THE NATURALIST ON CHIOS

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PUBLISHED BY
THE PREFECTURE OF CHIOS
2003

Contents

Map of Chios

Introduction

Commencing in 1992 I have been visiting Chios for holidays, the time on Chios since my retirement in early 1995 averaging nearly six months each year. My interests in all aspects of natural history, including a major invertebrate biodiversity study with the help of the Liverpool Museum and by colleagues from other U.K. institutions has given me a broad insight into Chios natural history. I have also undertaken much field investigation with local naturalists, from whom I have also received much help.

Chios is virtually unknown by Western Europeans interested in natural history. This is particularly the case in the U.K. which does not have any direct holiday charter flights operating to Chios.

Chios is the fifth largest Greek island , smaller than Lesvos thirty miles to the north and larger than Samos forty five miles to the southeast. Due to a combination of natural disasters and human conflict , Chios has suffered from a depressed economy relative to its neighbours , with little industrial or holiday accommodation development. Agricultural activity is non-intensive and patchy in nature and this has contributed to the retention of much of the natural landscape and to the preservation and protection of native plants and animals.

Pelinaeon Mountain

Chios has a very varied geology and an impressive topographic range capped by the Pelinaeon mountain in the north of the island which is 4250 ft high , considerably higher than on any other island in the region. Its location close to the Turkish mainland, opposite the Izmir Peninsular, provides a warm climate in a position in the centre of one of Europes main bird migration routes.

Its geological history and isolation, combined with its varied geology and topography, has lead to the evolution of numbers of plants and animals unique to the island. In many ways, Chios can offer the perfect holiday destination for the naturalist with wide ranging interests in plants and animals.

Chios has not suffered from the excesses of visually intrusive, environmentally damaging and inappropriate developments seen in many other Mediterranean areas. On the contrary many of the old properties in the villages are being gradually modernised with tasteful and sympathetic care to ensure the preservation of their character for the benefit of future generations of citizens and visitors.

Chios's compact shape and the recently developed network of good roads enables all parts of the island to be easily reached. This ensures that the visiting naturalist can enjoy the nature of Chios without the fatigue of long transit journeys between places of interest, thus maximising the time spent seeing plants and animals of interest. English is widely spoken and understood on Chios, and the people are very friendly and helpful.

West coast of Chios

Birds on Chios

Chios offers a similar birdwatching experience to that enjoyed by the large numbers of birdwatchers who visit Lesvos in April and May each year. Some 95% of the bird species seen on Lesvos at this time of year can also be seen on Chios, in many cases the birds can be found more readily on Chios and when located often offer better viewing prospects

There are three species resident on Lesvos which do not occur on Chios, namely , Rock and Kreupers Nuthatches and Middle Spotted Woodpecker. On the other hand I have found two migrant species on Chios which have not been recorded on Lesvos. The first European Upchers Warbler was found near Marmaro in the spring of 1997 when I was with a group of birdwatching friends of mine who were staying with me. In 2001 whilst carrying out some invertebrate biodiversity survey work on Marmaro Marsh I found a dark phase Western Reef Heron feeding along one of the many drainage ditches. In late winter I have also found the handsome and elusive Pine Bunting in the marsh. Research by Iannis Choremi and others in the early 1970's proved the presence, during September and October each year, of up to at least ten to fifteen Red-fronted Serin on Chios. This species, previously unrecorded from Europe, was known previously from Turkey. Apart from single records subsequently from Chalkis and Lesvos, Chios remains the only known European location for this species. The resident Jay on the island is of the Black-headed eastern group ' *atricapillus'*, this Taxon, *Garrulus glandarius anatoliae* being confined to the islands of Lesvos, Chios, Rhodes and Kos. A total of 66 species of birds are believed to breed on Chios.

The large rivers which feed into the Gulf of Kalloni and the Salt Pans provide the only significant habitat on Lesvos not represented on Chios. However nearly all the species of birds seen in these habitats also occur on Chios though not as consistantly and in the numbers seen in Lesvos.

During the peak period of the spring migration the changeable weather to be expected at that time of year can often lead to spectacular 'falls ' of migrating birds. Tens of thousands of birds seek shelter on Chios during brief periods of bad weather. I can still vividly recall my garden and adjacent properties in Vrondados giving shelter to scores of Whinchats and Pied and Collared Flycatchers with one olive tree in the garden 'decorated' with three pairs of Golden Orioles. During these passages of migrants occasional uncommon visitors also pass through my garden , including one Ruppells Warbler feeding on a shrub some six feet beyond my stretched out legs as I was drinking a glass of beer one lunchtime !!! This visitor making a welcome variation to the continuous visits by Olivaceous Warblers which breed each year in and around the garden.

Many of the rarer species of breeding birds which are eagerly sought by visiting birdwatchers on Lesvos are also to be found on Chios. Breeding Buntings include Black-headed and Cretzchmars Buntings both common on Chios. Breeding pairs of the rare Cinereous Bunting are found each year in the upland areas of north-central Chios amongst scattered pine trees. A visit to one of the easily accessible regular breeding sites will usually give the keen birdwatcher good views of these elusive birds. I well remember spending half an hour or so watching from my car parked on a mountain road the parents of three recently fledged juveniles feeding their offspring with large green crickets, the family party being only some twenty yards away.

These same upland areas, including those wooded areas in the southern parts of Chios hold many breeding Woodchat and Masked Shrikes. Rufous Bush Chats breed in the more open hilly areas in south-central Chios, the wonderful aerobatic 'butterfly' display flights of the ardent male suiter to his mate in which he loops and stalls to display his spread tail feathers is unforgetable , and remains for me one of the most memorable and spectacular displays of 'airmanship' in nature.

Birds of prey are always of great interest to birdwatchers and Chios has many resident and visiting species to be seen. Three species of owls occur on Chios, the Little Owl and Barn Owl being residents. Three years ago a pair of Barn Owls nested in one of the ruined stone buildings in the Kampos area not far from the airport. The calls of the summer visiting and breeding Scops Owls are one of the most widespread and characteristic sounds of Chios summer nights.

Short-toed Eagles and Long-legged Buzzards are widespread on Chios throughout the year. Some traditional nest sites on inland cliff ledges having accumulated large quantities of nest material over the years. Display flying near the nest sites and aerial food passes being observed occasionally. Two years ago a male Booted Eagle spent the summer near Volissos in an area containing numbers of very large old oak trees, this habitat being typical Booted Eagle breeding territory, hopefully one day they may return to breed here as they once did in the splendid Kampia Gorge. One September my daughter and I whilst walking the north coast road from Leptopoda to Kampia Beach were lucky enough to see a migrating family party of two adult and three juvenile Booted Eagles flying in a westerly direction towards Agiasmata, as they flew slowly past us at the same height as the road, we had wonderfully close views of all the individual birds.

In the spring large groups of Red-footed Falcons can be seen from time to time migrating northwards to their breeding grounds in the Balkans, the largest group I have seen numbered more than forty individuals. They had rested overnight in a sheltered upland valley near Armolia, I only found them because I had to get to the valley before dawn to recover some insects from a light trap I had set the previous evening. Just after first light the falcons were on the wing again.

Eleanoras Falcons are common summer visitors to Chios, they can be seen hawking for insects, mainly dragonflies, on their long slender wings over the orchards , fields and mountains of Chios. This species of falcon delays its breeding until later in the summer when the adults prey on young swallows and martins on which to feed their young. They breed as a colony on the small offshore island of Venetico just to the southeast of Chios. Honey Buzzards, Marsh Harriers and Hobbies are regularly seen in Chios as they pass over the island during migration periods.

An opportunity to take a boat trip round the southern tip of Chios should not be missed as this will offer the keen birdwatcher close views of birds otherwise difficult to see. Corys and Yelkouan Shearwaters will be encountered wheeling and skimming just above the waves. Approaching the southern tip of Chios some of the annually increasing numbers of Audouins Gulls will be seen flying and also resting on the eastern facing rocky slopes where courtship display was observed in 2001. Perhaps they will soon establish a breeding colony here. Peregrine Falcons can also be seen in this part of the coast as well as numbers of Pallid Swifts which nest in the sea caves and rocky clefts and fissures.

Kingfisher

Chios has its share of colourful birds as well, Bee Eaters have bred in the Volissos area since 2001 and Kingfishers are frequently seen fishing at Kato Fana, Lithi and Elinta. This year the presence of a pair of birds in the area of clay pits and freshwater pools at the abandoned Thimiana Brickworks indicate the potential for breeding to occur. Hoopoe and the different races of the Yellow Wagtail are common during spring migration and will allow close approach by the careful birdwatcher.

Chios has its share of unremarkable but nevertheless interesting 'Little Brown Jobs', often of particular interest to the more advanced birdwatcher. The same upland valley near Armolia which was the scene of the migrating group of Red-footed Falcons and the displaying Rufous Bush Chat, is the best place to see Olive Tree Warblers as my birdwatching friends and I discovered in 1997 when half a dozen singing males were found there. This valley also has regular breeding Masked Shrikes and Chukar.

Larger birds can be see on migration including groups of Little Egrets, Purple Herons and Glossy Ibis. A variety of wading birds can be seen on shorelines, estuaries, banks of seasonal streams, marshland and drainage ditches, including Wood, Green and Common Sandpipers. Little Bitterns, Crakes and Water Rails are to be found in brackish pools at the backs of beaches, such as at Kato Fana, Elinta and Kampia Beach, and on permanent marsh areas such as at Marmaro. Occasionaly much larger birds are seen including a Black Stork which I observed for about half an hour feeding in fields one spring at Kalamoti in south Chios. The shoreline at Managros had a flock of over a hundred Gargany on the 24th March 2003 where they had paused to rest on the beach whilst on migration northwards. The drier areas behind the beach hosts a variety of other migrants from time to time including, Stone Curlews, Quail, Tawny Pipits, Montagues and Hen Harriers.

A walk in the beautiful Kampia Gorge, which runs for a distance of about two miles from Kampia Village to Kampia Beach, in mid May is a joy to the general naturalist as the Gorge is far away from any roads and the air is filled only with the sound of singing Nightingales, rippling water and the buzzing of bees. It is also the home of many rare and interesting plants and insects

Wildflowers on Chios.

The wildflowers of Chios can be enjoyed by visitors throughout the year. However the variety and profusion of flowers is greatest from late winter to early summer.

Autumn and winter landscapes have fine showings of Colchicum, Cyclamen, Crocus, Sternbergia and many other plants.

In late winter, flowers of the Giant Orchid, *Himantoglossum robertianum,* appear in widespread localities throughout Chios. As the season progresses a succession of many different species of flowers reveal themselves and paint the landscapes in an ever changing pallette of colours.

Spring flowers at Managros

Due to the non-intensive and patchy agricultural practices in Chios there are always places of varied botanical interest in close proximity to each other, so many different species can be found in relatively small areas. The varied geology, the height of the hills and mountains and the climatic differences within the slopes, valleys and watercourses of the island coupled with the influences of compass orientation, gives numerous niche microclimates. The succession of flowers in the south of the island comes weeks earlier than on the northern mountain slopes, so a visitor in the peak flowering season can experience early, mid and late flowering species by moving relatively short distances.

The succession of spring and summer flowers includes four species of Anemones, four species of Tulip, four species of Poppies, Gladiolus, Cistus, Spartium, Nigella, Iris and many other species. Herbs including Sage and Origanum are in abundance and they contribute in great measure to the sweet perfumes which pervade the air of Chios during the flowering period.

There are many superb locations offering very different flower rich displays, amongst the best are :-

Kato Fana Beach

Spring Flowers at Kato Fana

Kato Fana on the southern coast of Chios has a fine undeveloped sandy beach, brackish pools, and flower rich areas behind the beach. It is particularly good for its displays of beach and dune flora in April and for Holy Orchid, *Orchis sancta*, in May.

Managros beach on the west coast of Chios near Volissos is a 3 Km long stretch of sand and gravel beach with a superb undeveloped hinterland of dunes and sandy gravels with a rich associated flora. The displays of spring flowers are particularly stunning and are at their best in late March to mid April.

Marmaro Marsh is the only remaining significant permanent freshwater marsh on Chios and offers fine displays of the associated specialist marsh plants.

Pelinaeon mountain has been the subject of botanical research for many years and has yielded several new species endemic to the mountain and so far not yet found anywhere else in Greece. These species include *Atraphaxis billardierei* and a beautiful yellow Fritillary, *Fritillaria pelinea.* The slopes at 2000 ft above the village of Viki are complete carpets of numerous species of flowering plants in April, reminiscent of alpine meadows.

Kampia Gorge is a deep narrow valley in the north of Chios featuring a permanent stream and many mature deciduous trees. It is two miles long and contains many interesting plants. It also has great scenic beauty and is at its best in mid May when the explorer can enjoy its cooling dappled shade and plants and creatures to the accompanyment of serenading Nightingales.

Coastal cliffs near Vrondados and Emporios, both on the east coast, are the habitat of the local and beautiful *Campanula hagielia* flowering in April and only found in the eastern Aegean and western Anatolia.

The lower hills in south central and south Chios near the villages of Pyrgi, Olympi and Mesta are rich in maquis flora and are particularly good for some of the rarer orchids.

In central Chios the western coastal village of Lithi and the inland villages of Anavatos and Avgonima are particularly rich in Orchids and Iris where numerous species are common amongst the limestone rocks.

As an example of the richness of the Chios flora one can do no better than describe the extensive numbers of taxa of orchids so far discovered on the island. Whilst the list is impressively large, there must be many other species on Chios which are as yet undetected. In the last two seasons, 2002 and 2003, five taxa have been added to the list. Orchid research on Chios has also been undertaken by occasional visits by botanists including Hirth and Spaeth, however much of the credit for our current knowledge must go to Pandelis Saliaris, a Civil Engineer working for the Region of the Northeast Aegean, who spends most of his free time during the orchid flowering season looking for new species and mapping the locations of all the species on the island. He recently published his illustrated book on the Orchids of Chios.

For a number of years Pandelis has hosted visits to Chios by a number of European orchid specialists. In recognition of the richness of its orchid flora, now shown to be one of the richest in Europe with well over 80 taxa, the International Orchid Convention will be taking place in Chios in 2005, timed to coincide with the flowering time of some of the rare species. This convention is supported by the Prefect, Mayors and citizens of Chios who are keen to encourage visits of 'Eco-tourists'.

By way of illustration of the range of taxa on Chios, the following notes will give the reader an impression of the potential for visiting orchid enthusiasts.

Ophrys homeri. This rare orchid was found in Chios in 1991 by the German botanists Hirth and Spaeth and described by them and published as a new species in 1997, with Chios as the type locality. It has been found subsequently in Kos and Lesvos, and in Mugli, Turkey. It has been found in a many places in central and southern areas of Chios including Elinta, Lithi, Ag Pateres and Pyrgi where it flowers in April and May.

Ophrys reinholdii var *leucotenia. Ophrys reinholdii* has been known to occur on Chios since the early 1990's when they were found in two localities in the northwest growing amongst oak trees where they flower in March and April. In May 2003 I found, in the company of Pandelis Saliaris, eight plants of *O.reinholdii* var *leucotenia* at about 2000 ft altitude on the northern slopes of Pelinaeon in open pine woods. The type locality of this variety is in the Antalya region of southwest Turkey where it is known only from six sites, hitherto the only known locations until its discovery on Chios.

Ophrys phrygia. This species was described in 1923 from plants found in the Antalya region of southwest Turkey, still the principal location for the species. It was discovered in several place on Chios within the last ten years mainly in central and northern parts of the island including Vrondados, Viki and Issidoros where it flowers in May.

Ophrys omegaifera. Another rare and localised species described in 1923 from plants found in Crete. It is now known from the Cyclades, Crete, Karpathos and Rhodes. The plants on Chios representing the most northerly known location. In Chios it has been found at many locations throughout the island including Viki, Vrondados, Anavatos and Mesta. It is also found in south-west Anatolia. It flowers from early March to mid April.

Ophrys regis-ferdinandii. This attractive, rare and local orchid was described in 1939 from plants found in Rhodes. It has now also been found in Simi, Tilos, and Samos. It is widespread and locally common in the southern half of Chios. It has also been discovered in Turkey near Cesme and Kucadaci. It flowers in March and April.

Orchis anatolica. This beautiful orchid is widespread and locally abundant on Chios, though it is generally considered to be local and rare elsewhere. It occurrs in a great variety of colour forms and its abundance has lead to the presence of many hybrids with other species on the island. It flowers from March to May. It is also known from the Cyclades and Crete in the west, to Lebanon, Syria and Israel in the east.

Orchis sancta. This attractive orchid is widespread and common throughout the lower areas of Chios. Its name of *sancta* was given because the flower has the appearance of a face hooded by a monks cowl. It is considered a rare orchid within its range of Greece, Turkey, and on the Meditteranean coast down to Israel, however it occurs in large numbers on Chios, particularly behind the beach at Kato Fana in May when it flowers after the leaves have died down.

Orchis anthropophora. I discovered this orchid on Chios in April 2002, near Olympi. It is generally considered to be rare in the eastern Aegean, though it has also been found on Lesvos. A detailed search around the original site near Olympi in 2003 found over twenty plants, with a further eight plants at a new site north of Mesta and three plants near Limenas. The individual florets are most attractive, resembling a cream and pink human figure wearing a bowler hat. The plants in Chios were all found in and near maquis vegetation with juniper content.

Insects on Chios

A study into the invertebrate biodiversity of Chios, which has been in progress now since the early 1990's by Liverpool Museum, has established the existence on Chios of a rich and varied fauna.

Butterflies and Moths

Butterflies were the only group of insects for which any sustained attempt had been made to identify the species occurring on Chios prior to the Liverpool Museum survey. This earlier research had shown that one species of butterfly, Chios Meadow Brown, *Maniola chia,* was an endemic, only found on Chios and the adjacent small island of Innousis. This butterfly is widespread and common on Chios in the summer. The survey has added 6 species of butterflies to the previously known total of 50. The most notable addition being the Plain Tiger, *Danaus chrysippus*, a very rare and specially protected species in Greece whose Chios stronghold is at Kato Fana where it has established a foothold probably reinforced by migration.

Two other species of protected butterflies also occur widely on Chios, the False Apollo, *Archon apollinus* and the Eastern Festoon, *Zerynthia cerysi* , both feeding as larvae on Birthworts, *Aristolochia* species, they are locally common on Chios. These two species fly early in the season being on the wing in March and April. They are particularly common in the northwest near the villages of Aphrodesia, Keramos and Leptopoda, and in south central Chios near the villages of Armolia, Kalimassia and Kataraktis. The Two-tailed Pasha, *Charaxes jasius* , is a very local butterfly on Chios and difficult to find, it has been seen occasionally on the south coast at Kato Fana and on the west coast at Lithi. The larval foodplants are the Strawberry Tree, *Arbutus unedo,* and the Eastern Strawberry Tree, *Arbutus andrachne,* both of which grow on Chios. The larvae are cryptically coloured to match the branches and twigs of the foodplant and are very difficult to see.

The total number of species of Lepidoptera identified to date is 430 including the discovery of possibly three species of moth new to science, subject to ongoing study prior to publication of descriptive papers in scientific journals. Six species have been identified from Chios which represent first European records.

Bees, Wasps and Ants

The Liverpool Museum survey has proved the presence of a large number of species of Bees, Wasps and Ants, (*Hymenoptera*), on Chios. The ants have been subjected to detailed study resulting in the recording of over 80 species, far more than recorded for any other Greek island. Kato Fana has proved to be particularly rich with 19 species recorded so far.

Spider hunting wasps, *Pompilidae,* are numerous on Chios with over 40 species identified to date. These wasps prey on spiders which they hunt by running over the ground on their long legs with a somewhat frantic darting gait, and long twitching curled antennae, diving beneath stones and pebbles and creeping amongst the roots of vegetation. They seize their prey and paralyse them with a surgical and accurate injection of venom into the spiders main nerve centres. The paralysed spider is then taken into the wasps nest chamber, usually a hole in the ground. The wasp then lays an egg on the spiders body which is a living food source for the growing larva. One of the largest species found on Chios is, *Cryptocheilus alternatus,* this has a wingspan of about 50mm and preys on species of large spiders. It is well known for preying on the large *Tarantula* spider, however its prey on Chios is other large spiders including *Pseudotarantula*. I have found this large wasp in the northwest of Chios behind the beaches at Managros and Agios Markella. Other species of these wasps are generally distributed on Chios and can be seen wherever their prey are to be found.

There are a number of other large predatory wasps on Chios, some of the most noticeable being the rich purply-brown winged, yellow and brown bodied wasps of the family *Scoliidae,* the species most often seen is *Scolia flavifrons,* the females of this species are the largest wasps found on Chios measuring up to 60mm in wingspan and 30mm in body length. The females burrow underground seeking out beetle grubs, including those of scarabs and chafers, these are paralised with an injection of venom and an egg of the wasp is then positioned on the body of the victim. The growing larvae feeds externally on the grub, first eating the non-vital parts of the body so as to avoid early putrifaction which would result from the early death of the prey. These wasps are widespread and common in the summer throughout the lower levels of Chios and can often be seen nectaring on wildflowers and shrubs. The smaller males are particularly fond of the flower heads of onion plants.

Social Wasps, *Vespidae,* of several species, are found throughout the island and generally are of great benefit. These wasps are carnivorous, feeding their larvae on pulped up insects, many of them harmful to gardeners and farmers. Bees in contrast are vegetarian, feeding their larvae on honey and pollen. Man has harnessed the hard working bee to provide honey from the stores built by the bees during the summer months. Social Wasps do not store food, neither do they swarm in order to establish

new colonies. At the end of the winter only mated female Social Wasps survive and they make a small nest out of paper produced by chewing wood and bark fibres.

Once the colony has expanded sufficiently, successive generations of workers tend the growing numbers of larvae in the nest by providing pulped insects as food, and making more nest cells, the queen then devotes all her energy to egg laying. During the course of the summer and autumn a nest can often produce 20000 or more individual wasps.

From mid summer to late autumn as the colony reduces the production of new workers and only raises a small number of fertile males and females, many workers cease searching for insect prey for the larvae and start to indulge in their fondness for sweet things like nectar and fruit. It is at this time that wasps can become very troublesome to people in country and seaside areas, particularly when eating and drinking in tavernas or having a picnic on a beach.

Like Bees, Social Wasps need good supplies of fresh water for the colony and much effort is expended in searching for and carrying water back to the nests, individuals flying several Km for this purpose when necessary. Areas of Chios with narrowly confined water supplies in otherwise very productive habitats for their food sources can show huge concentrations of Bees and Wasps at the localised source of water. This explains why Elinta can probably claim the title of 'Wasp Capital of Chios'. The underlying ground beneath the Elinta water course is formed from a thick layer of water impermiable clay.

All the water falling in a huge limestone catchment area to the north and east of Elinta, several square Km in extent, is channelled by this geological feature to exit into the sea at or below the shore line. This has given rise to the reedbeds immediately behind the beach at Elinta, which provide perfect breeding grounds for Mosquitos and blood sucking Horse Flies such as *Tabanus lunatus* . The fresh water spring line gives rise to free running water particularly along the centre and eastern sections of the pebble beach from about six feet above sea level, the head of water in the surrounding mountains also causes fresh water to be discharged from the seabed to a significant distance seawards. This section of beach is the best place in Chios for observation by naturalists interested in Bees and both Social and Solitary wasps. A swimmer in the waters just near to this part of the beach can see the peculiar optical distortion created by the mixing of streams of water with different salinity, the growth of specialised stone clinging weeds which require semi-saline conditions are to be seen at their best at this location.

Whilst observing the Social Wasps in mid to late summer at Elinta I have frequently seen holydaymakers coming onto an apparently attractive but yet deserted beach only to have to quickly abandon it due to unacceptable numbers of wasps. These wasps are even attracted to the heads of swimmers some distance from the shore, presumably because the swimmers hair is soaked in low salinity water. This unnacceptable level of wasp activity presumably explains the lack of housing or commercial interest in providing refreshment facilities at Elinta. Any attempt to spray the wasps with insecticides would be frought with problems due to the high level of collateral damage likely to be inflicted on the commercially valuable Hive Bees, much in evidence in the catchment area involved.

Many different species of Solitary Bees are to be found on Chios sustained by the extensive range of flowering plants found on the island.

Flies

Some families of two-winged flies, *Diptera*, have been the subject of detailed research by the Liverpool Musem and in the case of the Robber Flies, *Asilidae*, 40 different species have been found on the island though all have not yet been named , due to the need for taxanomic revision within the family. Three potentially new species have been found, currently subject to further study.

Two specimens of a rare species of Robber Fly, *Andrenosoma cornuta*, were discovered at Elinta and Agiasmata in 1997, the first Greek and European records, these were found close to the beaches at both sites. This species was described fifty years ago from three immature specimens taken in Turkey. No further specimens were seen until their rediscovery on Chios. The insect was not found in these two sites despite repeated searches in subsequent years. Fortunately in September 2002 a small colony was discovered on the coast just to the north of Gridia. A paper will be published in due course describing the habitat requirements and courtship and hunting behaviour of this species following further research on this colony.

An extraordinary attack by a large Robber Fly of the genus *Stenopogon*, (species probably *junceus*), was observed and photographed at Kato Fana where the prey species was a very large Antlion, *Palpares libelluloides.* This was unusual in that the span of the prey was four times larger than that of the predator. Because the predator is usually much larger than the prey in the Asilidae, photographs of the attack were of great interest to researchers into Robber Fly behaviour in the U.S.A.

Some Hover Fly, *Syrphidae*, genera have been the subject of detailed study on Chios where the range of available foodplants is particularly large and has the potential of hosting a large number of species . The genus *Merodon* is represented by fifteen species on the island. This genus includes a number of large, noticeable and attractive species which are sure to draw the attention of the naturalist because of their active and intrusive territorial defense behaviour. These insects can be found throughout the island wherever their foodplants occur. The larvae of this family feed on plants with bulbs or tuberous roots.

Some rare species of *Merodon* have been discovered on Chios including *Merodon toscanus*, which was described by the Dutch entomologist Hurkmans in 1993 from a single male specimen which he had taken in Italy. The single male taken in June 2001 between Armolia and Tholopotami being the second known specimen. Another rare species, *Merodon hamifera*, has been discovered on Chios with two males at Amahdes and a single male in Leptopoda. These were the first records since the original specimens were taken in Turkey over a hundred years ago and a single specimen was taken in Samos about seventy years ago. Colleagues from the U.K. and I have recently discovered a strong colony of this fly at Ag Iassos in Lesvos.

Two potentially new species of *Merodon* have been found on Chios and these are the subject of further study with the intention of publishing descriptions in due course. The early stages of many of the species occurring on Chios have unknown foodplants and their larvae have never been identified. The discovery of their foodplants and the preparation of detailed descriptions of the early stages would make a good project for a student of natural history on the island.

In April and May, insects which look like wasps may be seen nectaring on the spring flowers and are also to be seen flying slowly close to the ground amongst vegetation alongside country footpaths. Some of these insects are not wasps, they are Hoverflies which mimic them. This strategy protects them from potential predators who mistake them for wasps which have to be avoided. So far two species of flies of the genus *Xanthogramma* have been found on Chios. The photograph shows a female of *X. citrofasciatum* nectaring on a flower near Pagida early in April. Females seek out colonies of ants of the genus *Lasius,* these ants tend and protect underground 'herds ' of root aphids from which they receive sugary honeydew secretions in return for protection by these ants from their predators. However the larvae of *Xanthogramma* have developed methods to defeat the ants protection and successfully feed upon the aphids. Many other species of Hoverflies from many different genera also prey on aphids in their larval stages but these feed on different species of aphids in quite different ways.

A number of interesting Horse Flies, *Tabanidae,* have been found in Chios including a very rare endemic Greek species, *Haematopota graeca* . This species was described by the Hungarian entomologist, Szilady, from three specimens taken on Poros, however they were all lost when the museum in Budapest was destroyed during the Hungarian uprising in 1956. It had not been seen subsequently until its recent rediscovery at Kato Fana. It occurs in small numbers in the area immediately behind the beach, mainly in September and October and very occasionally in May. In the last six years an average of three specimens have been seen per year. They seem to be most common following wet winters.

Specimens of a large species of Horse Fly *Tabanus prometheus,* have been taken occasionally in north and central Chios, this species was previously known only from Transcaucasus, Iran and Bulgaria. One of the commonest species seen in June is

Tabanus lunatus, which occurs widely throughout the Mediterranean region. The females of this species readily seek blood from animals and humans, the females have bright green eyes with three lateral bands, bright magenta in colour. These insects can occur in large numbers and can cause serious loss of condition in animals such as horses, donkeys and cattle due to blood loss. In June 2001 I found a white cow tethered in a field to the west of Pitios, its legs were covered with hundreds of *T.lunatus* and one *T.prometheus,* as a result of this mass attack all of its legs were running with blood upon which the swarm of Horse Flies were feeding.

There are accounts of this behaviour in Africa, however this was the first time I have witnessed such an event. At the same time I noticed some donkeys in the village also attracting numbers of the same species of Horse Fly. Some villagers in Viki recently related to me the case of a donkey in the village which had died of blood loss as a result of a similar attack.

An investigation into these attacks in central Europe has shown that mass attacks peak at around 11am, the time I witnessed the Pitios attack, to be followed by a second attack at around 2pm. The literature on these flies indicate that these attacks usually follow a mass emergence at a time of very hot, calm and humid weather conditions. The females require a blood meal in order to mature and develop their eggs which are laid in the ground, 400 to 1000 eggs per female, often near or in aquatic or damp situations, they only seek blood after mating. The larvae are predatory, feeding in the soil on worms, molluscs and predominantly on the larvae of other Diptera.

There is another small family of flies, the Conopids, *Conopidae,* which have a very interesting life history. These flies prey on species of bees and wasps, *Hymenoptera,* many of the adults mimic the shapes and colours of their prey. One of the most noticeable in Chios is *Conops flavicauda,* which looks like a much thinner version of the familiar Oriental Hornet, *Vespa orientalis.* These two species share the same colour scheme of warm brown and yellow body colours and light brown / yellowish wings. They are widespread in Chios in late June through August and can be seen nectaring on umbelliferous plants such as Rock Samphire, *Crithmum maritimum,* in coastal locations.

Conopid females loiter around wild flower nectar sources waiting to pounce on visiting bees and wasps. In an attack an aerial wrestling match ensues, not always won by the attacker, in a successful encounter the Conopid inserts one of its thin barbed eggs into one of the segments of the victims abdomen using its piercing ovipositor. After the combatants disengage, the unsuspecting victim goes about its normal business unaware that it is doomed. The egg soon hatches and the small larva proceeds to eat the body tissues within the abdomen of the host. The larva passes through a number of stages following which the victim eventually succumbs to the attack and falls to the ground. The parasite pupates within or adjacent to the victims body, to emerge as an adult in the following season. I have found this species commonly on the north coast at Yiosonas and at Kampia Beach and at coastal locations on the west and south coasts. To date seven species of Conopid have been found on Chios.

Snakeflies, Ant-lions and Lacewings

Snakeflies, Ant-lions and Lacewings, (Order *Neuroptera*), are frequently to be seen on Chios by the observant naturalist. Currently 22 species of Neuroptera have been identified on the island as a result of the Liverpool Museum invertebrate biodiversity study. The previously described endemic species of Snakefly, (family *Raphidiidae),* *Raphidia peteressli,* only found on Chios, has been proven to be widespread and common. The survey also found *Raphidia ressli* at Armolia and Kipouries, these being the first European records. Snakeflies are so named because of their reptilian appearance due to the extended pro-thorax upon which their heads are attached. Their larvae prey on insects which are found under loose bark, the female having laid her eggs in crevices in the trunks and branches of trees or shrubs.

Eleven species of Lacewings, (family *Chrysopidae*), have been found on Chios, these delicate insects are either green or brown in colour, and have very attractive large veined wings. Their eyes are glistening and brightly metallic the origin of their alternative common name of 'Golden-eyes'. The larvae of Lacewings are predatory, those of a green colour, genus *Chrysoperla,* feed on Aphids, some species of other genera feed within ants nests on ant grubs.

Six species of Ant-lions and their cousins are found on Chios, the largest of which is *Palpares libelluloides,* measuring up to 140mm in wingspan, the subject of the attack by a Robber Fly described earlier. One of the most beautiful and noticeable species is *Nemoptera sinuata* whose delicate and ephemeral appearance, and drifting, floating flight, belies a sinister predatory early stage. The larvae of these two species live in the soil and leaf litter where they ambush and prey on small insects. *N.sinuata* can occur in large numbers in favoured locations in May. It can be locally common in some coastal locations on flowers, particularly on Managros Beach.

Larvae of species of the genus *Myrmeleon* burrow into loose sandy soil, the larva excavating a cone-shaped pit, at the bottom of which it hides out of sight with only its powerful jaws above the surface. The slope of the pit is such that any wandering ant will fall into the centre and into the jaws of the larva.

I have found these insects and their larval pits widely in Chios including Managros Beach, Ochrea near Volissos and at Kato Fana. Adults of the family *Ascalaphidae* are predatory and swift flying insects which prey on other insects caught in flight. They resemble dragonflies but can be identified by their long clubbed antenae and habit of resting with their wings folded tightly over their bodies. One species has been found on Chios, *Ascalaphus rhomboideus,* but this has only been seen on three occasions in twelve years. It flies in June and has been found at Kato Fana, Armolia and Avgonima.

Dragonflies

Dragonflies, (Order *Odonata*), are amongst the oldest known insects with fossils of their very large ancestors, up to 700mm in span, being found in Carboniferous deposits hundreds of millions of years old.

The present day naturalist on Chios will have the opportunity to observe many species in good numbers and at close quarters, if they visit their breeding grounds at the right time.

The invertebrate biodiversity study has identified 20 species as occurring on Chios, however it is anticipated that further survey work ought to prove the existence of perhaps up to 30 more species, depending upon migration conditions.

Dragonflies need water in which their larval stages develop, several species can tolerate water of varying quality and mineral content. However most species have preferences or particular kinds of water and habitats.

In lowland areas of Chios, pools of fresh water formed by springs or the collection of seasonal rains can be very attractive to a number of dragonfly species, particularly if they retain some water all year round and if they contain marginal vegetation. Two good examples of man-made sites are the pools in the abandoned brickworks at Keramia, Thimiana and the agricultural reservoir at Armolia.

The Thimiana site is of very great biodiversity value as it also has many other aquatic insects belonging to other orders, e.g. The Great Diving Beetle, *Cybister lateralimarginalis,* (*Coleoptera, Dytiscidae*).

Mike Taylor, Liverpool Museum.

In early June large numbers of Hawker, Skimmer and Darter Dragonflies emerge at night, their Nymphs climb out of the water and cling onto the stems of the marginal vegetation, they then emerge, expanding their wings and body parts and leave their Nymph skins as ‘ exuviae’, ghostly looking delicate translucent shells. It is possible to identify the species concerned by examining these exuviae. In favoured places hundreds of exuviae can be counted on the stems of marginal vegetation, this year I found several clusters of up to six all on top of each other at the Keramia pool. Species found here include, Vagrant Emperor, *Hemianax ephippiger* ; Emperor, *Anax imperator* ; Lesser Emperor, *Anax parthenope* ; Black-tailed Skimmer, *Orthetrum cancellatum* ; Scarlet Darter, *Crocothemis erythraea* ; Red-veined Darter, *Sympetrum fonscolombii* ; and Yellow-winged Darter, *Sympetrum flaveolum.*

O. forcipatus

The mountain streams and spring fed watercourses are breeding grounds for a number of species dependant upon clean well oxygenated water. The relatively low density of prey for the developing predatory larvae can result in extended timespans for the larval stages. This can extend to numbers of years in some species. The best places for observing these dragonflies include the rivers flowing down from Pelinaeon such as the river just to the north of Fyta, Kampia Gorge and Nagos. Species found here include, Greek Golden-ringed, Cordulegaster insignis ; Green-eyed Hook-tailed, Onychogomphus forcipatus ; Caliaeschna microstigma ; Beautiful Demoiselle , Calopteryx virgo ; Southern Skimmer, Orthetrum brunneum ; and Orthetrum anceps.

C. virgo

One special breeding habitat, brackish water, is necessary for some species including the Dark Emerald Damselfly, *Lestes macrostigma* currently known from just one site on Chios where it breeds in the pool at the back of the beach at Kato Fana. There are a number of generally distributed species on Chios which can be found almost anywhere including Migrant Hawker, *Aeschna mixta* ; Broad-bodied Chaser, *Libellula depressa* ; Southern Emerald Damselfly, *Lestes barbarus* ; White-legged Damselfly, *Platycnemis pennipes* and Blue-tailed Damselfly, *Ischnura elegans.*

Beetles

Chios has many species of beetles, study of which is in its early stages as part of the invertebrate biodiversity study. However the visiting naturalist will encounter many of the larger species, some of which are very attractive. In late June and July the Spanish Broom plants are often attended by specimens of *Purpuricenus desfontainii*, a large and spectacular red and black coloured Longhorn Beetle which has a remarkably disjunct distribution, occurring in Morroco and Greece and the Aegean islands.

Grasshoppers and Crickets

Some limited survey work has been undertaken on the Grasshoppers and Crickets, *Orthoptera,* for which over twenty species have been recognised.

The largest species found, *Saga natoliae , Tettigoniidae,* is one of the largest insects known from Europe with an elongated body and wings exceeding 10cm . I have found these ferocious, carnivorous insects in July on the road and in the adjacent vegetation between Diefcha and Fyta. They prey mainly on insects which they sieze with their powerful jaws. On one occasion I was handling a particularly large specimen in order to position it for photography when it bit one of my fingers, puncturing the skin and drawing blood. Males of these insects are unknown, the females reproducing by the process of parthenogenesis.

Many species of Grasshoppers are subject to predation. The large egg masses laid by some species, including Locusts, amongst litter and the roots of vegetation are sought out by female Bee Flies, *Diptera, Bombyliidae,* particularly from the Genus *Exoprosopa*. Nearly one hundred different species of *Bombyliidae* have been recognised during the Liverpool Museum survey. The diversity of this fauna contributes to a robust biological control mechanism on the island keeping Orthoptera numbers under control, thus avoiding development of populations of plague proportions. anagros and Kato Fana are particularly rich with respect to the numbers of different species occurring there.

Anastoechus nitidulus

Bush Crickets, *Tettigoniidae,* provide the prime food source for the rare and elusive Cinereous Bunting, which breeds in small numbers in the uplands of south and central Chios.

Scorpions and Spiders on Chios

Many other interesting animals are to be found on Chios by the curious naturalist including Yellow Scorpion, *Mesobuthus gibbosus,* to be found throughout the island but most readily found in the spring under stones in the gravelly areas at the back of Managros Beach. This kind of place also holds a few Black Widow Spiders for example both at Managros and at Komi.

One family of Spiders certain to come to the attention of the botanist are the Crab Spiders. These specialise in ambushing insects nectaring on many different species of wildflowers. They are masters of disguise and, like the Chameleon, seem to match perfectly with the colours of their chosen flower. I was recently photographing some insects on Managros Beach when I found a Crab Spider on one of the Yellow Poppies, *Glaucium flavum*, it had

just siezed a nectaring Bee, *Andrena thoracica*. The colour of the spider was an exact match with the yellow of the Poppy flower. Two Sun Spiders, *Galeodes graeca,* were taken in a Malaise trap in the old clay pits at Keramia, Thimiana in May 2003. These strange creatures appear to have ten legs, however the front pair have actually developed from their facial labia (lips).

Mammals on Chios

There are a few mammals on Chios including foxes, these are only seen occasionally, I have seen them twice in the Vrondados area, they have a reddish tinge to their coats.

Once when I was attending an insect trap, (Malaise Flight Interception Trap), deep in amongst the uncultivated old oak area of Ochrea near Volissos, I became aware of being watched. Staring at me from a distance of about fifty metres was a medium sized ‘ fox ?’. It had long grey hair, pointed ears and long nose and tail, it reminded me of Jackal, a species with which I was familiar from my African travels. I consulted the literature at the Liverpool Museum, on my return to the U.K., and was able to recognise the pictures of Jackal as being very, very close to the animal I had seen at Ochrea. At the time of my sightings I discovered well worn trails made by some animals in the long grasses and vegetation nearby, there were also ‘spraints’ of droppings, some of which I collected for examination by specialists at the Museum. These are in the freezers at the Museum awaiting investigation. It is understood that Jackal once occurred on Chios and Samos. It is currently considered extinct on Chios but is believed to still occur on Samos. Reports of further sightings would be welcome and should be investigated.

Beech Martins are seen occasionally in the upland areas, also as road casualties from time to time. Brown Hare and Hedgehogs occur though they are seldom seen. A few Otters were reported in the Delphini area in the early 1990’s. Wood and House Mice, and Black and Brown Rats are also resident on Chios. No detailed information is to hand on the resident species of Bats on Chios, though observation shows there to be several, based on size differences.

Frogs and Toads on Chios.

The Common Frog, *Rana temporaria*, is widespread and common wherever there are aquatic habitats. The European Tree Frog, *Hyla arborea*, is locally common in suitable habitats like Marmaro Marsh, it can be locally abundant in parts of the Kambos area.

The Common Toad, *Bufo bufo*, is generally distributed throughout the island and the small toads are a common sight in late May and June as they disperse from their aquatic nurseries in the many seasonal streams and drainage ditches in both agricultural and uncultivated areas. The Green Toad, *Bufo viridis*, with its distinctively spotted skin is a local resident which has been found in Lithi, Pyrgi and Kato Fana.

Lizards and Snakes on Chios.

One of the most noticeable lizards on Chios is the Turkish Gecko, *Hemidactylus turcicus,* which is common and can often be seen in houses and near outside lighting on external walls.This gecko is pale coloured and can be seen actively persuing its insect prey at night. Its darker relative Kotschys Gecko, *Cyrodactylus kotschyi,* is also widespread and common, though it does not come into houses. It lives amongst rocks and stones from which it emerges to persue its insect prey.

One of the most ubiquitous and noticable is the Agama Lizard, *Agama stellio,* which is very active by day in the warmer months of the year, when it can be seen on stone walls, rocks and craggy places. Its appearance is very reminiscent of the Marine Iguana, so familiar to viewers of natural history films of the Galapagos Islands.

The Wall Lizard, *Podarcis muralis,* and Erhards Wall Lizard, *Podarcis erhardii* are both common throughout the island and are both smoother and less 'craggy' in appearance than the Agama Lizard.

The Green Lizard, *Lacerta stellio,* is very noticeable because of its very attractive green to yellowish-green colour, which can appear almost fluorescent in certain light conditions.

One of the most unusual snakes to be found on Chios is the Worm Snake, *Typhlops vermicularis,* which I have found from time to time under stones in grassy and vegetated places behind the beaches at Kato Fana and Managros. It looks like a long thin pink worm with small beady black eyes. This snake is quite small, the specimens I have seen being only about ten inches in length. Another small snake which is very common is the Dwarf Snake, *Eirenis collaris,* this snake is unusual for a European snake in that it feeds exclusively on insects.

The Grass Snake, *Natrix natrix,* is also very common, where it favours aquatic habitats in which it can pursue its favourite prey, frogs. I have seen it most often amongst the reedbeds and marsh plants in the marshy spring fed ground just to the northwest of Lagkarda.

One of the most attractively patterned snakes is the Leopard Snake, *Elaphe situla,* which has a most colourful and attractive mosaic pattern which can be of a variety of colour forms. This snake can grow up to about a metre in length and is common on Chios. A number of them live in the Choremi estate in the centre of Chios Town where they perform a good service by preying on the mice which feed on spilt grain provided for a collection of domestic and ornamental Game Birds. If provoked, this snake, which is a non-venomous constrictor, pretends to be a Rattle Snake by raising and vibrating the tip of its tail as part of a threat / warning display.

One of the largest snakes to be found on the island is the generally distributed, non-venomous Aesculaian Snake, *Elaphe longissima,* which grows up to two metres in length. This snake also has a number of different colour forms, one of the most attractive ones I have seen was about one and a half metres long and most of its body was a rich shiny dark brown in colour, the front 20cm or so was a bright shimmering copper colour. I found this snake two or three years ago on the bank of the seasonal stream / agricultural track which joins the beach at Limnos near Volissos.

The Sand Boa, *Eryx jaculus,* occurs locally on the island, one was seen recently near the shore between the airport and Chios Town.

The only venomous snake on Chios, which can deliver a potentially fatal bite if untreated, is the Ottoman Viper, *Vipera xanthina,* this snake can grow up to 1.2 metres in length and is strongly built. Whilst it can be seen occasionally, usually as a road casualty in central and southern areas of Chios, its stronghold is the northwest of the island to the north of Volissos and to the west of Leptopoda. This is the best area for the visiting naturalist to seek them out, with due care and diligence, and observe these attractive snakes. It is regretable that so many snakes are deliberately killed by being run over by motor vehicles, as over 99% of road casualties are likely to be non-venomous species and harmless to man. Indeed the vast majority of indiginous snakes perform a service by helping to keep rats and mice under control.

Armadillos, Terrapins and Tortoises on Chios

Tortoise, *Testudo graela* and Marginated Tortoise, *Testudo marginata,* which can be found from time to time slowly walking along in country areas. I have found them up to 2000 feet in altitude.

However I was very surprised in 1997 when I found a Nine-banded Armadillo, in some uncultivated land between Avgonima and Anavatos. It seemed to be in good condition and well fed and happy in its environment. In many ways it had found a home from home far away from its native land of Florida. I can only assume that it was a pet which had escaped from a nearby household.

A visit to Marmaro Marsh or the area near to the old aqueduct in the eastern part of Chios Town in the summer months is sure to reward the naturalist with close views of Striped-necked Terrapins, *Mauremys caspica,* as they bask in the sunshine whilst pulled out on a log or drainage ditch embankment.

Loggerhead Turtles, *Caretta caretta,* can be encountered from time to time in the seas surrounding Chios, one turtle bred at Komi in 1992.

Marine Fish on Chios.

The clear unpolluted waters of the seas around Chios offer ideal conditions for the naturalist interested in observing marine life using simple equipment. A large number of species of colourful fish, corals, sponges and other sea creatures are easily seen in the many sheltered and shallow waters around the island. A visit to the local fish market will show the potential for such exploration.

The swimmer in the sea off one of the sandy beaches like Kato Fana, Salagonas or Komi, with a mask and snorkel will occasionaly encounter the fast moving and predatory Barracuda, *Sphyraena sphyraena,* chasing small fish along the edge of the beach. It is particularly fond of Gar Fish, *Belone belone*, whose long nosed and slim bodied shapes can be seen as they swim slowly in small schools just below the surface

of the sea. Local fishermen net these fish and use them as bait for catching the tasty Barracuda.

Exploration of the banks of seaweed just offshore can reveal the delicate and fascinating Sea Horse, *Hippocampus guttulatus.*

The swimmer will encounter small schools of Grey Mullet, *Mugil cephalus,* White Bream, *Sargus rondeletti,* Saddle Bream, *Oblada melanura,* and Red Mullet, *Mullus surmuletus,* all prized for their eating qualities. These fish are to be found swimming in small schools over rock strewn seabeds and in areas adjacent to rocky headlands. These same areas often have numbers of brightly coloured and patterned fish including the elegant Salema, *Boops salpa,* with its pale silver-grey sides decorated with numbers of horizontal yellow stripes. Other fish to be seen here include the attractive Blotched Picarel, *Maena maena*; Cuckoo Wrasse, *Labrus bimaculatus*; Ornate Wrasse, *Thalassoma pavo*; Rainbow Wrasse, *Curis julis* and the Peacock Blenny, *Blennius pavo.*

One of the smallest and most attractive fishes is the immature stage of the Mediterranean Damsel Fish, *Chromis chromis.* These fish are a dark irridescent electric blue in colour and can be found near the surface along the edges of rocky headlands where they hide in the many holes and crevices in the rock surfaces.

A swimmer at Salagonas on the south coast can see many of the fish described above. In the sea below the little church there is an old sailing ship anchor about two metres in length, very near the surface, whose stem and flukes have been thickly encrusted with many multicoloured sponges, corals and anemones over the years. The small sandy beach is a good place to search for sea shells, particularly after the winter storms. In 1996 I was lucky enough to find a large cowrie shell, subsequently identified as an Indo Pacific species, *Cypraea arabica arabica*, described by Linnaeus in 1788 and named after its markings reminiscent of arabic script. This was the first mediterranean record.

Care must be taken as some fish with poisonous spines occur in the waters around Chios and can inflict painful stings through venom injected via their spines. These include Streaked Weaver, *Trachinus lineatus,* which occurs in sandy waters about a metre in depth, and the Scorpion Fish, *Scorpaena porcus*, in more rocky areas.

Numerous other sea creatures can be seen including Star Fish, Sea Urchins and Sea Cucumbers.

Photographs

All the photographs in this booklet were taken by the author in Chios, except for the photograph of the Kingfisher which was taken by the author in England.

Acknowledgements

I would like to thank Michaeli and Maria Voulamandis and their family, hosts to my wife and I on our first visit to Chios in 1992, and for their continuing great help and friendship.

I would like to thank my colleagues in Liverpool Museum and in other institutions in the U.K. and overseas for their help in the invertebrate biodiversity study.

I would like to thank Iannis Choremi for much help and encouragement in my investigations into Chios natural history and for some of the information on Marine Life, Reptiles, Amphibians and Mammals for this booklet.

I would also like to thank Pandelis Saliaris for guiding me through the intricacies of orchid identification and for showing me these plants and their habitats on Chios. He also provided information on other aspects of Chios botany, some of which has been included in this booklet.

I would also like to thank Theo and Maria Chaviara and Giorgos Mizetziz, and my wife Tina, companions in many wildlife explorations in a beautiful island. The more I am shown new hidden and secret places on Chios, the more I realise how much more there is to be discovered and enjoyed.

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