



Butterflies of Oman

text and design by Torben and Kiki Larsen

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Foreword

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



It is gratifying to find this book following so soon after the publication of 'Wild Flowers of Northern Oman' in the series being produced by the Office of the Government Adviser for Conservation of the Environment about the flora and fauna of our country. Butterflies and flowers go naturally together and I am sure that those who have enjoyed reading and using the flower book will find equal enjoyment in 'Butterflies of Oman'.

Mr Larsen has visited Oman several times to study our butterflies and the scientific results of his work are recorded in the first two Special Reports of our Journal of Oman Studies. This series of books is a practical demonstration of the benefits to be gained from the Oman Flora and Fauna Surveys and from the Journal.

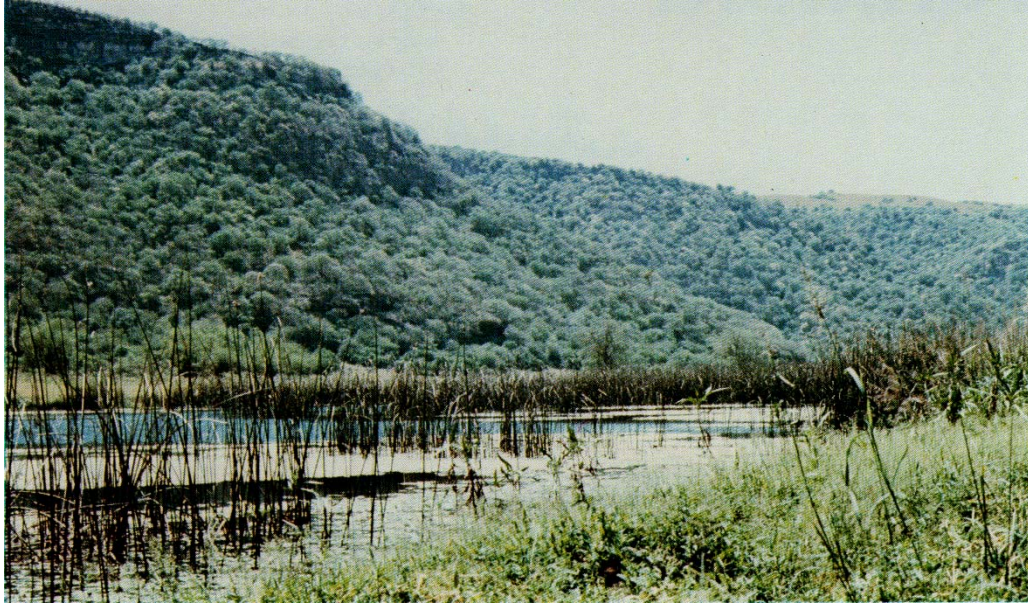
Once again our students in Oman are given an opportunity to learn to understand and to cherish an important and very beautiful part of our environment. I am sure that scientists, students and laymen alike who care about the wild creatures of God's creation, as indeed all of us should, will discover in the pages of this beautiful little book a fountain of information which perhaps they little expected in a desert land. I hope that some readers will also be encouraged by the words of the authors to go out and discover and record more for themselves and for science about these beautiful insects which brighten our lives and our country.

I wish to thank the authors and all those who have helped to produce this book for their contribution to the conservation of our environment which is a very important part of our national heritage. In the words of His Majesty Sultan Qaboos bin Said: 'God's gift of nature as a heritage carries with it a responsibility to guard it and nurture it for the future generations of our people'.

Muscat
November 1980

Faisal Bin Ali Al-Said
Minister of National Heritage
and Culture

4 Introduction



Dhofar landscapes: the picture above shows the scarp vegetation at the Darbat pools, the typical haunt of species such as *Stonehamia varanes*. The picture below shows the author at Aqabat al Hatab in a small valley where species such as *Colotis antevippe*, *Precis hierta* and *Spialia colates* were found.



Introduction

This book, follows *Wild Flowers of Northern Oman* by James Mandaville in the series of natural history books based on the scientific results of the Oman Flora and Fauna Surveys. Its purpose is to summarise our current knowledge of the butterflies of the Sultanate of Oman in such a way that it is of interest to all nature lovers and students of natural history.

Apart from my own papers on butterflies in the Journal of Oman Studies Special Reports Numbers 1 and 2, which describe the scientific results of the Oman Flora and Fauna Surveys in Northern Oman and Dhofar Province, no publications dealing with the butterflies of Oman exist. This book will, therefore, also be of interest to the professional entomologist. It identifies all the species known to occur in the Sultanate and all are illustrated in colour. Notes on identification, distribution and habits are given for each species.

Since the book is not primarily intended for specialists, the use of technical terms has largely been avoided. There is normally no discussion on the subspecific status of Omani butterflies although a list of the full scientific names is given at the end.

Without the scientific basis provided by the results of the Oman Flora and Fauna Surveys it would have been impossible to write this book. Mr P Granville White was responsible for butterflies during both the 1975 survey in Northern Oman and during the 1977 survey in Dhofar. Further valuable material was collected by Mr K M Guichard in Northern Oman and in Musandam in 1976. Since then much more material had become available. Firstly, as the guest of the government I visited Northern Oman and the Musandam area in February, 1979 and Dhofar Province in October, 1979 making extensive collections; secondly valuable supplementary information and material has been gathered by among others Mr M Baddeley and his son Shaun, Mr J R L Carter, Sgt R Frost, Major M D Gallagher, Mr D Mallon, Mr M Manley, Major T Michels and Mr R P Whitcombe.

Mrs D Hillcoat, Mr J P Mandaville Jr. and Mr A Miller have given botanical advice for which I am extremely grateful, and Mr A R Pittaway has kindly allowed me to use some of his photographs of Arabian butterflies for the book. Mr R Vane-Wright of the British Museum (Natural History) kindly gave me access to the collections under his care in order to arrange for the photography for this book despite the inevitable disruptions to the normal work of his department. I would also like to acknowledge the financial assistance of the Danish Carlsberg Foundation to my studies on Middle Eastern butterflies.

Although the amount of information now available about Omani butterflies is sufficient to form a comprehensive picture of the fauna, much more needs to be known about seasonal and geographical distribution, frequency, ecology and food plants in

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Oman. Certainly more species will eventually be discovered, although how many is anybody's guess. This presents a great opportunity for any naturalist living in Oman; he or she has an excellent chance of making a real contribution to the scientific exploration of the Sultanate.

It remains for me to express my admiration for and thanks to His Majesty Sultan Qaboos bin Said for his enlightened support of natural history research and conservation. My thanks are also due to His Majesty's Armed Forces and Civil Service for excellent logistical support during the field work. I am grateful to Mr Ralph Daly, the Government Advisor for Conservation and Development of the Environment for efficient organisation of the Oman Flora and Fauna expeditions and for his kind hospitality.

Torben B Larsen,
23 Jackson's Lane,
Highgate, London.
March, 1980

Botanical information

Where possible the plants mentioned in this book are cross-referenced to *Wild Flowers of Northern Oman* (Bartholomew, 1978) by James Mandaville Jr. In order to avoid excessive repetition, the scientific names of the various plant families are used throughout; the following list gives the English vernacular names for each of the plant families quoted:

Cruciferae = Mustard family
Capparidaceae = Caper family
Tiliaceae = Linden family
Malpighiaceae = Malpighia family
Rutaceae = Rue family
Rhamnaceae = Buckthorn family
Sapindaceae = Soapberry family
Leguminosae = Pea family
Compositae = Composite family
Plumbaginaceae = Leadwort family
Salvadoraceae = Salvadora family
Asclepiadaceae = Milkweed family

Boraginaceae = Borage family
Convolvulaceae = Morning Glory family
Solanaceae = Nightshade family
Scrophulariaceae = Figwort family
Acanthaceae = Acanthus family
Verbenaceae = Verbena family
Labiatae = Mint family
Polygonaceae = Buckwheat family
Euphorbiaceae = Spurge family
Moraceae = Mulberry family
Sterculiaceae = Cacao family

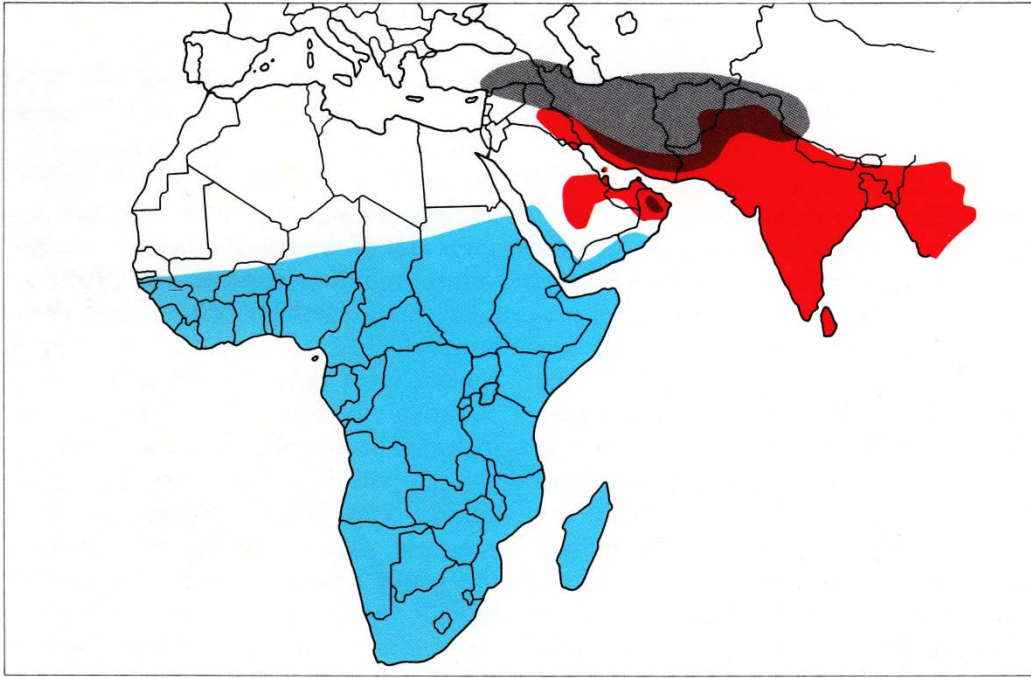
About Butterflies

Since this book deals with butterflies it is worthwhile to begin by finding out what a butterfly is. Butterflies are insects belonging to the order Lepidoptera which also includes moths. Together with beetles (Coleoptera) and wasps (Hymenoptera) the Lepidoptera belong to one of the three largest orders of insects, each of which have well over 100,000 species. However, there are probably only 15,000 species of butterflies, the vast majority of the Lepidoptera being moths. Butterflies and moths share the characteristic that they have four functional wings covered with minute scales which are attached to the transparent wing membrane in much the same manner as tiles on a roof. This is very clear under magnification as shown in the photograph on page 9. The very name Lepidoptera is derived from the Greek words for scales and wings. There is usually no problem in distinguishing between Lepidoptera and other insect groups, but the distinction between moths and butterflies is less easy. However, if a species of Lepidoptera flies by day, settles with the wings folded over the back when it rests, and has antennae which end in a club, then it is almost certainly a butterfly.

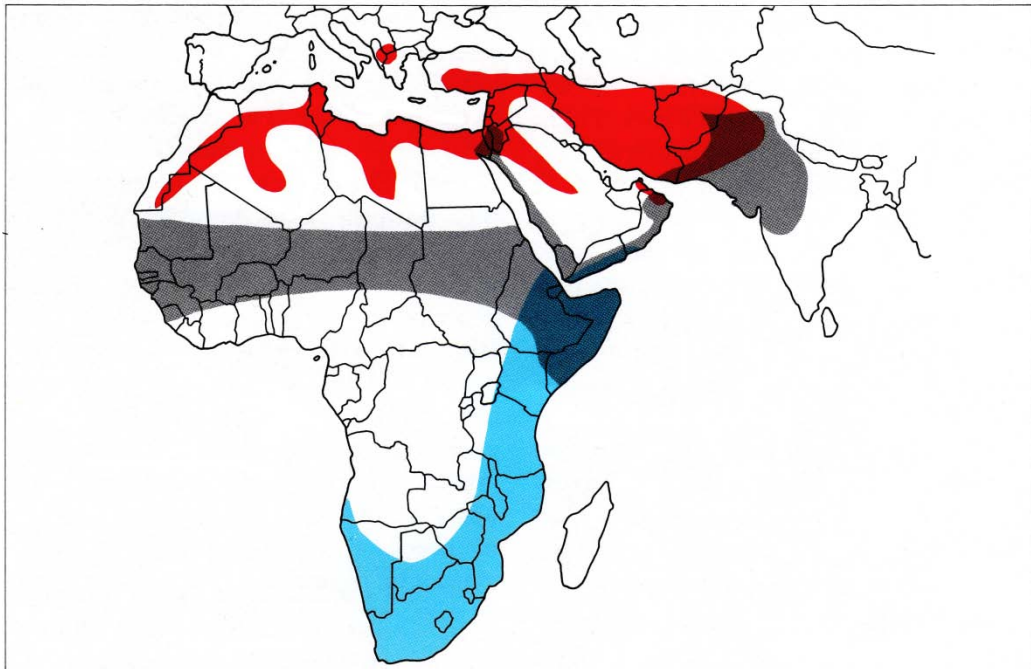
All living creatures are classified according to a scientific system started by the famous Swedish scientist, Carl von Linné, in the eighteenth century. Butterflies are grouped into families such as the Papilionidae or the Nymphalidae with the members of each family sharing a

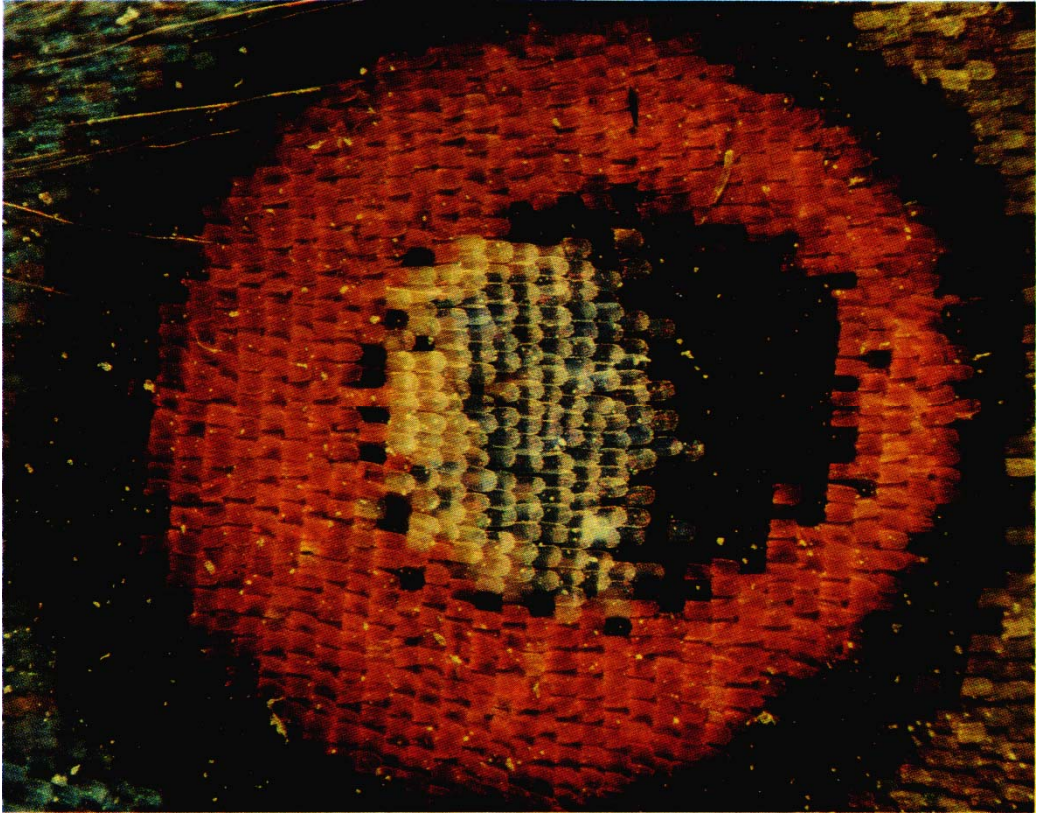
number of characteristics which are not found in other families. The running head titles of this book refer to these families. Within each family certain species are closely related and share a common ancestor; such species are included in a genus, the name of which is written with a capital letter. The genus *Tarucus* (pp 60-61) provides a good example; each of the three members of the genus found in Oman has its own specific name (*balkanicus*, *rosaceus* and *theophrastus*). In some cases there is significant geographical variation within what is clearly the same species, in which case a third, or subspecific, name may be added. Thus the Dhofar population of genus *Stonehamia* (p 42) is more closely related to the African species *varanes* than to the other three of four species belonging to the genus, but it is sufficiently distinct to deserve its own subspecific name, *bertrami*. The correct scientific reference to this butterfly thus becomes *Stonehamia varanes bertrami* (Riley, 1931). The name and date denote that the original description was done by Captain N D Riley in 1931. In this book subspecific names will be largely ignored in the main text, but the full names with authors are given on pages 78-79. The scientific system of nomenclature may seem somewhat cumbersome but it allows a degree of precision in communication which cannot be obtained by vernacular names as they vary from country to country.

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Above: Distribution area of *Papilio demoleus* (red), *Papilio demodocus* (blue) and *Hipparchia parisatis* (grey)
Below: Distribution area of *Elphinstonia charltonia* (red), *Colotis phisadia* (grey) and *Spialia colotes* (blue)





Close-up of the scales on *Precis orithya*

Butterfly Geography

There are just over seventy species of butterflies in Oman, and while this is rather more than in the United Kingdom, it is not much when considering that there are more than 15,000 species in the whole world. Some of the 'best' butterfly spots have more than 1,000 species flying in an area the size of Oman so it is worthwhile briefly examining why Oman should have relatively so few. Two main factors are responsible: *firstly* the geographical area from which the fauna was drawn, and *secondly* the ecological conditions which determine how many of them can survive today. In this section the first of these

factors will be dealt with in the broadest of terms.

Oman is situated at a geographical cross-roads between three distinct zoogeographical regions, the Ethiopian (Afro-Tropical) covering Africa, the Oriental covering tropical Asia and the Palearctic covering the temperate zones in Europe and the Middle East. In addition parts of the Omani fauna are drawn from a group of eremic species which are specially adapted to the subdesert zones bordering the Sahara, Arabian, Indian and Central Asian deserts. Examples of all four components of the fauna are shown in the two maps on the facing page.



Hibra Oasis near Rostaq, an excellent collecting locality

Papilio demoleus is the most typical example of an Oriental butterfly which has managed to penetrate Oman, but it is one of few; generally speaking the Oriental element is not of great importance. The close relative *Papilio demodocus* is an equally typical example of a common and widespread Ethiopian butterfly which penetrates Oman, though it reaches no further than Dhofar. Several other species share this type of distribution pattern and some of these manage to penetrate the Indian subcontinent as well. However, the Ethiopian element in the Omani fauna is not restricted to species which are widespread and common all over Africa. *Spialia colotes* is limited to Southern Africa, Eastern Africa and Southwestern Arabia. *Colotis phisadia* illustrates another type of pattern, where an Ethiopian species has managed to penetrate as far as India, but not to Southern Africa. *Colotis*

halimede (not shown on map) has a somewhat similar distribution pattern, but does not penetrate India. Some species not shown on the map have even more limited distributions; *Charaxes hansali* and *Spialia mangana* are both found only in the driest parts of East Africa and in Arabia. There are even some butterflies of obvious Ethiopian origin which are restricted to Arabia, but none of these have yet been recorded from Oman. The eremic butterflies are mainly found on the fringes of the Sahara, in the high Saharan mountains, in parts of the Middle East and Arabia to Northwestern India and Afghanistan to Turkestan: *Elphinstonia charlonia*, *Pontia glauconome*, the two *Apharitis*-species and *Tarucus rosaceus* are typical examples. The group is derived from both Ethiopian and Palearctic

stock but is now highly specialised and except for migrants its members are almost the only resident species in the deserts. Finally there are the Palaearctic species. At some stage in geological history, probably during the ice ages, a number of Palaearctic species managed to penetrate to East Africa via the high mountains of the Yemen. Most of the species probably became extinct as climates changed, but a few still survive. One such species, *Melitaea abyssinica*, extends from the highlands of Ethiopia via Yemen and the Asir to Dhofar. Northern Oman has been in much more recent contact with the Palaearctic fauna as evidenced by the presence of *Artogeia krueperi* and *Hipparchia parisatis* in the mountains of the northern provinces and by the presence of *Pseudophilotes vicrama* in Musandam.

Obviously the Oman butterfly fauna is complex and has been drawn from a rich reservoir, as climatic change established, broke off and re-established contact with neighbouring areas. The relative paucity of the fauna must be explained by the rather unfavourable current conditions as far as butterfly life is concerned; only the most hardy species can survive the arid climate.

Habitat

All butterflies require a special set of preconditions before they are able and willing to live in a given locality. This is why no butterflies live everywhere and this is why some are almost incredibly localised. The necessary conditions are the presence of a suitable food plant for the caterpillars and climatic conditions which will allow the species to survive on a permanent basis, although the ability

Wadi Halhal in the Jabal Akhdar, typical biotope for many species



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The egg of *Danaus chrysippus* laid on a flower of *Calotropis procera*

to migrate has allowed some butterflies to evade the latter. The two preconditions are interrelated, since plants are also subject to climatic pressures, but there are many plants which have a much wider distribution than the butterflies feeding upon them. Most caterpillars are very fastidious eaters, being able to survive only on one or on a narrow range of food plants. There are differences from group to group. All the Omani Satyridae feed on grasses; the bulk of the Pieridae feed on Capparidaceae or on Cruciferae; most of the Lycaenidae feed on Leguminosae though for instance *Myrina silenus* is only found on figs. Many butterflies found in neighbouring countries are undoubtedly absent from Oman simply because no suitable food plants are available. In addition to influencing the availability of plants, climatic conditions work directly on the butterflies. Many of the tropical species cannot survive frost or even temperatures of less than 10°C and hence they cannot survive in the high mountains of Northern Oman. Conversely some of the Palaearctic species cannot survive the heat of the plains and need coolness during winter.

Rainfall patterns play a role as well; some tropical species have broods throughout the year and those which feed on herbs cannot survive the extreme droughts of Northern Oman. It is no accident that most of the truly Ethiopian species in this area feed on trees or bushes rather than herbs or have adapted to oasis conditions such as *Chilades parrhasius* and *Hypolimnas misippus*. Nor is it accidental that the Palaearctic species such as *Artogeia krueperi* and *Pseudophilotes vicrama* are only found high in the mountains of Musandam or Northern Oman. On the other hand a Palaearctic species such as *Papilio machaon* has adapted to oasis conditions because they happen to contain suitable food plants. *Ypthima bolanica* appears to be strictly limited to rocky wadis at middle heights on the eastern slopes of the Jabal Akhdar and Jabal Aswad, places which to the human observer seem to hold little attraction. The mountains of Dhofar are more humid than the rest of Oman because of the Kharif season mists; many of the Ethiopian species which are limited to Dhofar would almost certainly have



Half grown larva of *Danaus chrysippus* on *Calotropis procera* in Musandam

managed to penetrate to Northern Oman if it had been less dry.

An important proportion of all Omani butterflies are more or less migratory; the migrations are not regular and directional as is the case in birds. Rather it seems to be a mechanism for ensuring that some specimens will always be present in any location suitable for breeding. However, sometimes populations build up spectacularly and the migrations may reach large dimensions. It is noticeable that the proportion of migratory species is high in a country like Oman where climatic conditions are very difficult for butterflies. Details about which species are migratory will be found in the main text.

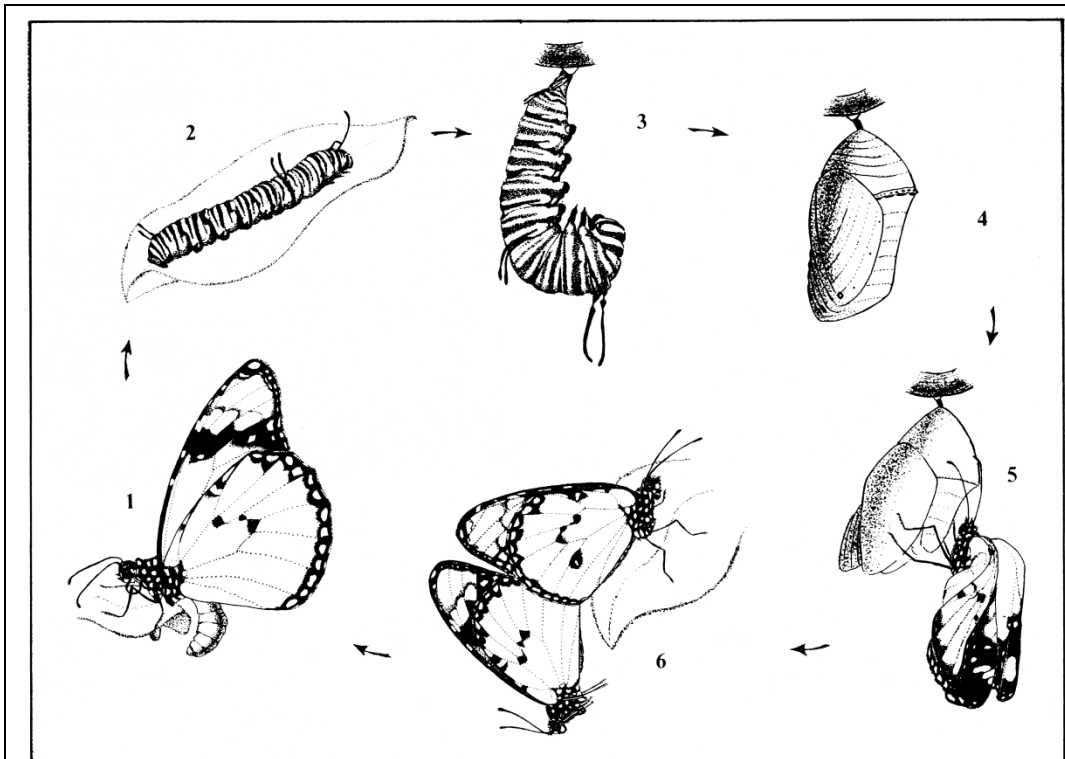
Biology

The general principles of the butterfly life-cycle are described and illustrated in the box on page 14. This section will therefore examine some of the variations on the main theme.

After having mated with the male, the female butterfly spends the remainder of

her life laying eggs, usually 100 to 300 over a period of a month or more. Some lay eggs in clusters (as illustrated on page 37 for *Anaphaeis aurota*) but more often they are laid singly, often only a single egg on each food plant. Female butterflies take considerable care only to lay eggs on the correct food plant and only when they are satisfied that the food plant has developed or will develop fresh leaves. The swallowtail, *Papilio demoleus*, may be seen investigating an orange or lime tree with great diligence and each time an egg is deposited on some particularly succulent young shoot. Although *demoleus* lays its eggs singly, several eggs are sometimes found on one shoot simply because two or more females have identified the same shoot as being especially good.

The eggs of butterflies vary from species to species. Those of the Papilionidae are spherical and have no distinctive features. The Lycaenidae have eggs which are shaped like small buttons and when closely examined they reveal an intricate pattern of little ridges. The eggs of the Pieridae are often bottle shaped with a number of vertical keels and grooves.

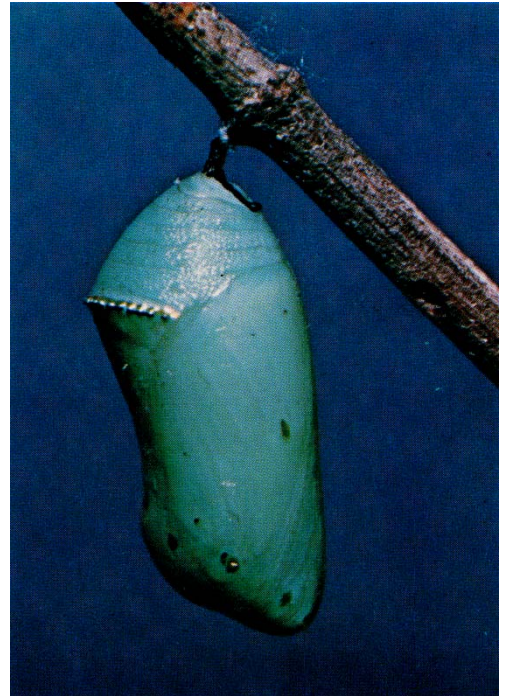


The life cycle of a butterfly

1. The life cycle of a butterfly starts when the female lays an *egg* on a suitable food plant. Within five to seven days the egg hatches and a tiny *larva* (caterpillar) emerges. In many species the first meal of the larva is its own egg shell and some will die if they are deprived of this.
2. The larva spends most of its time eating large quantities of fresh leaves and it grows rapidly. As the skin does not grow it finally splits behind the head, in effect allowing a larger larva to crawl out of the old skin. This happens five or six times till the larva is fully grown, normally within three to four weeks. However, some larvae aestivate or hibernate and then the process takes longer.
3. When the larva is fully grown it wanders off to find a suitable place in which to turn into *pupa*. Here it spins a silken pad; the Papilionidae, Pieridae and Lycaenidae spin a silken girdle as well. After a few days the larval skin splits for the last time and a pupa emerges; when the pupa is firmly attached to the silken pad with the help of some hooks at its end, the crumpled larval skin is discarded.
4. When carefully examined the *pupa* (or chrysalis) proves to have all the details of the adult butterfly outlined on its hard skin, all except the diminutive wings in natural size. Inside, the muscles and fat deposits of the larva are gradually transformed into a butterfly. A few days before the butterfly is due to emerge the pigments will start to show through the skin and immediately before it emerges the whole colour pattern is clear (p 15).
5. Finally, the pupal skin splits, the *butterfly* crawls out, pumps up its wings to natural size, dries them and flies off to find a mate so the whole cycle can be restarted once the female has been fertilised by the male as shown in 6.

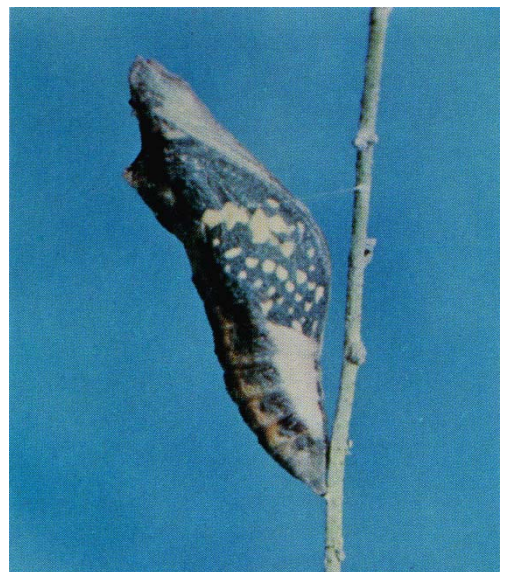
The form and colour of a larva vary even more than that of an egg and the differences are not easily generalised. For instance, there is no single way in which it is possible to distinguish the larva of a butterfly from that of a moth. The only certain thing is that furry caterpillars, with hairs that can be detached are moths rather than butterflies. Some of the variety in form and colour is shown in this book. Larval habits also differ. Some live exposed on the food plant all day long (Papilionidae, Danaidae and most Nymphalidae); some hide among the roots of the food plant during the day only venturing forth to eat during the night (Satyridae and a few Lycaenidae); some hide inside a small tent which they have constructed by spinning together one or more leaves of the food plant (*Vanessa cardui*, *Coeliades anchises* and most of the Hesperidae). The latter will construct a new tent every time they have eaten all the suitable food close at hand. Some larvae among the butterflies which lay eggs in clutches are gregarious, at least until they are halfgrown. Thus, in the genus *Colotis* it is quite common to see twenty or more larvae sitting side by side and eating so fast that the leaf literally vanishes before ones eyes.

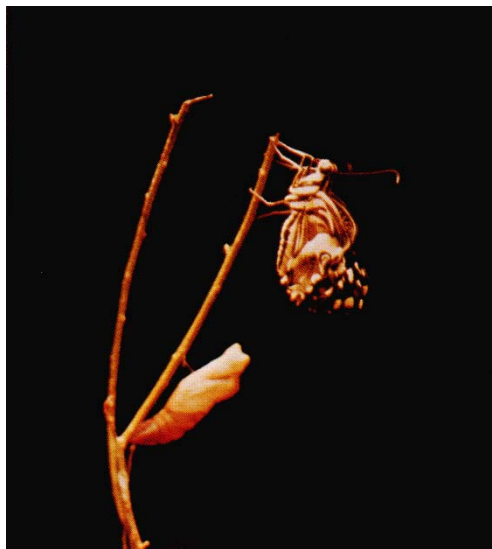
The pupae show less variation than the larvae though comparison between the pupa of *Papilio demodocus* and *Danaus chrysippus* on this page and that of *Euchloe belemia* on page 25 indicates the range of variation. Since the pupa cannot move it is usually very well camouflaged either on the food plant or on twigs and rocks nearby. A few (chiefly among the Hesperidae) pupate inside a rolled up leaf; others may pupate among the roots of the food plant or under bark (chiefly certain Lycaenidae).



Above: The pupa of *Danaus chrysippus*; some specimens are beige

Below: The pupa of *Papilio demodocus* just before hatching; the colour pattern of the adult butterfly is clearly visible





Above: A specimen of *Papilio demodocus* which has just emerged

Below: The larva of *Papilio machaon* photographed at Hofuf in Saudi Arabia



The living butterfly

It is a popular myth that butterflies only live for a day, so popular that it is even commemorated in song. There are certainly individual butterflies which are unlucky enough to fall prey to their enemies during the first day of their lives, but butterflies may live for a long time, often for a month or more, and the cause of death is rarely old age. The predators of butterflies see to that.

When the newly hatched butterfly sets out, its main purpose in life is reproduction and a secondary purpose is dispersal. Its powers of flight are a help to both. The colour patterns of butterflies are often developed as recognition mechanisms for the sexes. Experiments have shown that in some cases male butterflies will be more interested in exaggerated models of the female than in the real thing. Once visual contact has been established, the male and the female will often go through a complex ritual which is aimed at establishing that they really belong to the same species. One false step by either of the sexes and the courtship may well be broken off or will need to be resumed from step one. The courtship procedures involve other than visual and behavioural stimuli; smell enters into the picture as well. Males of many species have scent scales which play a role in the courtship. *Hipparchia parisatis* and *Azanus ubaldus* have clearly defined patches of such scales on the forewings, *Danaus chrysippus* has intricate hair-pencils inside the body which are extended when the females are wooed. It is important that reproductive potential is not wasted on sterile pairings between species of different kinds.

Most butterflies will take some sort of



Close-up of *Papilio demodocus* from Dhofar

nourishment during their adult lives, though the amount and type varies from species to species: Nearly all will come to flowers, with *Lantana*, *Heliotropium*, thistles and *Maerua* as great favourites. A few species show little or no interest in flowers; the two *Charaxes*, for instance, never do so. Many butterflies will come to damp patches near springs or on river banks. The Pieridae and some Lycaenidae are especially fond of this but many other species will do so from time to time (p 39). I had never seen *Danaus chrysippus* water until it happened in the Rostaq oasis. Some butterflies are attracted to sweet rotting materials such as fermenting fruit or the sap oozing out of an injured tree. This is especially true of the *Charaxes* and other Nymphalidae. On occasion large numbers congregate and they may become distinctly intoxicated. A few species are attracted to carrion; the male *Charaxes* and the species

of *Azanus* are most partial to this type of meal.

As previously mentioned few butterflies can expect to die from old age. The most important causes of death are accident and predation. Accident is usually related to weather, predation has almost infinite variations. Eggs are eagerly hunted by ants and by small birds for food; small parasitic wasps search out the eggs as hosts for their own larvae (p 18). The larvae are targets for certain wasps which inject an anaesthetic and haul them off to their finely constructed mud nests to act as stored food for their offspring. Another group of wasps lay their eggs directly in the butterfly larvae; it is quite common when breeding butterflies to find that instead of turning into a pupa the larva is killed when dozens of wasp larvae suddenly emerge through the skin and start spinning their little silken cocoons.



Above: Eggs of *Coeliades anchises* which show the exit holes from parasitic wasps.

Below: A crab spider which has caught a specimen of *Zizeeria knysna*



Sometimes grown wasps and flies emerge directly from a fully formed pupa. Birds, mantises, spiders and other animals also eat butterfly larvae. The adults are no safer; mantises, birds, lizards, dragonflies, robber-flies are only part of the list of enemies. Spiders such as the crab spider shown on this page specialise in catching adult butterflies. They sit well camouflaged in the flowers most attractive to butterflies and pounce the moment a butterfly arrives; yellow crab spiders are found in yellow flowers, white in white and so on. Web building spiders, too, catch many flying butterflies.

As always in nature a degree of stability is eventually arrived at. Species which have managed to balance their ecological requirements, their relationship to other insects or butterflies competing for food and their ability to survive predation are now permanent residents. Those who have not are now extinct or occasional immigrants.

This brief introduction has only been able to scratch the surface of the fascinating complexity and diversity of butterfly life. Few people notice butterflies and most would be surprised to learn that more than seventy species are found in the Sultanate. It is a pity that this should be so. Not only are butterflies beautiful, but their behaviour and life cycles are varied and interesting. Anyone who starts investigating the Omani butterflies will be rewarded by an introduction to a fascinating miniature world and will gain valuable insight into the ecological conditions of the country as a whole. The study of natural history in Oman is only beginning; the greater the number of participants, the faster progress will be; but the pleasures of participation bear their own reward.

Papilio machaon
Swallowtail



Papilio demoleus
Lime Butterfly

Papilio demodocus
African Lime Butterfly

20 Papilionidae

Three species of Swallowtail butterflies (Papilionidae) are known from Oman and are shown on the preceding page. They are among the largest and most beautiful butterflies in the country. *Papilio machaon* may immediately be distinguished from the other two by the presence of prominent tails on the hindwings. This butterfly has a vast global distribution in parts of North America, most of Europe, the Middle East and temperate Asia. Isolated colonies exist in the mountains of Yemen and in the Hofuf Oasis in Eastern Saudi Arabia. The form flying in Oman is more closely related to the Iranian than to the two Arabian forms. It has been recorded from Muscat and from the oases around Rostaq. *P. machaon* almost certainly does not occur in Dhofar but will probably be found in Musandam. In Rostaq the preferred food plant is *Ammi majus* (Umbelliferae) (Arabic *nayniya*), while in the neighbouring Hibra Oasis it feeds on *Haplophyllum tuberculatum* (Rutaceae).

Cultivated fennel (*Foeniculum*) is usually a popular food plant. In captivity the larvae will feed happily on fresh *Citrus*, but the voluntary choice of this plant in the wild seems to be rare indeed.

The two other species are of tropical origin and are closely related; some authorities consider them to be subspecies of one butterfly. *P. demoleus* is common in most of Asia, as well as in Southern Iran, Iraq and parts of Arabia (see map on page 8). *P. demodocus* is equally common in most of tropical Africa and in Southwestern Arabia, as far north as Jeddah. In Oman *demoleus* is a common oasis insect in the Eastern part and in Musandam; *demodocus* is only found in Dhofar. The two species have never been caught in the same locality. Although originally forest butterflies, both species now feed mainly on cultivated *Citrus*. It is doubtful whether *demoleus* could persist in Northern Oman in the absence of cultivated *Citrus* and it may even originally have been imported with

Ammi majus, food plant of *Papilio machaon*



Papilio demodocus at water, a common sight on hot days in Dhofar

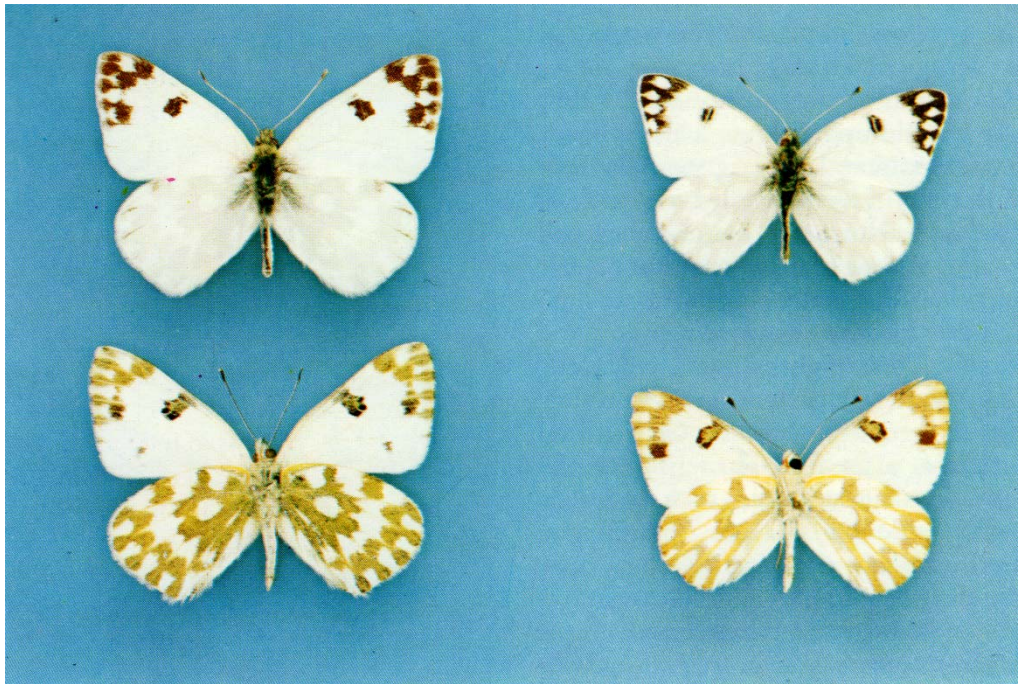


commercial plants. The larvae can do very real damage to young trees. Although the two species are similar they may be told apart through the broader central band and the larger orange spot in the anal angle of the hindwings of *demoleus*. In Northern Oman *machaon* and *demoleus* fly together in oases and their behaviour is rather similar though *machaon* usually stays closer to the ground. Their flight is rapid and somewhat erratic, often broken off when they stop to feed from flowers. Ornamental *Lantana* is a great favourite, but in the Hibra Oasis near Rostaq both were seen feeding side by side on *Psysorrhynchus chaemarapistum* (Arabic *khawfij*, see Mandaville, p. 11).

The young caterpillars of all three species are very similar-brown with a white saddle. This makes them prominent on the green foliage; but in fact their very prominence is camouflage. Viewed from above they exactly resemble bird droppings. The larva of the two tropical species eventually become a deep green. The larva of *machaon* when full grown is very different with bold black stripes ringing the light green body and with red spots and yellow markings (p 16). All larvae of the Papilionidae share a unique defensive mechanism. When roughly handled or otherwise disturbed, they can extend from the neck a forked, fleshy protuberance which gives off a pungently smelling fluid which is a concentrate from the essential oils of the food plants. Little is known about which enemies are actually deterred by this. Eggs and larvae of all three species are easy to find and they are the easiest species to breed for beginners. Their only requirement is a constant supply of fresh food.



Full grown larva of *Papilio demodocus* from Dhofar. On the Salalah plain it was feeding on *Haplophyllum tuberculatum* although it normally feeds on *Citrus*. The larva of *demoleus* is deeper green with less brown



Pontia daphidice

Bath White

The Pieridae, popularly known as the Whites and Yellows, is a large family most closely related to the Swallowtails. Members of the family are among the most prominent butterflies of sub-desert regions and are well represented also in Oman. The *Colotis* group of species is particularly characteristic of the dry tropics and their larvae all feed on plants which are typical of this zone, a classic example of co-evolution between plants and insects. The species figured above are the two Omani representatives of the genus *Pontia*. They are very similar, but *glauconome* normally has much lighter markings on the underside of the hindwings and has the veins underlined in yellow. During the hottest seasons very lightly marked *daphidice* may also be met

Pontia glauconome

Desert White

with, but the veins of this species are never underlined with yellow. *P. glauconome* is a butterfly of the desert and sub-desert, being found in the mountains of the Sahara, in Egypt, the Sinai, the Dead Sea area, the Jordanian desert, Iraq, Arabia, parts of Iran and in Afghanistan and Baluchistan. It is among the little group of butterflies which is common and widespread throughout Oman, even in the high mountains of the North and in the deserts. Their flight is fast and direct, usually close to the ground, but if there are flowers they will pause to feed. Active migration has not been noted, but casual wandering may still lead to considerable displacement. The larval food plants are mostly Resedaceae such as *Reseda* and especially

Ochradenus, but several species of the Cruciferae have also been recorded. In order to survive periods of extreme drought, the pupa of *glauconome* is able to spend several years waiting for the right climatic conditions which will permit a new brood to develop. Their mechanism for doing this must be extremely finely tuned. *P. daplidice* is essentially a butterfly of the dry temperate zone rather than the deserts. It is common in the Mediterranean area, in the Middle East and in the mountainous parts of Afghanistan and Northwestern India. There are isolated populations in Ethiopia and in the high mountains of Yemen, but otherwise it is so far unknown from Arabia, except for a single female which I caught in Wadi Halhal near Rostaq in March, 1979. *P. daplidice* is a strong migrant which regularly reaches Northern Europe and

the Oman specimen may have been a vagrant from Iran where the species is common. Arabia is probably too hot and dry to allow for permanent colonies of *daplidice* to exist. But it should be possible for large, temporary colonies to develop if migrant females reach areas with a plentiful supply of the food plants, species of Resedaceae. It is interesting to note the different survival strategies adopted by these closely related species which specialise in the dry zones. *P. glauconome* has specialised in mechanisms which allows it to survive even the toughest climatic conditions for several years, while *daplidice* has developed migratory tendencies which ensure that populations disperse so that some individuals reach suitable breeding areas even if the parent stock were to be totally wiped out by adverse weather.

Ochradenus baccatus, Jazirat al Ghanam, Musandam (Arabic Hibab)





Artogeia krueperi Krueper's Small White

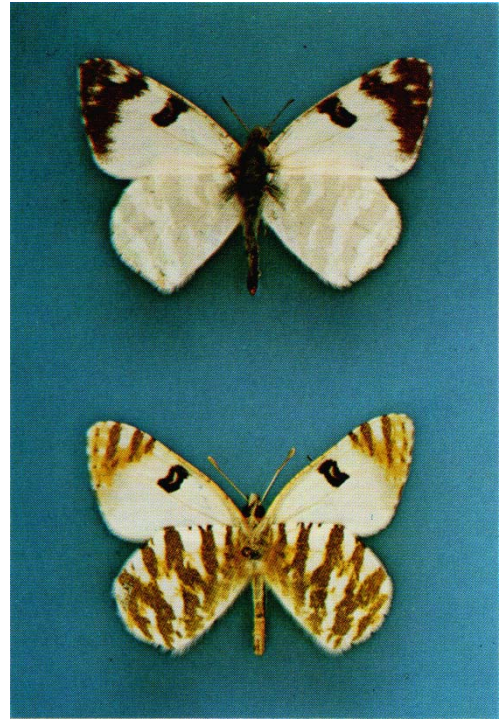
The underside of the hindwings of this butterfly carries a mottled pattern which is totally different from that of any other Omani butterfly. *A. krueperi* is generally a rare and excessively localised butterfly found in hot and dry localities from Greece and Turkey, via Iraq and Iran to Baluchistan and Afghanistan. The totally unexpected capture by P Granville White of a single specimen of *krueperi* at Birkat Sharaf, 2,100 m, in the Jabal Akhdar was a prime surprise of the 1975 Oman Flora and Fauna Survey. The specimen does not differ materially from the small series available from Iran and Afghanistan, but the capture of a larger number of specimens will be necessary before the status of the Oman form is finally determined. The flight of *Artogeia* species is generally weaker and slower than that of

the other Omani Pieridae and they are normally easy to catch. Little is known of the early stages of this butterfly, but species of *Eruca* and *Diplotaxis* were found in the area and are likely food plants. Normally *krueperi* flies in two annual broods, the second brood being more lightly marked than the first. The right hand column in the plate depicts a close relative of *krueperi*, *Artogeia rapae*. This is an exceedingly common butterfly in most of the Middle East and Iran; migrant specimens have established at least temporary colonies near Riyadh. It should reach Oman from time to time and though it probably could not establish permanent populations it might be able to develop large temporary colonies in agricultural areas. It can be a severe pest

on cabbages, but also feeds on cruciferous weeds and *Capparis*- species.

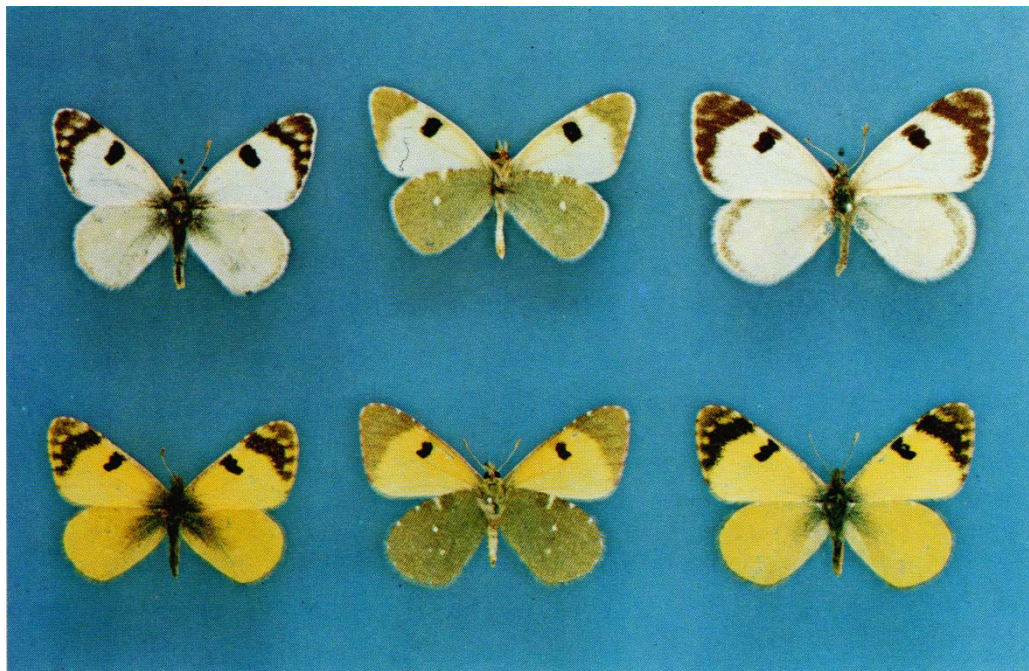
Euchloe belemia Green Striped White

This neat little white butterfly can be recognised from all other Omani members of the family by the regular green bands on the underside of the hindwings. A closely related species, *Euchloe falloui*, has been found in Saudi Arabia as far south as Jeddah and Riyadh but it probably does not reach any part of Oman. *E. belemia* normally has the black spot on the underside of the forewings centred with a white streak which is missing in *falloui*. *E. belemia* is widely distributed in Spain and North Africa, from where it extends via Libya, Egypt, Jordan, Lebanon and Syria to Iraq and then along the coast of Eastern Saudi Arabia and Iran to Baluchistan. An isolated colony is found in Ethiopia which is puzzling as the species is absent from both Upper Egypt and Western Arabia. In Arabia and in Baluchistan *belemia* is very local. The only Omani specimen is a female which I collected at 1,100 m in the mountains of Musandam in early March, 1979 during the Oman Flora and Fauna Survey. The species is confined to dry Mediterranean types of vegetation and is unlikely to be found elsewhere in Oman, though it might survive on the Batina coast. Through most of the range of *belemia* there is a main brood in early spring, usually followed by a partial second brood. The food plants are various annuals of the Crucifera; *Sinapis*, *Brassica* and *Sisymbrium* have been recorded from Saudi Arabia.



Pupa of *E. belemia* photographed in Saudi Arabia





Elphinstonia charlonia

Desert Black Tip

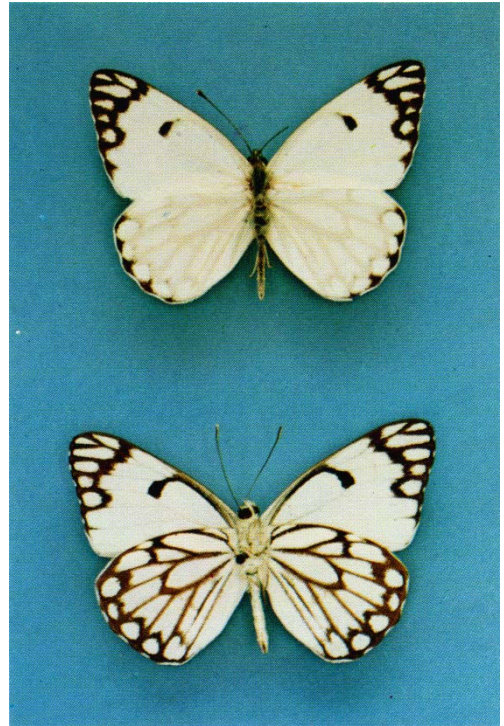
The Omani form of *charlonia* is white with black markings on the wing tips of the forewings and sometimes with a broad blackish border to the hindwings. The almost monotone greenish hindwing underside is very characteristic. *E. charlonia* is a butterfly which is especially adapted to arid conditions and it flies from North Africa and the Sahara mountains via Egypt to Arabia, the Middle East, Southern Iran and Baluchistan. There are two distinct subspecies in Arabia. The yellow one (ssp. *charlonia*) is found from North Africa to Arabia where it flies as far south as Riyadh. The white one (ssp. *amseli*) is more closely related to Iranian populations. The yellow and white subspecies probably do not meet in Arabia, but they come into contact in Iraq. The species appears to be

uncommon in Oman and there are only two records. Lt.-Col. Jayakar caught a series labelled Muscat at the turn of the century and K M Guichard took a series at Khasab in Musandam in May 1976. Jayakar visited Musandam on several occasions so it is possible that his specimens may not be from Muscat despite the labels. Judging from experience elsewhere, the butterfly is normally local, not very common and has two or three broods during winter and spring. The flight is rapid, but the butterfly often settles on the ground. Larval food plants are various Cruciferae; in Oman the most likely candidates are one or more species of *Diplotaxis* (Arabic *khawshyān*, see Mandaville p 10), while species of *Lonchophora* and *Matthiola* are mentioned in the literature.

Anaphaeis aurota

Caper White

This common butterfly can be recognised through the strongly pointed forewings and the neat black underlining of the veins of the underside of the hindwings. The black markings of the female are more extensive and less precise than in the male and the ground colour is often tinged with cream. *A. aurota* is found throughout tropical Africa, Arabia and the Indian subcontinent. It is migratory and regularly penetrates the Middle East and Egypt. As is the case in most migratory species there is little or no geographical variation. Actual migrations recorded from Arabia have been of modest proportions, but in East Africa several million butterflies may cross a narrow front in a single day. The species is probably a permanent resident in Oman but it is supplemented by immigrants and possibly Omani populations are responsible for populating Saudi Arabia and Iraq through northwards emigration. The flight is swift and erratic, but the butterflies are fond of flowers. Often large numbers may be found swarming around flowering *Maerua* trees (Arabic *sarh*, see Mandaville, p 14). Most of the desert and subdesert whites in genera related to *Anaphaeis* are strictly limited to one or two food plants, but *aurota* is more eclectic and feeds freely on *Capparis*, *Maerua*, *Cadaba*, *Boscia* and related plants. Sometimes the species is so abundant that the caterpillars completely strip trees and bushes; bare twigs may literally be festooned with the pupae of those caterpillars which did not starve to death. The regular occurrence of dwarf specimens is almost certainly linked to this type of overcrowding.



Pupa of *Anapheis aurota* on *Capparis spinosa* in Qatar





Pinacopteryx eripha

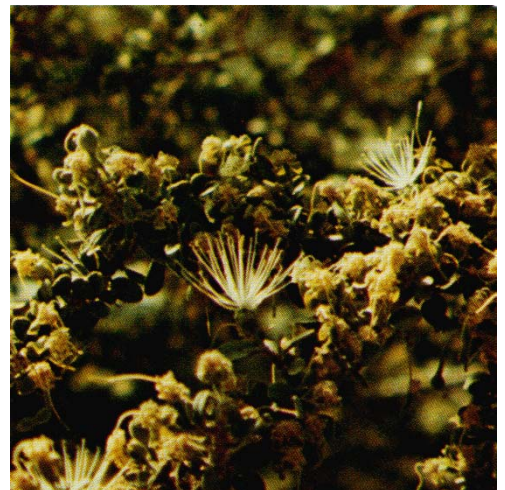
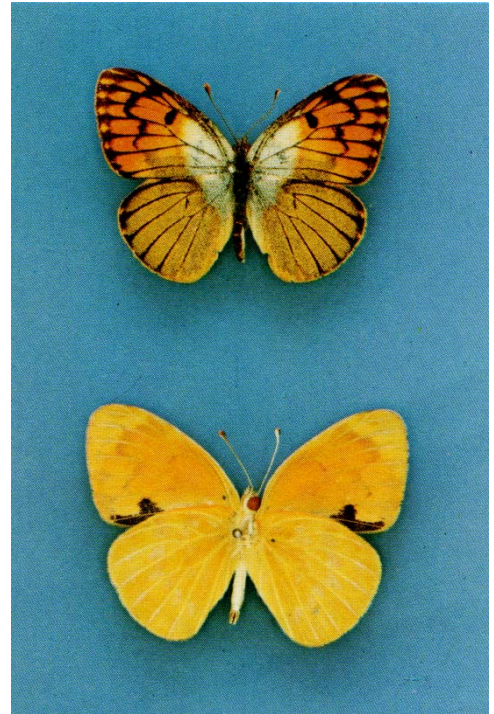
Zebra White

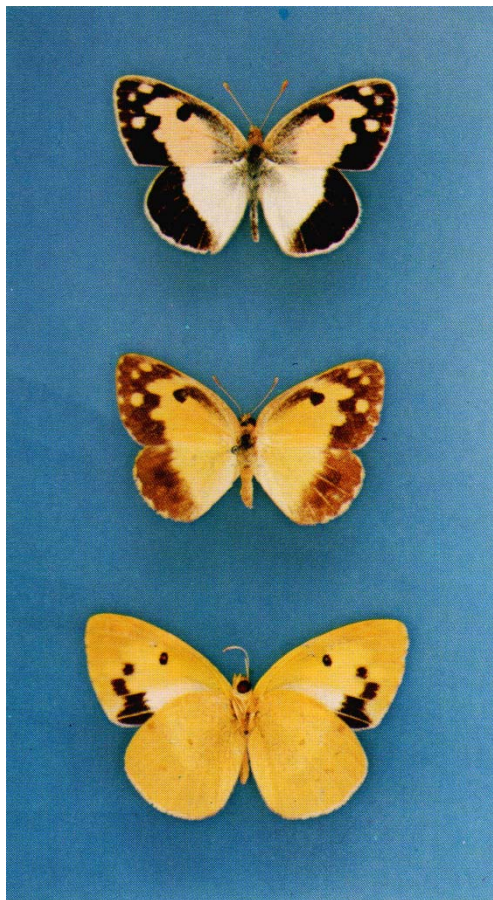
This is an unmistakable butterfly with its bold black and cream pattern which is rather reminiscent of European Satyridae from the genus *Melanargia*. The colloquial name of Zebra White is quite fitting. The species is well distributed in dry Africa, including Madagascar, Southwestern Arabia and Dhofar, but it does not penetrate the extreme dry zone which is frequented by certain species of *Colotis*. Pierids of this group are very sensitive indicators of rainfall and other ecological conditions. *P. eripha* is a somewhat localised butterfly which is rarely common. It was first found in Dhofar in 1943 and was rediscovered by the Oman Flora and Fauna Survey in the same province in 1977. But few specimens were taken. M D Gallagher took a series in the Jabal Qara in June 1979. I found it frequented the same area in October. It is most unlikely to occur in Northern Oman. In Dhofar it appears to be limited to the very hot and dry wadis such as the Wadi Adawnib system, where its food plants *Boscia* and *Cadaba* grow. It flies together with *Colotis halimede* which is limited to similar localities. The species is subject to a considerable amount of sexual, seasonal and geographic variation which has been the cause of some confusion in the correct application of subspecific names. Males may vary in ground colour between white and primrose yellow while females normally are tinged with yellow. Dry season forms are usually smaller than wet season forms and often have a strong white streak in the otherwise jet black cell area of the forewing. The underside of the female is often tinged with pink.

Colitis chrysonome

Golden Arab

This is the first of the eleven Omani species of the Genus *Colotis* which is such a characteristic component of the butterfly fauna of the dry tropics of Africa and Arabia, -and to a lesser extent of the Indian subcontinent. In Oman five of the eleven species are limited to Dhofar, while the remaining six also occur in Northern Oman. *C. chrysonome* is one of the four species whose ground colour is salmon, but it may be told apart from the others by a more golden hue and by the white base of the upperside of the forewings. The species is widespread in the dry zone of tropical Africa from Mauretania to Kenya, as well as in Arabia, where it is known from Jeddah to Aden, in Dhofar and from near Riyadh. It inhabits an even drier habitat than *Colotis danae*, *eucharis* and *antevippe* though they are often found together as well. It is one of the few true tropical butterflies to -be found in the Dead Sea area of Jordan. *C. chrysonome* is reasonably common in Dhofar, but so far there are no records from Northern Oman, nor for that matter from Asia. The butterfly is limited to areas where its food plant, *Maerua crassifolia* grows (Arabic *sarh*, see Mandaville, p 14 and this page). Here it flies rapidly, close to the ground, occasionally settling on flowers or on the bare earth, often underneath thorny shrubs of the type which can tear a butterfly net to shreds. There is little reason why it should not eventually be captured in Northern Oman since the ecological conditions appear suitable, the food plant is present and though not strongly migratory *chrysonome* shows fair powers of dispersal.





Colotis phisada
Blue Spotted Arab

These two small *Colotis* are pretty and vivacious butterflies with a wide distribution in the dry tropics, though their respective distribution areas are not identical. *C. calais* is found in most of peninsular India and all of dry Africa from the Cape to the Sahel as well as in Arabia. *C. phisadia* overlaps with *calais* for much of its range, but is restricted to the driest parts of Northern India, does not extend



Colotis calais
Small Salmon Arab

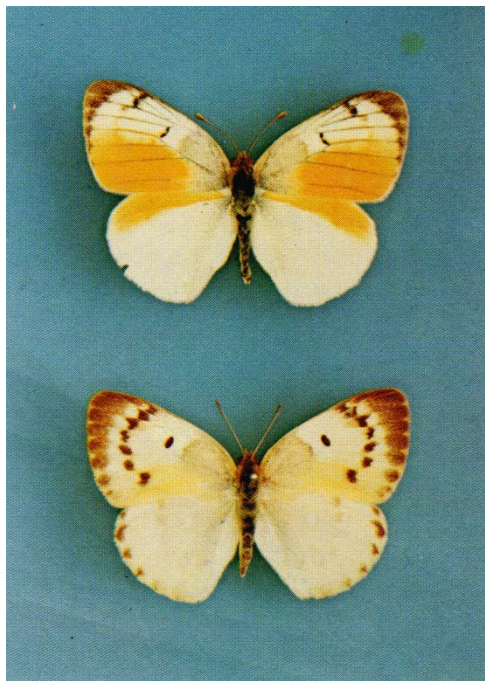
south of Kenya in Africa, while extending as far north as the Jordan Valley via Egypt and Arabia. Thus, although they share the same food plant and are often found flying together, there is little doubt that *phisadia* is better adapted to extremely arid environments than is *calais*. Available records of the food plants of the two species nearly all refer to species of *Salvadora* (Salvadoraceae), though for

calais there are scattered records of related plants. In Oman the food plant is *Salvadora persica* (Arabic *rāk* (*arāk*), see Mandaville, p 39). Both species have been recorded from Dhofar and Northern Oman, while the first record from Musandam was a single female captured by M D Gallagher in 1980. It is relatively easy to tell the two species apart; both sexes of *phisadia* have solid black borders to the upperside of the hindwings which in the male and most females is white while it is salmon coloured in *calais*. But the ground colour of female *phisadia* varies considerably from nearly white via yellow to salmon. In Northern Oman *calais* is definitely very much scarcer than *phisadia* while judging from the observations available it would appear that they are equally common in

Dhofar. This may be because the less arid climate of Dhofar is more suitable to *calais*, but there may be seasonal variations in frequency as well. Both species are normally found swarming around clumps of the food plant, sometimes by the hundreds. On the Batina coast between Sib and Sohar the plants grow in virtual sand desert where dunes form around them (see photo at bottom of page). There are almost no other plants and although no other butterfly is seen, there may be vast numbers of *phisadia*. Often geographically isolated specimens of *Salvadora* may contain a vigorous colony of *phisadia*, probably because this species is somewhat migratory. Modest migrations have been observed in the Jordan Valley and at sea off Aden.

Salvadora persica among dunes on the Batina coast. The particular group of plants photographed contained a large colony of *Colotis phisadia*



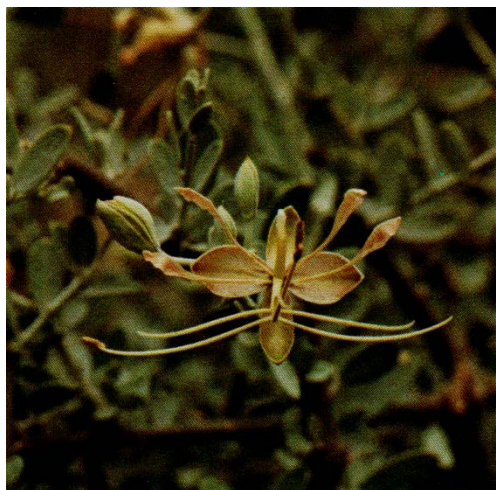


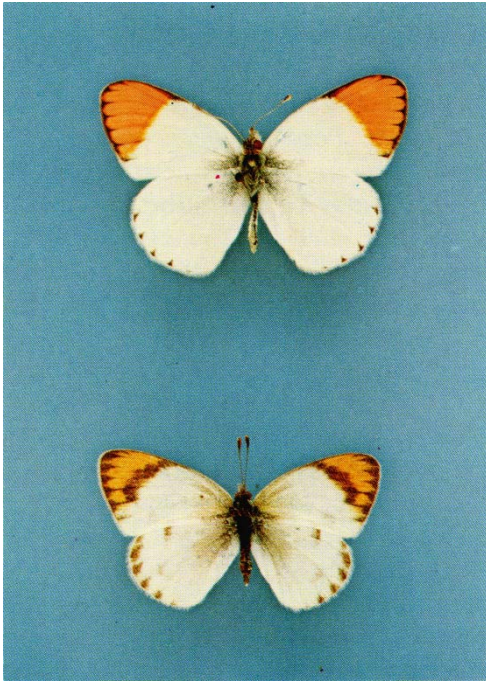
Colotis halimede

Yellow Patch White

In terms of colour pattern this is one of the most unusual of the Omani butterflies with its bold yellow markings on a white ground. A somewhat similar but smaller species, *Colotis pleione*, is known to occur in Aden, but it is unlikely to be found in any part of Oman. The male of *halimede* differs from the female in having the veins of the upperside of the forewings underlined in black, but the differences are smaller than in most of the other species of *Colotis*. Both sexes show some seasonal variation; those flying during the dry season have less well developed black markings than those of the wet. *C. halimede* is found in dry parts of Africa from Senegal to Arabia and as far south as Tanzania, but it does not penetrate the South African region. The butterfly was not known from Oman till P Granville White on the Oman Flora and Fauna Survey expedition to Dhofar captured two males and a female in Wadi Nar and in Wadi Raykhut in 1977. I found it in modest quantities in Wadi Adawnib and in Wadi Sha'ath. It is highly unlikely that *halimede* will be found in Northern Oman. The localities in which it has been found in Dhofar are nearly all in the driest parts of the coastal zone characterised by the presence of *Commiphora* and *Boscia*. Thus, although *halimede* shares with a common species such as *Colotis danae* the choice of *Cadaba* as the larval food plant, it appears to be more ecologically sensitive than the latter. In the Wadi Sha'ath *halimede* was flying with *Colotis eris*, *Pinacopteryx eripha* and *Colotis दौरا*, species which I met in few or no other localities in October 1979.

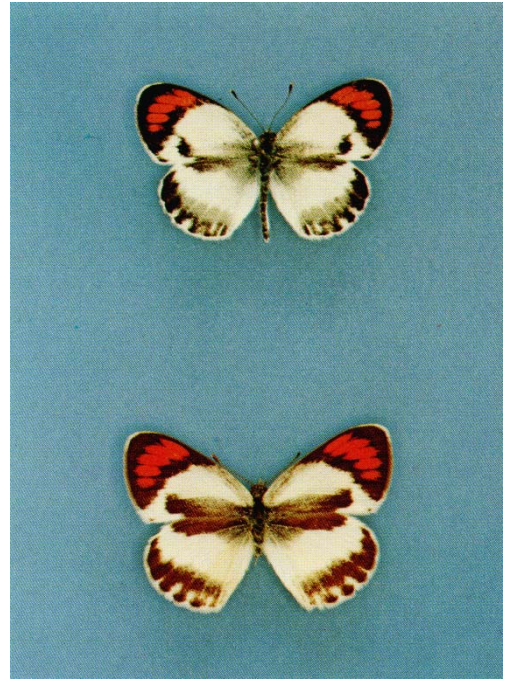
Flowering *Cadaba*, the larval food plant of *C. halimede*.
The adult butterflies feed from the flowers





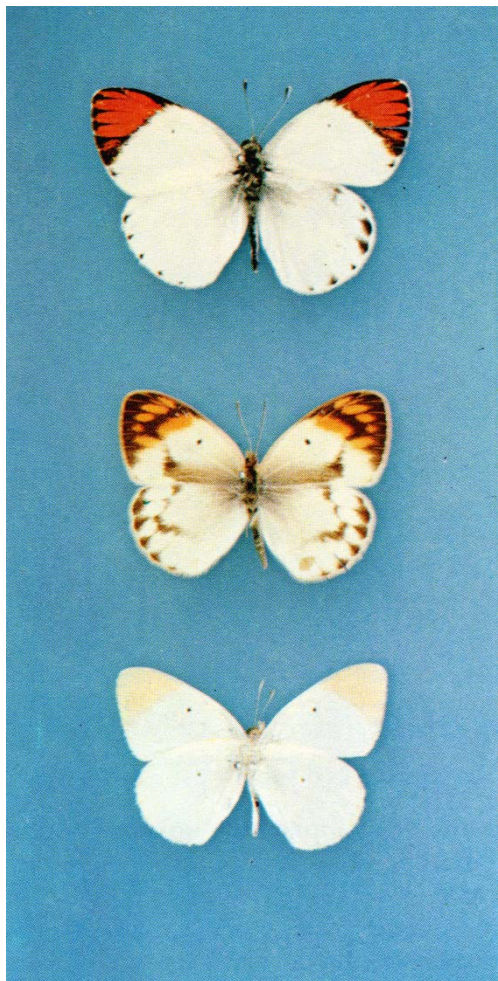
Colotis liagore
Desert Orange Tip

There is a bewildering array of orange tipped *Colotis* species in Africa but fortunately the five Omani species are relatively easy to tell apart. *Colotis liagore* most closely resembles *antevippe*, but it is normally smaller and always lacks the black spot present on the forewings of that species. *C. liagore* is distributed in the driest parts of Africa from Mauretania to Somalia, in Arabia and in Baluchistan. It penetrates more deeply into the Sahara and into Arabia than most species and has been recorded even from Riyadh. In Oman *liagore* has been found frequently in Northern Oman where it is found on rough ground and even occasionally in oases such as Rostaq. Surprisingly there are no records from Musandam or from Dhofar, though it should occur in both places, especially in Dhofar. The food plant was



Colotis दौरا
Black Marked Orange Tip

apparently unknown till A Pittaway found it on *Capparis cartilaginea* (Arabic *mallas*). *Colotis दौरا* may be recognised from other species by the prominent black markings on all four wings. It is a common species through much of Africa and there are records from Southwestern Arabia. However, the first Omani specimens were a small series which I caught in Dhofar (Wadi Shaa'ath and below Sarfait) in October 1979. The food plant of *دौरا* is probably *Cadaba*. All the *Colotis* display considerable seasonal variation, especially in the female. Generally speaking wet season forms are heavily marked with black. Identification of the five known Omani orange tipped species should present no difficulties but it must be borne in mind that one or two additional species might be found.



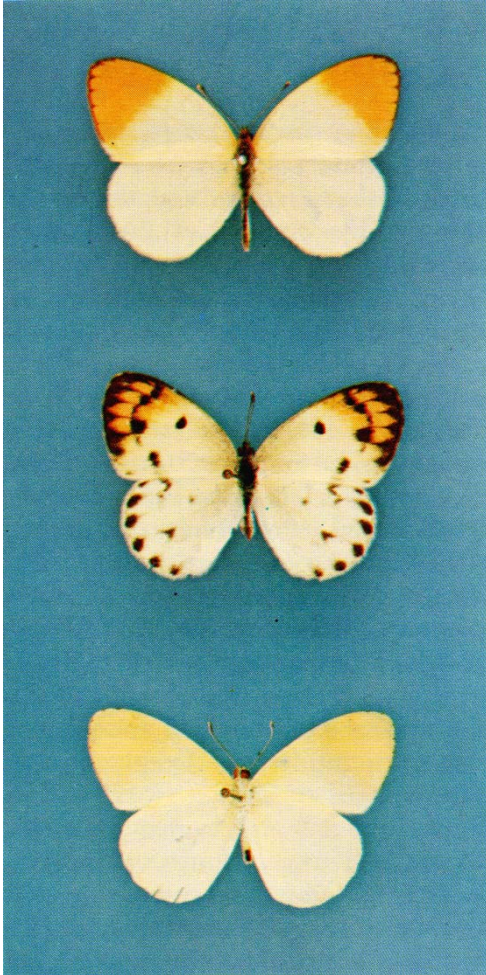
Colotis antevippe

Large Orange Tip

These two pages deal with the remaining three orange or red tipped *Colotis* found in Oman. The largest is *antevippe*, the only Omani species to have males with orange tips and a black spot in the cell of the forewing upperside. It is widely distributed throughout dry tropical Africa in a number of subspecies and is often very common indeed. Although it is one of the butterflies which might have been expected to occur in Arabia, there were no records till P

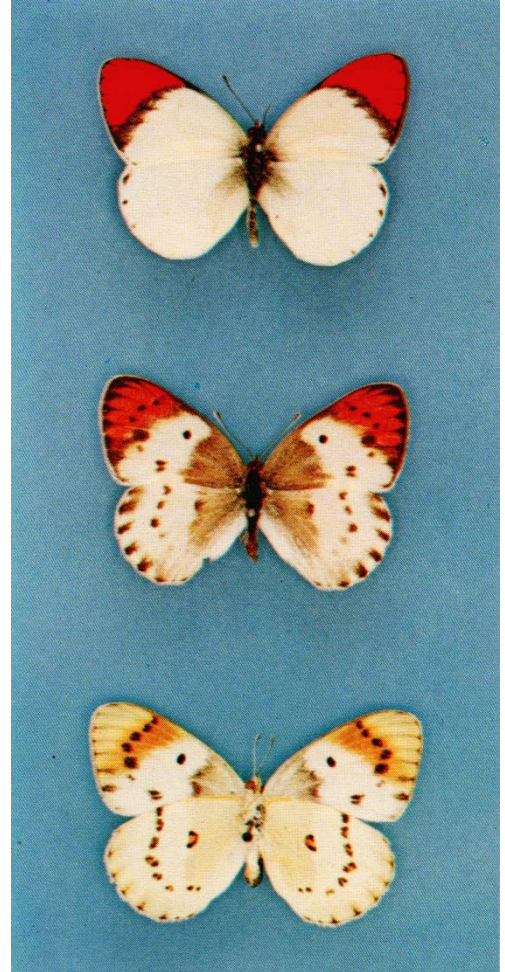
Granville White on the Oman Flora and Fauna Survey expedition caught a male and a female in Dhofar. I collected only two males in 1979 and saw few more. Possibly *antevippe* has been overlooked in Southwestern Arabia so far but it may be one of the few African butterflies, such as *Stonehamia varanes* (p 44), which in Arabia is genuinely limited to Dhofar. The food plants in Africa are various Capparidaceae.. It would be extremely interesting if future collectors could secure a long series of this species. *Colotis eucharis* may be recognised by the delicate pastel yellow ground colour of both sexes. It is found in most of dry Africa, where the populations from Kenya southwards to the Cape are a beautiful bright yellow, in Southwestern Arabia and Oman. In addition it is found in southern parts of peninsular India and in Sri Lanka. In Oman it is quite common in Dhofar and a single female was reported from Northern Oman a few years ago, by J R L Carter, but this remains the only record. The larval food plants appear to be limited to species of *Cadaba* (Capparidaceae) throughout its range.

The last of the three species, *Colotis danae*, may be recognised immediately by the vivid combination of bright white and scarlet, and it surely ranks among the prettiest of all the Omani species. The females, as is usual in the *Colotis*, are more strongly marked with black than the males; occasionally the females may completely lack the scarlet tips of the forewings. In Dhofar *danae* is common and widespread, though a little local. In Northern Oman it has so far been recorded only from the nature reserve at Qurum west of Muscat; it is obviously very local though it is likely to be found in other selected localities. The global distribution of *danae* is similar to



Colotis eucharis
Sulphur Orange Tip

that of *eucharis*, though it does go further north in India, being found in Baluchistan. It shares with *eucharis* the choice of *Cadaba* as larval food plant, but contrary to that species it accepts most of the other Capparidaceae on which the various Omani species of the *Colotis* feed. In nature the *Colotis* are all lively, sunloving butterflies which are fond of coming to lowers if they are available. They frequent



Colotis danae
Scarlet Tip

rough, open terrain where the food plants grow. Most of the species fly close to the ground with a rapid and erratic flight, though they may ascend to feed from trees such as *Maerua*. Of the Omani species only *Colotis eris* has a more direct flight higher above the ground. *C. fausta* also flies higher and ranges wider than the smaller species.



Colotis eris

Banded Gold Tip

This species can be recognised from all other Arabian *Colotis* by the golden violet tinge of the wing tips and through the considerable amount of black of the forewings in both sexes. In fact, the form flying in Arabia has more black than any flying on the African mainland. For this reason they are separated as a distinct subspecies, *contractus*. In Oman it has been found only in Dhofar and it is most unlikely to be found in Northern Oman. The species is found also in Southwestern Arabia and throughout dry tropical Africa, a distribution pattern which is shared with other species such as *Pinacopteryx eripha*, *Euchrysops osiris* and *Sarangesa phidyle*. Considering that *eris* displays little geographical variation in Africa, the presence of a defined subspecies in Arabia is interesting. Despite its wide distribution, *eris* is more local and less numerous than the other species of *Colotis*, and it may be missing from what in principle should be suitable areas. In Dhofar *eris* appears to be limited to localities where *Boscia* grows, that is in the transition zone between the coastal plain and the scarp (Mirbat, Wadi Sha'ath). The flight is fast and direct, resembling that of *Anaphaeis aurota* rather than that of the other *Colotis* which is also fast, but erratic and closer to the ground. The specimens captured were all taken on the flowers of a *Boscia* tree. *Boscia* is the most commonly quoted larval food plant in Africa, although it seems that in South Africa it feeds on species of *Capparis* as well. During a visit to Yemen Arab Republic in May 1980 I captured some females which differ from the normal Arabian form.

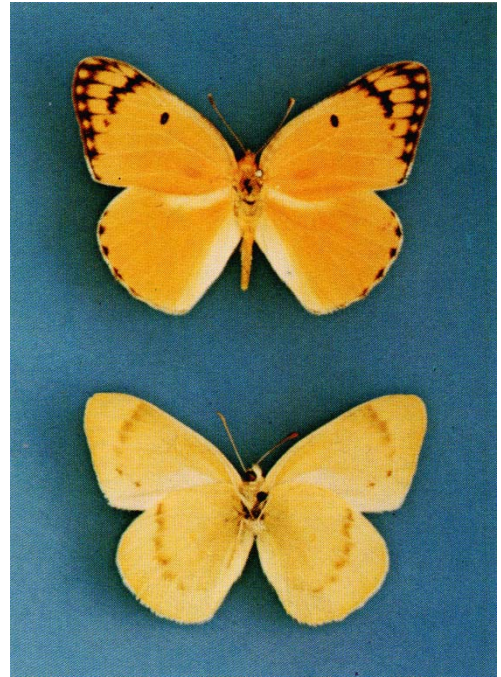
Boscia tree photographed at Wadi Sha'ath in Dhofar



Colitis fausta

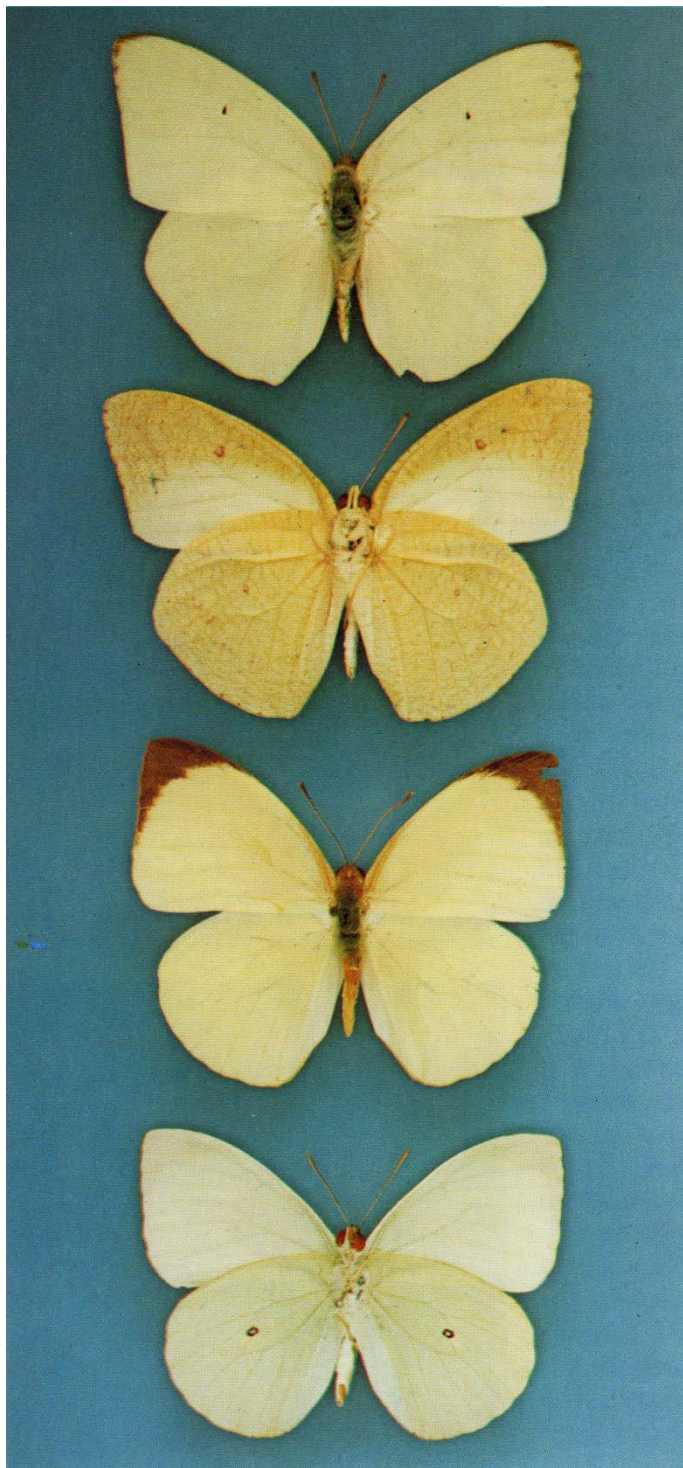
Salmon Arab

Although this butterfly has the same tone of colour as *Colotis phisadia* and *Colotis calais*, they are not that closely related. *C. fausta* may be distinguished by its larger size and the limited black markings. The distribution of *fausta* is different from all other Omani butterflies, since it ranges from Sri Lanka and India, via Iran and Arabia to Lebanon and Southern Turkey. It has been found near Cairo, but there are few records from Somalia or coastal Ethiopia which is curious considering that *fausta* is strongly migratory. It penetrates Lebanon every year in varying numbers, but cannot survive winter there. Equally it is unlikely that it can survive the hot summers of Central Arabia, so there is a real possibility that *fausta* cannot survive on a permanent basis anywhere in this part of the world. It may be an eternal nomad with climatic conditions triggering its migratory impulse. Very little is known of its status in Oman and Southern Arabia and it would be well worthwhile for resident entomologists to keep notes on the species. In all parts of the Sultanate it is normally found in rough mountain wadis where its rapid, dancing flight makes capture difficult. Usually only a few specimens are met with at any given time. The normal food plant in the Middle East is *Capparis spinosa*, the plant from which edible capers are harvested. Places where it has been captured in Oman so far were characterised by the presence of *Capparis mucronifolia* (Arabic *lišāf*, see Mandaville; p 12) so this is likely to be a food plant as well. The larvae are easily found and bred.



Eggs of *Anaphaeis aurota* on *Capparis spinosa*, the food plant also of *Colotis fausta*





Colotis florella
African Emigrant

Nepheronia buqueti
Plain Vagrant

Four males of *Catopsilia florella* at the edge of the pools at Ain Jarsis in Dhofar. Many species will seek out damp patches though some never do so



These two butterflies are not very closely related but they are treated together since they are similar. A constant difference between them is that both sexes of *florella* have a black spot on the upperside of the forewings which is always missing in *buqueti*. The wing shape of *florella* is more angular than in *buqueti*. *Catopsilia florella* is an African butterfly which has managed to penetrate the Canary Islands, the Eastern Mediterranean and the Indian subcontinent; however, it is not a permanent resident in Egypt, Lebanon and Palestine where it could not survive without migrating. There are records from most parts of the Arabian Peninsula including Dhofar and Northern Oman. So far there are no records from Musandam but it is bound to occur there as well. The species displays considerable variation in the extent of black markings on the upperside of the forewings and the females may be either white or deep yellow. Its flight is powerful and often high above the

ground; the butterfly is difficult to catch except when it is feeding on flowers or occasionally on damp patches. The larval food plant is *Cassia* (Leguminosae) (Arabic '*ishriq*', see Mandaville, p 26). Ants are often seen to swarm around feeding larvae. *Nepheronia buqueti* belongs to a group of butterflies which is limited to Africa. The species is found throughout the dry parts of the continent but appears to be common only in South Africa. There are records from South-western Arabia as well. In Oman it is only found in Dhofar where it must be relatively common since it was captured in three places by Bertram Thomas and again by both Vesey-Fitzgerald in 1973 and by P Granville White in 1977. I found it in many localities but never in quantity. Probably it will not be found in Northern Oman. Food plant records could not be traced but other members of the *Nepheronia* feed on Capparidaceae and Salvadoraceae.



Eurema hecabe Grass Yellow

This bright yellow butterfly is absolutely unmistakable among Omani butterflies, though several similar species are found in Africa and Asia. *E. hecabe* is common and widespread in all of tropical Africa and most of tropical Asia. In Arabia it has been found between Jeddah and Aden, in the Wadi Hadhramaut and more recently in Dhofar, but it does not appear to be widespread or common. There is also a thriving colony in the Khatif oasis in Eastern Saudi Arabia which was located by A Pittaway in 1977; this has almost certainly recently been introduced with crops or ornamental plants from either India or Sudan, since otherwise it is not found closer than about Karachi. In Oman it is limited to Dhofar where it is widespread but not common in the scarp zone, especially in the most moist parts. During the 1977 Oman Flora and Fauna Survey, P Granville White caught six specimens and I caught only ten in four localities. In Africa and Asia *hecabe* is a common garden butterfly. There is considerable seasonal variation; dry season specimens are smaller, with narrower and less scalloped black borders on the forewings. The dark markings on the underside may be either black or rust. The flight is weak and fluttering and it is therefore somewhat surprising to note that *hecabe* can display real migratory behaviour, though there are no migration records from Arabia. The food plants are normally Leguminosae in genera such as *Cassia* and *Sesbania*, the latter being the food plant in Eastern Saudi Arabia, but it feeds on other plants as well, including *Hypericum*.

Praying mantis eating a male of *Hypolimnas misippus*

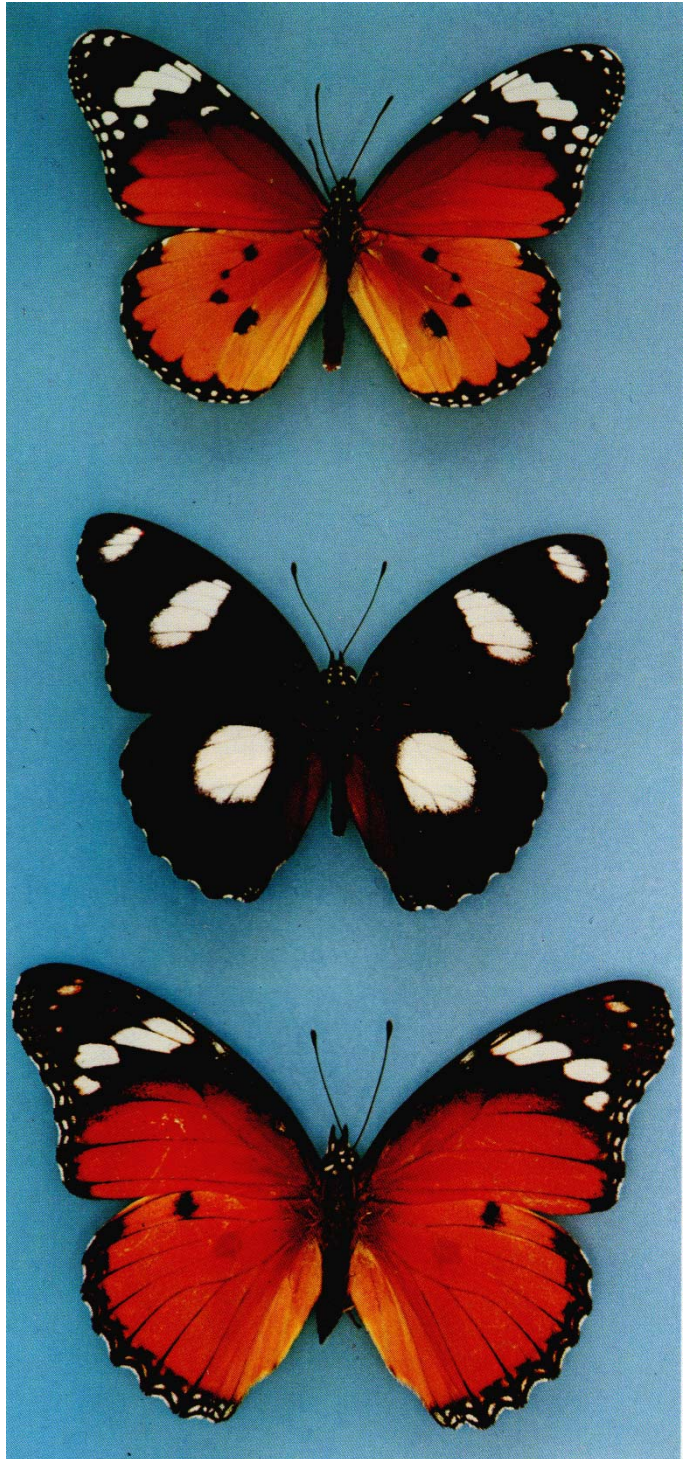


Danaus chrysippus
Plain Tiger

Hypolimnna
misippus
Diadem

Male

Female





Calotropis procera, favourite food plant of *Danaus chrysippus*

This section deals with two butterflies from different families both of which are illustrated on page 41. *Danaus chrysippus* is the only Omani representative of the Danaidae, while *Hypolimnas misippus* belongs to the Nymphalidae. Both butterflies are extremely widespread, ranging from Australasia, tropical and subtropical Asia, through parts of the Middle East and most of Africa. Both are common throughout Oman though the occurrence of *misippus* is somewhat fitful. *D. chrysippus* feeds on most species of Asclepiadaceae, including even such an unlikely candidate as *Caralluma*, but the preference usually is *Calotropis procera* (Arabic *shakhr*) which is shown above. *H. misippus* has been recorded on a number of different plants, but in Oman *Portulaca oleracea* (Arabic *barbīr*) which is common in cultivated areas is a favourite choice.

The black and white male of *misippus*, shot with purple is unmistakable and it has the characteristic fast flight and pugnacious behaviour of the Nymphalidae. The female is totally different, bearing a close resemblance to *D. chrysippus* in colour, pattern and behaviour; however, *misippus* never has the black spots in the centre of the hindwings, typical of *chrysippus*. The resemblance is not due to chance; on the contrary it is an example of one of the most remarkable phenomena in the butterfly world, mimicry. The food plants of *chrysippus* contain toxic substances (heart poisons in the cardenoloid group). These poisons are accumulated in the body of the butterfly which is so tough that it can withstand the first onslaught of an enemy. Experiments have proven that a bird which has once tried to eat a *chrysippus*

will avoid any insect with the same colour pattern for months afterwards. Through a process of natural selection the female of *misippus* has gradually evolved to a near perfect copy of the poisonous *chrysippus*, thus protected from attack. The mimicry relationship is all the more impressive because both butterflies have three different forms. The typical form illustrated on page 39 is by far the most common. Both species have another relatively common form without the black and white markings on the tip of the forewings. The third form has white hindwings; *chrysippus* with white hindwings seems to be extremely rare in Oman while *misippus* often has some white on its hindwings. Combinations of the forms are sometimes found. There is some evidence of seasonal variation in the relative frequency of the forms, especially in *chrysippus*, and there is strong

geographic variation. In West Africa for instance, all specimens of *chrysippus* have white hindwings. In Oman *chrysippus* may be found practically anywhere, but it is particularly common in the oases which also appear to be the main habitat of *misippus*. They possess some capacity for migration but there are no records of large scale migration from Arabia. The larva of *chrysippus* is shown on p 13; that of *misippus* is covered with fleshy, spined protuberances which are probably meant to deter parasitic wasps. The larvae of all the Nymphalidae in Oman with the exception of the two following species are built along the same. pattern. In October 1979, above Rakhyut in Dhofar, I saw a female specimen of what was almost certainly *Hypolimnas bolina*. A female of this butterfly, which is known to occur on Socotra, is shown on the back cover.

Danaus chrysippus on onion photographed at Khasab in Musandam





Stonehamia varanes
Pearl Charaxes

Charaxes hansali
Cream Bordered Charaxes

These two species are amongst the largest and most handsome of all butterflies in Oman but are unfortunately limited to the province of Dhofar. They are members of the Charaxinae, a large group of big butterflies centered on Africa, but also with representatives in East Asia. *Stonehamia varanes* is one of the most common and widespread of these species in Africa, but there are no records from Southwestern Arabia. Although

entomological investigation of the Yemen Arab Republic and the People's Democratic Republic of Yemen leaves much to be desired it is improbable that this distinctive species could have been overlooked, so the Dhofar population appears to be quite isolated. It has also developed a most distinctive subspecies lacking the white markings of the forewings which are prominent in the African subspecies The Dhofar sub-

species was named *bertrami* in honour of the famous explorer Bertram Thomas who was the first to catch the species in Dhofar while he was preparing for his crossing of the Rub al Khali. This butterfly is quite common in the woodlands of the Dhofar mountains and in the upper reaches of coastal wadis. I found them attracted to the sap from *Solanum incanum* (Arabic *sharinjiban*, see Mandaville, p 47). They like settling on tree trunks from where they occasionally swoop down. Known food plants are *Rhus* (Anacardiaceae) and *Allophylus* (Sapindaceae), both of which are found on the scarp. But they are so rare that they are unlikely to be the main food plants. *Charaxes hansali* is a more typical member of the Charaxinae than is *varanes*, and there are several similar species in Africa. *C. hansali* is the north-eastern representative of this complex, being somewhat uncommon and local in the driest parts of Kenya, Ethiopia, Sudan, Southern Egypt and South-western Arabia. The Dhofar population has been given its

own subspecific name but differences from other subspecies are not marked. The species was first collected by Bertram Thomas but has proved to be widespread and relatively common in the more open parts of the scarp vegetation and its fringes. At Wadi Sha'ath I found a number of specimens congregating at the sap oozing from an injured *Cissus*. The food plants in Dhofar are not known; in Kenya it feeds on *Salvadora persica* (Arabic *arak*) a common Dhofar plant which, however, has a distribution which does not match that of the butterfly at all. Both species are extremely fast on the wing and often fly high; they may be very difficult to catch when flying, a situation which is aggravated by the fact that neither sex visits flowers. They are, however, fond of foul substances. Both sexes of either species are strongly attracted to fermenting fruit; the males of *hansali* and to a lesser degree *varanes* are fond of rotting crab or shrimp and patches of urine.



A specimen of *Stonehamia varanes* in typical resting position on the branch of a tree (Wadi Sha'ath, Dhofar)



Melitaea abyssinica

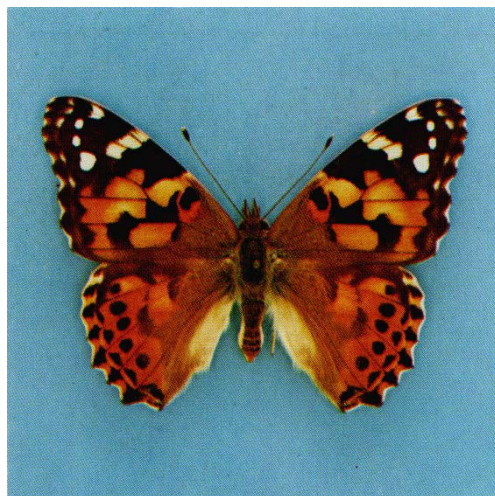
African Fritillary

This butterfly resembles no other Omani species, the intricately patterned underside of the hindwings being particularly characteristic. It is also one of the most interesting butterflies from a zoogeographic point of view. It is the only member of its group to be found in Africa and Southern Arabia where it is known from the highlands of Ethiopia, the Yemen, Saudi Arabia, the Wadi Hadhramaut and Dhofar. The closely related *Melitaea deserticola* is found from Morocco throughout North Africa to Jordan. Very little material of *abyssinica* is present in collections. The Omani specimens were collected by members of the 1977 Oman Flora and Fauna Survey expedition to Dhofar near Ayun, where I also found it. There is little chance that it will be found in Northern Oman while it is possible that one or two similar species might be found high in the Jabal Akhdar or in Musandam; *Melitaea persea* has been captured near Riyadh in Saudi Arabia. The Dhofar locality is on the Northern slopes of the Qara Mountains which are more arid than the luxuriant Southern slopes. Specimens of *abyssinica* were flying in shallow wadis with a varied and interesting flora. One of the common plants was a species of *Kickxia* (Scrophulariaceae) which is closely related to the food plants of other *Melitaea*. The larvae of all species in the group resemble those of other Nymphalidae in being covered with bristly spines; the pupae on the other hand are very characteristic, smooth and almost spherical, of a delicate white ground colour patterned with blotches of black and brown.

Vanessa cardui

Painted Lady

Vanessa cardui is one of the most accomplished migrants in the butterfly world and in consequence it has a wider distribution than any other species. Only in the Arctics and in parts of Latin America is it missing. Migrations are somewhat irregular in timing, intensity and direction, but they sometimes reach huge proportions. A mass invasion into Kuwait has been observed but otherwise, unfortunately, little information on its behaviour in Arabia is available. Robert Whitcombe saw a moderate migration moving towards the northeast on the higher parts of Jabal Akhdar in late July 1978. The species has been found at all times of the year throughout the Sultanate but the numbers vary considerably. When breeding conditions are perfect, rapid population build-up can take place. In March 1979 *cardui* were numerous in the Khasab Oasis in Musandam busily laying eggs on *Malva parviflora*; no trace of larvae were seen while half grown larvae were abundant at as-Sii, more than 1,000 metres up the Jabal Harim. On the wing *cardui* is a strong flier and very difficult to catch. Even when it settles on the ground it is wary and difficult to approach. The larval food plants are thistles and *Malva*, though many others are accepted especially during periods of extreme crowding. The larvae are dark brown with yellow lines and the body is covered in bristly spines. The larvae spin together leaves of the food plant to form a small tent in which they hide. Studies on the life cycle, the presence or absence and migration of this butterfly in Oman would be very useful.



Larval tent of *Vanessa cardui* on *Malva* in Musandam





Precis orithya
Blue Pansy

The two *Precis* are attractive butterflies whose colloquial English names, Blue and Yellow Pansy, are really apt. They are unmistakable, pretty and lively butterflies which cannot avoid attracting the attention of even the most casual observers. *Precis orithya* has a wide distribution covering most of Africa, Arabia, Iraq, the Indian subcontinent and much of Eastern Asia as far as Australia. It is somewhat migratory



Precis hierta
Yellow Pansy

and its presence in Iraq seems to depend on annual immigration from the Arabian peninsula. In Oman *orithya* is common and widespread in all provinces, both under natural conditions and in oases. The most frequently observed food plants are species of Acanthaceae, especially *Justicia* and *Barleria*. My own observations in Musandam indicated that *Blepharis ciliaris* (Arabic, *kanib*) should be added to the list

since *orithya* was found in many localities where it seemed the only suitable food plant. Under oasis conditions the favourite food plant is *Lippia nodiflora* (Verbenaceae), though I found it on a species of *Plantago* (Plantaginaceae) in the Rostaq oasis; Dorothy Hillcoat of the British Museum (Natural History) kindly identified the species as *P. amplexicaulis*. *Precis hierta* is also common and widespread throughout Africa and much of Arabia, from where it penetrates to the Nile Delta and on at least one occasion to Lebanon. A different subspecies is found on the Indian subcontinent. In Dhofar *hierta* is one of the most common butterflies both on the coast and in the mountains. It has not been recorded from Northern Oman but as it is known to be migratory it is bound to be found there as well. In fact, M Baddeley described to me a pair of butterflies which he had seen in courtship in the Wadi al Asi near Nakhl in the foot-hills of the Jabal Akhdar in April 1978; there is little doubt that they were *hierta*. The recorded food plants are species of Acanthaceae, especially *Barleria* and *Asteracantha*. The two species of *Precis* share the same habits and behaviour. They are quick flying, lively butterflies which usually stay close to the ground on which they settle to bask in the sunshine. They are fond of coming to flowers. Males display territorial behaviour, selecting a perch which controls an area from which they will try to evict any invaders whether rival males or any other butterfly. The only time when you see these butterflies high above the ground is during courtship; part of the foreplay to copulation consists of wild spiral flights where the male pursues the female so high that they are nearly lost from sight. Three other species of *Precis* are known from

Arabia. One of them is widely distributed from the mountains of Asir, through Yemen to the Wadi Hadhramaut. It is *Precis limnoria*, a chocolate coloured butterfly with small white spots on the upperside of the forewings, which is quite likely to turn up in the province of Dhofar in future.

Lippia nodiflora, the favourite food plant of *Precis orithya*, photographed at the Khasab Oasis

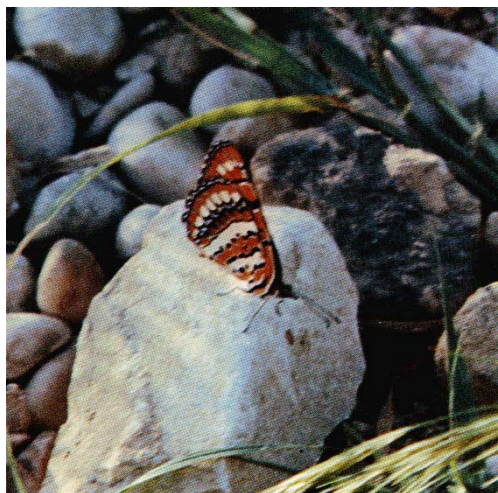




Byblia ilithyia

Joker

In Oman this is an absolutely unmistakable butterfly with its rich honey ground colour crossed with black bars and with its intricate underside patterns. In Southwestern Arabia a similar species, *Byblia acheloia*, exists and the possibility that it occurs in Dhofar cannot be ruled out. The distribution of *ilithyia* stretches from Niger/Haute Volta to Ethiopia, Southwestern Arabia and Dhofar; it reappears in dry Southern India and Sri Lanka. Coupled with the fact that at least *Byblia acheloia* shows some inclination to migrate, the distribution pattern suggests that *ilithyia* will eventually be found in Northern Oman. In Dhofar this butterfly is quite common in the dense vegetation of the scarp and in the valleys of the coast, though it is somewhat local. The group of butterflies to which this species belongs usually feeds on various species of Euphorbiaceae, but none of the known food plants were noted in Dhofar. *Jatropha* is a possible candidate. I noted that the species was often associated with the weed *Solanum incanum*. (Arabic *Sharinjibān*, see Mandaville, p 46-47) and thought it might be the food plant, but it turned out that the adult butterflies were feeding from sap which oozed out from plants damaged by other insects. One single plant attracted six or seven *ilithyia* as well as three specimens of *Stonehamia varanes*. The species is much attracted to flowers as well, *Heliotropium* being a great favourite.



A specimen of *Byblia ilithyia* resting on a small stone in a valley at the foot of the Jebel Qara in Dhofar. More often it will settle on the leaves of plants



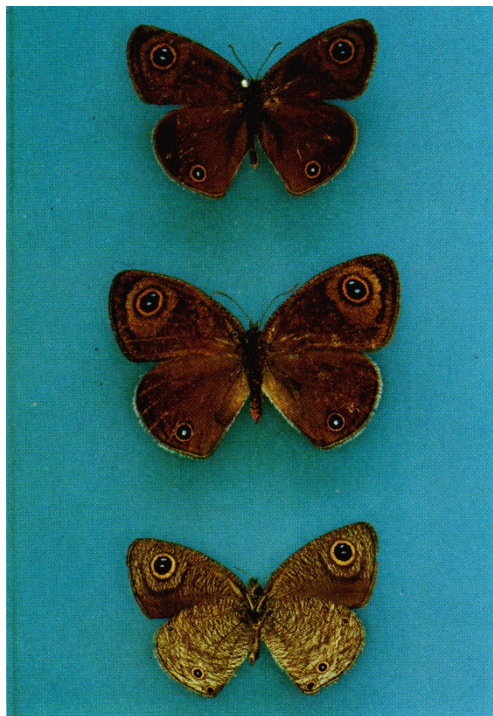
Hipparchia parisatis White Edged Rockbrown

This large butterfly with its prominent white borders is the first of four Omani representatives of the Satyridae, a family characterised by the prominent eyespots. It can be confused with no other Omani butterfly. The species is found from the Western Himalayas to Eastern Turkey and in Oman. It has been taken in both the Jabal Aswad and the Jabal Akhdar where it appears to be relatively common. Probably the mountains of Musandam will eventually prove to contain colonies as well while it is most unlikely to occur in Dhofar. The normal habitat is rough hillsides with shrubs and grass. Here the butterflies spend much of their time sitting on rocks or on the bare ground; when disturbed they fly off at great speed but settle again quite soon. During the hottest hours of the day they seek out the shade of caves or overhanging rocks and several specimens may then congregate. Contrary to tropical species which breed more or less continually, *parisatis* probably only has one annual brood which emerges

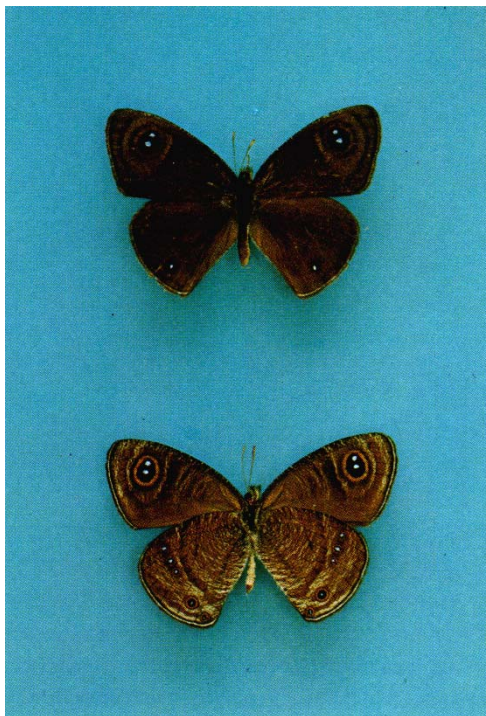
between May and June according to altitude. After mating females will spend the summer months resting and reappear with autumn rains to lay eggs on the fresh grass which is the larval food plant. The males may also be able to survive summer.

Melanitis leda Common Evening Brown

This unmistakable butterfly is illustrated on the back cover of the book. It has been caught only once in Oman, when T Michels took a male specimen in dense forest below the main army encampment at Sarfait in Dhofar. *Melanitis leda* is common throughout Africa and most of tropical Asia and there are a few records from Southwestern Arabia. The seasonal variation of this butterfly is interesting. The wet season form has pointed forewings and its underside carries a row of prominent eye spots; the dry season form has angular wings, a camouflaged underside and no eye spots. Contrary to most other butterflies *leda* flies at dusk and will often come to light.



Ypthima astrophe
Common Three Ring



Ypthima bolanica
Baluchi Ringlet

The two Omani *Ypthima* are easy to tell apart. The small *asterope* has only three minute eye spots on the underside of the hindwing while the larger *bolanica* has a series of five prominent spots. There are numerous similar species in both Africa and Asia but none of these reach Arabia. In spite of its small size and weak flight *asterope* has a vast distribution spanning most of Africa, the Middle East and much of Asia; it occurs in all parts of Oman where it is common both under oasis conditions and in bushland. The case of *bolanica* is very different; this is a scarce butterfly which was thought to be limited to Baluchistan until the 1975 Oman Flora and Fauna Survey discovered it in Arabia

for the first time. It has since proved to be quite common in the rocky wadis leading down from the high mountains in Northern Oman. Near Rostaq both species may be found flying in the same localities although *bolanica* is clearly more at home in rocky gorges than is *asterope*. They are relatively weak on the wing and enjoy sitting on the bare ground with wings two thirds open, basking in the sunshine. *Y. asterope* is known to feed on a number of common grasses, but the scarcity and localisation of *bolanica* suggests that it accepts only specialised sorts, so far unrecorded. Normally the caterpillars of the Satyridae feed only at night, spending the day in hiding among the roots of the food plants.

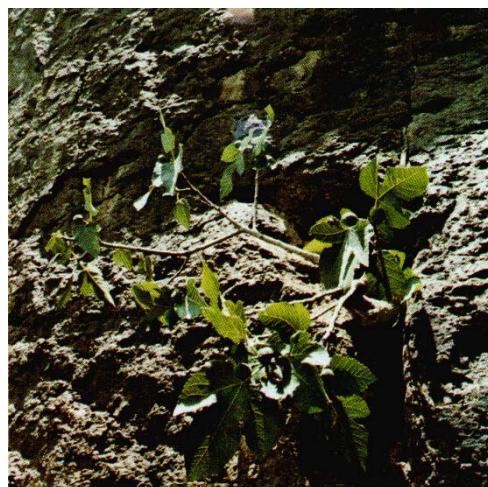
Myrina silenus

Fig Blue

This is a striking and absolutely unmistakable member of the Lycaenidae, which is found throughout Africa and Southern Arabia. Together with *Coeliades anchises* it is one of the most characteristic of the true African species which have managed to penetrate beyond Dhofar to Northern Oman. It has not been found in the Musandam peninsula, but may well occur since its food plants are plentiful there. Generally it is quite common except during the coldest part of the year in Northern Oman. As indicated by its vernacular name, the food plants are species of fig; experience in Africa shows that almost any species will do. In Northern Oman the butterfly has mainly been found in the rocky wadis leading down the eastern slopes of the high mountains, where it feeds on the common *Ficus salicifolia* (Arabic *lithab*, see Mandaville, p 59). At least three species of *Ficus* are used in Dhofar. Adult butterflies are fond of sunning themselves on the leaves of the tree of their birth from where they fly off on brief sorties at great speed, often returning to the same perch. Flowers hold no strong attraction for *silenus*, but occasionally they will settle on ripe figs broken open by birds. The young larvae feed on the surface of fresh leaves protected by a silken web; older larvae feed from the edges and camouflage themselves by filling the eaten-out gap with their bodies. Normally when fig leaves are damaged, a thick white sap oozes out, but the larvae of *silenus* have some mechanism for avoiding it. Pupation takes place in crevices on the larger branches or trunks of the tree on which they feed.



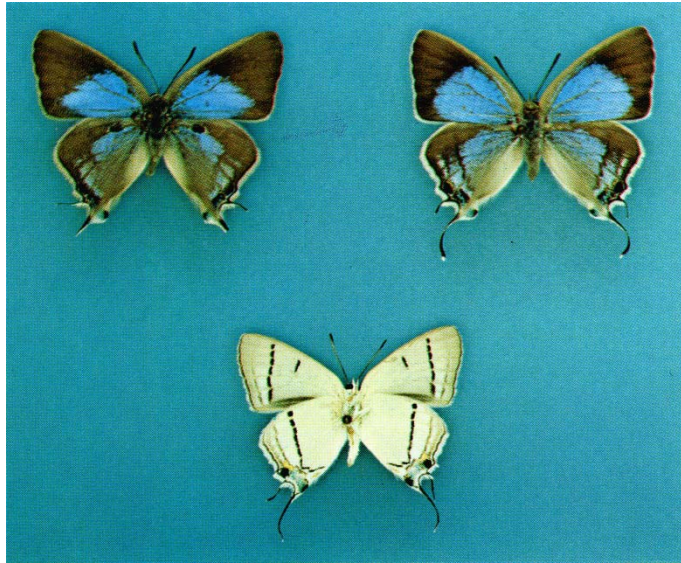
Ficus carica, one of the fig trees on which *Myrina silenus* feeds



54 Lycaenidae

Epamera glaucus

Arabian Sapphire



This is the only Omani representative of a large group of the Lycaenidae which live on parasitic mistletoes, *Loranthus* (Loranthaceae). The Omani species, *Epamera glaucus*, differs from the other indigenous Lycaenidae through the chalk white colour of the underside with prominent black lines on all four wings and through the oval black patch of scent scales on the leading edge of the upperside of the hindwing in the male. The species

has a limited distribution stretching from Somalia and the Ethiopian coast to Southwestern Arabia, and in the Jordan Valley. In Oman it is only known from the dry, north-facing mountain slopes of Dhofar, especially the Ayun area. I found the species in several places feeding on *Loranthus* growing on either *Acacia* or on *Cadaba*. The larva of *glaucus* feeds mainly on flower buds and the pupa is normally attached to the trunk of the tree on which the *Loranthus* grows where it is extremely well camouflaged. The adult butterfly has very retiring habits and systematic examination of trees carrying *Loranthus* is the only safe way of finding it, although both sexes are sometimes drawn to particularly attractive flowers. When the wings are folded the black markings of the hindwings in conjunction with the filiform tails combine to form a false head. This serves to direct the attack of certain predators to a non-vulnerable part of the butterfly.



Close up of the flowers of a *Loranthus* growing on *Cadaba* near the Ayun pools in Dhofar

Deudorix livia

Pomegranate Butterfly



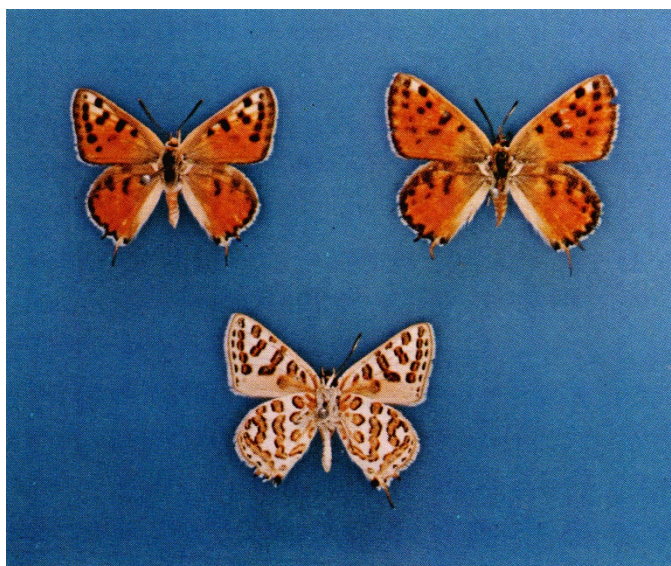
The bright red ground colour of the male upperside in this butterfly is unmistakable. The female is more nondescript, though the underside pattern of both sexes differs from that of any other Omani butterfly. *Deudorix livia* is found in the Sahel zone of tropical Africa, where it seems to penetrate no further south than Northern Kenya, and in Southwestern Arabia to Northern Oman and Southern Iran. It is a fairly strong migrant which has managed to find its way to Egypt and the Middle East (Lebanon, Syria, Jordan and Palestine), though it is probably not a permanent resident in these areas. There are records of *livia* from all parts of the Sultanate. It is relatively common in Dhofar at least in some years and J R L Carter has taken it in Northern Oman. I took a series of a dozen females at Khasab and al Jadi in Musandam in February 1979. It is a known migrant and records from Arabia suggest that it is dependent on immigration for permanent survival. The flight is direct and extremely rapid. Indeed, the species is not normally seen on the

wing but is more usually found feeding from flowers; in the Musandam peninsula I found it on cultivated onion and on *Tephrosia* (Arabic, *dafrā* see Mandaville, p 29). The choice of food plants of this butterfly is remarkable. The larvae may be found feeding inside the pods of *Acacia* trees and on other Leguminosae which is not surprising, but they also use three species which are normally not used by the Lycaenidae, or indeed by any other butterfly. The larvae may feed inside the fruits of Pomegranate (*Punica granatum*) (Arabic, *romān*), rendering them unfit for human consumption. It may feed on Loquat (*Eriobotrya japonica*) as well, but most surprisingly of all on Date (*Phoenix dactylifera*) where it eats the seeds or young dates. A group of Egyptian researchers, Awadallah, Azab and Nahal, studied the species under laboratory conditions and found that the number of days spent in pupal stage varies strongly with temperature; at 35°C they need seven days to hatch, while at 15°C they need as much as two months.



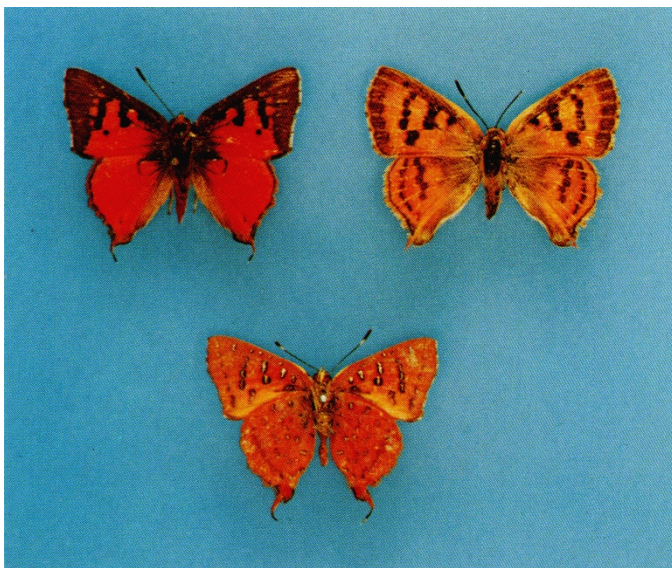
Apharitis acamas
Leopard Butterfly

Apharitis myrmecophylia
Desert Leopard Butterfly



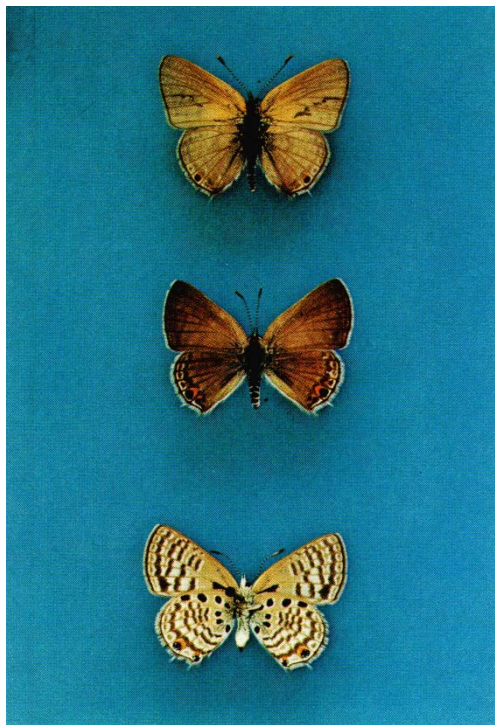
Axiocerces harpax

Common Scarlet



Axiocerces harpax is an unmistakable butterfly with its deep red or brick underside which is speckled with silver. It is common in Africa south of the Sahara and north of the Equator, as well as in Southwestern Arabia. The first Omani specimen was taken by P Granville White near Khadrafi in Dhofar in October 1977; I found it common in Dhofar in October 1979, especially in the drier zones characterised by the presence of the Frankincense tree. The butterfly has a rapid flight but it often settles on plants or on flowers such as those of *Acacia* or *Heliotropium*. A photograph of a live specimen is shown on the title page. The food plants are species of *Acacia*. The two Omani species of *Apharitis* are related to *Axiocerces harpax* but they differ in their less fiery ground colour and in having distinct bands on the underside of the hindwings. These bands are centred with a line of a dull leaden colour. Both species are variable and are not always easy to tell apart; however the pattern of markings of both the underside and upperside of *myrmecophila* is usually composed of

distinct spots rather than of clear-cut bands as in *acamas*. The line of marginal spots on the underside of the hindwings is black in the former and tawny in the latter. The genus *Apharitis* is specially adapted to the subdesert regions of Africa, Arabia and Western Asia and are among the few butterflies which can be taken in true desert. *A. acamas* is found from Niger to Egypt, Syria, Somalia, Arabia and via Iran to Afghanistan and India, while *myrmecophila* is found from Tunisia to the Jordanian desert and Arabia and in Southwestern Iran. Both are rare in Oman; *myrmecophila* was taken by Bertram Thomas at Shenna in the Rub al Khali and by K M Guichard on Masirah; *acamas* has been taken by M Baddeley in the Rostaq oasis, by J R L Carter at Salalah and by M D Gallagher on Masirah. In Tunisia *myrmecophila* is known to feed on *Calligonum comosum* (Polygonaceae) (Arabic *ābal*, *arṭa*, see Mandaville p 57); the larva feeds at night spending the day inside ants' nests at the root of the plant. In India *acamas* feeds on *Cassia*.



Anthene amarah settled on a twig, ready to fly off to investigate whether any passing butterfly should be a willing female



Anthene amarah

Leaden Ciliate Blue

This butterfly may be recognised by the grey/brown ground colour, which in the male is tinged with a golden sheen, and by the presence of three short tails on the hindwings. A somewhat similar species, *Anthene butleri*, has been recorded as far west as the Wadi Hadhramaut and could conceivably turn up in Dhofar. The prominent black spots on the underside of *amarah* are missing in this species. The genus *Anthene* in its widest sense has more than a hundred members in Africa and a few more in Asia; *amarah* is one of the most widespread species, being found throughout dry tropical Africa, extending up the Nile Valley and the Red Sea coast to Egypt and Aqaba, and penetrating much of Arabia. In Oman it is common in Dhofar, both on the coastal plain and on the north facing slopes of the mountains; it has been taken at Ruwi near Muscat in Northern Oman by K M Guichard in April 1976, and I found it on Jazirat al Ghanam off the West coast of the Musandam Peninsula in February 1979. Probably *amarah* is more common and widespread than the records imply since it is easily overlooked. The food plants are species of *Acacia*, in Oman probably primarily *A. tortilis* (Arabic *samur*, see Mandaville, p 25); wherever this tree grows the butterfly may be expected, even in areas which are totally unpromising for other species. When the *Acacia* trees are flowering in Oman *A. ehrenbergiana* (Arabic, *salam*) flowers in spring and *tortilis* in autumn—they may attract large numbers of Lycaenidae, especially *amarah* and species of *Tarucus* and *Azanus*.



Lampides boeticus

Pea Blue (Top Row)

The intricate underside patterns of these two butterflies will serve to distinguish them from each other as well as from all other Omani species, though one more species of *Syntarucus* might turn up in Dhofar. *Lampides boeticus* is one of the world's most widespread butterflies, occurring in the old world tropics and subtropics, migrating well into the temperate zone. In Oman it is one of the most common and widespread species throughout the Sultanate in all types of terrain. Often it is found swarming rapidly around the larval food plants and settling on leaves and both sexes come readily to flowers. The larvae feed on a variety of Leguminosae such as *Sesbania*, *Taverniera*, *Alhagi* and *Medicago*; more importantly they show a decided preference for cultivated beans and peas

Syntarucus pirithous

Zebra Blue (Bottom Row)

and since the larvae live inside the pods *boeticus* must be considered a real agricultural pest. *Syntarucus pirithous* is widespread in all tropical Africa, Southwestern Arabia and in the Mediterranean area, from where it penetrates Europe. So far the only Oman records are small series collected from many localities in the wooded parts of Dhofar during October of 1977 and 1979. The Arabian populations are known to be migratory so it would be surprising if it did not eventually turn up in Northern Oman. It will feed on most species of Leguminosae (*Indigofera*, *Rynchosia*, *Vigna*, *Melilotus*, Lucerne) and on occasion even on species of Plumbaginaceae or Rosaceae, unusual as Lycaenidae food plants.



**Tarucus
theophrastus**
African Pierrot

**Tarucus
rosaceus**
Mediterranean Pierrot

**Tarucus
balkanicus**
Balkan Pierrot

The members of this attractive little group of butterflies have several popular names, such as Tigers or Pierrots. The Omani species may be called African, Mediterranean and Balkan Pierrot respectively. The three species resemble each other closely, though the following characteristics will normally serve to distinguish them. The male of *balkanicus* is a deeper and duller blue than the other two species and normally it has clearly defined black spots on the upperside of the forewings. The female is very dark compared to the other species. The males of *rosaceus* and *theophrastus* are blue with a lilac sheen and are quite similar on the upper side. However, there are differences on the underside; on all four wings

rosaceus has a continuous black line just beyond the border, while in *theophrastus* this line is broken up into defined rounded spots. The difference is brought out well in the plate, but it is not always that clear. Females of *theophrastus* and *rosaceus* may be determined in the same manner, but although females of *balkanicus* are normally darker than those of the other two, difficulties in the identification of *balkanicus* and *rosaceus* may occur. Several closely related species which the specialist can easily tell apart through the study of the male genitalia are found in India and Africa. The three Omani species are common throughout the dry parts of Africa north of the Sahara as well as in Southwestern Arabia and in Dhofar. T.

rosaceus is also found in Jordan, Egypt, Iraq, Southwestern Iran and Northern India. *T. balkanicus* is found in the Balkans, Turkey, Lebanon, Syria, Jordan, Iraq, Iran, Afghanistan and Baluchistan. *T. rosaceus* and *balkanicus* have been found in all parts of Oman while *theophrastus* has only been recorded once from Dhofar; it might well turn out to be restricted to that area although it could occur in Northern Oman as well. *T. rosaceus* qualifies as one of the most common of all the butterflies in the country, while *balkanicus* generally is rarer and more localised. The habits of all three species are identical. They feed on bushes and trees of *Zizyphus* (in Oman especially on *Z. spina-christi* (*sidr* in Arabic, see Mandaville, p 23). The adults are always

found near the food plant around which they fly erratically, settling either on these or on low shrubs nearby. It is not unusual to find two or even three species on the very same tree. The butterflies are attracted to flowers, in Oman especially to species of *Tephrosia* and to *Heliotropium ramosissimum*. The larvae normally feed by eating only one side of the leaf, leaving a semi-opaque 'window' which makes it easy to identify trees with larvae, and these are then readily found and bred. Even in areas where the number of food plants is plentiful, it is characteristic that only a few will be singled out. In nature the larvae of *Tarucus* are tended by ants in a symbiotic relationship, but in captivity they will develop satisfactorily without the attention of ants.

A specimen of *Tarucus balkanicus* in typical sleeping position on a low plant in the Musandam peninsula



**Zizeeria karsandra****Zizeeria knysna****Zizeeria hylax**

This is a group of three small similar looking species with identical habits, known as the Grass Blues, though in fact *Zizeeria* and *Zizula* are not that closely related genera. *Zizula hylax* can immediately be told from the two *Zizeeria* by the chalky grey underside with well defined blackish markings; the *Zizeeria* have a more sullied beige underside with less distinct markings in dark brown. The upperside ground colour of male *hylax* is much lighter than in the *Zizeeria*. The photographs bring out these differences reasonably well. The two *Zizeeria* are almost impossible to distinguish without dissection and study of the male genitalia and since their known ranges do not overlap some researchers consider them to be subspecies of one butterfly. Generally speaking the markings on the underside of

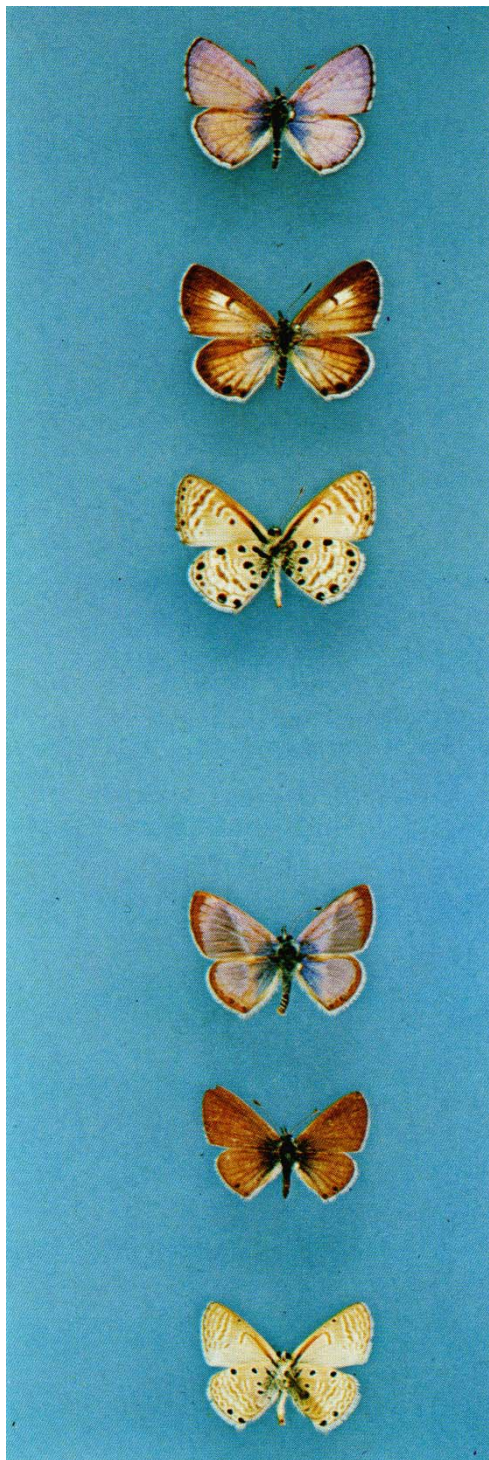
knysna are better defined than in *karsandra* and the underside ground colour is lighter and presents a more neat appearance. The black border of the male upperside is normally broader in *knysna* and the blue ground colour somewhat more intense. However, in case of doubt the genitalia must be examined. In practice the difficulties of determination is of lesser importance since the distribution of the two species is not known to overlap. *Z. karsandra* is widely distributed in the Australasian and Oriental regions, in Iraq, Eastern Arabia, the Middle East and parts of North Africa. *Z. knysna* is an African butterfly which is widely distributed on the continent, extending to Morocco, Spain and Southwestern Arabia. In Oman *karsandra* is found in the Musandam Peninsula and in Northern Oman, while it

is replaced by *knysna* in Dhofar. It cannot be ruled out that the two species will eventually be found flying together somewhere in Oman so it is worthwhile to take small samples from as many localities as possible. Both are normally common in areas with permanent water. In an area as arid as Oman, oases seem to afford the best conditions, at least for *karsandra*, which is most common along watering canals, in lucerne fields on the Batinah coast and in inland oases such as Rostaq. Here they flutter about very close to the ground, often settling on flowers to feed or on the ground to bask in the sunshine with the wings three-quarters open. They appear very restless. The food plants of *karsandra* are Bersim clover (*Trifolium alexandrinum*) and Lucerne (*Medicago sativa*) and probably other plants as well. Little is known of the habits and ecology of *knysna* in Dhofar. There are scattered records from the Salalah oasis, the coast and the Ayun

area, but it is likely that the habits are the same as for *karsandra*. In West Africa *knysna* is a common garden insect. It feeds on Leguminosae as does *karsandra*, but also on plants which are rather exotic for the Lycaenidae such as *Amaranthus* (Amaranthaceae), *Oxalis* (Oxalidaceae) and *Tribulus* (Zygophyllaceae). *Zizula hylax* has a vast distribution stretching from the Pacific Islands and the Oriental region via Arabia to all of tropical Africa. In Oman it is only known from Dhofar where it appears to be relatively common in a wide range of ecological conditions. There are relatively few records from elsewhere in Arabia. In habits and choice of habitat *hylax* resembles the *Zizeeria*, though it is sometimes willing to fly higher above the ground. Generally, it appears to be somewhat more localised. Recorded food plants are many species of various genera of the Acanthaceae as well as *Oxalis* (Oxalidaceae).



Zizeeria kneecap in typical resting position



Azanus jesus African Babul Blue

Azanus ubaldus Desert Babul Blue

The genus *Azanus* is closely linked to the *Acacia* zone of the African continent though some penetrate even the wetter parts. Two of the most widely distributed species reach Arabia, parts of the Middle East and the Indian subcontinent. The colloquial name, Babul Blue, refers to the Indian name for the *Acacia* tree. The two Omani species are fairly similar, yet easy to tell apart. The male of *ubaldus* is smaller than that of *jesous* and has a clearly defined patch of specialised sexual scales on the upperside of the forewing, whereas males of *jesous* are a uniform delicate lilac blue. Females are more alike, but female *jesous* has black marginal spots on the underside of all four wings; these spots are light brown in *ubaldus*. There are two further species of *Azanus* in Southwestern Arabia which could turn up in Dhofar; the underside of these is chalk white with black markings, unlike the beige and dark brown of *jesous* and *ubaldus**. *Azanus jesus* is by far the most common and widespread of the two in Oman, and indeed in Arabia and the Middle East as a whole. It may well be the most common and widely distributed of all Omani butterflies and there are records from nearly all localities in the Sultanate visited by collectors. *A. ubaldus* is generally a more localised butterfly which is adapted to even more arid conditions than *jesous*. So far there are only two records from Oman, both from Dhofar; P Granville White captured a pair at Ayun in October 1977 and M D Gallagher caught it in the same locality in June 1979. There

are scattered records from Arabia, including Qatar, and since the *Azanus* appear to be somewhat migratory it is probable that *ubaldus* will eventually turn up in Northern Oman and in Musandam. Both species feed on *Acacia*, in Oman undoubtedly especially *A. tortilis* (*samur*) and *A. ehrenbergiana* (*salam*), though *jesous* has occasionally been known to feed on other plants. The adult butterflies spend much of their time circling *Acacia* trees, sometimes settling on bare twigs. When the trees are flowering, they are a favourite source of food for the adults as well as for the larvae; when not, the butterflies descend from the trees to feed on other flowers. They sometimes come to water, occasionally also to rotting carcasses and other foul matter. The larvae

are typical for the family; their shape is like that of a flattened garden slug but with the segments of the body well defined. The ground colour is variegated green with some pinkish markings and the larvae are well camouflaged when they feed on flower buds or young leaves which are preferred to older leaves or to the pods. This is contrary to some of the other species, such as *Lampides hoeticus* or *Deudorix livia*, which prefer feeding on the peas inside the pods. The eggs of both species are laid singly on a suitable flower; they hatch after seven days, spend about three weeks as larvae, then about ten days as pupae before hatching.

* A specimen of *Azznus moriqua* was captured near Thamrait in Dhofar by F J Walker

Mixed forest of *Acacia tortilis* and *Zizyphus spina-christi* at Wadi Sallala in the Musandam peninsula. *Azanus jesous* was one of the few butterflies found here



66 Lycaenidae

The three species covered in these pages are closely related; *Chilades parrhasius* has until recently often been placed in the genus *Euchrysops*, but there are clear anatomical differences. The combination of tails on the hindwings and the rather simple pattern of the underside will serve to distinguish the first of the species from all other Omani butterflies except *Euchrysops osiris*. However, *parrhasius* is normally smaller than *osiris*, the ground colour of the male is less violet and on the upperside both sexes lack the prominent orange spot at the angle of the hindwing. *C. parrhasius* is widely distributed in the dry parts of India, Afghanistan, Southern Iran, and Arabia as far west as Aden. It has also been recorded from Africa. In Northern Oman it is widespread and relatively common, especially in the agricultural part of the Batinah coast. The only Dhofar record is from Wadi Raykhut, collected by P Granville White during the Oman Flora and Fauna Survey in October 1977. As yet there are no records from Musandam, but as *parrhasius* is found in the United Arab Emirates and is common in Qatar, it will certainly turn up there. According to Pittaway it feeds on *Acacia* and *Prosopis* in Qatar. The strong preference for agricultural areas on the Batinah indicates that *Prosopis* is the main food plant in Oman.

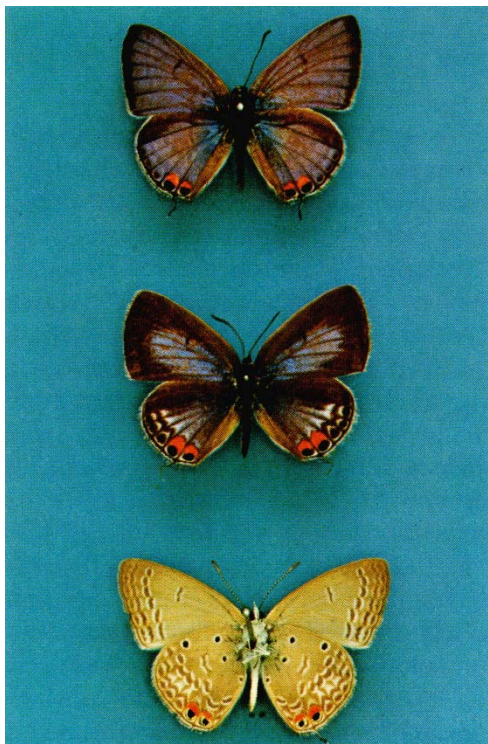
Euchrysops osiris is an African butterfly which is widespread through the dry parts of the continent from Senegal to Somalia, Southwestern Arabia and the Cape. From Oman the only records are from Dhofar, where it is widespread though not common in the forests and grasslands. It is unlikely to occur in Northern Oman. It feeds on various Leguminosae, especially *Becium*, *Vigna* and *Rynchosisia*.



Chilades parrhasius
Small Cupid

Euchrysops lois is darker than any of the other Omani species on both the upperside and the underside. The only similar species is a rare Somali butterfly which is not found in Arabia. *E. lois* itself has a restricted distribution, being found from Ethiopia to Dhofar. Very little material is available in collections and it was therefore of great interest that K M Guichard caught an immaculate series of four males and three females in Dhofar, at kilometre 48 on the Salalah-Thamarit road. I found it in the same area and near Ayun. Nothing is known of its early stages or habits, but the localities of capture indicate that it lives in very dry environments.

Many, if not most, species of Lycaenidae are often found in association with ants.



Euchrysops osiris
African Cupid

The larvae secrete a sugary substance from some special glands on the hind part of its body; this fluid is much appreciated by the ants which in turn not only refrain from attacking the larvae, but offer them active protection. This type of relationship—symbiosis—is carried to an extreme in cases where the ants carry off the larvae into the ants' nest itself and daily bring them the correct food plant. The adult butterfly emerges in the ants' nest. Although most Omani Lycaenidae are attended by ants, it appears that none of them are fully dependent upon a symbiotic relationship. It is not uncommon to find larvae of Lycaenidae among aphids, presumably because this makes it easier for the ants to

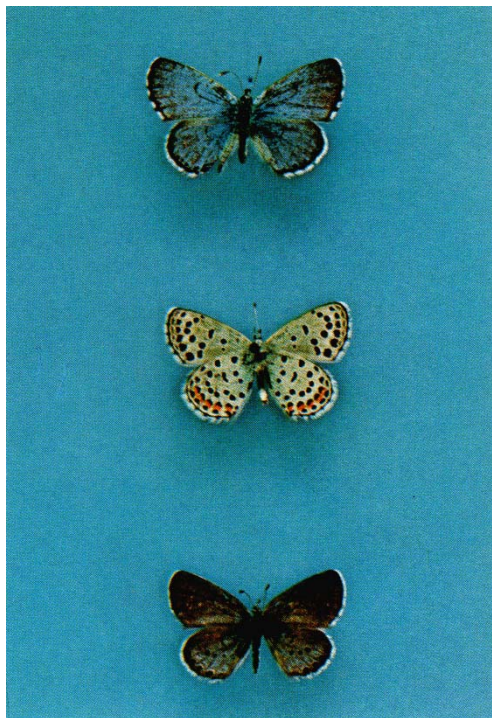


Euchrysops lois
Somali Cupid

find them since aphids are also attended by ants.

A male *Euchrysops osiris* at rest. Note the black and red spot on the hindwings which together with the tail forms a false head to deceive predators





Pseudophilotes vicrama

Baton Blue

This little butterfly differs from all other Omani blue butterflies by having a complete range of red marginal spots on the underside of the hindwings. The chequered fringes of the wings are also characteristic. *P. vicrama* is a Palearctic species which is found in Europe, the Middle East, Afghanistan, parts of the Soviet Union and Northwestern India. In Oman it is known only from Musandam, where a single female was caught by K M Guichard in April 1975 at as-Sii, a bowl 1,000 m up the Jabal Harim. I took a long series in the same locality in February 1979. Small colonies of the butterfly were located at several places on the rough shrub clad mountain sides surrounding the bowl and the species is obviously well established. *P. vicrama* is known from nowhere else in Arabia but it should be looked for in the higher parts of the Jabal Akhdar. The closest known populations are in the Zagros mountains of Iran, but the Omani population has not yet acquired any peculiar characteristics, though specimens seem slightly darker than the Iranian. Since *vicrama* normally has three annual broods it would be unwise to describe it as a new subspecies until material from summer is available. The adult butterflies fly about close to the ground and are inconspicuous. The population density of *vicrama* is low compared to most other Lycaenidae. The normal food plant is *Thymus* (Labiatae), but no thyme was found at as-Sii, so it is likely to feed on some related genus of the Labiatae, or even on a totally different plant.

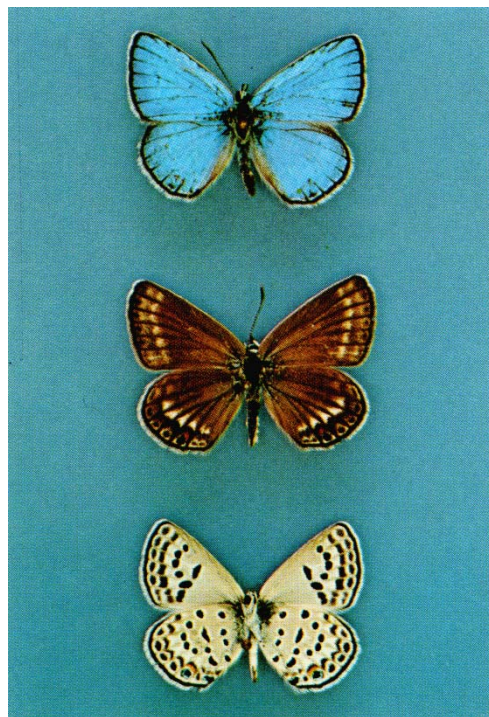
The habitat of *Pseudophilotes vicrama* at as-Sii



Agrodiaetus loewii

Loew's Blue

The beautiful, brilliant blue of the male and the black and white markings of the female will serve to distinguish *loewii* from the other Omani Lycaenidae. The underside is fairly characteristic as well. The black and white females are typical of subdesert populations of *loewii*, which stretch from Northern Egypt and Jordan, via Saudi Arabia (Riyadh), to South-western Iran and Afghanistan. Occasional females may be blue with broader black markings than in the male. Further north from Turkey via Lebanon and Iran to the Himalayas there is a series of subspecies with brown females which are adapted to Mediterranean types of climate rather than to subdeserts. *A. loewii* has been recorded from Oman only once, when K M Guichard took a long series at Khasab in the Musandam peninsula. It may occur in the Jabal Akhdar as the food plant is established in that area. The author failed to find it in Musandam in February and March of 1979. The period was probably too early for the single annual brood of the butterfly, although the food plant, *Astragalus fasciculifolia*, was already in full flower. The adults are strong on the wing, but they normally stay in the vicinity of the food plant. They are fond of the flowers of the food plant and of thistles. The Khasab series differs from the form flying in the Zagros mountains as well as from the form flying at Riyadh in Saudi Arabia, but the differences do not appear sufficiently large to warrant the description of a new subspecies. However, the species is one which would repay a full monographic study taking into account ecology, geographic distribution and variation.



Astragalus fasciculifolia, the food plant of *Agrodiaetus loewii* photographed in Musandam





A specimen of *Freyeria trochylus* feeding on *Tridax*, an imported weed



Freyeria trochylus

Grass Jewel

This is one of the few Omani Lycaenidae where the difference between the sexes is minimal, though females are normally slightly larger than the males. The male may be said to have a 'female' appearance. The large orange blotch on both the upperside and underside of the hindwings makes the species unmistakable; the black dots inside the red spot on the underside are ringed with metallic green scales. This butterfly varies considerably in size; small specimens are among the smallest of all the world's butterflies, perhaps the smallest. Despite its size, *trochylus* has a vast distribution covering all of dry Africa, the Balkans and the Middle East, India and much of the Oriental region. There are records from numerous localities all over Arabia, including the three main regions of Oman, this despite the fact that the small size and unobtrusive habits of this butterfly makes it easy to overlook. The normal food plant of *trochylus* is species of *Heliotropium* (Boraginaceae), a most unlikely choice for a member of the Lycaenidae, but it will also feed on the more normal *Indigofera* (Leguminosae) (see Mandaville, p 28). In Oman it has been caught under circumstances which suggest it feeds on both. On Jazirat al Ghanam off the Musandam coast found it associated with *Heliotropium ramossissimum*. The normal habitat of *trochylus* is rough open ground where the food plants grow, but certain species of *Heliotropium* are associated with agriculture and the butterfly will follow them here. Sometimes even an isolated plant will house a small colony of *trochylus* on a permanent basis.



Coeliades anchises

Large Skipper

Coeliades anchises is a representative of the Hesperiidae and it is by far the largest of the family in Oman. The sexes are similar. The Hesperiidae are rather far removed from the other families of butterflies found in Oman. The genus *Coeliades* is widely distributed in Africa; *anchises*, however, is only found in Southern and Eastern Africa, in Southwestern Arabia and in Oman. In Dhofar I found it at Wadi Sha'ath and above Rakhyut in localised colonies in October 1979 while there are many records from Northern Oman. Interestingly, the Omani form differs from that of Africa and Southwestern Arabia; together with the form found on the Island of Socotra it constitutes a separate subspecies, *jucunda*, which is characterised by the strong reduction of white markings on the underside of the hindwings. Their typical habitat in Northern Oman is mountain wadis at relatively low altitude which the butterflies patrol with their characteristic heavy flight, resembling that of certain

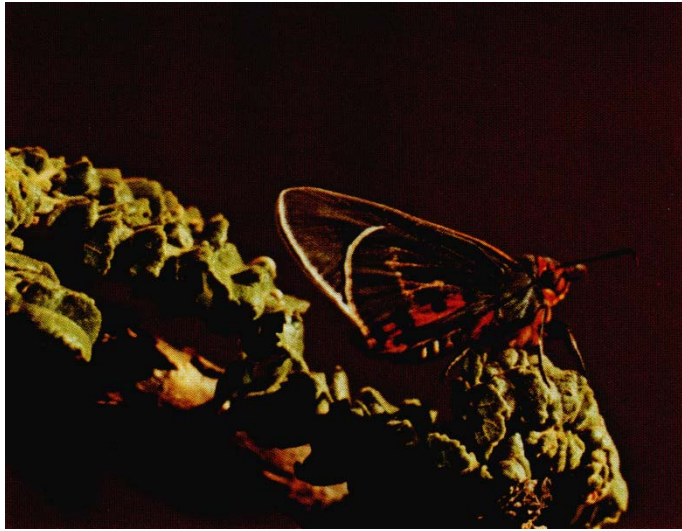
tropical moths more than that of butterflies. But at least at Rostaq it also occurs under oasis conditions. It often flies high above the ground, but comes readily to flowers and sometimes settles on rocks. *Maerua crassifolia* trees (Arabic *sarh* see Mandaville, p 14) in full flower may attract scores of *anchises* of both sexes. Contrary to most other Omani butterflies, *anchises* continues to be active almost till sunset. In Oman the larva of this butterfly is easily found on *Acridocarpus orientalis* (Malpighiaceae) (Arabic *qafaş*, see Mandaville, p 18). This is a characteristic wadi plant which somewhat resembles *Laurus* of the Mediterranean. In Africa other species of *Coeliades* are also known to feed on *Acridocarpus*, while *anchises* has been found feeding on *Marsdenia* (Asclepiadaceae). The larva spends most of its time in a tent constructed by leaves spun together, a habit shared by most species of Hesperiidae.

The characteristic larva of *Coeliades anchises* feeding on *Acridocarpus orientalis* in Wadi al-Asi near Nakhl

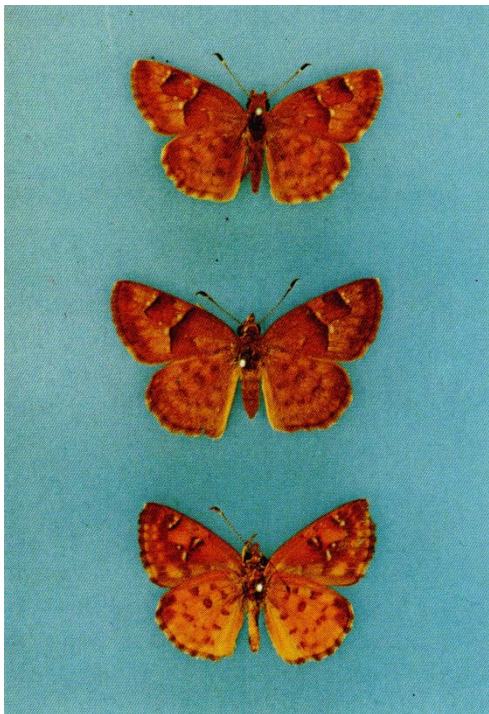


72 HesperIIDae

A specimen of *Coeliades anchises* seated on a twig from a frankincense tree



Sarangesa phidyle Orange Flat

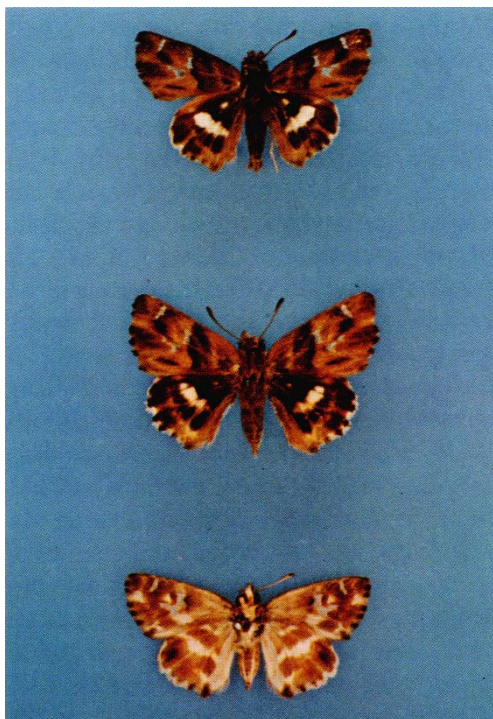


Sarangesa phidyle with its orange underside can hardly be confused with any other Omani butterfly. It is the only Arabian representative of a large genus which is well distributed in Africa and which has a few species in the Oriental region as well. The range of *phidyle* covers all of dry tropical Africa and it penetrates further into the desert regions than other members of the genus which accounts for its presence in Arabia. It has been taken in Dhofar by most visiting collectors. I found it relatively common though somewhat localised both on the coast, in the wooded scarp and in the drier, north facing valleys (e.g. at Aqabat al Hatab). The butterfly has a fast flight very close to the ground on which it settles often with the wings held flat; it is also attracted to flowers. During the heat of the day small numbers sometimes congregate in shady places such as small caves. The food plants appear to be unknown, but other species of *Sarangesa* have usually been found on various Acanthaceae.

Gomalia elma

African Mallow Skipper

Gomalia elma is a nondescript little butterfly which could be mistaken for a moth; the characteristic contrast between the brownish forewings and the blackish hindwings with white spots is very noticeable. There is considerable variation, both seasonally and individually, in the tone of the ground colour and in size; dry season specimens are usually smaller and lighter than those of the wet season. The butterfly is widely distributed in dry tropical Africa, through Southern Arabia to much of the Indian subcontinent. In Oman it is quite common in Dhofar and it has been recorded from many localities in Northern Oman. I did not find it in Musandam, but it may well eventually turn up there since conditions appear suitable.

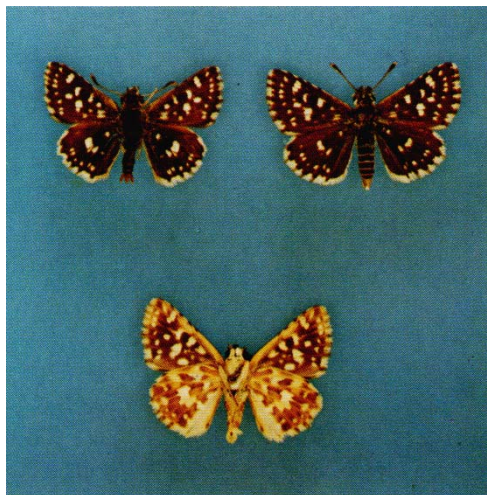


Abutilon pannosum photographed at Rostaq. A colony of *Gomalia elma* was living on this plant

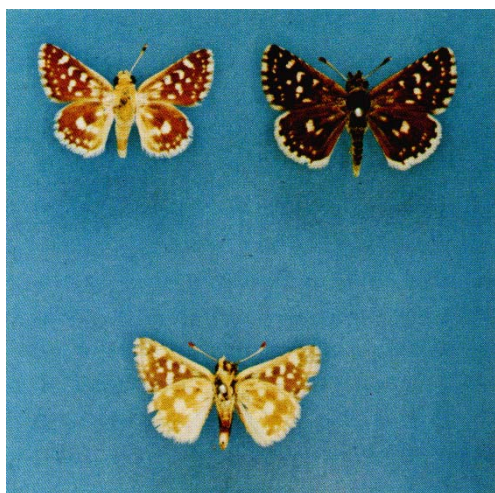
In Northern Oman the species inhabits rough ground on the foothills of both sides of the Jabal Akhdar (Nizwa, Bahla and near Rostaq), but it lives under oasis conditions as well (Batina coast and Rostaq). The flight is rapid and normally very close to the ground; males are territorial and select a perch from which they fly forth to chase off any intruders. K M Guichard suspected that the food plant in the wild was *Sida cordata* (Malvaceae); under oasis conditions the food plant certainly is *Abutilon pannosum* (Malvaceae), *munaqqā* in Arabic (see photo and Mandaville, p 16).



Spialia zebra
Zebra Grizzled Skipper



Spialia mafa
Mafa Grizzled Skipper



Spialia doris
Desert Grizzled Skipper

The *Spialia* group is an interesting but complex one, five representatives of which are known from Oman, with the possibility that one or two more might turn up in Dhofar. They are difficult to identify, but the following notes in conjunction with the photographs should serve to tell them apart. *S. mangana* never has the minute marginal spots on the upperside of all four wings which are present to a varying degree in the other four. *S. zebra* has a clearly defined white band on the underside of the hindwings in the same way as *mangana*; in the three remaining species the white markings on the underside are broken up in spots. *S. colotes* has a series of white spots on the underside of the hindwings which almost touch so as to form a complete but very irregular band; in addition it has two of the minute marginal spots on the upperside of the



Spialia colotes

Transvaal Grizzled Skipper

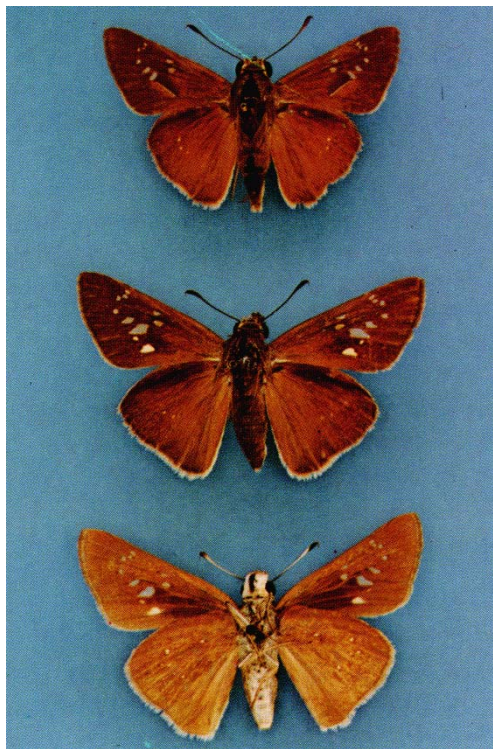
hindwings displaced inwards so that they are out of line. *S. doris* and *S. mafa* are almost impossible to distinguish without anatomical examination, but there are subtle differences in the pattern of the underside of the hindwings and the ground colour of *doris* is lighter than that of *mafa*. *Spialia mangana* is known only from Ethiopia, Somalia and Southwestern Arabia. A single specimen was caught at Ayun in Dhofar by P Granville White during the 1977 Oman Flora and Fauna Survey. The food plant is unknown and indeed little information on the butterfly is available. *S. colotes* is found in Southern and Eastern Africa as well as in Southwestern Arabia. The first Omani specimens were caught in 1977 in Dhofar at Aqabat al Hatab and along the Salalah-Thamarit road, where I also found it in October 1979. Its food plant is unknown. *S. zebra* is known from Eastern Africa through Southern Arabia to Baluchistan. It has been found in many localities in Dhofar and might be expected



Spialia mangana

Arabian Grizzled Skipper

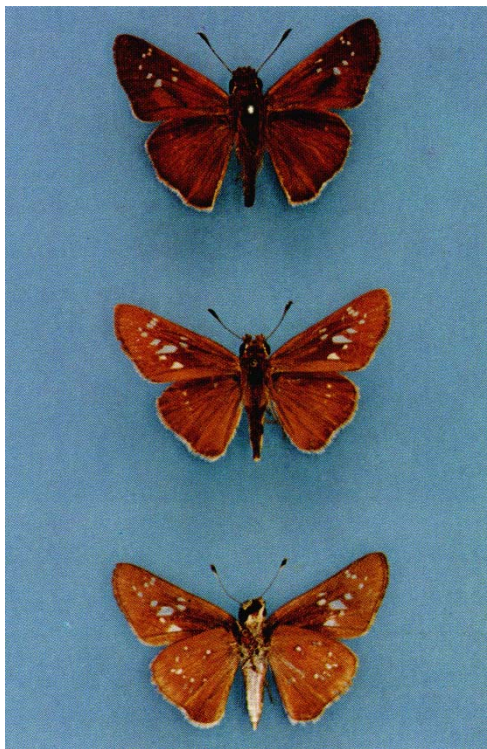
is Northern Oman. The only known food plants are species of *Melhanina* (Sterculiaceae). *S. doris* has a more northerly distribution than the other species, being found in Morocco, Egypt, Jordan, Arabia, East Africa, Southern Iran and Northwestern India. In Oman it is relatively common in Dhofar and I took a specimen on Jazirat al Ghanam, an island off the Musandam coast, in February 1979. Doubtless it occurs in Northern Oman as well. The food plants are species of Convolvulaceae (see Mandaville, pp 45-46). Finally *S. mafa* is found in Southern Africa, East Africa and Southern Arabia. It has been taken at Khasab in the Musandam peninsula, at Nizwa and Rostaq in Northern Oman and I took a few specimens in the Ayun area of Dhofar. The only known food plant is *Hibiscus aethiopicus*. All the species frequent rough open ground where they fly very fast close to the ground, often settling on the bare earth or on flowers. Several species may fly together.



Pelopidas thrax

Millet Skipper

The two species of *Pelopidas* are very similar indeed. The males have a streak of specialised sexual scales on the forewings, which is white in *thrax* and black in *mathias*. The females are identical. However, the underside of the hindwings in both sexes of *mathias* usually has a series of minute white spots in the cell and in each of the intervals between the veins. It is just possible to confuse the female of *Gegenes pumilio* (see next page) with that of the *Pelopidas*, but the light spots of the former species are not semi-transparent as in the two latter. Both species are widely distributed in dry Africa, in Arabia and in parts of the Oriental region; *thrax* manages to penetrate to the Mediterranean area in



Pelopidas mathias

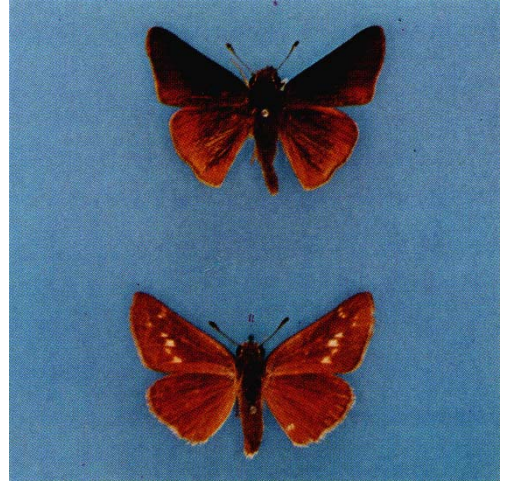
Lesser Millet Skipper

Jordan Lebanon and Egypt. In Oman *mathias* was found in several localities in Dhofar by the 1977 Oman Flora and Fauna Survey; K M Guichard caught a specimen in Rostaq in April 1976; I caught a single male at Khasab in Musandam in February 1979. So far *thrax* has only been found in Northern Oman (Rostaq and Wadi Sahtan) but it is certain to occur in Dhofar and probably in Musandam as well. In Oman they are undoubtedly chiefly oasis insects. The flight is rapid, but they often settle to feed on flowers or to bask in the sun. The food plants are grasses, including rice, wheat and millet; it is unlikely that the species ever occur in sufficient numbers to do damage.

Gegenes pumilio

Pigmy Skipper

This little skipper may be immediately recognised by the completely unmarked and very dark upperside of the male. The female does have some lighter spots, but unlike the species of *Pelopidas*, these spots are not semi-transparent. A further species, *Gegenes nostrodamus*, is almost certain to occur in Oman. It is normally larger and somewhat lighter than *pumilio*, though dissection is advisable to make absolutely sure. *G. pumilio* is widespread in tropical Africa, the Mediterranean area and the Middle East to Northwestern India. The first Arabian specimens were taken in Dhofar by P Granville White during the 1977 Oman Flora and Fauna Survey, but in 1979 I also captured it in Northern Oman and in Musandam. The chief habitat is



rough river beds where it is fond of basking in the sun, making off from time to time on furious sorties from which it often returns to the same perch. *Gegenes nostrodamus* would be more likely to turn up in oases.

Typical landscape in the foothills of the Jabal Akhdar, with flowering *Tecomella* tree (Arabic *Farfar*, Mandaville, p 52)



List of scientific names

PAPILONIDAE

Papilioninae

<i>Papilio machaon muetingi</i> Seyer 1976	19
<i>Papilio demoleus demoleus</i> Linné 1764	19
<i>Papilio demodocus demodocus</i> Esper 1798	19

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<i>Pontia daplidice daplidice</i> Linné 1758	22
<i>Pontia glauconome glauconome</i> Klug 1829	22
<i>Euchloe belemia</i> ssp.	25
<i>Elphinstonia charlonia amseli</i> Gross & Ebert 1975	26
<i>Anaphaeis aurota aurota</i> Fabricius 1793	27
<i>Pinacopteryx eripha tritogenia</i> Klug 1829	28
<i>Colotis calais amatus</i> Fabricius 1775	30
<i>Colotis phisadia phisadia</i> Godart 1819	30
<i>Colotis chrysonome chrysonome</i> Klug 1829	29
<i>Colotis halimede halimede</i> Klug 1829	32
<i>Colotis danae eupompe</i> Klug 1829	34
<i>Colotis eucharis evame</i> Klug 1829	34
<i>Colotis antevippe zera</i> Lucas 1852	34
<i>Colotis liagore</i> Klug 1829	33
<i>Colotis dairia dairia</i> Klug 1829	33
<i>Colotis eris contractus</i> Gabriel 1954	36
<i>Colotis fausta fausta</i> Olivier 1804	37
<i>Nepheronia buqueti buehneri</i> Rothschild 1921	38

Coliadinae

<i>Catopsilia florella</i> Fabricius 1775	38
<i>Eurerna hecabe senegalensis</i> Boisduval 1836	40

DANAIDAE

Danainae

<i>Danaus chrysippus chrysippus</i> Linné 1758	41
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<i>Charaxes hansali arahica</i> Riley 1931	44
<i>Stonehamia varanes bertrami</i> Riley 1931	44

Nymphalinae

<i>Melitaea abyssinica scotti</i> Higgins 1941	46
<i>Vanessa cardui cardui</i> Linné 1758	47
<i>Precis hierta cehrene</i> Trimen 1870	48
<i>Precis orithya here</i> Lang 1884	48
<i>Hypolimnas misippus</i> Linné 1764	41
<i>Bythia ilithyia ilithyia</i> Drury 1773	50

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<i>Melanitis leda</i> Drury 1807	51
<i>Hipparchia parisatis</i> Kollar 1850	51
<i>Ypthima asterope asterope</i> Klug 1832	52
<i>Ypthima bolanica</i> Marshall 1882	52

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<i>Epamera glaucus</i> Butler 1885	54
<i>Deudorix livia</i> Klug 1834	55

Aphnaeinae

<i>Apharitis myrmecophila</i> Dumont 1922	56
<i>Apharitis acamas bellatrix</i> Butler 1886	56
<i>Axiocerces harpax kadugli</i> Talbot 1935	56

Polyommatainae

<i>Anthene amarah amarah</i> Guerin 1849	58
<i>Lampides boeticus</i> Linné 1767	59
<i>Syntarucus pirithous</i> Linné 1767	59
<i>Tarucus theophrastus</i> Fabricius 1793	60
<i>Tarucus rosaceus</i> Austaut 1885	60
<i>Tarucus balkanicus</i> Freyer 1844	60
<i>Zizeeria karsandra karsandra</i> Moore 1896	62
<i>Zizeeria knysna</i> Trimen 1862	62
<i>Zizula hylax hylax</i> Fabricius 1775	62
<i>Azanus ubaldus</i> Cramer 1782	64
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<i>Freyeria trochylus trochylus</i> Freyer 1844	70
<i>Euchrysops lois</i> Butler 1885	66
<i>Euchrysops osiris</i> Hopffer 1855	66
<i>Pseudophilotes vicrama dara</i> Christoph 1890	68
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HESPERIIDAE**Coeliadinae**

<i>Coeliades anchises jucunda</i> Butler 1881	71
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Pyrginae

<i>Sarangesa phidyle</i> Walker 1870	72
<i>Gomalia elma elma</i> Trimen 1862	73
<i>Spialia mangana</i> Rebel 1899	74
<i>Spialia doris doris</i> Walker 1870	74
<i>Spialia colotes semiconfluens</i> de Jong 1978	74
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<i>Pelopidas thrax thrax</i> Hübner 1821	76
<i>Gegenes pumilio</i> ssp	77

Main references to Arabian butterflies

- Gabriel, A G 1954. *Expedition to South-West Arabia, 1937-38, Lepidoptera, Rhopalocera*. British Museum of Natural History, London
- Klug, F 1829-32. *Symbolae Physicae seu icones et descriptiones insectorum, quae ex itinere per Africam borealem et Asiam occidentalem FRIDERICI GUILHELMI HEMPRICH et CHRISTIANI GODOFERI EHRENBURG studio novae aut illustratae redierunt*. Berlin
- Larsen, T B 1977. The butterflies of Eastern Oman and their zoo-geographic composition. *The Scientific results of the Oman Flora and Fauna Survey 1975. Special Report I. Journal of Oman Studies*: 179-208
- Larsen, TB 1979. The fauna of Saudi Arabia: Lepidoptera. (Notes on a recent collection by W Büttiker in 1975 and 1976). *Fauna of Saudi Arabia*, 1: 342-344
- Larsen, T B 1980. The butterflies of Dhofar and their zoo-geographic composition. *The scientific results of the Oman Flora and Fauna Survey, 1977. Special Report II. Journal of Oman Studies* (in press).
- Pittaway, AR 1979. The butterflies and hawkmoths of Eastern Saudi Arabia. *Proc. Brit. ent. nat. Hist. Soc.*, 12: 90-101
- Pittaway, A R 1980. Butterflies of Qatar, April-June, 1979. *Ent. Gaz.*, 31: 103-111
- Rebel, H 1907. Lepidopteren aus Südarabien und von der Insel Socotra. *Denkschr. Mat.-Nat. Klasse Kaiserl. Akad. Wissensch.*, 71: 1-100
- Riley, N D 1925. List of the butterflies collected in Arabia by Captain R E Cheesman. *Ann. Mag. Nat. Hist.*, 9 (15): 151-152
- Riley, N D 1932. Butterflies, in THOMAS, B 1932. *Arabia Felix*. Jonathan Cape, London
- Wamecke, G 1930. Die Grossschmetterlinge der Hamburg, ischen Süd-Arabien-Expedition C. Rathjens-H von Wissmann. *Mitt. Münch. ent. Ges.*, 20: 21-40
- Wamecke, G 1933. Ein zweiter Beitrag zur Kenntniss der Macro-Lepidopteren-Fauna Südwest-Arabiens. *Mitt. Münch. ent. Ges.*, 23: 27-32, and *ibid.* 1934, 24: 19-20
- Wiltshire, E P 1952. Lepidoptera recently taken in Arabia. *Bull. Soc. Fouad Ier Entomol.*, 36: 135-150
- Wiltshire, E P 1964. The Lepidoptera of Bahrain. *J. Bombay Nat. Hist. Soc.*, 61: 119-141

Notes on photographs

When three specimens of a butterfly are shown on a plate, the male is at the top or on the left, the female to the right or immediately below the male. The underside is illustrated below the male and female except on pages 26, 59 and 68 where it is between the male and female. When only two specimens are shown, the male and the underside are illustrated unless the sexes are very different in which case a female upperside is included.

Front cover illustration:
Danaus chrysippus



Hypolimnas bolina (female)



Melanitis leda (male)