Cupido telicanus*) from the islands of Brava, Fogo, Santiago, São Vicente and Santo Antão. Riley (1968: 65) recorded *Leptotes pirithous* (as *Syntarucus telicanus*) and said: "Like the other blues of the Cape Verde Islands this species almost certainly owes its presence there to the leguminous crops grown by man ...". Mück & Traub (1987) recorded it from the island of Santiago and Báez & García (2005) noted it from Brava, Fogo, Santiago, São Vicente, Santo Antão, remarking that it was 'possibly native' on the islands.

The authors found *L. pirithous* to be very common – occasionally abundant – on most of the islands visited (Brava, Fogo, Santiago, Maio, Boa Vista, São Nicolau, São Vicente and Santo Antão). It was invariably encountered in company with other lycaenid species, including *Azanus moriqua* and *Lampides boeticus*, less frequently *Zizeeria knysna*, and in places where both occurred, also *Chilades evorae*. It occurred in almost all habitats, from coastal dunes to the summit of mountains (see Flight & Habitat). In view of its frequency and wide distribution, it was surprising not to encounter it at all on Santa Luzia or Sal, although others (Aurivillius 1910) have recorded it from the latter.

**FLIGHT & HABITAT** Flight is fast, and it may be difficult to separate *pirithous* from other lycaenids in flight. It is found almost everywhere there is vegetation, particularly nectar producing plants. On Brava, it regularly visited the yellow flowers of *Wedelia trilobata* (Asteraceae) which formed a low hedge outside a petrol station in the centre of Nova Sintra, together with *A. moriqua*, *Z. knysna* and *L. boeticus*. On Fogo, it was the most widespread and abundant lycaenid (with the possible exception of *Z. knysna*, which might have been more common locally). It was frequent on the quantities of *Heliotropium ramosissimum* (Boraginaceae), which attracted lycaenids on most islands, and was also seen nectaring on *Launaea arborescens* (Asteraceae) on Boa Vista.

**HOST-PLANTS** The polyphagous caterpillars are known from several genera of Fabaceae and also from Ericaceae, Fagaceae, Lythraceae, Plumbaginaceae, Rosaceae and Verbenaceae. In Cape Verde, they were reported to feed on *Medicago sativa* (Fabaceae) (Mück & Traub 1987), and the authors obtained eggs from a female laying on *Indigofera tinctoria* L. (Fabaceae) on São Nicolau. Adults were also closely associated with both the lowland *Lotus latifolius* and the montane taxon *L. purpureus*. Schmutterer *et al.* (1978) regarded *Leptotes pirithous* (as *Syntarucus pirithous*) as a potential pest on *Cajanus cajan* (pigeon pea) (Fabaceae), especially during the dry season.

**NOTES** There are issues concerning the systematics of *Leptotes pirithous* in the Cape Verde Islands – and perhaps also in other parts of its range (*cf.* Stempffer 1935, Tite 1958). So far as the islands are concerned, the situation was brought to the fore by Libert *et al.* (2011), who described *Leptotes pirithous capverti* from three ♀♀ specimens (in effect 1♀ – the other two were said to be in very worn condition – and no ♂♂) from Santo Antão. The present authors make no criticism of this action, although it is unfortunate that it took no account of *pirithous* phenotypes elsewhere in the Cape Verde Islands and was instead compared (Libert *et al.* 2011: 65, figs 7, 8) with a ♀ from Cameroun, despite the fact that specimens similar to Cameroun material occur in other Cape Verde islands. The holotype of *capverti* (Libert *et al.*, 2011: 65, figs 5, 6) is damaged, but the features of a ‘dark’ form are obvious, and they are certainly very different in appearance to the paler, brighter and more distinctly marked females that occur elsewhere (*e.g.* Boa Vista).

Description of the ♀ provided by Libert *et al.* (2011) was “mainly based on the type, the only female in good condition” (2011: 66 [translation]), but nevertheless reliably illustrates differences between this and the more usual phenotype, with the exception of the overall size, which those authors believed to be “small ... of 50 females of the nominate subspecies [examined], only three are of comparable size” (Libert *et al.* 2011: 66 [translation]). Presumably the 50 females examined were all from mainland Africa – but, wherever their origin, they did not include material from other Cape Verde populations. The present authors have seen many hundreds of this and other forms of *L. pirithous*

in the Cape Verde Islands and observed no discernible difference in size – indeed the largest individuals seen were of the dark phenotype.

Libert *et al.* (2011) were of the opinion that their new taxon was local in forested areas and near crops, at elevations between 1,000 and 1,400 m. Their three females were collected in different localities on the island of Santo Antão, in January 2009. Acknowledging some confusion in the literature, including difficulty in separating different *Leptotes* species in Africa, they briefly referred to “*L. p. insulana* (Aurivillius, 1909) [from] Europe Island in the Mozambique Channel ...” (Libert *et al.* 2011: 66 [translation]) and were of the opinion, perfectly reasonably, that their new taxon should not be associated with ‘subspecies’ *insulana* Aurivillius, which occurred on the other side of Africa, with nominate *pirithous* occurring between these island localities (*i.e.* on mainland Africa).

The question of Aurivillius’ contribution to this issue is in itself interesting. Ackery *et al.* (1995: 644) believed that *insulana* represented “probably nothing more than an aberration”. But Aurivillius, whose paper on the Cape Verde Islands (Aurivillius 1910) came only a year after he coined the name (Aurivillius 1909), clearly had it in mind when he saw *pirithous* specimens from the western Cape Verde Islands (he was aware of material from islands that included São Nicolau, São Vicente and Santo Antão) (Aurivillius 1910: 496), when he said: “The specimens are all small, 18-22 mm, and the females are as in var. *insulana* Auriv[illius] without white markings ... although the [number of specimens available] are all fairly worn, it is remarkable that I can discover no trace of the tails of the hind wings. It is possibly [therefore] an island tailless form” (Aurivillius 1910: 496 [translated]). It is true that the tails of *L. pirithous* are often short and may be vestigial, even in fresh specimens (in comparison with the often long and filamentous tails of many other polymmatine species). The tails were presumably missing from his damaged material.

Aware of the recent description of *L. p. capverti*, the present authors were hopeful of finding this new taxon on the islands and were surprised to find both sexes of this dark form abundant in many localities on São Nicolau, São Vicente and Santo Antão. *L. pirithous* was equally common on other islands. Examination of voucher specimens suggests that *pirithous* is

very variable in the Cape Verde Islands. The very dark ♀ form described by Libert *et al.* (2011) appears to be constant (with a correspondingly dark ♂) on the northwesterly islands of Santo Antão and São Nicolau and more-or-less constant on the southwestern islands of Brava and Fogo, although on those islands, ♀♀ sometimes show some obscure signs of the ‘usual’ paler upperside markings of *pirithous* elsewhere. On the easterly islands of Maio and Boa Vista, phenotypes are very variable, with most ♂♂ typical of *pirithous* elsewhere (including mainland Africa), but with variants transitional to the darker phenotypes found further west. For reasons we cannot now explain, we found we had no voucher specimens from São Vicente, but we do have photographs, from which it is clear that the phenotype there is much the same as the large islands immediately to the west (Santo Antão) and east (São Nicolau).

This is an interesting situation. We hesitate to firmly allocate any name (including *capverti*) to the dark form of the western Cape Verde Islands until further data are available. We sent fresh ova home to England from a dark female observed ovipositing on *Indigofera tinctoria* (Fabaceae) on São Nicolau, but unfortunately what should have been a relatively straightforward rearing process foundered on the vagaries of the post office(s) concerned. It is regarded as important to rear the Cape Verde phenotypes to see if they breed true (*i.e.* that dark forms really are confined to the western islands, with paler forms in the east). But for the present, we do not have a view on whether the name *capverti* should be properly referred to a species, or to a subspecies of *L. pirithous*, or whether the dark form should be referable to ‘form *insulana* Aurivillius (= *capverti* Libert, Baliteau & Baliteau)’, or whether these are seasonal or ecological forms.

***Zizeeria knysna*** (Trimen, 1862)

*Lycaena knysna* Trimen, 1862,  
*Transactions of the Royal Entomological Society of London*, (3) 1: 282, type locality:  
South Africa

RANGE Practically all of Africa, including most of the islands, Seychelles, southwestern Arabia, southern Spain and the Canary Islands.

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa

Vista, Sal, São Nicolau, São Vicente and Santo Antão.

Riley (1894: 129) reported a female *knysna* (as *Lycaena lysimon* Hübner) taken “on board ship between St. Vincent [São Vicente] and Sierra Leone”, and Aurivillius (1910) recorded this species (as *Cupido lysimon*) from the islands of Brava and São Nicolau. Nyström (1958: 11–12) recorded it (as *Zizera lysimon*) from Brava, Santiago, São Nicolau, São Vicente and Santo Antão and added: “Two different modifications of this species are included in the material from Cape Verde – one of a normal size (*c.* 26 mm), which Dr. Viette has named f. *knysna* Trim[en], and one much smaller (*c.* 16 mm). The latter Dr. Viette has named *Zizula hylax* Fab. As *lysimon* is known to be a species exhibiting seasonal dimorphism, and since the genitalia of the male of both this size types agree, I consider that they belong to the same species – especially since the dates for the smaller modification (only from [Santiago]) are later – *i.e.* it represents another generation ...”. Perhaps this confusion is understandable: Viette carried out a great deal of work in the Pacific islands, where *knysna* and *hylax* fly together, and Nyström (1958: 9) said that among the lycaenid specimens available “there were a number of very ragged specimens which were difficult to identify”. Mück & Traub (1987) recorded *Z. knysna* from Santiago and Báez & García (2005) recorded the species from Brava, Fogo, Santiago, São Nicolau, São Vicente, Santo Antão, suggesting it was ‘possibly native’. The species was recorded from several localities on Santo Antão by Baliteau & Baliteau (2011), who also recorded it as common on São Nicolau.

On Brava, this was a very common species, including in the middle of Nova Sintra where grass and a few *Medicago* plants grew between the cobble stones. It was also common on Fogo on the cobbled roads and at roadsides around the island and from the beach to cultivated areas inside the caldeira. On Santiago, it was locally abundant wherever there were host-plant and nectar sources, including just below the summit of Monte Gâmba at 880 m elevation. It was perhaps less widespread on Maio, although it was common near the coastal salt pans and on the vegetated central reservation on the coastal road in Vila do Maio. It was common in all suitable places on Boa Vista and Sal. It was also common between 1,200 and 1,300 m above the Monte Gordo Park office on São Nicolau and

appeared in some numbers on the summit ridge when the sun came out. It was also present almost everywhere we stopped on São Vicente, even in dull weather, often in a large and boldly marked form, and on Santo Antão it was common throughout the island, often flying in company with *Chilades evorae*.

**FLIGHT & HABITAT** Flight is generally close to the ground and rarely any distance from host-plants. With other lycaenids (*L. boeticus*, *L. pirithous*, *A. moriqua*) it was common nectaring on the yellow flowers of *Wedelia trilobata* (Asteraceae) outside the local petrol station in Nova Sintra on Brava and visited *Heliotropium ramosissimum* (Boraginaceae) wherever it was

found throughout the islands and also *Tridax procumbens* (Asteraceae).

**HOST-PLANTS** Larvae of *Z. knysna* are polyphagous. Mück & Traub (1987) recorded larvae on *Tribulus terrestris* (Zygophyllaceae) and *Amaranthus* sp. (Amaranthaceae) on Santiago. Baliteau & Baliteau (2011) noted close association with *Amaranthus blitoides* (Amaranthaceae). Elsewhere, *knysna* utilises a variety of plants, including *Cajanus*, *Lotus*, *Medicago*, *Pisum*, *Trigonella*, *Zornia* (Fabaceae), *Malva* (Malvaceae), *Fagonia*, *Tribulus* (Zygophyllaceae), *Amaranthus* (Amaranthaceae) in the Canaries (Schurian 1994), *Chenopodium*, *Spinacea* (Chenopodiaceae), *Euphorbia* (Euphorbiaceae) and *Oxidalis* (Oxalidaceae) (Larsen 2005).

### Theclinae

***Deudorix dinomenes*** Grose Smith, 1887

*Deudorix dinomenes* Grose Smith, 1887, *Annals and Magazine of Natural History*, (5) 19: 65, type locality: Uganda

**RANGE** Africa. The nominate subspecies occurs in eastern and southern Africa; ssp. *diomedes* Jackson, 1966, occurs in West Africa.

*D. dinomenes* was recorded (as *Virachola dinomenes*) from Santiago by Mück & Traub (1987). The authors said: "This species appeared in 1984 suddenly near INIA [at São Jorge dos Orgãos, Santiago], but seems no longer to occur there [translation]". They also noted (Mück & Traub 1987: 94): "This striking [species was] first discovered in the spring of 1984 ... from the pods of *Acacia seyal* (Leguminosae), where the larvae eat the seeds ...[translation]". They went on to say that the species could not be found

subsequently and that it is likely that it failed to become established on the island. Báez & García (2005) registered the presence of *D. dinomenes* on Santiago and suggested it was 'probably introduced'.

*D. dinomenes* is a forest species that was known from few specimens in West Africa until recently (Larsen 2005). There is no indication that it has become established in the Cape Verde Islands as a result of its apparently brief appearance in the early 1980s. Larvae are polyphagous. The late Torben Larsen, who knew the butterfly fauna of West Africa intimately, was of the opinion that the records of *D. dinomenes* may well have referred in fact to *D. livia* Klug, 1834, a widespread species of the savannah and Sahel (T. Larsen in Mendes & Bivar de Sousa 2010).

## NYMPHALIDAE

### Danainae

***Danaus chrysippus*** (Linnaeus, 1758)

*Papilio (Danaus) chrysippus* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 471, type locality: Canton, China

**RANGE** A very wide distribution throughout much of the tropical and subtropical regions of

the Old World. Throughout the Afrotropical Region, including many of the islands, the Canary Islands, southern Europe (apparently recently established in southern Spain and elsewhere) and through the Middle East to the Oriental Region and beyond. The Australian populations of what were at one time considered to be *D. chrysippus* were separated (as *D. petilia* Stoll, 1790) by Lushai *et al.* (2005).

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Ilhéus do Rombo (Ilhéu de Cima), Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Raso, Santa Luzia, São Vicente and Santo Antão. The only island from which the species has not been recorded therefore is Branco, for which there are no records of any butterfly species, but *D. chrysippus* may well occur there: the island is very steep, but there is vegetation and *Calotropis procera* was recorded there by Lobin (1986).

Aurivillius (1910) recorded this species (as *Danaida chrysippus* var. *alcippus*) from the islands of Santiago, Boa Vista and São Nicolau. It is interesting that he placed all these specimens (27♂♂, 15♀♀) under f. *alcippus* (see Notes below). Nyström (1958: 7) recorded this species (as *Danais chrysippus*) from the islands of São Nicolau, São Vicente and Santo Antão, noting that the majority of specimens (16 in total) belonged to “ab. *alcippus* Cr.; only two agree with the description of *chrysippus* L. (both from S. Antão: Rib. Grande) ...”. Mück & Traub (1987) recorded it (as *Danais chrysippus*) from the island of Santiago and Baliteau & Baliteau (2011) recorded the species from several localities on Santo Antão, adding that it was common on São Nicolau, where it was very variable in appearance. Mendes & Bivar de Sousa (2010) reported specimens in IICT from Santiago, Brava (for the first time), Santo Antão, São Vicente, Boa Vista and Maio.

The species was recorded from Raso, 13-28 November 2009, by S. Davies (in Brooke & Davies 2009), with large numbers of *V. cardui* and a solitary *C. croceus*, following a period of heavy rain on nearby São Nicolau in September: “With the high rainfall and resulting lush vegetation came unusual insect activity ... the 24th saw another large arrival of insects [including] a few more African Monarchs (with a single *Danaus chrysippus alcippus* type with the orange hindwings and a few of the variant with the whitish hindwings [*sic*: it is actually f. *alcippus* that displays variable white patches on the hindwing]) ...”. At that time “vegetation was, by Raso standards, luxuriant” although “butterfly numbers visibly dwindled ... as the vegetation browned” (Brooke & Davies 2009: 2). The following year *D. chrysippus* and *V. cardui* were again abundant on Raso (Brooke & Welbergen 2010), although whether this was as a result of contemporary local migrations or of successful breeding from the previous year’s influx is not

known. Both species were present in fewer numbers, 9-25 November 2011 (Brooke & Flower, 2011), but in 2012 a solitary *D. chrysippus* was the only butterfly seen from 6 to 26 November (Brooke & Finnie 2012). No *chrysippus* were seen on Raso in 2013 (Brooke & Dierickx 2013) (the same year the present authors visited Raso) and no butterflies were noted in 2014 (Brooke & Dierickx 2014).

The presence of many healthy *Calotropis procera* plants on Raso when the present authors visited in 2013 might suggest a suitable habitat, but the island is generally very dry, and there is a paucity of adult nectar plants available. *D. chrysippus* may be able to survive on Raso for short periods, but is probably unable to persist in the long term.

The authors found *D. chrysippus* on each of the other Cape Verde islands visited. It was widespread but rather sporadic on Brava, from Nova Sintra to the coast at Fajã de Água, usually individually or in small numbers. On a whole day spent on Ilhéu de Cima (Ilhéus do Rombo), a very large number of *Calotropis* plants were examined. A solitary *chrysippus* larva was the only butterfly seen and there were no other signs of feeding on *Calotropis* leaves (*i.e.* no leaf damage or larval frass). It is quite probable (see Raso above) that *D. chrysippus* regularly establishes populations on the Ilhéus do Rombo when conditions are suitable, at least in the short term. The species was common and widespread on Fogo, Santiago and Maio, with several thousands seen on the last island in one sheltered valley. On Boa Vista and Sal, we were surprised to see few *chrysippus* individuals and during two days on Santa Luzia only two specimens were seen on the beach, flying around *Calotropis* plants; no signs of larval feeding were seen. On São Vicente and Santo Antão, the species was common, although levels of parasitism were locally very high (see Notes below).

FLIGHT & HABITAT *D. chrysippus* can be encountered in almost any environment, usually flying around or searching for *Calotropis* plants or feeding at flowers. Adults were seen feeding at a number of plants, including, on Fogo only, *Sarcostemma daltonii* (Apocynaceae), which may even represent a potential host-plant (a common asclepiad on steep cliffs). On Maio, it was observed in large numbers, feeding on an unidentified daisy-like plant. It was regularly seen visiting *Heliotropium ramosissimum*

(Boraginaceae), *Lantana* (Verbenaceae) and *Tridax procumbens* (Asteraceae) on different islands.

**HOST-PLANTS** The asclepiad *Calotropis procera* is without doubt the favoured host-plant of *D. chrysippus* in the Cape Verde Islands. The plant is common and widespread and *chrysippus* larvae were found on it on several islands, often in large numbers. It is also known to feed on *Asclepias curassavica* (Asclepiadaceae), a common host-plant elsewhere in the world, but infrequently encountered in the Cape Verde Islands (an empty *chrysippus* pupal case was found above a healthy *curassavica* plant growing outside shops in Espargos on Sal). The distinctive *Periploca chevalieri* Browicz (= *P. laevigata chevalieri* (Asclepiadaceae) is certainly a host-plant in the caldeira on Fogo (P.J.C. Russell pers. obs.).

**NOTES** The occurrence of different forms of *D. chrysippus* in the Cape Verde Islands is interesting. Aurivillius (1910) remarked that of the specimens he saw from the islands all but three were of the African phenotype, the three ♂♂ that were different being very dark. Baliteau & Baliteau (2011) remarked that the species was very variable in appearance on São Nicolau and others have also remarked on Cape Verde phenotypes, albeit with some minor confusion over what constitutes form *alcippus* (a form in which the hindwings have a distinct area of white scales). So far as the 'usual' African phenotype is concerned, the situation is best explained by the late Torben Larsen: "... the African populations are often placed as ssp. *aegyptius* Schreber, 1759, described from Egypt where the species is effectively monomorphic in the nominate form. I believe the populations from Asia, western Arabia, and the eastern Mediterranean are of the same origin (Larsen 1986), while those of eastern Africa and southwestern Arabia are related. The correct name for the Afrotropical population would then be ssp. *alcippus* Cramer (1777), but I doubt there would be a need for it. The variation of the species cannot be described in conventional subspecific terms. In northern Sumatra and on the Malaysian coast the species changed from the *chrysippus*-morph almost wholly to the *alcippus*-morph during the period 1890-1950, but it is still very rare in India. The *alcippus*-morph increased from 16 to 71% of the Ugandan population

during the 20<sup>th</sup> century ... huge literature ..." (Larsen 2005: 278). The present authors agree with Larsen's view (the first author has experience of *chrysippus* across a good deal of its range). There is little point in endeavouring to define 'alcippus' within geographical boundaries: although it may be the dominant form in some geographical localities, phenotypes are known to change over time and *alcippus* forms do not lend themselves to geographic 'pigeon-holing' (*i.e.* subspecies).

The authors observed that *chrysippus* occurred on almost all the islands with a high percentage of *alcippus* phenotypes, ranging from individuals with an almost completely white hindwing to those with a suggestion of white around the median veins (and many intermediates). On most islands, plain brown individuals, lacking any white, were almost or actually absent. The exception was Santo Antão, where *D. chrysippus* was very common. We were surprised to note almost immediately that most *chrysippus* specimens on the island were of the plain brown phenotype. Indeed, in almost a week spent on the island, very few *alcippus* individuals were seen. We planned to rear a large number of specimens from apparently healthy larvae taken from *Calotropis* plants in different parts of the island in order to obtain some quantitative assessment of phenotype, but soon discovered that the level of parasitism in the larvae collected was 100%. It was nevertheless remarkable that on this island – *i.e.* Santo Antão – the relative phenotypes were, at a rough guess, ± 90% nominotypical, whereas on all the other islands where such an assessment was possible, individuals were ± 90% *alcippus*.

Reasons for this phenomenon are not clear, but we wonder if the presence (in very large numbers) of *Cotesia* parasitoids (Braconidae) was a factor. Adult butterflies were common and both eggs and larvae were common on almost every *Calotropis* plant seen (a few solitary, very isolated plants appeared healthy, with no sign of either), to a degree that in some areas individual plants were almost completely stripped of leaves. The presence of such very large numbers of larvae had clearly facilitated the abundance of parasitoids, because there were numerous larvae, of all sizes, either dead or showing signs of sickness – and all the apparently healthy examples we collected for rearing were also found to be parasitised. The distinctive clusters of yellow parasitoid cocoons

were also in abundance. It is possible, in times of such population explosions of both parasitoid and butterfly, that *chrysippus* numbers may crash almost (or even actually) to local extinction as a result and that the dominant phenotype of subsequent populations are dependent on the genotype of immigrants from adjacent islands (*i.e.* the founder effect).

Mück & Traub (1987) recorded this butterfly (as *Danais chrysippus*) from the island of Santiago and mentioned that larvae were often parasitised by *Cotesia* (as *Apanteles*) *danaisae* Hedqvist, 1965. There is some uncertainty

***Danaus plexippus*** (Linnaeus, 1758)

*Papilio chrysippus* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 471, type locality: North America

RANGE North and Central America, Europe (usually as a vagrant, although it does seem to be now established in various localities in Spain), Southeast Asia, Australia, New Guinea, the Pacific Islands as far east as the Society and Marquesas groups. It is resident on the Azores, Canary Islands and Madeira, but absent from the African mainland.

DISTRIBUTION IN CAPE VERDE Recorded from São Vicente. This is a new record for the Cape Verde Islands.

Riley (1968: 63) said: “It is curious that the true Monarch butterfly of America, *Danaus plexippus*, which is a great migrant that has at

regarding the name of the braconid parasitoid affecting danaine populations in the Cape Verde Islands. We sent voucher samples to Mark Shaw, an acknowledged authority on the group, with a particular interest in parasitism of butterflies. The type locality of *C. danaisae* (Hedqvist, 1965), is São Nicolau, and the voucher specimens from Santo Antão match the description of *danaisae* tolerably well. However, it may transpire that *danaisae* is a junior synonym of *C. chrysipti* (Viereck, 1911), described from the African mainland (Mark Shaw *in litt.* 2014).

times been taken even in England, and has spread right across the Pacific, is not reported from the Cape Verde Islands, though established in the Canaries and Azores”. This remains curious, although we wonder if the massive fluctuations of *D. chrysippus* numbers and its *Cotesia* parasitoid might have a rapidly terminal effect on the persistence of an occasional *plexippus* reaching the islands from the west (North America) or the north (Canary Islands). Whilst *D. plexippus* will also utilise *Calotropis*, there are no nearby populations (*plexippus* is absent from mainland Africa) from which populations might be reinforced regularly.

A solitary ♂ *D. plexippus* collected by David Hall, on the beach near the jetty at Baía das Gatas, São Vicente, 23 November 2012, is the first record of this species from the Cape Verde Islands. The specimen has kindly been donated to BMNH by David Hall. The present authors did not see this distinctive species on any of the Cape Verde Islands.

## Nymphalinae

***Hypolimnas misippus*** (Linnaeus, 1764)

*Papilio misippus* Linnaeus, 1764, *Museum Ludovicae Ulrica Reginae*, p. 264, type locality: “America” [erroneous - probably Java (*cf.* Honey & Scoble 2001: 350)]

RANGE *H. misippus* is a polymorphic and mimetic species widely distributed in the tropical regions of the world, including Africa. Reports from the Azores, Canaries and Madeira are sporadic and although the species may have been resident occasionally for short periods, it does not appear to have persisted on any of the islands (Tennent *et. al.* 2013). Recent reports, suggesting

the species is common or even established on the North Atlantic islands (*e.g.* Báez, 1998, Báez & García 2005, Mendes & Bivar de Sousa 2010) are exaggerated.

DISTRIBUTION IN CAPE VERDE Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, São Nicolau, São Vicente and Santo Antão.

Aurivillius (1910) recorded this species from the islands of Brava (including an ‘*ab. inaria*’ Cramer) and São Nicolau. Nyström (1958) recorded it from São Nicolau, São Vicente and Santo Antão and noted that of 17

individuals examined, eight were ♂♂ and that one ♀ specimen from Monte Verde, São Vicente, belonged to ab. *alcippoides* Butler, and four (Po do Lombinho, Chã de Preguiça, Ribeira Brava [São Nicolau] and Chã de Morte-Lagedo [Santo Antão]) were ab. *inaria*. Mück & Traub (1987) recorded this species from Santiago. Báez & García (2005) listed Brava, Santiago, Maio, Boa Vista, São Nicolau, São Vicente and Santo Antão, noting that the species was ‘probably native’. Mendes & Bivar de Sousa (2010) recorded quite a large number of specimens of both sexes in IICT from Santiago, Fogo, Santo Antão, São Nicolau and Maio.

The authors recorded a ♂ in poor condition outside our hotel in Nova Sintra, Brava. A ♀ was subsequently taken feeding – surely rather unusually – at the flowers of *Sarcostemma daltonii* (Asclepiadaceae) on the west coast of Brava at Fajã de Água. On Fogo, a ♂ was seen in a vegetable garden in Mosteiros and what was almost certainly a ♀ *misippus* was observed flying across a road in the same area. It was more common on the larger islands – on Santiago several males were seen on the upper part of the road leading up to Monte Gâmba (1,080 m), feeding at flowers; a female was observed on the ridge path leading to the summit and males were seen in a dry ribeira in the area of Porto Gouvela, west of Praia. Only one specimen was seen on Maio – a ♂ at 50 m elevation near Figueira da Horta – and on São Nicolau ♂♂ were seen on the track either side of Hortelão (Monte Gordo). Also on São Nicolau, one fresh ♀ was seen resting in tree foliage about 8 m above the track in very damp, cloudy conditions at 1,200-1,300 m elevation and several males were seen in the areas of Ribeira João and Água das Patas, northwest of Vila da Ribeira Brava. On São Vicente, *H. misippus* was more common than on any other island. Males were seen in many places, but it was most frequent at all levels on Monte Verde; females – invariably of the form with the forewing apex broadly black, enclosing a series of white markings – were seen at higher levels, particularly in the rough edges of cultivated fields.

**FLIGHT & HABITAT** Males are most often encountered either sitting on the road/track or feeding at flowers (especially *Lantana*, where present). Elsewhere, males often defend territories, but this was not observed on any of the Cape Verde Islands, although males did tend

to return to the same general area after some minutes when disturbed. Females were most often seen resting with wings half open on rocks or on bare ground in waste or cultivated areas, and were extremely difficult to approach. They were very sensitive to even the most careful movement, but seldom flew far when disturbed. Males were occasionally seen hill-topping.

**HOST-PLANTS** In Cape Verde, larvae were collected on *Portulaca oleracea* (Portulacaceae) (Mück & Traub 1987). Larvae are polyphagous and feed on a variety of host plants, including species of Acanthaceae, Amaranthaceae, Arecaceae, Convolvulaceae, Malvaceae, Portulacaceae and possibly Moraceae.

**NOTES** Riley (1968: 64) recorded *Hypolimnas misippus*, and said of the polymorphic females (in Africa): “These polymorphic female forms are now so firmly established genetically that they persist even in the absence of the models”. On the Cape Verde Islands, most females observed by the authors were of the typical ‘*chrysippus*-mimic’ phenotype, but without the hindwing white patch that characterises most of the *chrysippus* phenotypes in the Cape Verdes. Only one ♀ of a different phenotype was seen – on Monte Verde, São Vicente – lacking the dark forewing apex with its white elongated spots, but with a small white median patch on both surfaces of the hindwing. As Larsen (2005: 335) pointed out, “in West Africa the model [*i.e.* *Danaus chrysippus*] is monomorphic in the *alcippus* morph, but by far the most common morph of *misippus* is the nominate with orange hindwings, which is thus an inappropriate mimic ...”. The same can be said of the relationship between *D. chrysippus* and *H. misippus* in the Cape Verde Islands – the bulk of the former are of form *alcippus*, with a varying amount of white on the upperside hindwing, while the usual form of the latter encountered is of a ‘non-*alcippus*’ form.

***Vanessa cardui* (Linnaeus, 1758)**

*Papilio cardui* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 475, type locality: Europe, Africa

**RANGE** Probably the most cosmopolitan butterfly in the world, *V. cardui* is a strongly

migratory species, ranging from New Zealand to Iceland, but is absent from South America.

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Santa Luzia, Raso, São Vicente and Santo Antão.

Aurivillius (1910) recorded this species (as *Pyrameis cardui*) from São Nicolau. Nyström (1958) recorded it (as *Pyrameis cardui*) from Sal, Santa Luzia, São Vicente and Santo Antão. Báez & García (2005) recorded it from Brava, Fogo, Santiago, Boa Vista, Sal, São Nicolau, Santa Luzia, São Vicente and Santo Antão and regarded the species as 'probably native'.

Bearing in mind that, as elsewhere, numbers may be dependent on local conditions and season, this is probably the most common and widespread butterfly in the Cape Verde Islands and is, with *Danaus chrysippus*, able to extend its range dramatically with local migrations when conditions are suitable. This is illustrated in records made by a Cambridge University team studying the Raso Lark each November since 2002. No Raso butterfly records were made until 2006, when *V. cardui* was "abundant ... [with] some individuals fresh, others well worn", 4-18 November (Brooke & Welbergen 2006: 5). No butterflies were reported in the next two years, but S. Davies (in Brooke & Davies 2009) recorded large numbers of *V. cardui* (together with several *D. chrysippus* and a solitary *C. croceus*) on Raso in November 2009, following a period of heavy rain on São Nicolau in September: "With the high rainfall and resulting lush vegetation came unusual insect activity. When we arrived there were literally thousands of Painted ladies *Vanessa cardui* present, migrants which dwindled dramatically in numbers over the next week. After 23 November, a windy hazy day with much Saharan dust in the air, the 24th saw another large arrival of insects with 100s of Painted ladies ..." (Brooke & Davies 2009: 7-8). The following year, 2010, *V. cardui* was again abundant, 9-26 November, with *cardui* numbers increasing from the 20<sup>th</sup> (Brooke & Welbergen 2010). Between 9 and 25 November 2011, "Painted lady and African monarch butterflies were seen on only about half the days rather than in abundance every day, as had been the case over the past two years ... the island appeared to be offering less favourable conditions than in 2009 and 2010" (Brooke & Flower 2011: 1-2). No *V. cardui* were

encountered, 6-26 November 2012 (Brooke & Finnie 2012) and only four individuals were seen between 6 and 26 November the following year (Brooke & Dierickx 2013).

There seems little purpose in recording in detail where the present authors saw *V. cardui* in the Cape Verde Islands. It was not seen on Raso and only three individuals were seen on Santa Luzia, but on all other islands visited, *V. cardui* was common, from beachside vegetation to the summits of the highest peaks.

**FLIGHT & HABITAT** The butterfly can be encountered almost anywhere. It frequently visits flowers, including *Lantana* (Verbenaceae), *Tridax procumbens* (Asteraceae) and *Heliotropium ramosissimum* (Boraginaceae). It was occasionally seen by the authors feeding at *Poinsettia* (Euphorbiaceae) and the catkin-like flowers of *Prosopis juliflora* (Fabaceae).

**HOST-PLANTS** *V. cardui* is one of the most polyphagous butterflies known, but species of Urticaceae, Asteraceae and Malvaceae are the most frequently used. In the Cape Verde Islands, larvae were reported on Malvaceae and *Trichodesma africanum* (Boraginaceae) and a pupa was collected on *Nicotiana glauca* (Solanaceae) (Mück & Traub 1987). The authors found larvae on an unidentified plant (Urticaceae) on Brava.

***Vanessa atalanta* (Linnaeus, 1758)**

*Papilio atalanta* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 478, type locality: Sweden (Honey & Scoble 2001: 302)

**RANGE** North Africa, through Europe and temperate Asia to Japan. Also in the Azores, Canary Islands and Madeira.

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Santiago, São Nicolau and Santo Antão.

A short comment by Baliteau & Baliteau (2011: 86) regarding the occurrence of this species represents the first record of this species from the Cape Verde Islands: "Non observé sur Santo Antão alors qu'il vole par dizaines sur le point culminant de São Nicolau" (Not observed

on Santo Antão while flying by tens on the highest point of São Nicolau). Martin Jacoby (*in litt.* 2013) climbed to the top of Monte Gordo on São Nicolau, 24 December 2012, where he observed several *V. cardui* and briefly observed a solitary ‘red admiral’. His contemporaneous written note on the latter reads: “I only saw it for a second and formed a strong impression that the red forewing [band was] broad and irregular with distinct black marks in [it] ... this impression may well have been coloured by memories of *Vanessa indica* on the Canary Islands and wishful thinking ...”. This is perhaps most likely to have been *Vanessa atalanta*, although this description relates more to *V. vulcania* than *V. atalanta*; subsequent capture of *V. vulcania* on Sal by the present authors (see below) perhaps makes either species possible.

The authors were aware of the unconfirmed record by Baliteau & Baliteau (2011) and hoped to confirm (or not) the frankly rather unlikely presence of *V. atalanta* in the Cape Verde Islands. Confirmation came earlier than expected when, on our first morning in the Cape Verdes, a post-breakfast stroll through the gardens of our beachside hotel in Praia, Santiago, disturbed a fresh ♀ *atalanta* resting on the leaves of an *Acacia* tree. It stayed in the area long enough to be photographed and one of us caught it by hand. This was an unexpectedly good start to our project. It was also the only specimen of either sex of *V. atalanta* we saw that was not either on the summit, ridge or the higher slopes of a mountain. Subsequently, a male was seen settled on the tarmac of the small parking area near the top of Monte Gâmbôa (1,080 m) and others were found on the ridge and path from there to the summit. On São Nicolau, two specimens were seen (one was collected) feeding at *Lantana* on the track either side of Hortelão and another was seen on the summit ridge of Monte Gordo. On Santo Antão, it was common one late afternoon along part of the northern crater rim of Cova, where males defended territories along almost a kilometre of road in dappled sunlight, settling often on low vegetation or on the road itself.

**FLIGHT & HABITAT** The true habitat of this species in the Cape Verde Islands is not known. Hill topping behaviour, common in many butterflies in both temperate and tropical regions, is generally considered to be advantageous for species with a low population density – males congregate on high points and as a result females

can be assured of finding a mate following emergence.

**HOST-PLANTS** *V. atalanta* utilises a variety of host-plants throughout its wide range. In the Canary Islands and North Africa it regularly uses species of *Urtica* and *Parietaria* (Urticaceae).

**NOTES** Presumably, *V. atalanta* arrived in the Cape Verde Islands from the nearest populations in North Africa or the North Atlantic islands. It is a well-known migrant and, although a familiar butterfly in parts of northwestern Europe, it has only recently been able to withstand the milder winters and become truly resident – previously populations were provided or enhanced by northerly migrations from southern Europe and North Africa.

***Vanessa vulcania*** (Godart, 1819)

*Pyrameis vulcania* Godart, 1819,  
*Encyclopédie Méthodique*, 9: 320, type  
locality: Canary Islands

**RANGE** Restricted to the Canary Islands and Madeira. Previously considered a subspecies of the Indian species *Vanessa indica* Herbst, 1794.

**DISTRIBUTION IN CAPE VERDE** Recorded from Sal (but see also *V. atalanta* above, regarding the possibility of the occurrence of *V. vulcania* on São Nicolau). Collection of a female in the grounds of our hotel in Espargos, Sal, was serendipitous. Preparing to leave for a day in the field early one morning, we realised we had forgotten the camera and one of us returned to the room, to see a large butterfly fluttering in the shaded porch outside a nearby room. It was eventually captured in the grounds of the hotel. This is the first record for the Cape Verde Islands.

**FLIGHT & HABITAT** Probably much the same as *V. atalanta*.

**HOST-PLANTS** Like *V. atalanta*, *V. vulcania* utilises species of *Urtica* and *Parietaria* (Urticaceae) (Meyer 2003, P.J.C. Russell pers. obs.).

**NOTES** The occurrence of *V. vulcania* in the Cape Verde Islands is rather intriguing. Whilst other fundamentally Palaearctic butterflies (*Pontia daplidice*, *Vanessa atalanta*) occur

commonly over a wide area of North Africa and the Canary Islands and are migratory in their habits, *V. vulcania* is restricted to the Canary Islands and Madeira and is not renowned for a migratory disposition. So far as the authors are aware, this is the first recent and reliable record of *vulcania* outside its usual range. The question arises as to whether its presence is the result of an accidental introduction or whether it arrived under its own steam. This mystery cannot be answered, but since its congener, *V. atalanta*, seems to be established in the Cape Verde Islands and the two species share host-plants, there seems no reason why this vanessid should not persist on the islands.

The down side is that of all the islands, Sal is one of the least likely for *vulcania* to establish itself, as it is generally dry, potential host-plants are only sparsely available in comparison to other islands (e.g. Santiago, São Nicolau, Santo Antão) and there are almost certainly extended periods when conditions are entirely unsuitable for *V. vulcania*. It is also noted that, although slightly chipped, this female specimen was in rather fresh condition, indicating a local emergence rather than a long journey. The nearest source population is the Canary Islands, some 1,500 km to the northeast. See also Notes under *Nymphalis polychloros*, below.

***Nymphalis polychloros*** (Linnaeus, 1758)

*Papilio polychloros* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 477, type locality: Europe

RANGE From North Africa across southern and central Europe eastwards to the Himalaya.

Mendes & Bivar de Sousa (2010: 53-4) noted a ♀ specimen in ICT, labelled with coded data suggesting it was collected at Pedra Badejo, on Santiago, in a sugar-cane field, 25 January 1961. The specimen is devoid of any rufous or reddish tint and is identical to material from southern Europe (*i.e.* it did not originate from North Africa, where *N. polychloros erythromelas* Austaut, 1885, occurs). The species is absent from the North Atlantic islands. Mendes & Bivar de Sousa (2010: 53) believed this “represents a Palearctic element in the islands’ macrolepidopteran fauna”; we have serious

reservations regarding this record, and believe that, if accurate, it represents an accidental introduction, although it is noted that the specimen in question (examined by the authors) is in very worn condition.

One might reasonably question why this solitary record of *N. polychloros* is not in the erroneous/unlikely section of this paper, but a solitary record of *Vanessa vulcania* is not in doubt (it was collected by the authors) and is tentatively included in the list of resident species. It is hard to believe that either species would find the Cape Verde Islands particularly suitable for colonisation. Our placement of *N. polychloros* in particular is provisional, based on the facts that the very worn individual of *N. polychloros* was discovered in an apparently unsuitable locality, the species is not usually migratory (nor are closely related species), it does not occur in the North Atlantic islands (or anywhere in Africa south of the Sahara) and there do not appear to be obvious host-plants in the Cape Verdes. Elsewhere, *polychloros* larvae feed on species of Salicaceae (sallows: *Salix*), Ulmaceae (elms: *Ulmus*, *Celtis*), Rosaceae (*Prunus*, *Crataegus*, *Pyrus*) and some other deciduous trees, none of which were seen by the authors on any of the Cape Verde Islands. There are not thought to be any Ulmaceae species on the islands. *Cydonia oblonga* and *Salix fragalis* are the only species of Rosaceae and Salicaceae respectively - both are frequently cultivated on Santo Antão (Maria Romeiras, in litt.), but suitable host-plants for *N. polychloros* seem to be, at best, severely limited.

By comparison, although *V. vulcania* is also not known for migratory tendencies, it does occur on the North Atlantic islands. The specimen seen was apparently freshly emerged and its congener *V. atalanta*, with which *vulcania* shares host-plants, is established on at least three of the Cape Verde Islands.

***Junonia oenone*** (Linnaeus, 1758)

*Papilio (Nymphalis) oenone* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 474, type locality: “Asia” [= Africa (see Honey & Scoble 2001: 355-356).]

RANGE Throughout tropical Africa, including Madagascar and Aldabra. Southern Arabia. Larsen (2005: 339) said this species “... must be

one of the most common and widespread butterflies in Africa and has been recorded from all parts of West Africa”.

**DISTRIBUTION IN CAPE VERDE** Recorded from Santiago. This is the first record for the Cape Verde Islands.

**FLIGHT & HABITAT** Only seen hill-topping on Santiago. Several males were seen flying swiftly around the summit of Monte Gâmbôa (1,080 m) in dull weather, returning after a few minutes to the same area when disturbed to sit on bare rocks or waste ground, often with wings spread flat. Others were seen on the overgrown path to the summit, resting on long, slim grass stems, where they were difficult to approach. It is interesting that the flight pattern and habitat was similar in every respect to circumstances where the first author has observed the closely related *Junonia orithya* (L, 1758), on remote islands in Papua New Guinea (W.J. Tennent, unpublished data). In West Africa (Larsen 2005: 339), *J. oenone* “... originally a savannah butterfly it is now most common in cleared areas ... including gardens and street verges in ... towns ... whenever the sun is out the butterfly is continuously active, flying about, settling on the ground, and seeking out flowers, not least *Tridax*”.

**HOST-PLANTS** In West Africa host-plants “seem to be exclusively Acanthaceae (*Asystasia*, *Berleria*, *Hypoestes*, *Justicia*, *Paulowilhelmia*, *Ruellia*) ...” (Larsen 2005: 339).

**NOTES** Although this is the first record of the genus *Junonia* from any of the Cape Verde Islands, the occurrence of such a widespread Africa species is hardly surprising. It may be a relatively recent arrival, but conditions on the islands seem ideal for residency.

***Byblia ilithyia*** (Drury, 1773)

*Hypanis ilithyia* Drury, 1773, *Illustrations of natural history; wherein are exhibited upwards of two hundred and twenty figures of exotic insects ... to which is added a translation into French*, 2, pl. 17, figs 1, 2, type locality: Africa, Arabia, India

**RANGE** The range of this species “covers the driest parts of West Africa and large parts of eastern and southern Africa ... flies through

southern Arabia to the parts of Pakistan, India and Sri Lanka with an Afrotropical flora” (Larsen 2005: 344).

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, Fogo, Santiago, Maio, Boa Vista, Sal, São Nicolau, Santa Luzia, São Vicente and Santo Antão.

Nyström (1958: 9) recorded this species from Fogo, Santiago and São Nicolau, noting that “The specimens from Santiago and Fogo have a darker brown pattern on the undersides of the wings than the specimens from São Nicolau. They probably belong to another generation”. Báez & García (2005) added Santo Antão and suggested the species was ‘probably native’. Mendes & Bivar de Sousa (2010) recorded specimens from Santiago and Santo Antão and published the first records for Boa Vista (one ♀, João Galego, flying over maize and bean fields in November 1961) and Maio (one ♂, Vale de Figueira), in IICT. David Hall (unpublished data) found *B. ilithyia* common in gardens and in a dry river bed at Coculi, south of Ribera Grande, Santo Antão.

Surprisingly, the authors saw *B. ilithyia* very infrequently. Aside from an individual seen at the roadside on the road to Rui Vaz on Santiago, it was only seen on Fogo, where it was abundant in a localised area a few kilometres west of São Filipe. Several individuals were seen flying across the road near an extensive patch of rough ground on either side of the tarmac road, connected by a tunnel under the road. This was extremely dry – most of the tangled vegetation appeared to be dead and investigation identified several hundreds of these butterflies, ‘aestivating’ in large groups in the vegetation and on the wing, with males clearly searching systematically for females. Females were almost all damaged or worn and several pairs were seen *in copula*. Solitary individuals were fleetingly observed elsewhere on the island, at the roadside on the road to Mosteiros and on the road up to the caldeira.

**FLIGHT & HABITAT** According to Larsen (2005: 344) the butterfly is “... a species of the driest savannah types”.

**HOST-PLANTS** In Africa, larvae feed on species of *Delechia* and *Tragia* (Euphorbiaceae) (Ackery *et al.* 1995).

### Satyrinae

#### *Melanitis leda* (Linnaeus, 1758)

*Papilio leda* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 474, type locality: “Asia” [possibly Canton, China]

**RANGE** Widespread in the Afrotropical, Oriental and Australian Regions, extending well into the western Pacific. Found throughout tropical Africa, including many of the islands (Larsen 2005).

**DISTRIBUTION IN CAPE VERDE** Recorded from the islands of Brava, Santiago, São Nicolau and Santo Antão. It is almost certainly more widespread than these few islands suggest. The few records available are probably a direct result of the species’ secretive habits of resting in dense vegetation during the daytime.

Aurivillius (1910) recorded *M. leda* from the islands of Santiago and São Nicolau. Nyström (1958) added Santo Antão and Mendes & Bivar de Sousa (2010) provided the first record for Brava. Riley (1968: 64) said: “It seems surprising that no other Satyridae have so far been recorded from the Cape Verde Islands. The family is quite numerous in West Africa, and grasses, on which they all feed, are no doubt available”.

The present authors saw a solitary specimen on Santiago, but found it locally common on São

Nicolau, where a fresh female was seen on a track at 1,300 m above the park office on Monte Gordo. It was common in areas of Ribeira João and Água das Patas at 300-400 m elevation, northwest of Vila da Ribeira Brava, at rest under *Terminalia* and other spreading trees and in thick brush. At this time – the last week of November 2013 – worn wet season forms and fresh dry season forms were seen in approximately equal numbers.

**FLIGHT & HABITAT** In recording *M. leda* from Santo Antão, Baliteau & Baliteau (2011) noted that observations were made between sea level and 1,100 m elevation (but also at Morro de Covãozinho, Planto Norte, at 1,779 m), mainly in the late afternoon and early evening. *M. leda* is crepuscular, flying very swiftly as dusk approaches. In the daytime, individuals generally rest in dense scrub or in the deep shade of large trees and seldom fly far when disturbed. Their cryptic underside markings are extremely effective – it can be quite difficult to spot an individual, even when one has seen it come to rest, and they are notoriously difficult to approach. Adults rarely visit flowers – the first author has experience of *M. leda* in many parts of the Oriental and Indo-Pacific regions and, aside from rare visits to *Lantana* in Hong Kong, cannot recollect seeing it visit flowers. It is more frequently encountered at rotten fruit or carrion.

**HOST-PLANTS** The caterpillars feed on a wide diversity of Poaceae, including rice and maize.

### ERRONEOUS AND UNLIKELY RECORDS AND THOSE REQUIRING CONFIRMATION

Several species not listed above (oddly, mostly pierids), were recorded historically from Cape Verde and included in the fauna by subsequent authors. We have examined each of these records and reached the conclusion that most of them are either erroneously recorded or represent misidentification. Each is critically examined here.

Provenance of the first three taxa is questioned for much the same reasons. All three species were recorded from Cape Verde by Riley (1894), who provided an annotated checklist of insects and spiders collected during the United States Eclipse Expedition to West Africa in 1889-90. Riley (1894: 565) noted that “... the

literature at command in Washington upon exotic species, is yet very insufficient ... I have been obliged to refer much of the material to specialists for determination, my own part in the work being little more than the orderly arrangement of the determinations for publication ... the Lepidoptera, after some few species had been determined at the [Smithsonian], were sent to Rev. W.J. Holland, of Pittsburgh, Pa., who submitted a full list of determinations arranged according to locality...”.

Judging from localities noted by Riley, the expedition visited the Congo (‘Banana Point’), Angola (São Paul de Loanda [= Luanda]), Sierra Leone (Freetown) and Ghana (Elmina), as well

as calling briefly to São Vicente in Cape Verde. The Coleoptera and Lepidoptera were more generally collected than the insects of any other order and an accumulated total of 32 butterfly taxa from all localities (including mainland Africa) were recorded. So far as the Cape Verde Islands are concerned, Riley recorded only five butterfly species from the islands: *Belenois creona* (as *Pieris severina*), *Colotis euipe* (as *Teracolus evippe*), *Colotis amata* (as *Teracolus calias* [sic]), *Hypolimnas misippus*, and *Zizeeria knysna* (as *Lycaena lysimon*). The last two species are quite widespread in the islands, whereas the three pierid species, all recorded from ‘St. Vincent, Cape Verde Islands’, have not been seen there before or since. These issues are discussed in detail below, but it would require a massive leap of faith to accept that three of the five species said to have been collected by the expedition on a very brief visit, were in the same place, in totally unsuitable habitat, and have never been encountered subsequently.

Conversely, it may be that the vegetation of São Vicente has changed – a description of fleeting visits in 1913 and 1927 by Malcolm Burr paints a rather more dismal picture than we recognise: “The island consists of very rugged lavas with a sharp and jagged outline against the sky and is absolutely sterile. In the little town there are a few wind-stricken palms and other trees planted in soil imported at great cost. To the south and east of the town there is a flat expanse of the detritus of the rocks and beyond that a range of dunes; this part is exposed to the prevailing wind from the north east which was blowing that day with uncomfortable vigour ...” (Burr 1927: 92). It is possible that in the twelve decades since these species were said to have been recorded on São Vicente, human activity has changed the environment to a significant degree.

Since Charles Riley was a non-Lepidopterist working at the Smithsonian Institute (see Introduction) and he sent ‘difficult’ specimens to a well-known entomologist of the day, W. J. Holland at the Carnegie Museum in Pittsburgh for identification, the authors contacted those two institutions in the hope of finding the specimens said to have taken on São Vicente. However, none appear to exist. There are no specimens with appropriate labels in the Smithsonian Institution (Brian Harris *in litt.* 2014), nor in the Carnegie Museum (John Rawlins *in litt.* 2014).

It might be argued that dismissing three long-standing Cape Verde species records is rather cavalier, but we believe that, taken together, the evidence suggests that none of the records are genuine. It is noted that some odonates, allegedly collected by the Eclipse expedition on São Vicente (P.P. Calvert *in* Riley 1894), may also be doubtful (Martens & Hazevoet 2010). In summary, so far as butterflies are concerned:

- (1) if correct, solitary specimens, in very poor condition, of three different pierid species were collected on one island (São Vicente) at exactly the same time, and none have ever been seen on any Cape Verde Island in the ensuing 125 years;
- (2) there was, by Riley’s admission, no specialist lepidopterist on the Eclipse Expedition and difficulty was experienced in obtaining identifications;
- (3) all three specimens were said to be badly damaged and none appear to be extant;
- (4) the only other butterflies said to have been collected on São Vicente were a male *Hypolimnas misippus*, and *Zizeeria knysna*, both of which occur throughout much of Africa. This invites the belief that only six butterfly specimens of five different species were taken in the Cape Verde Islands by the Eclipse Expedition, all on São Vicente, and that three of these species were pierid species in a totally unsuitable habitat;
- (5) none of the common São Vicente species were recorded by the Expedition;
- (6) individuals of each of the species claimed to have been collected on São Vicente by members of the expedition, were also collected in several mainland African localities, where the expedition spent most of its time.

If the provenance of the three pierid species is in doubt – and it clearly is – it may be that also neither the solitary *H. misippus* nor *Z. knysna* were collected on São Vicente – in fact that no butterflies were taken there. It is not known how long the Eclipse Expedition stayed on São Vicente and it may have been only a brief visit for water and/or provisions.

***Belenois creona* (Cramer, 1776)**

*Papilio creona* Cramer, 1776, *De Uitlandsche Kapellen voorkomende in de drie waereld-deelen Asia, Africa en America*, 1 (8): 148, pl. 95, figs C-F, type

locality: “Indes Orientales” [erroneous; *recte*: Africa]

The pierid species listed by Riley (1894) included *Belenois creona* (as *Pieris severina*), based on ‘fragments of *Pieris*, probably *severina*, collected at Cape Verde Islands (St. Vincent)’. Riley himself questioned the identification – or reported someone else’s doubts (see below) – when he said (Riley 1894: 569): “The principle reason for calling this identification into question is the fact that the anterior wing lacks the black spot at the end of the cell. Otherwise, so far as can be determined from the fragments of the insect preserved for us by the diligence of the collector, there is reason to think that the foregoing determination is correct. Two undoubted examples were collected at Banana Point, Congo”. Báez & García (2005) based the occurrence of *Belenois creona severina* (Stoll, 1781) in Cape Verde on Riley (1894), as did Mendes & Bivar de Sousa (2010: 49), who correctly commented that “*B. c. severina* is the eastern and southern subspecies [of *creona*] and its presence in Cape Verde seems highly improbable. The nominal [*sic*] subspecies ranges from Senegal to Nigeria and it is certainly the subspecies that, if Riley’s identification were to be correct, would occur in Cape Verde”. Aurivillius (1910) noted that it was ‘the other species’ he could not identify (see *Colotis euipe* below).

In addition to Riley himself questioning identification of *B. creona*, Mendes & Bivar de Sousa (2010) thought the species’ presence in Cape Verde unlikely. Riley’s (1894) record was repeated by subsequent authors (e.g. van Harten 1993, Bauer & Traub 1981) and Báez & García (2005) regarded it as being ‘probably native’. This is undoubtedly not the case. The species has not, so far as the authors are aware, been reported in the islands in well over a century and, aware of this and other dubious historical records (see below), paid particular attention to the possibility of its occurrence there whilst travelling through the islands. It is noted that the Eclipse Expedition collected ‘two undoubted examples’ of *B. creona* in the Congo (Riley 1894) and it seems likely that if the very damaged specimen referred to by Riley was indeed that species, it is more likely to have originated on a mainland African locality than on the Cape Verde Islands.

The species occurs throughout West Africa. It is a common butterfly of the Guinea and Sudan Savannah and invades agricultural lands in the forest zone, especially during the dry season, sometimes establishing more or less permanent colonies (Larsen 2005). Like many other pierids, the species is known to be migratory, but whilst the possibility that a specimen may reach Cape Verde under unusual climatic conditions is not discounted, it is considered highly unlikely that this was the case. The driest of the Cape Verde Islands are those in the east (*i.e.* Sal, Boa Vista and Maio), nearest to the African mainland. No suitable habitat was seen by the authors on São Vicente and it is our belief that there is no reliable record of *Belenois creona* from Cape Verde.

#### *Colotis euipe* (Linnaeus, 1758)

*Papilio (Danaus) euipe* Linnaeus, 1758, *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*, 1 (Animalia), 10<sup>th</sup> edition, p. 469, type locality: “Asia” [= Africa (see Honey & Scoble 2001: 324).]

Riley (1894: 569) reported *Colotis euipe* (as *Teracolus euipe*) with the occurrence of “one badly damaged specimen of the male of the species, St. Vincent [São Vicente], Cape Verde Islands. Also two males and one female, St. Paul de Loanda [Luanda, Angola]”.

This is a common species throughout the Afrotropical Region, with the nominotypical form occurring in The Gambia and Senegal. *Colotis* species are diverse, but most are easily recognisable by coloured apical patches on the forewing that may be noticeable even in flight. The genus is well known to the first author and both authors were aware of historical *Colotis* records, taking note of every ‘white’ pierid seen. Nothing resembling a *Colotis* was encountered. *C. euipe* is the only *Colotis* species adapted to a forest zone, although it also has a preference for agricultural land (Larsen 2005).

It is noted that the Eclipse Expedition collected *C. euipe* in Angola (Riley 1894) and it seems probable that the solitary ‘badly damaged’ specimen was either misidentified or that it originated from a locality on the West African mainland. No suitable habitat was seen by the authors on São Vicente and it is our belief that

there is no reliable record of *Colotis euipe* from Cape Verde.

***Colotis amata*** (Fabricius, 1775)

*Papilio amata* Fabricius, 1775, *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adjectis synonymis, locis, descriptionibus, observationibus*, p. 476, type locality: "India orientale"

Like the two previous pierid species, *Colotis amata* was reported (as *Teracolus calias* [sic, recte: *calais*]) from "one mutilated female, St. Vincent, Cape Verde Islands. Also one male, St. Paul de Loanda [Luanda, Angola]" (Riley 1894: 570). Unlike the two previous species, which could conceivably be confused with other pierid species, it is hard to believe that the distinctive salmon pink upperside and broad dark wing borders of *C. amata* could be overlooked.

The first author has experience of this species in southern Algeria, Mauretania and Zimbabwe; like the previous two pierid species, the authors actively looked for this species on all of the Cape Verde Islands, without success. Also in common with the previous two species, it was collected by the Eclipse Expedition on the West African mainland (Angola) (Riley, 1894: 570), and it is considered likely that if the species was correctly identified, it is more likely to have been taken on the mainland than on the Cape Verde Islands. It is our belief that there is no reliable record of *Colotis amata* from Cape Verde.

The Cape Verde record was repeated by subsequent authors (e.g. van Harten 1993, Bauer & Traub 1981). Báez & García (2005) regarded it as being 'probably native'.

***Eurema senegalensis*** (Boisduval, 1836)

*Terias senegalensis* Boisduval, 1836, *Histoire Naturelle des Insectes. Species général des lépidoptères*, Vol. 1, p. 672, type locality: Senegal

Larsen (2005: 87) said of this taxon: "While the species certainly extends from the West African forest zone to Kenya and much of Tanzania, as well as Zambia, its status east of the Rift and further south seems less clear ...".

Nyström (1958) recorded *E. hecabe* (as *Terias brenda*) from Santiago and also recorded, on the same page, a specimen of *Terias senegalensis* at Lagoa, Santiago, and three

specimens at Praia, all in February 1954. The name *brenda* Doubleday & Hewitson, [1847] is a synonym of *senegalensis*. Under *Eurema hecabe*, Riley (1968: 63) noted that *hecabe* was subject to considerable seasonal variation and that "two of these seasonal forms ... f. *brenda* ... f. *senegalensis* ... both these may well be taken flying together ...".

Other than Nyström's (1958) rather confused report (Riley [1968] regarded *senegalensis* a synonym of *hecabe*), there is no record of this species in the Cape Verde Islands. These two *Eurema* species are very similar, and although they are separable, there is no reliable evidence of *E. senegalensis* occurring in the islands. It is "normally larger than *E. hecabe* and of a more pure lemon yellow in the male, with no hint of the golden tone often seen in *E. hecabe* ..." (Larsen 2005: 87). There are other differences between the two and unlike its savannah congener, *E. senegalensis* is a forest species. It also has a distinct tendency to fly higher above the ground than *E. hecabe*, which flies close to the ground and is associated with low growing plants (e.g. *Mimosa*). No *Eurema* individual with either the phenotype or the habits of *E. senegalensis* was seen by the authors in examination of several hundred specimens of *E. hecabe*, both in the field or confirmed by dissection. It is considered highly likely that Nyström's (1958) historical record was a misidentification of the common and widespread *E. hecabe*.

***Eurema floricola*** (Boisduval, 1833)

*Xanthidia floricola* Boisduval, 1833, *Faune entomologique de Madagascar, Bourbon et Maurice. Lépidoptères*, p. 20, pl. 2, fig. 7, type locality: Madagascar

Larsen (2005: 88) recorded *E. floricola* from several countries in West Africa and said: "In West Africa this species is certainly considerably scarcer and more localised than *E. hecabe*. It seems not to penetrate much into savannah country and to be most frequent in the savannah/forest transition".

Aurivillius (1910) recorded one ♂ and two ♀♀ of this species (as *Terias floricola* var. *ceres*) from Orgãos Grandes on Santiago. It is noted that he did not record *E. hecabe*. This record has been referred to by others (e.g. Bauer & Traub 1981, van Harten 1993).

Many of the comments made regarding *E. senegalensis*, above, apply equally to *E.*

*floricola*. It can be easily confused with *E. hecabe*, but we can find no reliable evidence of it ever having occurred in the Cape Verde Islands. Mendes & Bivar de Sousa (2010) correctly pointed out that ‘var. *ceres*’ of *floricola* is restricted to the islands of Mauritius and Reunion. We agree with those authors in regarding records of both *E. senegalensis* and *E. floricola* as misidentifications of *E. hecabe*.

*Azanus mirza* (Plötz, 1880)

*Lycaena mirza* Plötz, 1880, *Stettiner entomologische Zeitung*, 41: 203, type locality: West Africa

A common savannah species that penetrates the forest zone more than other *Azanus* species (Larsen 2005).

*A. mirza* has been recorded from the Cape Verde Islands by several authors, beginning with

Nyström (1958). Despite Aurivillius’ (1910) report of *A. moriqua* from Santiago, Nyström (1958) recorded only *A. mirza* from the islands and illustrated the male genitalia to support his identification. However, he illustrated the genitalia of *A. moriqua*, not *A. mirza* as he believed (see Notes following *A. moriqua*, above).

In the light of these varying records and in the knowledge that confusion between the two species is possible without dissection, the authors examined a large number of *Azanus* species from every locality where *Azanus* was found. No specimen of *A. mirza* was identified and we believe that previous records of this species are the result of misidentification. We believe that there is no reliable evidence to support the occurrence of *A. mirza* in the Cape Verde Islands.

## DISCUSSION

Conventional wisdom for many years was that ‘Macaronesia’ *sensu stricto* encompasses the North Atlantic islands (Azores, Canary Islands, Madeira) together with some limited areas of mainland Africa (Morocco) and Europe (Portugal). More recently, the Cape Verde Islands have been considered an element of ‘Macaronesia’ (see in particular Vanderpoorten *et al.* 2007), but despite the presence of the occasional ‘unexplained’ palaeartic element (*e.g.* *Pontia daplidice*), the butterflies of Cape Verde have long been considered fundamentally Afrotropical in origin. Although there are perhaps too few butterfly taxa on the Cape Verde Islands to make any meaningful assessment, it was anticipated that our survey would essentially confirm this status.

Riley (1968: 62) recorded *Pontia daplidice*, suggesting that “the nearest known habitats are Morocco and the Canary Isles, whence the Cape Verde population probably came” and added “the food-plant of the caterpillar is mignonette [*Reseda* sp. (Resedaceae)], again a Palearctic species”. This was the only palaeartic species noted by Riley and it is interesting that part of his *raison d’être* for regarding the local *Colias* species as *C. electo*, was that *electo* “does not occur north of the Sahara, but south of that barrier is common wherever the leguminous crops and native plants grow on which the

caterpillar feeds” (Riley 1968: 63). The implication for this statement – and erroneous identification – is that because the Cape Verde Islands’ butterfly fauna is Afrotropical, the *Colias* species occurring there must be an African *Colias* rather than a Palaeartic species that does not occur in Africa anywhere south of the Sahara. The correct identification of *C. croceus* by Mendes & Bivar de Sousa (2010) effectively dented the ‘wholly Afrotropical’ view and our own fieldwork confirms that, although the bulk of butterfly species are indeed of African origin, there is also a distinct Palaeartic element. Remarkably, we also recorded an undisputedly ‘Macaronesian’ species not known in the western Palaeartic outside the Canary Islands and Madeira, *i.e.* *Vanessa vulcania*.

Providing a definitive number of butterfly species resident on the Cape Verde Islands is hampered by lack of data on the status of some species, but of the *ca* 26 species we regard as resident or probably resident, at least three species (*Pontia daplidice*, *Colias croceus*, *Vanessa atalanta*) cannot possibly have originated from mainland Africa just a few hundred kilometres to the east, nor from the Americas, a much greater distance to the west, since they do not occur there. The only realistic source – although one must be mindful that accidental introduction is always a possibility –

is the North Atlantic islands ('Macaronesia') to the northeast or, beyond those islands, Morocco or southern Europe. We note also that the nearest source for *Danaus plexippus*, and the only source for *Vanessa vulcania*, is the North Atlantic islands.

The two large nymphalids recorded from the Cape Verde Islands from solitary specimens (*Nymphalis polychloros*, *Vanessa vulcania* – although the latter may also have been observed on São Nicolau) represent slightly different issues. For reasons explained in the relevant section, above, the 'natural' occurrence of *N. polychloros* is thought highly unlikely, since it does not occur in mainland Africa, the Americas or the North Atlantic islands, and occurs in Morocco in a different phenotype. The nearest source is Portugal and it has already been noted that the specimen in question was said to have been caught in a totally alien habitat for the species and that there are no obvious natural host-plants for the species in the islands. Conversely, *V. vulcania* can only have come from the North Atlantic islands – whilst we are cautious that the solitary specimen collected was on the island of Sal, which provides little apparently suitable habitat, we acknowledge that its congener, *V. atalanta* is clearly resident on several of the Cape Verde Islands and remained undiscovered there until recently.

Butterfly species (34) recorded from the Cape Verde Islands are presented in Table 1. Disregarding records of species we regard as due to erroneous historical data (*creona*, *euipe*, *amata*), misidentification (*senegalensis*, *floricola*, *mirza*), endemic (*evorae*), brief introduction or rare vagrancy (*dinomenes*, *plexippus*), highly unlikely occurrence for reasons already discussed (*polychloros*) and widespread species that could have come from Africa, the North Atlantic islands or elsewhere (*borbonica*, *boeticus*, *pirithous*, *knysna*, *chrysippus*, *cardui*), leaves 17 species. Of these, 13 (76%) are without doubt, or are extremely likely to be, African in origin (*forestan*, *florella*, *hecabe*, *brigitta*, *glauconome*, *osiris*, *jesous*, *moriqwa*, *ubaldus*, *misippus*, *oenone*, *ilithyia*, *leda*), whilst the remaining four species (24%) are clearly not of African origin (*croceus*, *daplidice*, *atalanta*, *vulcania*). It is acknowledged that these data provide some recognition for inclusion of the Cape Verde Islands in 'Macaronesia' *sensu lato*.

It is probable that butterfly numbers on different Cape Verde Islands are subject to occasional dramatic variations, dependent on weather conditions and local migrations. For example, the authors spent two days on uninhabited – and generally very arid – Raso Island, scouring extensive areas of vegetation that included *Calotropis* and *Lotus*, host-plants for *Danaus chrysippus* and *Colias croceus* respectively, but saw no butterflies. However, a study team working under the aegis of Cambridge University has stayed on Raso Island for 2-3 weeks or more each November since 2002, in pursuance of long-term studies of the endemic Raso Lark. It is clear from the unpublished reports of each of these visits that proliferation and condition of vegetation on the island is subject to major variation, dependent on local conditions, particularly rainfall either on Raso or adjacent islands. The reports give an interesting insight into butterfly numbers visiting the island (and represent the only records of butterflies from Raso to date). For example, rain on São Nicolau in September 2009 was sufficiently heavy to cause major infrastructure disruption there and resulted in atypical proliferation of vegetation – and of butterflies – on Raso (Brooke & Davies 2009). No butterflies were seen (or were not recorded) in the early years of the Raso Lark research, but presence of butterflies in 2006 (Brooke, & Welbergen 2006) and 2009–2013 (Brooke & Davies 2009, Brooke & Welbergen 2010, Brooke & Flower 2011, Brooke & Finnie 2012, Brooke & Dierickx 2013) are recorded (see *Colias croceus*, *Vanessa cardui*, *Danaus chrysippus*). For the record, and because these data have not been published elsewhere (Mike Brooke *in litt.* 2015), other insects noted on Raso in November 2009 are cited here.

Odonata: "Associated with these butterflies was a big arrival of 300-400 Red-veined Darters *Sympetrum fonscolombii* ... other species noted at this time were ... another species smaller than the Red-veined Darters, possibly Red-veined Dropwings *Trithemis arteriosa*, quite a few Vagrant Emperors *Hemianax ephippiger*, a few of another large unidentified hawk sp., two Wandering Gliders *Pantala flavescens*".  
Lepidoptera (moths): "a few Rush Veneers *Nomophila noctuella*, a highly migratory pyralid micro moth, two Crimson Speckleds *Utetheisa pulchella*, another highly migratory moth, a couple of noctuid moth species which were

similar to Gold Spot *Plusia festucae* and Beautiful Golden-Y *Autographa pulchrina*" (S. Davies in Brooke & Davies 2009). The following year grasshoppers were said to be abundant (Brooke & Welbergen 2010: [2]) and in 2013 "although smaller grasshoppers were scarce, locusts were seen frequently ..." (Brooke

& Dierickx 2013: 2). Also for the record, the only Lepidoptera the present authors saw during two days on Raso were *ca* five specimens of *U. pulchella*, which was present in many places on all the other islands, including where little or nothing else was flying.

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species	Brava	Ilhéu de Cima	Fogo	Santiago	Mato	Boa Vista	Sal	São Nicolau	Santa Luzia	Raso	São Vicente	Santo Antão	CV status	source
<b>Hesperiidae</b>														
<i>Coeliades forestan</i>			x	x				x			x	x	resident	Africa (sub-sahara)
<i>Borbo borbonica</i>	x		x	x	x						x	x	resident	Africa + Mediterranean
<b>Papilionidae</b>														
<i>Papilio demodocus</i>	x		x	x	x	x		x	x		x	x	resident	Africa + SW Arabia
<b>Pieridae</b>														
<i>Catopsilia florella</i>	x		x	x	x	x	x	x	x		x	x	resident	Africa + regular migrant
<i>Belenois creona</i>													erroneous record	Africa
<i>Colotis euippe</i>													erroneous record	Africa
<i>Colotis amata</i>													erroneous record	Africa
<i>Colias croceus</i>				x	x			x	x	x	x	x	resident	Palearctic
<i>Eurema hecabe</i>	x		x	x	x	x		x					resident	Africa + Old World tropics
<i>Eurema senegalensis</i>													misidentification of hecabe	Africa
<i>Eurema floricola</i>													misidentification of hecabe	Africa
<i>Eurema brigitta</i>			x										resident	Africa + Oriental + Indo-Pacific
<i>Pontia daplidice</i>	x		x	x				x			x	x	resident	Palearctic
<i>Pontia glauconome</i>			x	x	x	x	x					x?	resident	Africa + Asia
<b>Lycaenidae</b>														
<i>Euchrysops osiris</i>	x										x	x	resident	Africa + S Arabia
<i>Azonus jesous</i>			x	x	x								resident	Africa + Middle East
<i>Azonus moriqua</i>	x		x	x	x	x	x	x	x		x	x	resident	Africa
<i>Azonus mirza</i>													not known - possible confusion with <i>Azonus moriqua</i>	Africa
<i>Azonus ubaldus</i>					x								resident	Africa, including North + Middle East + India
<i>Chilades evorae</i>									x		x	x	endemic	Cape Verde Islands
<i>Lampides boeticus</i>	x		x	x	x	x	x	x			x	x	resident	almost cosmopolitan
<i>Leptotes pirithous</i>	x		x	x	x	x	x	x	x		x	x	resident	Africa + S Europe + Arabia
<i>Zizeeria knysna</i>	x		x	x	x	x	x	x			x	x	resident	Africa + S Europe + Arabia
<i>Deudorix dinomenes</i>				x									not known - apparently temporarily resident in 1984	Africa (possible misidentification of <i>Deudorix livia</i> - also Africa)
<b>Danainae</b>														
<i>Danaus chrysippus</i>	x	x	x	x	x	x	x	x	x	x	x	x	resident	Africa + Old World tropics and subtropics
<i>Danaus plexippus</i>											x		probably rare visitor	Most of the world (absent from South America)
<b>Nymphalidae</b>														
<i>Hypolimnas misippus</i>	x		x	x	x	x		x			x	x	resident	Africa + tropics elsewhere
<i>Vanessa cardui</i>	x		x	x	x	x	x	x	x	x	x	x	resident	almost cosmopolitan
<i>Vanessa atalanta</i>				x							x	x	resident	Palearctic
<i>Vanessa vulcania</i>							x	?					not known	Macaronesian
<i>Nymphalis polychloros</i>				?									not known	Palearctic
<i>Junonia oenone</i>				x									resident	Africa
<i>Byblia ilithiya</i>	x		x	x	x	x	x	x	x		x	x	resident	Africa + S Arabia + India
<b>Satyrinae</b>														
<i>Melanitis leda</i>	x			x				x				x	resident	Afrotropics + Oriental + Indo

Appendix 1. Distribution and status of Cape Verde butterflies.



## Notes on some hawk-moths (Lepidoptera: Sphingidae) from the Cape Verde Islands

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Keywords: Sphingidae, hawk-moths, Cape Verde Islands, distribution, host plants

### ABSTRACT

The authors carried out a survey of butterflies on 12 of the Cape Verde Islands from 29 October to 18 December 2013. During the survey records were also made of the few hawk-moths (Lepidoptera: Sphingidae) encountered during the day, or feeding at flowers at dusk and dawn. None was collected at light. Since several of our records are believed to be new island records, we present them here. The few voucher specimens collected have been deposited in the Natural History Museum, London.

### RESUMO

Os autores desenvolveram um levantamento de borboletas em 12 ilhas de Cabo Verde entre 29 de outubro e 18 de dezembro de 2013. Durante o estudo, foram igualmente efectuados registos de algumas sphingídeos (Lepidoptera: Sphingidae), encontradas durante o dia ou alimentando-se nas flores ao amanhecer e entardecer. Nenhuma foi recolhida através de luz artificial. Dado que possivelmente alguns desses registos serão novos para as ilhas, são também aqui apresentados. Os escassos espécimes 'voucher' recolhidos foram depositados no Museu de História Natural de Londres.

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## INTRODUCTION

The authors carried out a successful survey of butterflies in the Cape Verde Islands during the period 29 October to 18 December 2013 (Tennent & Russell 2015). With the exception of two administrative days on Santiago, the first island we visited was Brava, where a first instar sphingid larva was discovered feeding on an Oleander bush *Nerium oleander* L. (Apocynaceae). In our ignorance – although in our defence, neither of us being a sphingid specialist and the larva being extremely small – we assumed that this was probably a larva of the Oleander hawk-moth *Daphnis nerii* Linnaeus, 1758.

We soon realised that it was not *D. nerii*, and decided that we would record such hawk-moths as we happened to encounter on our travels around the islands. When a specimen of *Nephele accentifera* Palisot de Beauvois, 1805 emerged from the ‘*nerii*’ pupa a month later, we realised that this was not only a new record of

this species from Brava, but that *Nerium oleander* probably represented a previously unrecorded host-plant.

The following short list records sphingid moths seen in the Cape Verde Islands. Aside from the specimen of *N. accentifera* already mentioned and several larvae of *Acherontia atropos* Linnaeus, 1758 collected on *Nicotiana* plants (Solanaceae), all our records are the result of collecting during the day or at dusk, in both cases usually at flowers. No moths were collected at light. We have also included such records from the literature as we happened across and also from the collections of the Instituto de Investigação Científica Tropical (IICT), Lisbon, Portugal. In a small number of cases our records appear to represent new island records or to confirm a historical record; we have indicated the former where we believe it to be so. Our few voucher specimens have been deposited in the Natural History Museum (BMNH), London, UK.

## SPECIES LIST

***Agrius convolvuli* (Linnaeus, 1758) or *Agrius cingulata* (Fabricius, 1775)**

These two species may be difficult to separate on the wing (*i.e.* without experience or voucher specimens) and no comment is made on whether historical records belong to one species or the other. An *Agrius* species was observed on 15 November flying in shade under a trellis in the grounds of the Quinta da Montanha, Rui Vaz, Santiago, at *ca* 800 m. The pink/grey striped body was clearly visible in flight, but although it is acknowledged that *cingulata* is significantly brighter pink than *convolvuli*, species identification was uncertain. A sphingid, almost certainly an *Agrius* species, was also seen feeding at papaya flowers *Carica papaya* L. (Caricaceae) on São Nicolau at dusk, 23 November. This seems to be the first record of an *Agrius* species from São Nicolau.

The only sphingid species recorded from the Cape Verde Islands by Riley (1894: 131), during the U.S. Eclipse Expedition to West Africa (1889-1890), was *Agrius cingulata* (as *Sphinx cingulata*): “Three specimens, St. Vincent [São Vicente], Cape Verde Islands”, although it is noted that some of the butterflies recorded from São Vicente on that expedition are in doubt

(Tennent & Russell 2015). Aurivillius (1910) recorded an *Agrius* species (as *Herse cingulata*) from the islands of Brava (1♀) and Santiago (1♂). Nyström (1958) recorded *Herse convolvuli* from a pupa found at Praia, Santiago, 6 February 1954, which hatched in the middle of April. Schmutterer *et al.* (1978: 331) dealt with insect pests in the Cape Verde Islands and included one sphingid, *i.e.* *Agrius convolvuli*: “Eine einzelne Imago des Windenschwärmers wurde in der Ribeira Seca auf Santiago festgestellt (Sept. 1976)” [A single imago ... has been found in the Ribeira Seca in Santiago.]. Traub & Bauer (1982) recorded both species (*convolvuli* was misprinted as *concolvuli*) from Santo Antão and confirmed previous records from São Vicente and Santiago. Báez & García (2005) recorded *A. cingulata* from Brava, Santiago, São Vicente and Santo Antão. They also recorded *A. convolvuli* from Brava, Santiago and Santo Antão and regarded both species as ‘probably native’. *A. convolvuli* is known from Fogo (São Filipe) and Santo Antão (Cove de Paúl) (Ian Kitching *in litt.* 2013.).

***Acherontia atropos* (Linnaeus, 1758)**

We came across a small larva feeding on *Nicotiana*, 2 km west of João Galego, Boa Vista, at 50 m elevation, 18 November. Further larvae were encountered near the centre of Espargos, Sal, also feeding on *Nicotiana*, at sea level, 22 November. A male emerged from one of these larvae, 30 December. This seems to be the first record of this species from Sal and possibly the first published record from Boa Vista. Aurivillius (1910) recorded 2 ♀♀ of this species from Brava, Traub & Bauer (1982) recorded it from Santo Antão, São Nicolau, Santiago and Fogo, and Mück & Traub (1987) recorded it from Santiago. Mück *et al.* (1990) recorded the species from Santo Antão, São Nicolau, Santiago, Fogo and Brava, whilst Báez & García

(2005) reported *A. atropos* from Brava, Santiago, São Nicolau and Santo Antão, and suggested the species was ‘probably native’. Baliteau & Baliteau (2011) recorded the species from Santo Antão. Jenine Carvalho, Head of Wildlife Protection, Brava, showed us a small collection of insects he had collected on Brava some years previously. These included a specimen of *A. atropos*, which he said was common on the island and that larvae fed on potatoes. Additionally, ornithologist Cornelis Hazevoet found a dead specimen of *A. atropos* on a hillside above Fajã de Água, Brava, 31 December 1987. The specimen was deposited in the collection of the Naturalis Biodiversity Center (RMNH), Leiden, The Netherlands.

***Daphnis nerii* (Linnaeus, 1758)**

We did not encounter this species, despite examining a large number of *Oleander* leaves. Mück & Traub (1987) recorded it from the island of Santiago and said (Mück & Traub 1987: 94): “Obwohl zwei Raupen dieser Art im Sommer 1984 in S. Jorge auf Oleander beobachtet wurden, ist es sehr fraglich, ob *D. nerii* auf den Kapverden etabliert ist. Das zweimalige Auftreten 1983 und 1984 auf S. Tiago [Santiago] ist mit hoher Wahrscheinlichkeit auf Zuwanderung zurückzuführen” [Although two larvae of this species were observed in the summer of 1984 in S. Jorge on Oleander, it is

very questionable whether *D. nerii* is established in Cape Verde. The two-time occurrence in 1983 and 1984 on Santiago is due most likely to immigration.]. Traub (1988) recorded *D. nerii* from São Jorge dos Orgãos, Santiago, at light. Báez & García (2005) also recorded *D. nerii* from Santiago and regarded it as ‘probably native’. Mück & Traub’s record of *D. nerii* larvae feeding on Oleander is interesting as this is the usual host-plant of *nerii*, but in view of our records of a *Nephele accentifera* larva on the same plant, it may not be certain that their larvae were indeed *D. nerii*.

***Nephele accentifera* (Palisot de Beauvois, 1805)**

A small larva found feeding on *Nerium oleander* on Brava (see Introduction) was reared and produced a specimen of *N. accentifera*. A second specimen was collected in a gorge at the side of the road leading to the caldeira on Fogo late one afternoon. The only other specimen seen was flying with other sphingid species (see above) on the steep slopes of a shallow gully 2 km southeast of Povoação Velha on Boa Vista. These seem to represent the first records of *N. accentifera* from Brava and Boa Vista.

Nyström (1958) recorded the species from

the islands of São Nicolau (one specimen at Ribeira Brava in February 1954) and Santo Antão (three specimens at Chã de Morte and one at Chã de Morte-Lagedo in January 1954). Traub & Bauer (1982) recorded *N. accentifera* from Fogo, and confirmed its occurrence in Santo Antão and São Nicolau. Báez & García (2005) reported the species from Fogo, São Nicolau and Santo Antão and suggested it was ‘probably native’. Baliteau & Baliteau (2011) recorded the species from Santo Antão, including a host-plant record of *Ficus sycamorus* L. (Moraceae).

***Hippotion celerio* (Linnaeus, 1758)**

On Brava, a specimen was seen shortly after dawn feeding at flowers of *Impatiens* sp.

(cultivar) (Balsaminaceae) on the central reservation of the road outside our hotel in Vila Nova

Sintra, 5 November. In the following days, it was common at both dawn and dusk feeding at the same flowers at the grounds of the Casas do Sol hotel at São Filipe, Fogo. It was equally common on *Impatiens* flowers in mid-November on Maio. On Santiago, several were seen flying on a dull afternoon around the Quinta da Montanha, Rui Vaz, at ca 800 m, feeding at *Bougainvillea* and other flowers. Several were also seen at *Lantana* near the peak of Monte Gâmbôa (1,080 m), also on Santiago, 15 November. On Boa Vista several were encountered, 19 November, flying with *Hyles livornica*, *H. tithymali* and *Nephele accentifera*, in extremely windy conditions, on the leeward side of several slopes of a shallow gully 2 km southeast of Povoação Velha. Nothing else was flying and all were keeping very close to the ground, apparently feeding at small, unidentified yellow flowers. On São Nicolau, a specimen was taken flying around endemic *Echium stenosphon glabrescens* (Pettersson) Romeiras & M.C. Duarte (Boraginaceae) growing in profusion outside the Monte

Gordo Park offices at 500 m elevation. These seem to be the first records of *H. celerio* from Brava, Fogo and Maio.

Nyström (1958) recorded this species from the islands of São Nicolau, São Vicente and Santo Antão, Mück & Traub (1987) recorded it from Santiago and Traub & Bauer (1982) recorded it from Santiago and Sal, while confirming Santo Antão and São Nicolau. Mück *et al.* (1990) recorded *H. celerio* from Santo Antão, São Vicente, São Nicolau, Sal and Santiago and reported the hymenopterous *Trichogramma lutea* Girault, 1911 (Chalcidoidea) parasitising ova. Báez & García (2005) reported the species from Santiago, Sal, São Nicolau, São Vicente and Santo Antão, and considered it to be 'probably native'. Vieira (2008) recorded *H. celerio* from Sal and Baliteau & Baliteau (2011) recorded it from Santo Antão. On São Nicolau, a specimen was present in a small collection of insects held at the Monte Gordo Park headquarters.

#### ***Hippotion eson* (Cramer, 1779) or *Hippotion gracilis* (Butler, 1875)**

Two small sphingids with brown forewings and pink hindwings were seen very clearly for some minutes, feeding at *Lantana* near the peak of Monte Gâmbôa (1,080 m), Santiago, 15 November. Unfortunately, neither was collected. It could have been either of these species (Ian

Kitching *in litt.* 2013), but neither has previously been recorded from the Cape Verde Islands. The first author is familiar with similar small *Hippotion* species elsewhere (Tennent 1991, 1992, Tennent *et al.* 2015) and is in no doubt that this is what they were.

#### ***Basiothea medea* (Fabricius, 1781)**

One specimen was taken near the peak of Monte Gâmbôa (1,080 m), Santiago, 15 November, whilst feeding at *Lantana*. Another was seen, but not caught and a third specimen was seen at the same place the following day. This seems to be the first record of this species from Santiago.

Mück & Traub (1987: 94) recorded larvae from Brava feeding on *Borreria verticillata* (L.) (Rubiaceae): "Auf der Insel Brava wurden die

grünen Raupen mit ihren Augenflecken auf dem Thorax auf der Rubiacee *Borreria verticillata* gesammelt" [On the island of Brava, the green caterpillars were collected ... on the Rubiaceae *Borreria verticillata*.]. Traub & Bauer (1982) recorded *B. medea* from Fogo and Báez & García (2005) noted the Brava record, suggesting that *B. medea* was 'probably native'.

#### ***Hyles tithymali* (Boisduval, 1834)**

One specimen (possibly more – unconfirmed) was positively identified on Boa Vista, 19 November, flying with *Hyles livornica*, *Hippotion celerio* and *Nephele accentifera*, in extremely windy conditions, on the leeward side of the slopes of a shallow gully 2 km southeast of Povoação Velha. Although most sphingid

moths seen feeding at the flowers of *Impatiens* sp. (cultivar) in various localities on several islands were identified as either *H. celerio* or *H. livornica*, it is quite probable that these included further specimens of *H. tithymali*, which were not identified. This seems to be the first record of *H. tithymali* from Boa Vista.

Aurivillius (1910) recorded a male of this species (as *Celerio euphorbiae* var. *mauretanicum*) from São Nicolau and Mück & Traub (1987: 94) recorded this species (as *Hyles euphorbiae*) from Fogo: “Auf Fogo fressen die Raupen in grosser Zahl an der endemischen Euphorbie *Euphorbia tuckeyana*” [On Fogo, the caterpillars eat in large numbers at the endemic euphorbia *Euphorbia tuckeyana*.]. Traub & Bauer (1982) recorded this species (as *Hyles euphorbiae*) from Santo Antão,

Santiago and Fogo. Báez & García (2005) recorded it (as *Hyles euphorbiae*) from Fogo, Santiago, São Nicolau, Santo Antão and suggested it was ‘probably native’. Baliteau & Baliteau (2011) recorded it from Santo Antão. Specimens also formed part of a small collection of insects held at the Monte Gordo Park headquarters on São Nicolau. The collection of IICT contains specimens from Brava.

### *Hyles livornica* (Esper, 1779)

*Hyles livornica* and *Hippotion celerio* were the two commonest sphingid moths seen by the authors in the Cape Verde Islands. On Santiago several specimens were observed (and two collected) whilst feeding at *Lantana* flowers near the peak of Monte Gâmbôa (1,080 m), 16 November. Both this species and *H. celerio* were common on Boa Vista on 19 November, flying with smaller numbers of *H. tithymali* and *Nephele accentifera* in extremely windy conditions on the leeward slopes of a shallow gully 2 km southeast of Povoação Velha. They were feeding on ground hugging yellow flowers (not identified) and did not stop for more than a few moments at individual flowers, making approach difficult on the steep, unstable shale slopes. On São Nicolau, on 23 November, one specimen was seen at dusk in some quite dense vegetation (presumably searching for flowers), near the centre of Vila da Ribeira Brava. Also on São Nicolau, several individuals were attracted to the flowers of *Echium stenosphon* on Monte Gordo at 600 m elevation on 6 December. This seems to be the first record of *H. livornica* from Boa Vista.

Aurivillius (1910) recorded three males of this species (as *Celerio lineata* var. *livornica*) from Brava and Nyström (1958) recorded it (as *Celerio lineata* f. *livornica*) from the islands of Santiago, Sal and São Vicente. Mück & Traub (1987: 95) recorded the species (as *Hyles lineata livornica*) from the island of Santiago: “Die Raupen ... fressen an *Boerhavia* spp. und *Euphorbia hirta*” [The caterpillars ... eat *Boerhavia* spp and *Euphorbia hirta*.]. Traub & Bauer (1982) recorded this species (as *Hyles lineata livornica*) from Santo Antão, São Nicolau and Fogo and confirmed Sal and Santiago. Báez & García (2005) reported it from Brava, Fogo, Santiago, Sal, São Nicolau, São Vicente and Santo Antão, regarding it as ‘probably native’. Vieira (2008) recorded it from Sal and noted it was also known from Santo Antão, São Vicente, São Nicolau, Santiago, Fogo and Brava. Baliteau & Baliteau (2011) recorded the species from Santo Antão. There are specimens from Maio and Santiago in BMNH. Harbich (2007) studied biological and morphological issues regarding *H. livornica* on Santiago.

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Short Note | Nota Breve

## Recent and noteworthy records of Cetacea from the Cape Verde Islands

Simon Berrow, Pedro López Suárez, Beatrice Jann, Joanne O'Brien, Conor Ryan, Jaqueline Varela & Cornelis J. Hazevoet

Keywords: Cetacea, Ziphiidae, Physteridae, Delphinidae, distribution, Cape Verde Islands

During August-September 2014 and 2015, yacht-based surveys were conducted in the Cape Verde archipelago with the main objective of trying to locate humpback whales *Megaptera novaeangliae* during the late boreal summer (Berrow *et al.* 2014). Spring breeding humpbacks in Cape Verde waters are known to have their feeding grounds in the high Arctic (*e.g.* Wenzel *et al.* 2009). While these animals have generally left the breeding grounds by mid-May, a number of sightings during the summer months (June-August) have raised the possibility that animals from southern stocks may occasionally reach as far north as Cape Verde (Hazevoet *et al.* 2011). The cruise plans of both surveys were designed to maximize survey effort in those locations with recent sightings of humpback whales (*e.g.* off the island of Maio; E. Magileviciute unpublished data), as well as visiting habitats that are known to hold humpback whales during the spring (*e.g.* off the island of Boa Vista; Ryan *et al.* 2014). In 2014, 12 days were spent at sea (31 August-11 September) and a total of 1,182 km of track line surveyed. A continuous watch for cetaceans was maintained from the yacht during daylight hours. All cetacean species were recorded with a best estimate of numbers, presence of calves and behaviour. Apart from Maio and Boa Vista, waters off the islands of Santiago, São Vicente, Santa Luzia and São Nicolau, as well as Branco and Raso islets, were surveyed.

Seven cetacean taxa were identified to species level and two more to genus level. Humpbacks were the only baleen whale species recorded. We recorded eight odontocete taxa, including melon-headed *Peponocephala electra* and short-finned pilot *Globicephala macrorhynchus* whale and rough-toothed *Steno bredanensis*, pantropical spotted *Stenella attenuata* and Atlantic spotted *S. frontalis* dolphin (see Berrow *et al.* 2014), all of which are frequently reported from Cape Verde waters. Here we report on sightings of taxa the occurrence of which in Cape Verde seas has not or only rarely been established. Also included are a few recent stranding data from Boa Vista.

**BEAKED WHALES** There were two sightings of beaked whales *Mesoplodon* sp. One group of four individuals, including a calf or small juvenile, were observed at 14°.96722'N, 23°.40863'W (between Maio and Santiago) in very rough seas (Force 8) on 7 September 2014. They were observed for around 20-30 seconds during which time they surfaced on three occasions with poor images taken on the third surfacing (Fig. 1). They were *ca* 5-7 m in length, light brown in colouration with a broad triangular shaped dorsal fin. The beak appeared above the water on surfacing, with the head also apparent. Images taken were too poor to establish their identity at the species level.



Fig. 1. Unidentified beaked whale *Mesoplodon* sp. between Maio and Santiago, 7 September 2014.  
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Fig. 2. Unidentified beaked whale *Mesoplodon* sp. off Praia, Santiago, 8 September 2014.  
© Simon Berrow.

The second sighting of beaked whales was near the port of Praia on Santiago (14°.88846'N, 23°.51483'W) on 8 September 2014. A number of small (maximum *ca* 5 m in length) grey coloured whales surfaced near the vessel but travelling away, making it difficult to see their head or beak (Fig. 2). There were four animals in total, including one calf. On surfacing, their beak was raised clear of the water before being slapped down onto the surface of the water. Good HD film of the whales was obtained and sent to a number of beaked whale specialists for species identification (see Acknowledgements). Although these consultants thought they could have been Gervais' beaked whale *M. europaeus*, the footage was considered not quite good enough to unequivocally confirm species identification.

Previously, the occurrence of *Mesoplodon* spp. in Cape Verde seas was known from only three occasions, *i.e.* the stranding of a single *M. europaeus* on Maio, 15 May 2013 (Koenen *et al.* 2013), and a Blainville's beaked whale *M. densirostris* photographed off northern Boa Vista, 14 April 2011 (Wenzel & López Suárez 2012). Four beaked whales observed and photographed

off southern Sal, 11 February 2010, were tentatively identified as *Mesoplodon* cf. *europaeus* (Hazevoet *et al.* 2010).

**DWARF OR PYGMY SPERM WHALE** Two small whales were observed off Tarrafal, São Nicolau (16°.40329'N, 24°.3298'W) on 1 September 2014. One was seen breaching twice (Fig. 3). Based on the robust body, large bulbous head and proportionally small flippers, they were identified as either dwarf *Kogia sima* or pygmy sperm whale *K. breviceps*, but the short time of observation and poor quality of footage obtained did not allow for identification to species level. There were no observations of live *Kogia* spp. in Cape Verde seas prior to the present sighting, the only record being of a stranded dwarf sperm whale on Boa Vista in August 2004 (Hazevoet *et al.* 2010).



Fig. 3. Breaching *Kogia* sp. off Tarrafal, São Nicolau, 1 September 2014. © Tony Whelan (video grab<sup>1</sup>).

**KILLER WHALE** A pod of five killer whales *Orcinus orca*, consisting of an adult male, a juvenile and three others, was seen off Tarrafal, Santiago (16°.52157'N, 24°.37805'W) on 10 September 2014 (Fig. 4). Images were submitted to the North Atlantic Killer Whale Catalogue, but it has as yet not been possible to match these individuals (Andrew Foote *in litt.*).

There were only three documented sighting records of killer whales in Cape Verde seas prior to this record, *i.e.* a pod of nine animals off southern Sal, 29 February 1996, one off western Boa Vista, 21 September 2001, and six animals off southern Sal, 23 November 2013 (Hazevoet & Wenzel 2000, Hazevoet *et al.* 2010, Cozens 2014). In addition, 2-3 individuals (including an adult male) were seen 700 m off Ponta Preta, Sal, 21 July 2015 (Anonymous 2015), bringing the total number of killer whale records in Cape Verde during the past 20 years to five.

<sup>1</sup> For video see <http://tinyurl.com/qhuseuo>



Fig. 4. Killer whales *Orcinus orca* off Tarrafal, Santiago, 10 September 2014.  
© Joanne O'Brien.



Fig. 5. Fraser's dolphin *Lagenodelphis hosei*, off Tarrafal, São Nicolau, 30 August 2015.  
© Pedro López Suárez. Fig. 6. Fraser's dolphin, Praia de João Barrosa, Boa Vista, 17 July 2015.  
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**RISSE'S DOLPHIN** While sailing from Maio to São Nicolau on 6 September 2015, 6-7 adult Risso's dolphins *Grampus griseus* were seen milling at the surface at 15°28'48"N, 23°27'27"W (Fig. 7-8). Although Risso's dolphin is a cosmopolitan tropical and warm temperate taxon, there were only two previous records from Cape Verde seas, *i.e.* at least three animals in the lee of Raso, 25 January 1989, and *ca* 20 animals off eastern Santo Antão, 26 June 1993 (Hazevoet & Wenzel 2000).

**FRASER'S DOLPHIN** In the early morning of 30 August 2015, a large mixed school of dolphins

was encountered south of Tarrafal, São Nicolau. There were *ca* 150 Fraser's dolphins *Lagenodelphis hosei* (Fig. 5), > 100 melon-headed whales and a few short-finned pilot whales. In addition, there were two strandings of Fraser's dolphin – a dead adult at Praia Cabral, Boa Vista, 24 February 2014, and an adult, still alive and returned to the sea, at Praia de João Barrosa, Boa Vista, 17 July 2015 (Fig. 6). Previously, there were only two records of Fraser's dolphin, *i.e.* a pod of *ca* 20 animals about 5 nm southwest of São Nicolau, 31 August 2003, and a stranding of one at Praia de Curral Velho, Boa Vista, 10 March 2006 (Torda *et al.* 2010).



Fig. 7-8. Risso's dolphins *Grampus griseus* between Maio and São Nicolau, 6 September 2015.  
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**Short Note | Nota Breve**

## **Reassessment of records of Baird's sandpiper *Calidris bairdii* in the Cape Verde Islands**

**Richard Porter & Tony Prater**

Keywords: *Calidris* spp., identification, *Calidris bairdii*, invalid records, Cape Verde Islands

The 6<sup>th</sup> and 8<sup>th</sup> Cape Verde Bird Reports (Hazevoet 2010, 2014) include records of the alleged first and second records of Baird's sandpiper *Calidris bairdii* for the archipelago. If the accompanying photographs are of the actual birds observed, then it would appear that both were misidentified.

The first record, an adult at the Santa Maria saltpans, Sal, 20-22 October 2007 (Hazevoet 2010) is supported by a photograph that shows a little stint *C. minuta*. We can understand why it was considered a Baird's sandpiper as the primaries appear to extend far beyond the tertials and whilst the tail cannot be observed, one could expect that extension too. The bird shows thin, dark, central upperpart streaks and a strong supercilium that occur in little stint, but less so in Baird's. The breast pattern is also characteristic of little stint, and not Baird's, in that it is lightly washed grey rather than having a brownish ground colour with darker streaks in a strongly marked breast (cf. O'Brien *et al.* 2006).

The second record is of a juvenile at the São Vicente sewage works, 1-3 November 2012 (Hazevoet 2014), supported by a photograph that shows a white-rumped sandpiper *C. fuscicollis*. The bird in the image shows an upperpart pattern that fits with a juvenile *C. fuscicollis* just moulting into winter plumage. The supercilium is typical of that species as are the faint dark streaks along the flanks. The bird also shows a further character that supports this re-identification: the feathering on the upper and lower mandible is more or less equal in *C. fuscicollis*, whereas in *C. bairdii* the feathering on the lower mandible extends well beyond the feathering on the upper mandible (Simpson 2014).

As these two records were taken to represent the only records of Baird's sandpiper in the Cape Verde Islands, it must be concluded that there are no records of that taxon in the archipelago so far.

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