

RAIN FORESTS OF SÃO TOMÉ AND PRÍNCIPE: BUTTERFLIES AND CONSERVATION

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ABSTRACT.— The rain forest butterfly fauna of the African islands of São Tomé and Príncipe are discussed.

KEYWORDS: *Acraea*, Aganainae, African, *Asota*, *Dixeia*, Ethiopian, *Hypolimnas*, Lycaenidae, *Mylothris*, Noctuidae, Nymphalidae, Pieridae, *Zizeeria*.

São Tomé and Príncipe are a very well known territory among naturalists dealing with the Ethiopian region, especially among ornithologists and entomologists. The extremely interesting fauna of these islands comprises many endemic species. The forests of São Tomé and Príncipe were included in the World Wildlife Fund's Biosphere Zones list. The International Council for Bird Preservation (ICBP) carried out a survey of 75 threatened forests in tropical Africa and the Malagasy region to determine those most important for conservation: in this survey the forests of southwest São Tomé were ranked second.

Most of the endemic butterfly species of São Tomé and Príncipe were discovered and described at the end of the last century and in the first two decades of this century. However, the total number of Lepidoptera species inhabiting São Tomé and Príncipe has remained unknown. Virtually nothing was known about the biology of the endemics, their correct systematic status, or even general information about the zoogeography of the butterflies of the two islands.

Very few entomologists have visited São Tomé and Príncipe in the last twenty years, first of all because of the restrictions imposed by the Marxist regime, in power since 1975. Secondly, we have to realize that the fauna of São Tomé and Príncipe, though interesting, is relatively poor compared to the neighboring continental forests. Scientific expeditions or private entomologists have been rather reluctant to risk their money and time on São Tomé, preferring to investigate the nearby Cameroon or Gabon, areas where a rich harvest can be guaranteed. In the early 1980s, the only naturalist who dared to concentrate his efforts on São Tomé and Príncipe, against all odds, was a French botanist and entomologist, J.-G. Canu.

My own trip to São Tomé and Príncipe began upon landing at the São Tomé airport on 14 Jan 1989, without any visa, short of money, knowing nobody in the country, and counting on my good luck. My two-month visit was very interesting and fruitful, eventhough there were unpleasant moments at times. I was arrested twice, being charged with "suspicious behavior." It was suspicious indeed—a foreigner armed with a butterfly net and a camera, trying to get a lift! I must here express my gratitude to my benefactor and friend, Dr. Juan Racaj, for shelter, advice,

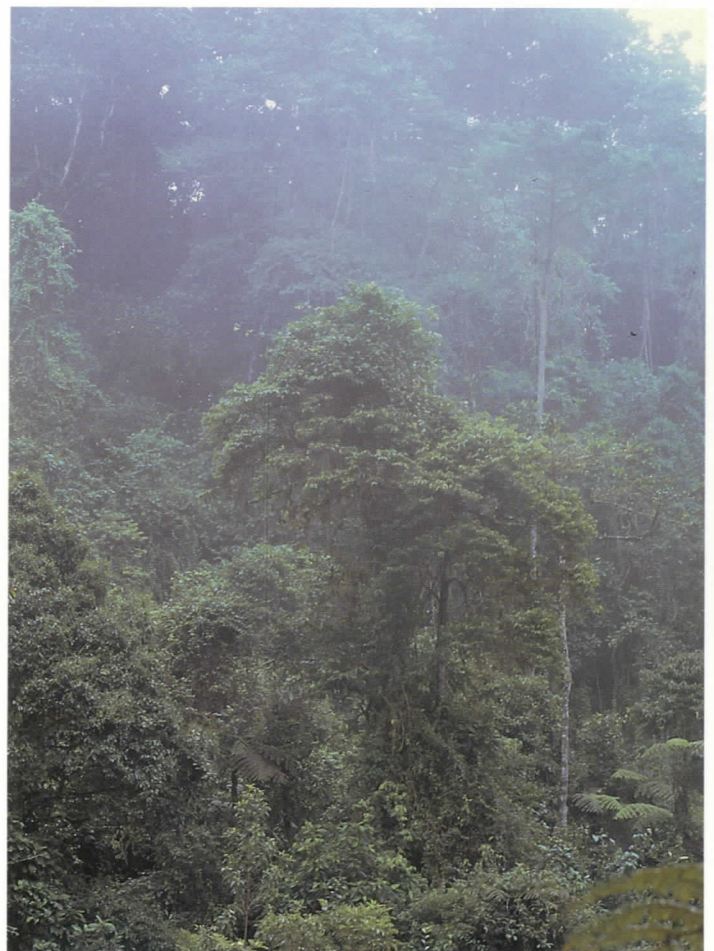


Fig. 1. Primary cloud forest, in the vicinity of Lago Amelia (1400m).

protection, and understanding.

When I landed for the second time at the São Tomé airport, in Jul 1990, I had a special permit granted by the Ministry of Agriculture of São Tomé and Príncipe, obtained thanks to the help of the Institute of Zoology of the Jagiellonian University, Krakow. My second visit, more than two months in duration, was equally interesting even though some of my projects were

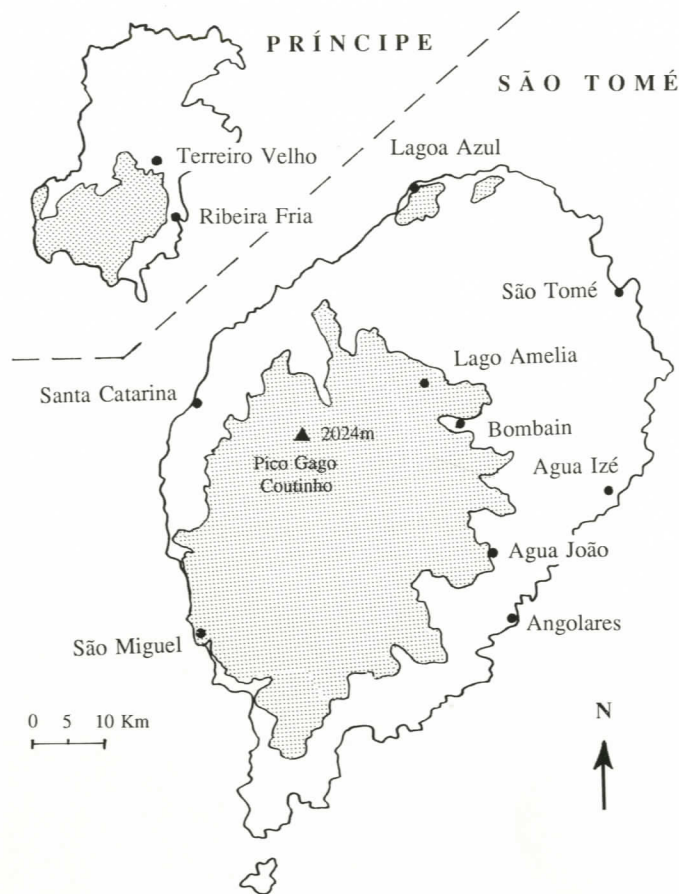


Fig. 2. Map of São Tomé and Príncipe islands, illustrating primary and secondary forest areas and the major localities of the text (after Rodriguez, 1974).

jeopardized by heavy rainfall in the southern part of São Tomé.

My main achievement was the production of the first checklist of the butterflies of São Tomé and Príncipe and the description of two new endemic subspecies from the island of Príncipe: *Bematistes alcinoe racaji* Pyrcz and *Acraea pharsalus carmen* Pyrcz. These matters, as well as some aspects of the zoogeography, speciation, dispersion, behavior, and biology of São Tomé and Príncipe butterfly species, were discussed in a previous article (Pyrcz, 1991).

I also gathered an important collection of moths from São Tomé island. This collection is stored in the Zoological Museum in Krakow. It is useful to note that the moths of the two islands are only superficially studied, and the material in Krakow comprises certainly quite a few undescribed taxa.

In the paper, I will concentrate on some aspects of conservation and my field experiences on the two islands. São Tomé and Príncipe Republic includes two major islands in the Gulf of Guinea; the remaining two islands are Fernando Poo and Annobón, along with several rocky islets. The Equator crosses the small island of Rolas, situated south of São Tomé. São Tomé and Príncipe are situated about 150km from each other and 200km from the continental coast. The two major islands do not form an archipelago from the zoogeographical standpoint as there is practically no proof of any species interchange between them, and it appears their faunas evolved independently.

The surface area of of São Tomé is 800 sq km. The highest

summit on the island, the extinct volcano Pico Gago Coutinho, reaches 2024m. Annual rainfall ranges from 5000mm in the southwest to less than 1000mm in the north. The surface area of Príncipe is 125 sq km. The highest point of Príncipe are basaltic peaks on the southern part of the island's plateau at about 1000m. The annual rainfall for Príncipe is similar to that of São Tomé.

After its discovery in the 1490s by Portuguese sailors, São Tomé and Príncipe became an important agricultural colony of the Portuguese Crown. For more than 200 years, São Tomé was a sugar cane producer. Since the end of the last century, coffee and cocoa have been the most important agricultural products. In the 1950s, São Tomé was the world's second greatest exporter of cocoa! If the exploitation of the forests for cultivation, construction and fuel wood had continued at the rate during the first half of this century, by now wildlife on São Tomé and Príncipe would have been only a memory. Unfortunately for the economy, but fortunately for nature, the prices of cocoa on the world market dropped dramatically in the 1960s. Later on, in the 1970s, the Marxist planned economy and the nationalization of the land ruined totally the national economy. Annual cocoa production fell to less than 10,000 tons, versus 200,000 tons in the 1950s. Many plantations were abandoned and eventually covered by secondary growth. In the central part of São Tomé, we can see the ruins of the "ancient" condominiums of São Paulo, Zampalma, Nova Ceilão, and many other, looking more like thousand-year-old Maya or Angkor ruins, than like houses left only 30 years before! I remember my amazement when, deep in the forest, I collapsed against something which appeared to be a railway track! Thirty years of stagnation had permitted the vegetation to recover. However, the secondary growth areas are not composed of the native plants but mostly of alien plant species introduced from the African mainland or from Southeast Asia, usually being unsuitable for the endemic insects as host-plants.

Primary vegetation remains in the regions where climatic and relief conditions are too harsh for profitable agriculture, that is, in the central and southwestern part of São Tomé and in the southern part of Príncipe. Primary forest occupies approximately one-fourth of the surface of the two islands presently.

ICBP proposed the creation of a protected area on São Tomé that would include most of the remaining primary rain forest. Preliminary talks with the government of the Republic were undertaken and the future park delimitation was traced by the ICBP-East Anglia University expedition in 1990. The ICBP project is concerned basically with the protection of bird species, and from this point of view the proposed park limits are satisfactory. It must be pointed out, however, that several endemic butterfly species (and probably other insects) are confined to the dry vegetation zone [e.g., *Graphium leonidas sanctithomae* (L. Cerf), *Dixeia piscicollis* (Pinhey), *Charaxes defulvata* (Joicey and Talbot)] which is not included in the project of the future national park. In the northwestern corner of São Tomé, there is a patch of relatively well preserved savanna and dry forest vegetation situated between the localities of Praia das Conchas and the coast north of Neves as far as the place called Lagoa Azul. The size of this area is about 15 sq km and it is of little value for agriculture. The only population of *Graphium leonidas sanctithomae*

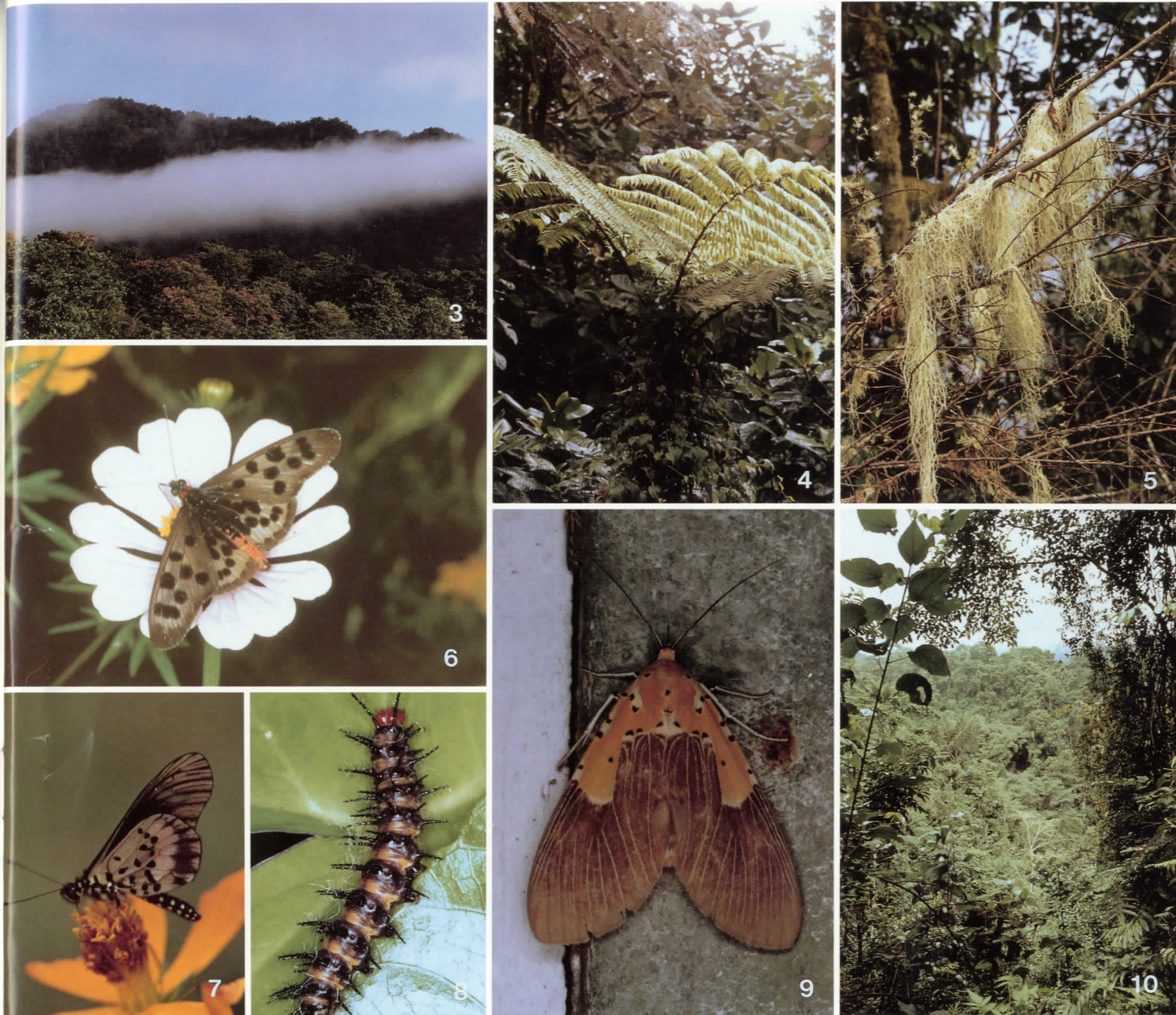


Fig. 3-10: 3. Early morning clouds in a São Tomé forest by Bombaim. 4. Primary vegetation, São Tomé (1500m). 5. Primary vegetation, São Tomé (1500m). 6. *Acraea niobe*, in a garden (Bombaim). 7. *Acraea newtoni* (Bombaim). 8. *Acraea zetes* larva, final instar (Terreiro Velho, Príncipe). 9. *Asota* sp. moth (Noctuidae: Aganainae) (Bombaim). 10. Secondary forest, Bombaim area (600m).

as well as one of the two known populations of *Dixeia piscicollis*, were found in this area. I suspect that *Charaxes defulvata* might occur in this area as well. Many other dry-zone butterfly species are found exclusively in the Lagoa Azul area. The creation of a small wildlife preserve should be seriously considered.

ICBP did not propose any protection area for Príncipe. This is mainly due to the fact that its fauna does not include any endemic bird species. The ecological situation on Príncipe seems much better than on São Tomé, but it must not be forgotten that the part of the relatively undisturbed forest on Príncipe where the endemic insects can sustain a safe population density level is only 25 sq km large. This is a tiny area that can be destroyed in a

period of a few years if not effectively protected. In recent years the economic policy of the São Tomé and Príncipe government has turned toward reprivatization of agricultural lands. The influx of foreign capital, mostly French and Portuguese, represents a chance for the weakened economy, but on the other hand presents a serious threat to the ecosystem. The first warning of the troubles to come for the nature of these islands is the construction of a water dam in the southcentral part of Príncipe, on the limits of the undisturbed forest that should be protected. The purpose of this power plant is to promote the insular economy. Let us hope it will not turn into a Trojan Horse for the fragile ecosystem of Príncipe.

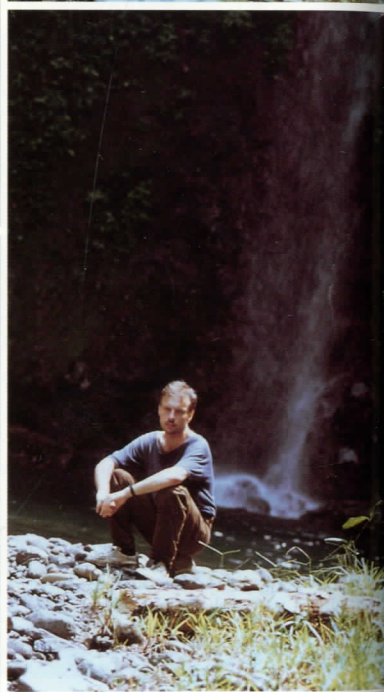
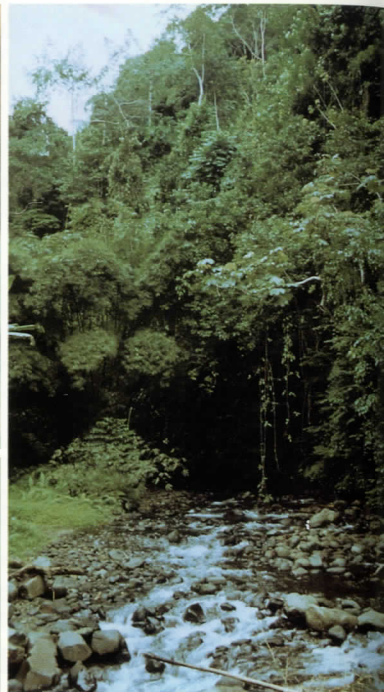


Fig. 11-17: 11. *Acraea insularis*, on *Vernonia amygdalina* flowers (Bombaim). 12. *Hypolimnas salmacis thomensis* ♂, sunning, (Cantagalo trail). 13. *Hypolimnas salmacis thomensis*, a ragged ♀ (Bombaim). 14. Rio Bomba stream, Bombaim area. 15. Baited trap in Bombaim, with a ♀ *Charaxes candiope thomasius* inside (Mr. Rato Cabinda helping). 16. *Acraea niobe* (Milagrosa-Bombaim trail). 17. Aguas Verdes waterfall and author.

According to the Rhopalocera checklist, the fauna of São Tomé includes 11 endemic species and 7 endemic subspecies in the total of 47 confirmed butterfly species. The fauna of Príncipe includes 5 endemic species and 3 endemic subspecies in the total number of 42 registered species. While 38% of the São Tomé species are endemics, their population density is very low. They are outnumbered by the recently introduced cosmopolitan species. I estimate that at least 10 endemic species on São Tomé may be approaching extinction! Only a few species—*Papilio demodocus* Esper, *Appias epaphia* (Cramer), *Leptosia nupta* (Butler), *Hypolimnas dubius* Beauvois—constitute 90% of the butterflies observed.

In the richest and the best explored stand of rain forest, at Bombaim on São Tomé, I recorded 29 species (and I should add that quite a few species were seen in Bombaim only once or twice), while in the Terreio Velho area I observed 38 species. This gives the impression of a greater butterfly diversity on Príncipe than on São Tomé, even though the total number of species on São Tomé is higher. This situation is probably due to the extensive use of DDT on São Tomé: this pesticide was not used on Príncipe. It is, however, only my supposition, as I do not have any data about the abundance of butterflies on São Tomé prior to 1980.

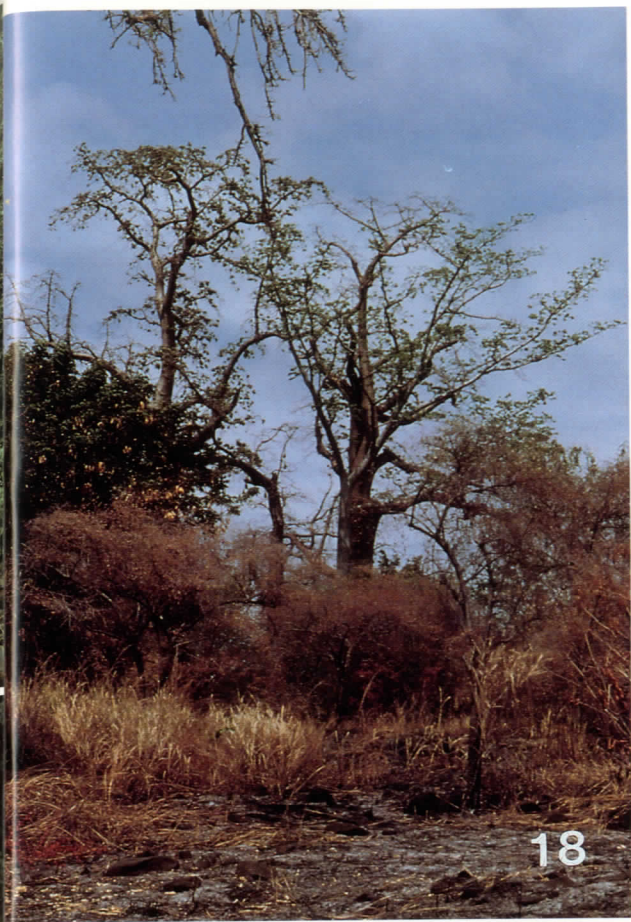


Fig. 18-23: 18. Savanna vegetation, Lagoa Azul area. 19. *Hypolimnias misippus* mating (Agua Izé). 20. *Hypolimnias misippus* ♂ on rotten bread fruit (Agua Izé). 21. *Mylothris rembina* f. *semifusca* (Agua Izé). 22. *Dixeia piscicollis* (Agua Izé). 23. *Zizeeria knysna* (Agua Izé).

ENDEMICS ON SÃO TOMÉ

Papilio bromius furvus (Joicey and Talbot)

Single specimens can be observed in the transitional secondary/primary vegetation areas in the humid zone at Bombaim, Agua Joao, Santa Catarina, and São Miguel, throughout the year.

Graphium leonidas sanctithomae (Le Cerf)

The only population was found independently by me in Feb 1989, and by J. G. Canu, in Lagoa Azul.

Dixeia piscicollis (Pinhey)

Two populations found in Lagoa Azul, Feb 1989, and in Agua Izé, Sep. 1990.

Acraea niobe (Sharpe)

Widespread and relatively common; flies in the humid zone throughout the year.

Acraea newtoni (Sharpe)

Observed only in Bombaim, Jul-Sep 1990.

Acraea insularis (Sharpe)

Extremely rare; only a few specimens existing in collections; seen in Bombaim, Sep 1990.

Acraea zetes annobona D'Abreu

The commonest of all the endemics; occurs in the secondary vegetation areas, mostly in the drier zones, but also in cultivated land; exists on Annobón Island (Pagalu).

Leptotes terrenus (Joicey and Talbot)

Not seen.

Virachola chalybeata (Joicey and Talbot)

Not seen.

Epamera bellina maris (Riley)

Only one specimen seen, Jan 1989, in the primary forest west of Bombaim.

Chilades sanctithomae (Sharpe)

Not seen.

Sallya boisduvali insularis (Joicey and Talbot)

A few specimens seen on the open Bombaim Valley, Jan 1989 and Aug 1990.

Neptis eltringhami (Joicey and Talbot)

Very rare; one specimen taken in Agua Joao, Feb 1989, and a few seen in Bombaim, Jan 1989 and Aug 1990.

Hypolimnas salmacis thomensis (Aurivillius)

Relatively common in the forested areas, especially in Dec-Feb.

Charaxes candiope thomasius (Staudinger and Schatz)

The most widespread of all the *Charaxes*; occasionally seen on the western coast in Santa Catarina and Lagoa Azul, and on the eastern coast in Angolares, but more abundant in the central part of the island; flies throughout the year.

Charaxes monteiri (Staudinger)

Distributed in the same areas as the previous species; flies throughout the year but seems more common in the rainy season.

Charaxes odyseus (Staudinger)

Confined to the humid zone, in the vicinity of the primary vegetation; flies throughout the year.

Charaxes antiquus (Joicey and Talbot)

Very rare; seen in Bombaim, Jan 1990, and taken by J.-G. Canu in the Lago Amelia area (1400m).

Charaxes defulvata (Joicey and Talbot)

This species was thought to be extinct; I observed it in Agua Izé, Jan 1989.

ENDEMICS ON PRÍNCIPE

Graphium leonidas santamarthae (Joicey and Talbot)

Extremely rare; seen twice in the Terreiro Velho area, Mar 1989.

Acraea medea (Cramer)

Rather uncommon; flies in all habitats throughout the year.

Acraea pharsalus carmen Pyrcz

Abundant on the forest edge; flies throughout the year.

Bematistes alcinoe racaji Pyrcz

Very rare; single specimens seen in the vicinity of the primary forest, Mar 1989 and Aug 1990.

Neptis eltringhami? (Joicey and Talbot)

The status of this species remains doubtful; observed in the Ribeira Fria-Terreiro Velho area, Mar 1989.

Charaxes lemosi (Joicey and Talbot)

Can be quite abundant in the southern forested part of the island, especially in the rainy season.

Charaxes barnsi (Joicey and Talbot)

Occurs regularly throughout the year; however, never as numerous as *C. lemosi*.

Pseudacraea gamae (Joicey and Talbot)

Only a few specimens seen, Mar 1989 and Aug 1990.

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