

LEPIDOPTERA IN HONG KONG, APRIL 1993

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From 5–26 April 1993 we visited friends who had recently settled in Hong Kong. The chance to get to grips with the southern Chinese Lepidoptera which occupy this area was too good to miss, so arrangements were made for light-trapping as well as day-time recording during our stay. In a previous paper resulting from this expedition (Waring *et al.*, 1994) we reported on the Hawk-moths (Sphingidae) recorded and made the point that there is much more to Hong Kong than overcrowded cities of skyscrapers and traffic. That paper includes a map showing the localities we visited. The aim of this paper is to report the rest of the Lepidoptera we recorded and to describe some of the habitats in more detail.

GENERAL HABITAT NOTES

Much of Hong Kong is mountainous and urban development is concentrated in the few level areas, mainly around the coast and on man-made platforms of land created by infilling bays. Large areas of hillside are free of development and set aside as catchwaters to meet the demands of the urban population. Water collecting channels follow contours around the hills and channel rain water into the reservoirs. Each channel is equipped with a path to facilitate servicing and these paths make excellent walking and insect collecting routes.

Elsewhere most of the lower hillsides are covered in shrubby vegetation. These hillsides are probably richer in butterfly and moth species and numbers now than they have been since the British acquired Hong Kong in 1842. At that time most of the natural forest had already been cleared by the Chinese, and nineteenth century photographs and accounts report hillsides largely devoid of shrubs and converted into open grassland and rock by clearance, domestic livestock and fires. With the move from a rural farming way of life to an urban lifestyle dependent on imports, the native flora has been left to develop on the hills and these places are valued by local people who use them for weekend walks away from the crowded city. Forty per cent of the total area of the territory is country parks, although building and other developments have taken place within them. Many areas which were previously paddy fields or other farmland have now been abandoned or are rented out as dumping grounds for broken-down vehicles and other waste products of the consumer society, or as lorry parks for the vast number of trucks moving goods between Hong Kong and China. This is particularly the case in the New Territories near the border with China.

As neglected farmland becomes invaded by native herbs, forbs, shrubs and trees, it can become of great value to wildlife. Many former crops, including various fruit trees, are native to Hong Kong or are related to native species, and these provide a wide variety of larval food plants concentrated into relatively small areas. Such places can be most productive of Lepidoptera. One such, at Fung Yuen, was kindly shown to us by Mike Bascombe and provided our best butterfly-watching day of the visit.

SITE DETAILS

The location of these sites within Hong Kong is shown in the map which accompanies our previous paper (Waring *et al.*, 1994).

Tai Po Kau Special Conservation Area (TPK)

The best of our moth-trapping nights were in the woodland at Tai Po Kau. This is apparently the most species-rich and well developed area of native woodland in Hong Kong, in terms of trees and shrubs, with some reaching over 10 m in height, but even this has been heavily managed in the past. Very little if any of the original forest cover survives in Hong Kong, except perhaps in a few ravines and gorges inaccessible to domestic stock and fire. Much of the woodland at Tai Po Kau was cleared and planted with the native Chinese pine *Pinus massoniana* in the 1940s and 1950s (Thrower, 1984) or earlier. The plantings have largely failed but the protection they received has allowed native trees and shrubs to grow up amongst them. Pockets of native forest probably survived as well because there is currently a rich variety of flora and fauna on the site. Thrower (1984) lists the wide range of oaks (Fagaceae) and laurels (Lauraceae) characteristic of the original forest remnants and still present today, along with lists of the shrubs, climbers and herbs. The large mammals such as the South China tiger *Panthera tigris amoyensis* and the leopard *Panthera pardus* were lost in the original clearances but various forest birds appear to have recolonized. We had only two evening sessions (19.00–22.00 hrs) with a light trap here, but this proved to be easily the most productive site for moths, in terms of numbers of individuals and species of those we visited, and included most of the largest species we saw. If only it had been possible to trap all night at this wonderful site.

Tau Po Kau is at least starting to look like mature woodland again. Much of the New Territories outside the country parks looks grossly degraded and is littered with debris and junk, but even here there is the pleasure of seeing several species of swallowtail butterflies such as *Papilio polytes* and *P. paris* which are common. We saw *P. helena* visiting flowers of the introduced *Lantana* by an open sewer littered with refuse at the foot of skyscrapers, and *Graphium agamemnon* in the botanic gardens in the middle of central Hong Kong amid the urban highways and flyovers.

Fung Yuen Site of Special Scientific Interest (FY) (Fig. 1)

This is a largely abandoned formerly cultivated area by remnant woodland. It includes orchards of overgrown fruit trees including tangerine and other citrus trees, banana, papaya and lychee among others, with rambling native shrubs, climbers such as *Aristolochia*, and invading wild herbs and grasses. All of these plants combine to produce a very nectar-rich and structurally diverse habitat. We had only a single daytime visit here and no opportunity for night work, but we saw more butterflies here than anywhere else and found two species of day-flying ctenuchid moths.

*Mai Po Marshes Ramsar Site and Nature Reserve
of the World Wide Fund for Nature (MP) (Fig. 2)*

In addition to visiting the special areas at Fung Yuen and Tai Po Kau we light-trapped at Mai Po Marshes. This is an internationally important wetland site for migratory birds, and the only substantial area of mangrove swamp remaining in



Fig. 1. Overgrown orchards at Fung Yuen.

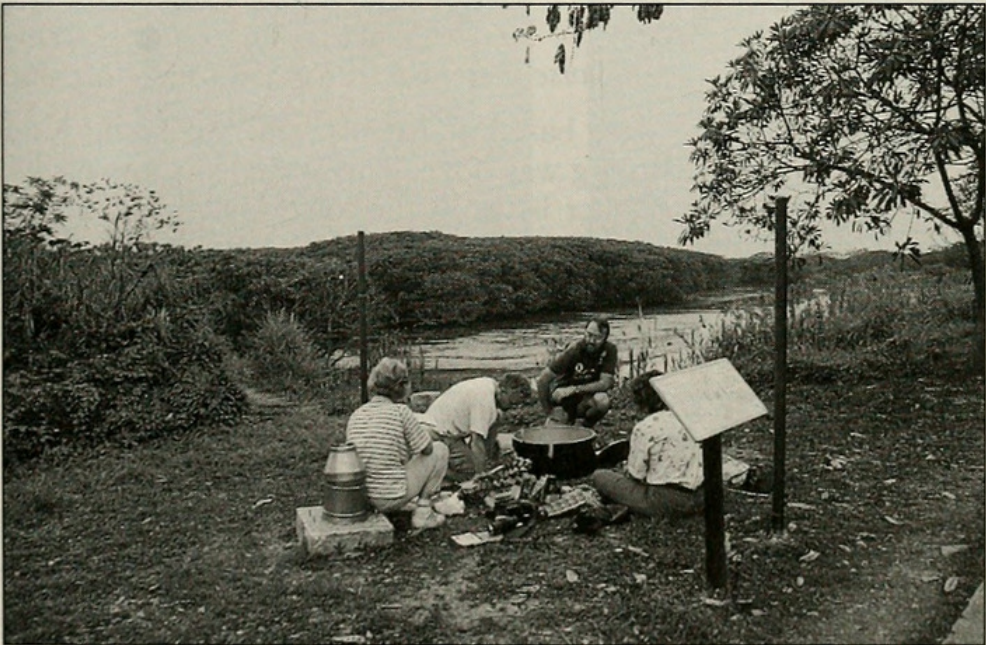


Fig. 2. The light trap site by the mangroves at Mai Po.

Hong Kong. As such it is managed as a reserve by the Hong Kong branch of the World Wide Fund for Nature and it has recently been declared a Ramsar site. The ecology and management history of this nature reserve have been documented and illustrated in detail by Irving & Morton (1988). Compared to the Tai Po Kau woodlands the vegetation is much less diverse in structure and species composition. The main elements are the mangrove trees, of which there are six species present, and zones of emergent plants, particularly the common reed *Phragmites australis*,

together with ruderal plants on the banks and dyke edges. We were able to run a light trap here for two full nights and the catches reflect the vegetation, with very large numbers of the mangrove-dependent polymorphic geometrid *Cleora injectaria* (Plate I, Fig 1) and the reed-dependent pyralid *Chilo luteellus*, and small numbers of a rather narrow range of other species. Butterflies were infrequent compared with other sites, only the lycaenid *Zizeeria maha* being common on our visit.

Wardhaven, Long Harbour, Sai Kung Country Park (LH) (Fig. 3)

Our third main area of light-trapping was at Wardhaven, Long Harbour, where we were able to stay in a bungalow with a boathouse, situated on a severely denuded hillside of scrubby grazed vegetation typical of much of Hong Kong. This base had mains electricity and we were able to operate a Robinson trap all night for three nights running between the boathouse and the bungalow. This gave an insight into the typical moth fauna which presumably occupies much of Hong Kong. A wider variety of moths was captured than at Mai Po but the wetland specialists were notable by their absence, as were the very large species we found at the Tai Po Kau woodlands.

From the Wardhaven bungalow we were able to walk up into the open rocky grassland on the higher slopes and ridges to the summit of Sharp Peak/Nam She Tau (468 m) (Fig. 4).

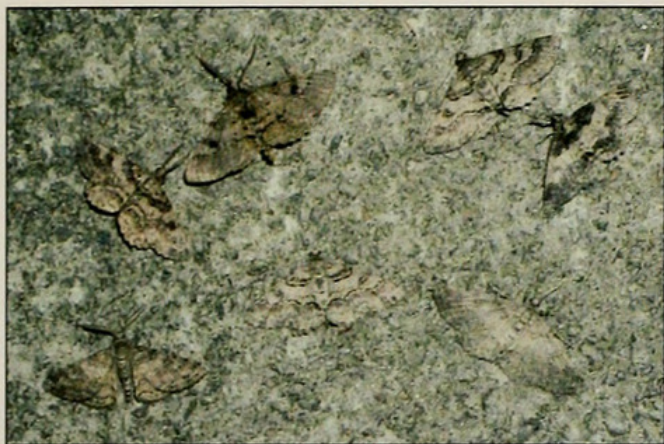
Repulse Bay (RB)

At the start of our visit we were based at Repulse Bay on Hong Kong Island around which some limited recording was done. This included some walks through scrubby vegetation on the catchwater between the town and the nearest reservoir, and the operation of a Robinson trap on the top-storey balcony of our apartment building for a couple of nights. The trapping resulted in only two macro-moths: a



Fig. 3. The light trap site between the bungalow and the boathouse at Long Harbour.

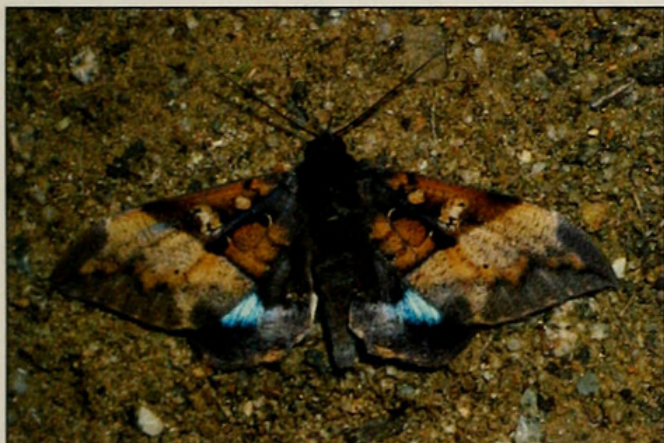
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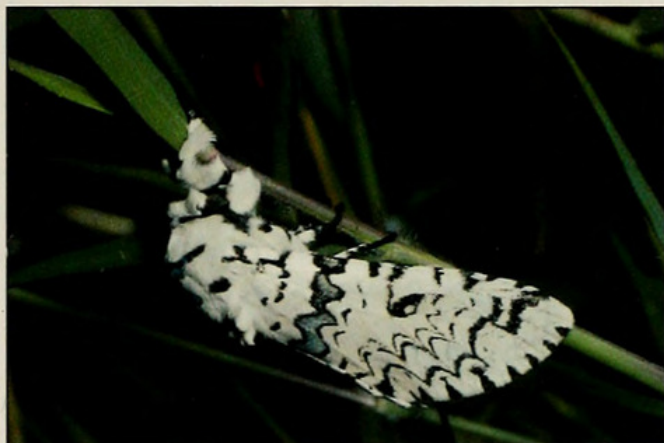
1. Polymorphic *Cleora injectaria* from the mangrove swamp at Mai Po.



2. The Hong Kong fritillary, *Argyreus hyperbius* on Sharp Peak.



3. *Ischyja manlia* from the woodland at Tai Po Kau.



4. *Cerura priapus* from the scrubland at Long Harbour.



5. The saturniid moth *Samia cynthia* in the Tai Po Kai woodlands.



6. Paul Waring by a light trap in the Tai Po Kau woodland. On hand *Actias selene*, on jacket *Lyssa zampa*.



Fig. 4. The trail to the summit of Sharp Peak (468 m).

single swallowtailed geometrid *Ourapteryx clara* and the noctuid moth *Hypocala deflorata* with yellow hindwings. At least it was a start!

Other areas visited, but not recorded entomologically, included Lantau Island, parts of which look very promising for Lepidoptera but which may suffer a great deal of change as a result of the new airport under construction on the north side of Lantau, and the associated developments which include a new town for 200,000 people.

SEASONAL DETAILS

Our arrival in Hong Kong on 5 April coincided with that of a cold front from the north-east over the land mass of China, and temperatures were 14 to 17°C. For most of the following three weeks of our stay they were between 20 and 30°C. The weather was predominantly dry and calm during the day but relative humidity was high and many days started or ended cloudy. Near the coast, such as at Repulse Bay, mists and low cloud were frequent and there was often a wind from the hills. There were two thunderstorms during the nights. While we were at Mai Po there was a light shower by day. In the last week after we had finished light trapping, there was some heavy rain on two days. March and April mark the beginning of the summer rains in Hong Kong and are usually unsettled. Temperatures and rainfall increase dramatically in May and continue high into September and October. November to February is cooler, dry and sunny. In 1993, March and most of April were drier than average.

Much of the foliage on the native trees and shrubs is evergreen but the new spring growth on a number of species was unmistakable because the leaves begin red, turning green only when growth is well advanced. New light green shoots were apparent on other shrubs and trees and many species were in bud or coming into flower. The pink and white flowered *Bauhinia* were in flower along the streets or were going over. This is the national flower of Hong Kong and it now replaces the Queen's

head on some of the new coinage. John Tennent (pers. comm.) had found that some of his largest catches of moths at light occurred during March and April.

THE BUTTERFLIES

Butterfly identification is easy in Hong Kong. Marsh (1960) and Johnston & Johnston (1980) provide colour identification guides covering the majority of species and the former also reports on world-wide distribution. In Hong Kong there are just over 200 species belonging to nine families. The distribution and habits of the adult and immature stages of the butterflies received much study during the 1970s and 1980s by Mike Bascombe, the Johnstons and others, the results of which have been written up by Mike and will be published soon. Our visit to Fung Yuen on 11 April coincided with superb sunny weather and demonstrated the range of species on the wing. Several swallowtails *Papilio* spp. were well out, including numbers of *P. polytes* which flitted around the abundant *Lantana* blossoms, seemingly without ever settling. *P. paris* put in several fleeting appearances, flashing the turquoise blue patches on its black hindwings in the process. *P. helena*, *P. memnon*, *P. agamemnon* and *P. protenor* were also seen and several *Lampropteryx curius* were observed. The latter is apparently scarce and restricted to just a few sites in Hong Kong (Johnston & Johnston, 1980; M. Bascombe and A. Galsworth (pers. comm.). Several adults were seen flying around the tops of trees, their long tails streaming behind while they visited the blooms of citrus for nectar. They occasionally flew lower and settled on vegetation to rest.

We were also fortunate to see one of the two Hong Kong birdwing species, *Troides helena*, which was just beginning its flight season. We saw this large black and yellow butterfly on two or three occasions, possibly more than one individual, flying high up around the tree-tops, occasionally coming lower, but never in range of the camera. Also seen briefly was *Graphium antiphates*, a white swallowtail streaked with black.

Two other species of large butterflies with wing-tails also seen were the nymphalids *Polyura athamas* and *Charaxes polyxena*. Both species were seen feeding at sap running from wounded *Citrus* trees in a shady overgrown orchard grove by the allotments. The *Polyura* returned several times to different trees and was relatively easy to approach. The *Charaxes* was much more wary but eventually a male and female settled on the same sap run and it was possible to approach and photograph them once they were engrossed in their meal. Neither was disturbed by the light of the flash.

The large blue and black, "tortoiseshell"-like nymphalid *Polygonia canace* was also seen and photographed feeding at sap in the same citrus grove.

The most numerous butterfly was the pierid *Pieris canidia*, both adult and larvae of which closely resemble those of our small white *P. rapae*. The much larger orange-tipped pierid *Hebomoia glaucippe* was seen, flying fast across the allotments, on a couple of occasions.

Also seen were single individuals of the nymphalids *Neptis hordonia* and *Precis lemonias*, both basking in the sun, and the satyrids *Melanitis leda*, seen drinking at damp mud, and *M. phedima*, disturbed from amongst leaf-litter, both within the shade of the *Citrus* grove.

Two of the black and white hesperiid *Tagiades litigiosa* were seen, both settling with wings spread flat on the upper surfaces of leaves, and the dusky brown skipper *Odontoptilum angulata* was noted visiting citrus flowers.

On many other days the weather was much less sunny and few butterflies were seen. At Mai Po for example, the only butterfly at all in evidence was the lycaenid

Zizeeria maha, which was quite numerous, flying near the ground around trefoils (*Trifolium/Lotus* spp.) by the paths. It was also an abundant butterfly at Repulse Bay, where a considerable increase in numbers was noted during the course of our stay, presumably the result of fresh emergences.

At Tai Po Kau rather few butterflies were seen on walks around the paths through the woodland. No doubt the cloudy weather on both days we visited played a part in this. Most frequently seen was the amathusiid *Faunis eumeus*, a number of which were encountered singly, flitting about between the low plants among the trees on each side of the rather shady paths. The satyrids *Lethe confusa* and *Ypthimna lisandra* were also fairly common along the woodland paths and also in more open scrub and grassland on the hillsides wherever we went in the New Territories, Hong Kong Island and Lantau.

A visit to the island of Tap Mun on 15 April was notable for the sight of the danaid *Euploea midamus*, a female of which was seen laying eggs on an unidentified palm. *Papilio polytes* was common on this island and was undoubtedly the most frequently seen *Papilio* species during our time in Hong Kong, occurring throughout the New Territories, on Lantau and even in the middle of Hong Kong Central among the skyscrapers.

A day spent walking to and climbing up Sharp Peak from Wardhaven, Long Harbour, on 14 April was memorable for two encounters with the Hong Kong fritillary *Argyreus hyperbius*, both males (Plate I, Fig. 2). The first was seen in open rocky grassland on a ridge looking up to Sharp Peak and the second was on the very summit. On both occasions the butterfly appeared to be "hill-topping", i.e. flying about the highest point of ground in the vicinity, restricting its activity to this area and returning to the same high spots repeatedly, and investigating other butterflies which came near. Both individuals were photographed basking on rocks. Violet *Viola* sp., upon which the larvae of this species feed, was frequent amongst the grass in this area. Also on the trek to Sharp Peak we saw a single specimen of the black and orange hesperiid *Ampittia dioscorides etura*, the only one we found. It was basking on a path through grassland but near scrub. Throughout this day the weather was cloudy with intermittent sun, but we all got well and truly sun-burned.

We saw the black, white, yellow and red pierid *Delias pasithoe* at Hong Lok Yuen and Tai Po Kau, and several of the distinctive pale yellow and black larvae of the papilionid *Chilasa clytia* at rest on the upper sides of leaves of *Litsea glutinosa*, a plant with leaves which look somewhat like a laurel (*Laurea*), growing through a fence along the main road at Repulse Bay.

THE MOTHS

Our previous paper (Waring *et al.*, 1994) dealt with the hawk-moths (Sphingidae) which we recorded. Little information has been published on the other groups of moths in Hong Kong and no systematic review has appeared so far. Some of the larger and more attractive species are mentioned in more general works on the natural history of Hong Kong, and Hong Kong is the type locality for a few species described by Walker and others in the 1860s, so there has evidently been sporadic collecting of moths in Hong Kong for over a hundred years.

Identification of moths from Hong Kong requires recourse to texts on neighbouring areas (such as Barlow, 1982; Holloway, 1983 onwards, and Seitz, 1908–1928) to make approximate determinations, followed by comparisons with named specimens and their genitalia in museum collections, chiefly, in this case, the national collections of the Natural History Museum (BMNH), London. Difficulties of identification and the time required for this job may have deterred earlier

collectors from writing up their material. Now is an exciting time for work on the moths of Hong Kong. Several collections have been made recently and these stand a good chance of being worked up and the results published, largely due to the efforts of Tony Galsworthy (AG), who is working on a check-list for Hong Kong. Recent collections which the present authors have seen include those of John Tennent (1992), much of which is now being mounted by Clive Turner for identification, Kent Li, who was inspired by John Tennent and carried on collecting moths after John's departure, Mike and Freida Bascombe, who collected, reared and photographed many moth larvae over an 18-month period, Tony Galsworthy, who collected moths at light on Victoria Peak over a 3-year period and who later trapped extensively in the Tai Po Kau woodlands after our departure, and Roger Kendrick, who visited Hong Kong and collected with Kent Li in July 1994. There is also a collection of unnamed moths made during an Oxford University Expedition to Hong Kong in 1981 and now housed in the BMNH.

In spite of the above collecting effort, some of the species we found during our visit appear to be the first records for Hong Kong, and in some cases the only ones so far. Many of our records are for localities from which these moths have not been recorded previously, indicating how imperfectly known the moth fauna and its distribution remains.

A list of the species we recorded, with sites and dates, is given in the accompanying Table, as our contribution to the growing body of data. Efforts were made to obtain identifications for all macrolepidoptera seen. Some microlepidoptera were also collected and a few of particular interest to us are included. All the identifications have been made in close collaboration with Tony Galsworthy, who has checked the genitalia against material in the BMNH wherever necessary and almost as a matter of course for some taxa.

The notes and observations which follow have been compiled in the limited time available since our return to the UK. Our aim is to provide some background information on the moths and to put our records into the context of the developing understanding of the moths of Hong Kong. The check-list being prepared by Tony Galsworthy will provide further details and indeed the first part of this list, on the ennomine geometrids, will soon be ready for publication.

Our most productive and exciting nights of light-trapping were in the Tai Po Kau woodlands (Plate I, Fig. 6) and some species were only seen here. It was a spectacular sight to see such large species as the Atlas moths *Attacus atlas* and *Samia cynthia* (Plate I, Fig. 5), the moon moth *Actias selene* and the oriental noctuid moths *Ischyja manlia* (Plate I, Fig. 3) and *Hypopyra ossigera* flying down from the forest trees soon after dark. Trapping at other sites helped to establish what could be expected in the open scrubby habitats that are more widespread in Hong Kong, and the sessions at Mai Po revealed some of the specialities of mangrove swamp.

ACCOUNTS BY FAMILY

Cossidae

Only one cossid was seen, *Zeuzera coffeae*. The larva is a well-known stem-borer of coffee and cocoa but it has been reported from many other host-plants of at least 38 genera in 20 families, according to a literature review by Arora (1976). The moth occurs throughout the lowlands of the Indo-Australian tropics, especially in disturbed habitats such as secondary forest and in agricultural areas (Holloway, 1986).

Zygaenidae

The one zygaenid we saw was *Cyclosia papilionarius*, which is quite unlike any British species. It is a large black and white day-flier which resembles a danaid butterfly but also flies at night. Larvae in the genus are said to feed on the Solanaceae (Barlow, 1982).

Limacodidae

Limacodids were quite frequent in our light traps, both as individuals and species, some much larger than the British species. The group includes a number of species which are major pests of coconut and other crops in South-East Asia (Holloway, 1986). One we recorded was *Thosea sinensis* which is sometimes a pest of oil palms *Elaeis* spp. (Musaceae) according to Barlow (1982). Other closely related species have been recorded from tea *Camellia* (Theaceae), *Citrus* (Rutaceae) and a wide range of other hosts (Holloway, 1986).

Thyrididae

A singleton of the distinctive *Calindoea argentalis*, a silver moth with large brown patches on the forewings, was captured at light in the Tai Po Kau woodlands on 18 April. The larvae occur in rolled leaves on *Syzygium jambos* (Myrtaceae), a common cultivated fruit tree, of which there are several by streams at Tai Po Kau (Li, 1996).

Drepanidae

Just one species was encountered, *Oreta insignis*, over twice the wingspan of any British drepanid but with the characteristic hooked forewing tips of the group. It was only seen in the woodland at Tai Po Kau where it seemed to be common, with four in one evening.

Lasiocampidae

Three brownish "lappets" came to our lights. *Euthrix isocyma* was seen only in the Tai Po Kau woodlands, at the beginning and end of our visit; a total of four individuals. Singletons of *Dendrolimus punctatus* and *Kunugia divaricata* were noted in the open scrubland at Long Harbour. The larvae of *Kunugia* spp. have been recorded from trees of the Dipterocarpaceae while records for those of *Dendrolimus* are mainly from conifers and for *Euthrix* from grasses (Holloway, 1987).

Geometridae

A wide range of geometrid moths was encountered, the largest number of which belong to the subfamily Ennominae. A number were very similar in appearance to species in Britain, including *Abraxas amacula*, *Ourapteryx clara* and three *Cleora* species. Others were much larger than any British geometrids, such as *Chorodna ochreimacula* and *Chorodna strixaria* with wing-spans of 70 and 80 mm respectively. Some were very strikingly and exquisitely marked such as the yellow and red *Plutodes* species and the bold leopard-spotted *Obeida tigrata*. The majority were cryptically marked and would blend in when at rest on the trunks and branches of

trees or amongst leaf litter. Though cryptic from above, *Pachyodes* (*Terpna*) *calaurops* has a strikingly bold black and white underside.

The next most numerous sub-family was the Geometrinae, and among the many green species were the almost fluorescent day-glo green *Agathia carissima* and *A. lycaenaria*. Members of the genus feed on plants of the Apocynaceae such as *Carissa* spp., according to Barlow (1982).

We recorded two species of emerald green *Thalassodes*. One is *T. immissarius* but the other has defied identification so far. Tony Galsworthy and Jeremy Holloway are working on this problem.

The gaudy blue, yellow and black *Dysphania militaria* has a 70-mm wingspan. Several were seen resting in prominent positions on the upper surface of leaves in scrubby habitat in a number of places on the hillsides and water-catchments. The moths were ready to fly if disturbed and were also seen frequently on the wing by day. In the woodland at Tai Po Kau we saw a large number of these moths flying in a group around a single high branch of a tree in the afternoon. It was a spectacular sight. We presume they were males assembling to a female concealed somewhere amongst the leaves. The larva has been reared from *Carallia* (Rhizophoraceae) in Hong Kong (M. Bascombe, in Holloway 1996).

Other subfamilies of the Geometridae were poorly represented. Among the Sterrhinae were the distinctive *Somatina anthophilata* and *S. obscuriciliata*, the red mocha-like *Anisodes absconditaria* and several nondescript *Idaea* and *Scopula* spp. The strikingly angular fawn *Heteralex unilinea* was the only member we saw of the Oenochrominae. The peculiar translucent *Pseudeuchlora kafebera* and familiar gem *Orthonama obstipata* were all we saw of the Larentiinae. *O. obstipata* is quite common in Hong Kong (AG pers. comm.)

Uraniidae

The striking large swallow-tailed brown moth *Lyssa zampa* was our sole introduction to the Uraniidae in Hong Kong. A single worn individual came to the light trap in the Tai Po Kau woodlands on each visit, suggesting our expedition was at the end of an adult generation. According to Barlow (1982) the species is widespread in the Indo-Australian region and is not confined to woodlands, occurring also in cultivated and built-up areas, the larvae feeding on *Eugenia malaccensis* (Myrtaceae). Formerly the Uraniidae were included in the Geometroidae, partly because they have abdominal tympanal organs like the Geometridae. However the detailed structure of these organs is different and no other defining characters are shared with the geometrids, so they are currently given their own superfamily Uraniioidea (Scoble, 1992). Some members of this group have beautiful iridescent markings and look superficially like large butterflies.

Saturniidae

The saturniids we encountered were the moon moth *A. selene*, in the entirely different habitats of the Mai Po swamps and the Tai Po Kau woodlands, and two Atlas moths, *Attacus atlas* and the smaller mauve and brown *Samia cynthia*, both only seen at the Tai Po Kau woodlands. It was a great thrill to see these large moths come to light. On the night of 18 April in the woodland glade at Tai Po Kau we had two *A. atlas* and one each of *S. cynthia* and *A. selene* flying around the trap at the same time, flapping large wings and dipping into the grass around the light.

Attacus atlas is not confined to the Tai Po Kau woodlands. AG has not seen it on Victoria Peak, neither in his trap nor at house lights, but he is aware of occasional individuals reported by people who have chanced upon them by day, on both Hong Kong Island and the New Territories. Herklots (1951) reports finding a number of cocoons on a small tallow tree *Sapium sebiferum* on Lantau island on 10 March 1935. The adults had emerged from all but two. The last two hatched early in April and one, a female, attracted a worn male on her third evening, at Herklots' house. These paired and the resulting larvae were reared on *Hibiscus*.

The larvae of *Actias selene* have been recorded in Hong Kong feeding on ivy tree *Heptapleurum octophyllum*, tallow *S. sebiferum* and *Hibiscus* by Herklots (1951). He reported finding cocoons of this species hanging from branches of the deciduous tallow after the leaves had fallen. He found the adults frequently attracted to light on Victoria Peak. They were seen in October and produced at least three generations per year, with further adults in February, May and August, overwintering as cocoons.

Sphingidae

The sphingids we recorded are dealt with in detail in the previous paper by Waring *et al.* (1994). Sixteen species were recorded, including one, *Sataspes infernalis*, which was new for Hong Kong.

Notodontidae

Three species of notodontid were encountered. A singleton of *Netria viridescens* was seen at Tai Po Kau. This is a large cryptic prominent moth which looks like old brown bark mottled with green algae. AG has recorded this species frequently on Victoria Peak. It occurs from the oriental tropics to New Guinea but appears to be a complex of several species, the taxonomy and distribution of which requires further study (AG pers. comm.). According to Moore & Bell (cited in Holloway, 1983), based on observations in India, all larval records were from the Sapotaceae, including *Bassia*, *Mimusops*, *Sideroxylon* and *Achas sapota*, the larvae living on the undersides of the leaves and feeding only on the youngest ones.

A pair of the slim-winged fawn *Turnaca ernestina* turned up at Long Harbour on 14 April but were not seen on the same site on 13 and 15 April and at no other site.

Five individuals of a *Cerura* species (Plate I, Fig. 4) came to light at Long Harbour. These were first thought to be *C. kandyia tattakana*, which is rather similar in appearance but, on the basis of their genitalia, AG found them to be a new species, which has now been described as *C. priapus* (Schintlmeister, in prep). Specimens conforming to this new species have also been found in Thailand and Vietnam.

Lymantriidae

The most numerous members of this family were small yellow moths of the genus *Euproctis*, of which we had at least three distinct species. Specific identifications have proved difficult to obtain so far. One species, close to *E. recurvata*, was only seen at Long Harbour, where it was frequent. Another, close to *E. seitzii*, was found in three separate habitats (see Table).

The other lymantriids have been easier to identify. They range from the large grey *Lymantria dissoluta* to the peculiar *Perina nuda*, in which the female is a nondescript white or yellowish moth but the male has transparent wings virtually bare of scales

except for black areas near the body. The thorax and tip of the abdomen viewed from below are orange.

Arctiidae

Of particular interest among the eight species of Lithosiinae encountered was *Paraona fukiensis*. This moth has uniform black forewings and body, with a red collar on the thorax, just like the red-necked footman *Atolmis rubricollis* in Britain, but it is much larger, at over 60 mm in wingspan, and has white hindwings. It was encountered only in the Tai Po Kau woodlands. The larva feeds on lichens according to S. Sugi (pers. comm.). Perhaps it will prove to be an indicator of the less disturbed woodlands in the region.

The Aganainae, represented in particular by the genus *Asota*, are better known as the Hypsiidae, but are considered by Holloway (1988) to be noctuid moths misplaced in the Arctiidae. Three species of *Asota* were found during light-trapping in the Tai Po Kau woodlands. This is a genus of large distinctive moths. All three have yellow bodies spotted with black, suggesting they are distasteful, and the yellow and black spotting extends to the base of the forewings in most members of the genus and sometimes to the hindwings. The larvae of this genus are also black and yellow (Bell in Holloway, 1988) suggesting that both larva and adult are distasteful. They are common in most habitats in Hong Kong, including urban areas (AG pers. comm.). The genus is associated with figs, *Ficus* spp. (Moraceae). *A. caricae* has been recorded on *Ficus oppositifolia* and as a pest on papaya *Carica* sp. Holloway (1988) adds foodplants from several other families.

Two species of the genus *Nyctemera* (considered members of the Arctiinae rather than Aganainae in Holloway, 1988) were also seen. These black and white moths also appear to accumulate toxins (Holloway, 1988). They fly by day and night and look somewhat like pierid butterflies. *N. adversata* (formerly *plagifera*) has been reared from various Compositae and occurs in open and secondary forest habitats from the Himalayas to Japan and Borneo (Holloway, 1988).

Nolidae

Two species of the Nolidae were encountered, both in the Tai Po Kau woodlands and both as singletons.

Ctenuchidae/Syntomidae

Three species of these wasp-like moths were found. An orange-banded *Syntomis* sp. near *formosae* was found on a field edge by scrub at Fung Yuen at rest by day. The yellow-banded *Syntomoides imaon* was found actively moving through grass only a few metres away. Three individuals of the smaller and drabber *Eressa confinis* later turned up at the light trap among scrub at Long Harbour, all on the same night. The larva of *S. imaon* has been noted feeding on *Anacardium* (Anacardiaceae) and on *Citrus* (Rutaceae) in India (Holloway, 1988).

Noctuidae

A wide variety of noctuid moths, of 12 subfamilies, were encountered during our time in Hong Kong including some very large ones. More species belonged to the Ophiderinae than any other subfamily and only one to the Noctuinae, the familiar

dark swordgrass *Agrotis ipsilon* which is almost cosmopolitan, excepting high latitudes, arid areas and lowland rainforests (Holloway, 1989).

The most spectacular of the noctuid moths we saw was a singleton of *Ischyja manlia* to light in the Tai Po Kau woodlands. This is a moth with pointed chocolate forewings over 90 mm in span, and black hindwings with iridescent blue central flashes. The larvae of *I. manlia* feed on the foliage of trees of several families. They have been reported on leaves of the lychee, *Litchi chinensis* (Sapindaceae), and mango, *Mangifera indica* (Anacardiaceae), in Thailand (Kuroko & Lewvanich, 1993) so the tallow, *S. sebiferum*, is a likely host in Hong Kong. AG often saw this moth at lights on Victoria Peak so the species is not confined to mature woodland in Hong Kong. The adults have been reported piercing the fruit of guava, *Psidium guajava* (Myrtaceae) and longan, *Dimocarpus longan* (Kuroko & Lewvanich, 1993). The moth is widespread in India and China.

A single individual of the ophiderine noctuid moth *Tinolius hypsana* came to the light trap at Tai Po Kau in the company of five *Asota* individuals (see Arctiidae above). This moth looks superficially like *Asota* which it is assumed to mimic, being similar in size, shape, general colouring and patterning, though the yellow body is banded rather than spotted.

The catocaline noctuid moths were well represented, particularly in the woodland but with some also in scrub, and comprised large generally cryptic species, some with brightly marked hindwings.

A number of hypenines and herminiines were encountered, particularly in the woodland.

The amphipyridines were well represented in the open habitats at Mai Po and Long Harbour and less so in the woodland, including various species of *Spodoptera* and *Athetis*.

By contrast, the Hadeninae was poorly represented in all habitats compared with Britain and continental Europe. One of these was the "wainscot" moth *Leucania compta* which was found in the reedbeds of Mai Po, along with large numbers of the reed-dependent pyralid *Chilo luteellus*.

Only two species of the Plusiinae were seen, perhaps due to the time of year.

A single adult of the striking *Mimeusemia postica* came to light at Tai Po Kau. This is a member of the former Agaristidae, which is now regarded as a subfamily of the Noctuidae (e.g. Holloway, 1988; Scoble, 1992). Many members of this group are as brightly coloured and rather similarly marked to the arctiid or tiger moths.

CONCLUSIONS

Just over one hundred species of macro-moths were recorded during our visit to Hong Kong, which involved only five complete nights of light-trapping (three at Long Harbour, two at Mai Po) with partial nights at Tai Po Kau (twice), Hong Lok Yuen (once) and unproductive sessions on an upper balcony at Repulse Bay. This total is an indication of the species-richness of the moth fauna of Hong Kong. The large differences between the types of moths captured at the various sites indicate that there is considerable local variation between sites and habitats within Hong Kong. In particular there are early indications that the moth fauna of the Tai Po Kau woodlands is particularly rich in species and may be a stronghold for species not seen elsewhere. On the basis of the limited available data, including the as yet largely unpublished results of fieldwork by Mike Bascombe, Tony Galsworthy, Roger Kendrick, Kent Li and John Tennent, it appears that certain species are localized habitat specialists, such as *Paraona fukiensis* in mature semi-natural woodland and

the mangrove form of *Cleora injectaria* at Mai Po. That several of the species we found were either undescribed or new to science at the time we found them and that others are the first records for Hong Kong is an indication of how much work still remains to be done to evaluate the moth fauna of Hong Kong and how even a brief visit such as ours can make an important contribution to the available knowledge.

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GOOD NEWS FOR THE MOTHS OF HONG KONG

Since the above work, it is pleasing to report that Roger Kendrick has secured a position at the Department of Ecology and Biodiversity, University of Hong Kong, to study for a PhD on the zoogeography and phenology of the moths of Hong Kong. This will involve extensive light-trapping and other methods of sampling in different habitats all over the Territory, which will greatly improve our knowledge of the moth fauna and its conservation requirements. The University of Hong Kong are to be congratulated for making this appointment possible. The project is due to begin in January 1997.

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APPENDIX. Macro-moth species and a few micros recorded in Hong Kong 7–18 April 1993 (excluding the Sphingidae published in Waring *et al.*, 1994). The generic names in parentheses after the authors are the names under which the species were first described. This format has been adopted in several recently published lists as a means of helping keep track of species in the face of numerous taxonomic revisions and unstable nomenclature. Key to table, site codes (as shown in text): RB = Repulse Bay, Hong Kong Island; TPK = Tai Po Kau Country Park, New Territories; HLY = Hong Lok Yuen, New Territories; FY = Fung Yuen, New Territories; LH = Long Harbour (Wardhaven), New Territories; the catch on 15th was not recorded in full, only the new species being noted; MP = Mai Po Marshes, New Territories. The numbers in parentheses after the site codes indicate the number of individuals seen.

	April Site	7-9 RB	10 TPK	10 HLY	13 LH	14 LH	15 LH	16 MP	17 MP	18 TPK
COSSIDAE										
<i>Zeuzera coffeae</i> Nietner, 1861		-	-	-	LH(12)	-	-	MP(3)	-	-
ZYGAENIDAE										
<i>Cyclosia papilionarius</i> (Drury, 1773) (<i>Noctua</i>)		-	-	-	-	-	-	-	-	TPK(1)
LIMACODIDAE										
<i>Cania bilinea</i> Walker, 1855 (<i>Neaerna</i>)		-	TPK(1)	-	-	-	-	-	-	TPK(1)
<i>Miresa</i> near <i>metathermistis</i> Hampson, 1910		-	-	-	-	-	-	-	-	TPK(1)
<i>Narosa nigrisigna</i> Wileman, 1911		-	-	-	-	-	-	-	-	TPK(1)
<i>Phlossa</i> (<i>Iragoides</i>) <i>conjuncta</i> (Walker, 1855)		-	-	-	-	LH(1)	-	-	-	-
<i>Quasithosea obliquistriga</i> (Hering in Seitz, 1931)		-	-	-	LH(1)	-	-	-	-	TPK(1)
<i>Thosea sinensis</i> (Walker, 1855) (<i>Anzabe</i>)		-	-	-	-	-	-	-	-	TPK(1)
THYRIDIDAE										
<i>Calindoea argentalis</i> Walker, 1866 (<i>Rhodoneura</i>)		-	-	-	-	-	-	-	-	TPK(1)
GEOMETRIDAE										
Oenochrominae										
<i>Heteralex unilinea</i> (Swinhoe, 1902) (<i>Epidesma</i>)		-	TPK(1)	-	LH(2)	-	-	-	-	TPK(1)
Geometrinae										
<i>Agathia carissima</i> Butler, 1848		-	-	-	-	-	-	-	MP(1)	-
<i>Agathia lycanaria</i> (Kollar, [1844] 1848)		-	-	-	LH(1)	-	-	-	MP(2)	-
<i>Eucyclodes infracta</i> (Wileman, 1911) (<i>Thalassodes</i>)		-	-	-	LH(2)	LH(1)	-	-	-	-
<i>Dysphania militaris</i> (L. 1758) (<i>Phalaena</i>)		RB(2)	TPK(several by day)	-	-	-	-	-	-	TPK(1)

Appendix continued

	April Site	7-9 RB	10 TPK	10 HLY	13 LH	14 LH	15 LH	16 MP	17 MP	18 TPK
<i>Corymeca speculata</i> (Moore, 1868)		-	-	-	-	-	-	-	-	TPK(1)
<i>Ectropis intermedia</i> (Warren 1899) (<i>Psilalcis</i>)		-	-	LH(1)	-	-	-	-	-	TPK(1)
<i>Fascellina chromataria</i> Walker, 1860		-	-	LH(1)	-	-	-	-	-	-
<i>Fascellina plagiata</i> (Walker, 1866) (<i>Geometra</i>)		-	-	-	LH(1)	-	-	-	-	-
<i>Gonodontis pallida</i> (Butler, 1880) (<i>Orsonoba</i>)		-	-	-	-	LH(1)	-	-	-	-
<i>Hypomecis transscissa</i> (Walker, 1860) (<i>Boarmia</i>)		-	-	-	-	-	-	-	-	TPK(2)
<i>Hyposidra infixaria</i> (Walker, 1860) (<i>Lagyr</i>)		-	-	LH(3)	-	-	-	-	-	-
<i>Krananda oliviomarginata</i> Swinhoe 1894		-	TPK(1)	-	-	-	-	-	-	TPK(3)
<i>Obeidia tigrata</i> (Guenée, 1857) (<i>Abraxas</i>)		-	11 April Fung Yuen	-	-	-	-	-	-	TPK(1)
<i>Ophthalmitis herbidaria</i> Guenée, 1858 (<i>Ophthalmodes</i>)		RB(1)	-	-	-	-	-	-	-	-
<i>Ourapteryx clara</i> Butler, 1880		RB(1)	TPK(1)	-	-	-	-	-	-	TPK(7)
<i>Plutodes costatus</i> (Butler, 1886) (<i>Garaeus</i>)		-	TPK(1)	-	-	-	-	-	-	TPK(2)
<i>Plutodes exquisita</i> Butler, 1880		-	-	LH(3)	LH(2)	-	-	-	-	-
<i>Pseudonadagara semicolor</i> (Warren, 1895) (<i>Osteodes</i>)		-	-	-	-	-	-	-	-	TPK(2)
<i>Pseudothalera carolinae</i> Galsworthy MS*2		-	-	-	-	-	-	-	-	TPK(2)
<i>Racotis boarmia</i> (Guenée, 1857) (<i>Hypochromia</i>)		-	TPK(1)HLY(1)	-	-	-	-	-	-	TPK(1)
<i>Rhynchobapta flaviceps</i> (Butler, 1881) (<i>Nadagara</i>)		-	-	-	-	-	-	-	-	TPK(1)
<i>Rutellerona pseudocessaria</i> (Holloway, 1993)		-	-	-	LH(1)	-	-	-	-	-
<i>Scardamia metalaria</i> (Guenée)		-	-	-	LH(1)	-	-	-	-	-
<i>Semiothisa lacriphaga</i> Banziger & Fletcher 1988		-	-	-	-	LH(1)	-	-	-	-
<i>Serratophyga xanthospilaria</i> (Wehrli, 1925) (<i>Hypephyra</i>)		-	TPK(1)	-	-	-	-	-	-	TPK(1)
URANIIDAE										
<i>Lyssa zampa docile</i> Butler 1869 (<i>Nyctalemon</i>)		-	TPK(1)	-	-	-	-	-	-	TPK(1)
DREPANIDAE										
<i>Oreta insignis</i> Butler, 1877		-	-	-	-	-	-	-	-	TPK(4)
LASIOCAMPIDAE										
<i>Dendrolimus punctatus</i> (Walker, 1855)		-	-	-	LH(1)	-	-	-	-	-
<i>Euthrix isocyma</i> (Hampson, 1892) (<i>Odonestis</i>)		-	TPK(3)	-	-	-	-	-	-	TPK(1)
<i>Kunugia divaricata</i> (Moore, 1884) (<i>Gastropacha</i>)		-	-	-	-	-	LH(1)	-	-	-

SATURNIIDAE

<i>Actias selene</i> (Hübner, [1802])	-	TPK(1)	-	-	-	MP(1)	TPK(1)
<i>Attacus atlas</i> (Linnaeus, 1758)	-	-	-	-	-	-	TPK(2)
<i>Samia cynthia</i> (Drury, [1773])	-	-	-	-	-	-	TPK(1)

SPHINGIDAE (see Waring *et al.* 1994 for details)

Sphinginae 4 species recorded

Magroglossinae 12 species recorded

NOTODONTIDAE

<i>Cerura priapus</i> Schintlmeister (in MS)	-	-	LH(2)	LH(3)	-	-	-
<i>Netria viridescens</i> Walker, 1855 (a sp. complex)	-	-	-	-	-	-	TPK(1)
<i>Turnaca ernestina</i> (Swinhoe 1885) (<i>Corma</i>)	-	-	-	-	LH(2)	-	-

LYMANTRIIDAE

<i>Aroa substrigosa</i> (Walker, 1855) (<i>ochripicta</i> of Moore 1879)	-	-	-	LH(3)	-	MP(1)	-
<i>Dasychira chekiangensis</i> Collenette, 1938	-	-	HLV(1)	-	-	-	-
<i>Dasychira costalis</i> Walker, 1855 (<i>Melia</i>)	-	-	-	LH(2)	-	-	-
<i>Dasychira nigrifulva</i> Walker, 1865	-	-	-	-	-	-	TPK(1)
<i>Euproctis</i> sp.A = <i>E. recurvata</i> Leech or close	-	-	-	LH(6)	LH(7)	-	-
<i>Euproctis</i> sp.B = <i>E. seitzi</i> Strand, 1910 or close	-	-	-	-	LH(6)	MP(2)	TPK(15)
<i>Laelia anamesa</i> Collenette, 1934	-	-	-	-	LH(1)	-	-
Possible <i>Laelia</i> female ^{*4}	-	-	-	-	LH(1)	-	-
<i>Lymantria dissoluta</i> Swinhoe, 1903	-	-	-	-	-	-	TPK(1)
<i>Orgyia postica</i> Walker, 1855 (<i>Lacida</i>)	-	-	-	-	-	MP(1)	-
<i>Perma nuda</i> (Fabricius, 1787)	-	-	-	-	-	-	-
<i>Pantana</i> close to <i>sinica</i> Moore, 1877	-	-	-	-	LH(1M2F)	MP(1M)	TPK(1)

ARCTIIDAE

Lithosiinae

<i>Asura arcuata</i> (Moore, 1882) (<i>Lyclene</i>)	-	-	LH(1)	-	-	-	-
<i>Chionaema fasciola</i> (Elwes, 1890) (<i>Bizone</i>)	-	TPK(1)	-	-	-	-	-
<i>Chionema quadrinotata</i> (Walker, 1869) (<i>Bizone</i>)	-	-	LH(1)	-	-	-	-
<i>Eilema</i> 3 spp.	-	TPK(1)	-	-	LH(1)	MP(4)	TPK(1)
<i>Paraona fukiensis</i> Danielle, 1952	-	TPK(1M1F)	-	-	-	-	TPK(9)
<i>Stigmatophora flava</i> (Bremer, 1852)	-	-	-	-	LH(1)	-	-

Appendix continued

	April Site	7-9 RB	10 TPK	10 HLY	13 LH	14 LH	15 LH	16 MP	17 MP	18 TPK
Arctiinae										
<i>Cretonotos gangis</i> (Linnaeus, 1763) (<i>Phalaena</i>)		-	-	-	LH(2)	LH(3)	-	-	-	-
<i>Cretonotos transiens</i> (Walker, 1855) (<i>Spilosoma</i>)		-	-	HLY(1)	-	LH(2)	-	-	-	-
Aganainae										
<i>Asota heliconia</i> (Linnaeus, 1758) subsp. <i>clavata</i> Butler		-	TPK(6)	-	-	-	-	-	-	TPK(1)
<i>Asota caricae</i> (Fabricius, 1775)		-	TPK(3)	-	-	-	-	-	-	TPK(3)
<i>Asota plaginota</i> Butler 1875 (<i>Hypsa</i>)		-	TPK(1)	-	-	-	-	-	-	TPK(1)
(<i>Asota</i> now sometimes grouped in Hypsidae or within Noctuidae)										
<i>Macrobrochis gigas</i> (Walker, 1854) (<i>Lithosia</i>) 4 April Victoria Peak		-	-	HLY(1)	-	-	-	MP(1)	-	-
<i>Nyctemera adversata</i> (Schaller, 1788)		-	-	-	-	-	-	-	-	TPK(1)
<i>Nyctemera mulleri</i> Snellen, 1863 ssp. <i>carissima</i> Swinhoe 1891 (<i>Leptosoma</i>)		-	-	-	-	-	-	-	-	-
CTENUCHIDAE										
Syntominiæ										
<i>Eressa confinis</i> (Walker, 1854)		-	-	-	-	LH(3)	-	-	-	-
<i>Syntomis</i> ? <i>formosae</i> * or <i>lucerna</i> , but most like unnamed series with <i>formosae</i> 11 April Fung Yuen-										
*now named <i>Amata edwardsii</i> (Butler, 1876)										
<i>Syntomoides</i> (<i>Ceryx</i>) <i>imaon</i> Cramer 1780 (<i>Sphinx</i>)		-	11 April Fung Yuen-	-	-	-	-	-	-	-
NOLIDAE										
<i>Celama taeniata</i> Snellen, 1875		-	-	-	-	-	-	-	-	TPK(1)
<i>Melanographia flexilineata</i> Hampson, 1898 (<i>Nola</i>)		-	TPK(1)	-	-	-	-	-	-	-
NOCTUIDAE										
Agaristinae										
<i>Mimeusemia postica</i> (Walker, 1862) (<i>Aegocera</i>)		-	TPK(1)	-	-	-	-	-	-	-
Noctuinae										
<i>Agrotis ipsilon</i> (Hufnagel, 1766)		-	-	-	LH(1)	-	-	-	-	-

Hadeninae

Aletia formosicola Yoshimatsu, 1992
Hypopteridia reversa (Moore [1885], 1844)(*Aletia*)
Leucania compta Walker, 1862
Tiracola aureata Holloway, 1989

Amphipyryinae

Athetis sincera (Swinhoe, 1889) (*Spaelotis*)
Athetis stellata (Moore, 1882) (*Graphiphora*)
Aucha villiana (Swinhoe, 1893) (*Dinumma*)
Callyna semivitta Moore, 1882
Condica conducta (Walker, [1857] 1856) (*Caradrina*)
Feliniopsis indistans (Guenée, 1852) (*Hadena*)
Sasunaga longiplaga Warren, 1912
Sphragifera rejecta (Fabricius, 1775) (*Noctua*) (was *Chasmina*)
Spodoptera cilium Guenée, 1852
Spodoptera exigua (Hübner, 1808)
Spodoptera litura (Fabricius, 1775) (*Noctua*)
Spodoptera pecten Guenée, 1852

Acontiinae

Cerynea contentaria (Walker, 1861) (*Ephyra*)
Flanmona trilineata Leech, 1900
Perynea ruficeps (Walker, 1864) (*Thermesia*)

Chloephorinae

Carea angulata (Fabricius, 1793) (*Bombyx*)
Carea varipes Walker [1857] 1856
Earias flavida Felder, 1861
Negeta sp.^{*3}

Sarothripinae

Lamprothripa scotia Hampson, 1902 (*Ptisciana*)
Risoba basalis Moore, 1882
Selepa sp. (2 similar spp. in HK) (near to *S. celtis* in BM)

[illegible]



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