

MADEIRA INSECTS: FAUNAL NOTES, ADDITIONS AND DESCRIPTIONS OF NEW SPECIES OF CHALCIDOIDEA (HYMENOPTERA)

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With 14 figures

ABSTRACT. This paper is primarily a report on the Hymenoptera Chalcidoidea collected in Madeira by the author and his wife in 1982. Some general aspects of the fauna are discussed and an account is given of visits to some classical collecting localities. The following Madeiran species new to science are described: *Euchalcidia aeneonitens*, *Makaronesa obscuripes*, *Pteromalus poisoensis*, *Hyssopus cracens*, *Elachertus sylvarum*, *Necremnus fumatus*, *Pediobius laticeps*, *Chrysocharis miranda*, *Aprostocetus hians*, *Aprostocetus phloeophthori*. Keys to males and females of the known species of *Makaronesa* are given. Thirty eight already-described species are also added to the Madeiran list, making the total number recorded from the island about 188. Five species were reared by the author from a Dipterous host mining leaves of the grass *Brachypodium sylvaticum*; the host of three of these species was not previously known.

SUMÁRIO. Este trabalho é principalmente um relato sobre os himenópteros calcidóides colhidos na Madeira pelo autor e sua mulher em 1982. Alguns aspectos gerais da fauna são debatidos e dá-se uma descrição das visitas a algumas localidades de colheita clássicas. Descreve-se as seguintes espécies novas para a ciência: *Euchalcidia aeneonitens*, *Makaronesa obscuripes*, *Pteromalus poisoensis*, *Hyssopus cracens*, *Elachertus sylvarum*, *Necremnus fumatus*, *Pediobius laticeps*, *Chrysocharis miranda*, *Aprostocetus hians*, *Aprostocetus phloeophthori*. São dadas chaves para machos e fêmeas das espécies conhecidas do género *Makaronesa*. Trinta e oito espécies já conhecidas mas novas para a fauna da Madeira foram registadas o que aumentou o total do número destes insectos assinalados na Madeira para cerca de 188. Cinco espécies foram criadas pelo autor dum Diptero hospedeiro minando folhas da gramínea, *Brachypodium sylvaticum*; o hospedeiro de três destas espécies não era anteriormente conhecido.

INTRODUCTION

Attracted by the idea of another visit to Madeira, my wife and I returned to the island on July 16th 1982 and passed a pleasant and eventful month there. The scenery, botany, and not least the entomology of the island were features which kept us occupied so that the time passed all too rapidly. As a result of our earlier visits, in 1972 and 1980, we were better acquainted with the possibilities and planned some excursions to more remote areas. Based on Funchal, our trips into the country were mostly made by hired car, sometimes by transport kindly

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arranged by local institutions. Weather was on the whole good and the results of collecting insects exceeded our expectations.

It is our pleasure to thank the following who have helped in various ways to make our visit a success :

The Mayor of Funchal; Senhor João Carlos Nunes Abreu, Head of the Direcção Regional de Turismo of Funchal; Senhor Henrique Costa Neves, of the Forestry Department of Funchal; Mr. G. E. Maul, formerly Curator of Museu Municipal do Funchal, and Senhor José Luís Vasconcelos, of the same Museum. I am especially grateful to the former, not only for much advice and practical assistance, but for making available Menezes' *Flora* which was indispensable for checking the plants we encountered.

I wish especially to thank my wife, who not only dared to drive our car around some of the most forbidding ravines, but also helped on various occasions with the collecting.

I am indebted also to members of the staff of the Department of Entomology, British Museum (Natural History): Dr. B. H. Cogan and Mr. L. M. Pitkin, for help in identifying Tephritid flies; M. J. Quinlan for identifying Cynipoidea; Miss Pamela Gilbert who kindly allowed me to consult Wollaston's correspondence with H. T. Stainton, contained in the Library of the Department.

Also to Mrs. A. Z. Smith (Librarian, Hope Entomological Collections, Oxford) for placing at my disposal Wollaston's MS list of Madeira beetles.

In the text, where the depository of material is named, the British Museum (Nat. Hist.) is abbreviated to BMNH. Unless otherwise stated specimens were captured by the author (whose name is generally indicated by initials (M. de V. G.).

GENERAL FEATURES OF THE CHALCIDOID FAUNA

The author has already remarked (Graham, 1981b: 5) on the paucity of Torymidae and Tetrastichine Eulophidae in Madeira. Further collecting has not changed this opinion. Their scarcity is probably due to the comparatively poor fauna of gall-forming insects, Cynipidae in the case of Torymidae and Diptera Cecidomyiidae in the case of Tetrastichinae, which would be potential hosts. In areas of more natural forest where native species of Chalcidoidea were most abundant, these two host families had few representatives. Amongst Diptera hosts in Madeira, Agromyzidae probably play the most important part. In forest areas at intermediate altitudes there appear to be very large populations of at least some Agromyzid species, e. g., *Cerodontha pygmaea* (Mg.) and *Phytomyza nigra* Mg., and probably a number of Madeiran Eulophidae depend on these as hosts. Even at very high altitudes some Agromyzidae occur, together with some of the Eulophidae found in the intermediate zone. It is noticeable that in the same areas Braconidae, subfamily Alysiinae,

(especially Alysini) are plentiful, and these also parasitise Agromyzidae. Our experience shows that areas of forest having a carpet-flora dominated by the grass *Brachypodium sylvaticum* (Huds.) Beauv. hold a particularly rich fauna of Chalcidoidea and Alysine Braconidae in Madeira. This is certainly because at least some of them parasitise leaf-mining Agromyzidae on this grass (see our records of rearings noted below). The typical Chalcidoid species associated with *Brachypodium sylvaticum* in northern Europe (*Tetramesa fulvicollis*, *Eurytoma collaris*, *Pediobius eubius*) appear to be absent from Madeira, but their place is occupied by others, e. g., *Pnigalio pectinicornis*, *Pediobius laticeps*, *Chrysocharis centralis*, *C. discalis* and *Aprostocetus flavifrons*. At low levels, areas dominated by the grass *Hyparrhenia hirta* (L.) Stapf also tend to support a varied fauna, though in this case particularly of Chalcidoidea family Encyrtidae, which parasitise Coccoidea. On the other hand, in Madeira areas of mixed grasses other than *Brachypodium* or *Hyparrhenia* are often virtually devoid of Chalcidoidea; similar associations in Europe would hold vast numbers of them, especially Tetrastichinae and other Eulophidae. Some of these grasses have been introduced to Madeira and evidently the Chalcidoidea dependent on hosts living on them have not found their way there.

Another moderately important group of hosts comprises certain Aphidoidea and their Syrphid predators, which support e. g., Chalcidoid parasites of the genera *Aphelinus*, *Syrphophagus*, *Aphidencyrtus*, *Pachyneuron* and *Asaphes*. Psylloidea probably serve as hosts to several Chalcidoid species in Madeira. *Tetrastichus arboreae* belongs to a group of species which parasitise *Trioza*, some of which are common in Madeira. *Trioza urticae*, known to be host of a *Tetrastichus* species in Europe, has been recorded from Madeira. In Europe nettles (*Urtica dioica* L.) have a small Chalcidoid fauna. The only nettle we saw in Madeira, near Curral das Freiras in May 1980, was probably *U. dubia* Forssk.; I swept these plants but found none of the parasite species found in Europe.

Coccoidea are another important group of hosts, especially in lower level areas.

Some species of Chalcidoidea must have extremely high populations in Madeira. A notable example is *Diglyphus eleanorae* which is both widespread and abundant. We have not taken it much below 300m. but between that level and 1800m. it occurs nearly everywhere, even on the summits of Pico Ruivo and Pico do Arieiro, and in quite remote valleys. It is particularly abundant in shady forest with a thick carpet-vegetation between 600m. and 1400m. Some *Chrysocharis* species (*centralis*, *discalis*) are present in large numbers between those levels, whilst *Pnigalio pectinicornis* is hardly less numerous. We met with one extraordinary case of abundance in *Chrysocharis centralis*. On 11th August 1982 my wife and I were brushing *Hydrangea* along the levada path leading from Queimadas to the Pico das Pedras road. At one shady spot where the path crossed a small stream I found my

net full of *centralis* and could have taken hundreds of them. On the way back I brushed the same bushes and found nearly as many *centralis*. Females outnumbered males in the ratio of perhaps 20 to 1. The significance of this swarm was not obvious but possibly mating was involved. At that time no host was known for *centralis*, but it seemed unlikely to have any on *Hydrangea*, whilst a possible host-plant *Quercus robur*, which is planted all along this part of the levada, was beaten but found to harbour no *centralis*. Later I reared some specimens from puparia of the Agromyzid fly *Cerodontha pygmaea* (Mg.) on *Brachypodium sylvaticum*, which may well be its chief host-plant as I have found it in all the places where *centralis* occurred. Possibly, however, it may have an alternative host in some areas, e. g., the moth *Phyllonorycter messaniella* (Zell.) which mines oak-leaves and is recorded from Madeira.

Madeiran representatives of some European Chalcidoid species tend to be smaller than their European counterparts. This is noticeable in *Hemiptarsenus unguicellus*, *H. dropion*, *Miotropis unipuncta* and *Asaphes suspensus*. Madeiran *Asaphes suspensus* also tend to be slightly darker, males sometimes having the femora infuscate and the flagella partly to entirely fuscous; females usually have the head olivaceous, thorax bronze-green or bronze (in European specimens both are normally bright or blue-green) whilst the femora are occasionally brownish, rarely also the tibiae. Females of *Hemiptarsenus dropion* tend to have the forewing heavily dark-clouded as in specimens from Ireland, but in British females it is usually less infuscate, occasionally even immaculate. The minute size of some specimens of *Mesopolobus laticornis* agg. which I took at about 1100m. on Montado dos Pecegueiros is probably attributable to the less favourable conditions prevailing at that altitude on the north side of the island.

SEASONAL ACTIVITY OF CHALCIDOIDEA

In Europe a marked break in activity occurs with most species in winter, commonly from November until March. In Madeira the winter months are very mild at low and intermediate levels, and only in the mountains does one encounter strong winds, mist and heavy rain, and sometimes snow. Therefore many insect species appear to remain active throughout the year, including many Chalcidoidea which must have a succession of generations as I have found several species both in mid-winter, in May, and in July-August. From an Agromyzid Dipteron I have reared one species of Eulophid chalcidoid which continued to emerge at intervals from August until late December (see records below). The thistle *Galactites tomentosa* L. has a long flowering season (February to September) so that more than one brood of the associated Tephritid flies and their parasites can probably develop on this plant. The above remarks apply to insect species at lower and intermediate

altitudes, though there is probably a short winter break in activity in the more hostile mountain regions.

A number of both indigenous and introduced trees and shrubs are evergreen and thus afford shelter for insects at all seasons. Some introduced plants are affected by the milder winter climate of Madeira, for example oaks (*Quercus robur*) tend to retain their foliage until displaced by the new growth about February of the following year.

CHALCIDOID FAUNA IN RELATION TO CULTIVATION AND STOCK-FARMING

A number of insect species have been imported with various introduced crop and other plants. As regards Chalcidoidea, this would appear likely with some Encyrtidae parasitising scale insects (Coccoidea) occurring on various cultivated plants at lower levels. These are mainly anthropochor species which, with the increase of cultivation, will probably tend to oust native species.

Local dispersal of some indigenous species associated with plants used as fodder seems likely. In Madeira most cattle are kept in sheds for a large part of the time because of the dangerous nature of the terrain, fodder being brought to them, sometimes from a considerable distance. The fodder consists largely of grasses including *Brachypodium* species, and various herbs including *Galactites*. A number of Chalcidoid species are now known or believed to be associated with hosts living in these plants and no doubt transport of fodder aids their dispersal to a limited extent.

It is not easy to assess the present numbers of anthropochor Chalcidoidea associated with stock, as such animals are largely confined on private holdings where one naturally cannot trespass. Occasionally one finds such species where cattle roam free, for example at Queimadas where *Spalangia cameroni* was found. Several anthropochor species were already recorded more than a century ago. Horses were then more common, but otherwise perhaps the picture has not greatly altered.

NOTE ON CYNIPOIDEA ASSOCIATED WITH OAKS (*QUERCUS ROBUR* L.) IN MADEIRA

In my last paper (Graham, 1981 : 5) I remarked that it was not clear how many oak-insects had found their way into Madeira. In the case of Cynipoid wasps I can now give a few records. The first record of *Andricus ostreus* (Htg.) (= *anthracinus* (Curtis) in Madeira was published by Tavares (1905 : 225) ; it was found at the Monte in August 1903 on *Quercus pedunculata* Ehrh. (= *robur* L.). Tavares also recorded (1903 : 184) *Neuroterus aprilius* (Giraud) from Madeira (locality not given). In 1980 we took several *Andricus* which are probably *anthracinus* at Curral dos Romeiros, also some specimens of *Synergus gallae-pomiformis* (Fonsc.). The chalcidoid *Mesopolobus tibialis* Westwood which we found on 11.v.1980 in the same locality were likely to have

parasitised the *Andricus (tibialis)* has been reared from *A. anthracinus* in Europe). The galls formed by *anthracinus* on oak leaves are small and easy to overlook, whilst the oaks at Romeiros (and others at Queimadas) were on sloping ground and their foliage often out of reach. At Queimadas on 11.viii.1982, however, I found a damaged gall which appeared to be that of *anthracinus* on a leaf of *Quercus robur*. *Mesopolobus fuscipes* (Walker), of which I took a single female at Romeiros on 21.vii.1982, has been reared in Europe from galls of *anthracinus* f. *furunculus* and *Neuroterus aprilius*, both of which occur in Madeira. Although *Quercus robur* is said to have been brought to Madeira about 1803 by the Conde de Carvalhal, not many Cynipoidea associated with it can have been introduced, otherwise one would expect more of their parasites to turn up.

T. V. WOLLASTON'S COLLECTING LOCALITIES

From 1847 onwards Wollaston visited Madeira no less than eight times, five of his visits being of several months' duration. He was mainly interested in Coleoptera, but managed to collect quite a number of other insects, including Chalcidoidea. He himself published descriptions of some of these. It is not widely known that he had projected a second volume to follow his *Insecta Maderensia* and which would cover insects other than Coleoptera; this idea was never realised. He also took a great interest in the botany of the island. One of our special aims has been to revisit as far as possible the localities where he collected more than a century ago, so as to gain an idea of their present state and possibilities. We have now been privileged to visit all but one or two of these classic localities, which has provided a much better insight into Wollaston's activities. Naturally with the short time at our disposal, our surveys were of a preliminary nature.

A note regarding some localities frequently mentioned by Wollaston, particularly in his major works of 1854 and 1857, is relevant. In certain cases the orthography of their names has altered, though most are easily recognizable. I have taken as a standard reference the Portuguese 1 : 50,000 scale map of Madeira issued in 1971 by the Instituto Geográfico e Cadastral, Funchal, the most detailed available, and have compared with it a number of older maps dating back to 1851. Some of the old maps contain inaccuracies and one has to be careful when elucidating Wollaston's localities, a few of which give difficulty. One example is the «Lombo dos Pecegueiros» which he so often mentions in his works of 1854 and 1857. On the 1971 map this name is applied to a narrow, almost inaccessible ridge just north of Pico Ruivo de Santana in the north-eastern part of the island. This, however, is not Wollaston's locality, because in his *Catalogue* (1857 : 45) he mentions «mountains both to the east and west of the São Vicente ravine... namely, at the Lombo de Vaca and the Lombo dos Pecegueiros». This indication, sup-

ported by other details, shows that his «Lombo dos Pecegueiros» was the high ridge to the north of Paul da Serra in the western half of the island; it is marked on the 1971 map as Montado dos Pecegueiros. Similarly, his «Lombo de Vaca» is the mountain just east of São Vicente, now marked as Lombada das Vacas. A third locality which may give rise to confusion is his «Cruzinhas» because this name occurs in several places in Madeira. One is familiar to visitors as a beauty spot in Ribeira Seca in the eastern part of the island. This is not Wollaston's Cruzinhas, which is not marked on the 1971 map. I have been able to identify his locality as the intersection where the old track from the north coast village of Seixal meets the path going westward from Paul da Serra to the Fanal. This intersection (which is marked on some older maps as «Cruzinhas») is a few kilometres south-east of the Fanal, which was also visited by Wollaston in the same year (1850).

It is well known that Wollaston's specimens bear no locality labels, although each Madeiran specimen has a number on the underside of its card. Recently, however, Smith and Graham have reported (1982 : 253) on a Wollaston manuscript list of Madeiran beetles found in the Hope Library archives and which gives the key to these numbers.

EXPEDITIONS TO SOME CLASSIC LOCALITIES

The devotion and perseverance of the botanists and entomologists of the classical period of Madeiran exploration, such as Wollaston, Lowe, Moniz, Castello de Paiva and others, compels admiration. In the absence of any but horse-roads and foot-tracks, and with horses, mules and hammocks as the only means of transport, it is extraordinary how they reached so much of the remote and difficult terrain. A map showing the horse- and foot-roads about 1850 is given in Harcourt's book (1851). Even today, in spite of great advances in transport and facilities, one can scarcely hope to emulate all their expeditions. We have been privileged to visit most of Wollaston's localities and some others; the more noteworthy of these are now mentioned.

1. IAN EXPEDITION TO MONTADO DOS PECEGUEIROS

Through the kind assistance of Mr. G. E. Maul and Mr. Henrique Costa Neves, I realised a long standing ambition to visit this remote locality, celebrated for its native flora and fauna. Few visit this region, and apparently no entomologist since Wollaston camped there with Lowe 19th to 23rd July 1850 and in July 1855. With its highest point about 1,300 m. above the sea, it is frequently enveloped in cloud, whilst the terrain is rough and impossible to cross without a guide. A visit is only practicable during the summer. On 3rd August 1982 Mr. Neves, after picking up a guide, drove my wife and me to Estanquinhos on the Paul da Serra, which we reached about 11. This was the start of our walk,

which followed the old track to Seixal, almost invisible in a sea of bracken. It was a glorious morning on the Paul, with some cloud just below us. We ran into mist soon after skirting Pico Ruivo do Paul, but it soon cleared off. A few Clouded Yellow butterflies, and Grayling (probably *Hipparchia aristaeus*) were dashing about between patches of mist. I swept bracken, finding small Diptera and Hemiptera, but no Hymenoptera. Presently the vegetation became like maquis, with bracken up to 2 metres in height, and dense thickets of *Erica scoparia*, later mixed with *E. arborea*. About 12.30 we entered the forest proper, as described by Wollaston: «thicket and nearly impenetrable groves of Folhado [*Clethra arborea*], and where the moisture was most excessive» (1854 : 453). In this upper region *Clethra* was abundant, mixed with laurels, *Erica* of both species, with a sparse carpet of ferns and bracken and some *Brachypodium sylvaticum* from which I swept several parasitic Hymenoptera. I noted the aspect of the Dipterous fauna, as potential hosts of these parasites. No Cecidomyiidae were found, though Sciaridae were abundant. Agromyzidae were frequent, whilst Dolichopodidae, Lauxaniidae, Phoridae, Mycetophilidae and Sphaeroceridae made up a substantial part of the fauna. Some Anthomyzidae and Sciomyzidae were taken. Amongst the Diptera, Agromyzidae probably supply the greater number of hosts for parasitic Hymenoptera such as Chalcidoidea (particularly Eulophidae) and Braconidae of the subfamily Alysinae. The other Dipterous families mentioned are less likely hosts. Amongst Agromyzid leaf-miners, those mining grasses, especially *Brachypodium sylvaticum*, are most important in the less dense forest. In the dense regions the dominant trees and shrubs are Lauraceae and Ericaceae the leaves of which are too tough for leaf-miners, while the carpet-flora is very sparse and probably offers little for exploitation by these Diptera.

We ate our lunch in the dense forest lower down, dark and extremely humid (my glasses kept fogging up, impeding collecting!). The flora consisted mostly of *Clethra*, *Laurus azorica*, and the giant *Vaccinium*, with a few *Ocotea foetens* (Til) one about 1m. in diameter; the carpet very sparse, composed of hard-fern, some bracken, *Sibthorpia*, mosses and lichens. Epiphytes abounded on the trees; one handsome green foliose lichen (possibly a *Sticta*) decorated nearly all the trunks of the *Clethra* and laurels. This may have been the species which Wollaston (1865 : 157) referred to (perhaps incorrectly) as «Madre de Louro». My wife saw a striking fungus which from her description might have been a *Clathrus*. From the laurels I beat two fine Curculionid beetles of I believe Wollaston's genus *Atlantis* (now regarded as a subgenus of *Laparocerus*). Hymenoptera were extremely few here, probably because of the thin carpet-flora. Diptera were represented by abundant Sciaridae, and members of the other families noted for the higher region but in fewer numbers.

I had hoped to see the place named Chão das Castanheiras, where Wollaston camped in 1850 and which he described (1854 : 188) as «thick-

ly studded with enormous Spanish chestnuts». Our guide recalled the name and indicated where the spot had been, though the chestnuts have long since gone. Groves of this tree were found all over Madeira in Wollaston's day, but most were destroyed later by fungal bark disease.

Below 1000 m. progress became rather slow because of the steep slope which was littered with laurel leaves and very slippery. Here and there the ground had been grubbed up by feral pigs. At a somewhat lower level *Brachypodium* and flowering plants became more frequent, and if one had more time to collect, this zone would probably produce interesting Hymenoptera. About this point Mr. Neves showed us the remains of a charcoal burner's oven, doubtless disused for a century or more.

As we descended along the edge of the Ribeiro do Inferno, going became difficult, not least owing to vicious brambles (*Rubus ? ulmifolius*) which, often concealed among bushes of *Lytanthus salicinus*, caught us unawares; their fruit, however, was delicious. Once I triumphed over the prickles when, after taking a sweep with my net and becoming entangled, I was delighted to find the fourth known specimen of a native Chalcidoid (*Mauleus*) in it.

After 5½ hours, and with our knees decidedly shaky, we reached sea-level at the bottom of Ribeiro do Inferno, where we drank pure water dripping from the ravine cliff, whilst awaiting the arrival of the Land-rover to take us back to Funchal. So ended a unique experience, full of botanical and entomological interest.

2. A WALK TO THE FANAL

Another remote and little-frequented region is the Fanal, where Wollaston camped with R. T. Lowe for about 10 days in early June, 1850. He often mentions it, and «Cruzinhas», in his *Insecta Maderensia*. The best way to reach it is by walking from the Paul da Serra. My wife and I spent three days at Rabaçal in 1982, and on July 28th we shouldered our rucksacks and crossed Campo Pequeno on the Paul to the Fanal track. The weather was fitful, mostly cloudy and windy, occasionally with some misty drizzle, though fortunately it became fine when we reached our destination. I did some sweeping amongst *Erica* and bracken when we stopped for a picnic on the High Fanal just before reaching the hill Pedreira, and collected a few insects including Hymenoptera. On the sandy track beyond this we saw a number of sand-wasps (*Podalonia*) and Clouded Yellow and Grayling butterflies occasionally appeared. By one o'clock we had reached the heart of the Fanal, that delightful park-like region with woods composed of enormous Til (*Ocotea foetens*) twisted into fantastic shapes and bearing a wealth of epiphytes, and a great expanse of pasture where cattle and goats were grazing (almost the only place on Madeira where one sees cattle at large). The til-woods had a very sparse carpet, mostly clumps of

fern (*Cystopteris* sp.) and a few herbs. I swept a few Ichneumonidae and Proctotrupeoidea from them. Diptera comprised numerous Dolichopodidae, a few Agromyzidae including *Cerodontha* sp., and some Sciariidae, Phoridae, Sphaeroceridae, Drosophilidae, Sepsidae, Chloropidae, Tephritidae and Lauxaniidae. Some Tephritid flies were plentiful, for example *Dioxyna sororcula* (Wied.) and a *Paroxyna* (perhaps *tessellata* (Loew)). Possibly one or both of these are associated with *Leontodon* (? *saxatilis* Lam.) which is abundant on these upland pastures. One might expect them to have *Pteromalus* parasites though none were actually found in the Fanal. Here we saw the few people we encountered on the walk: a forest officer and a group of peasants, some of whom appeared to be performing a veterinary operation whilst another was carrying a dead goat.

Later we continued to the level of the Lagoa, an interesting crater-like depression which Wollaston had visited. I did not reach the crater itself, but collected briefly by the watercourse which runs into it, in the shady forest which here consists of large Til, some shrubs, much fern and some bracken. I was pleased to obtain a species of the Chalcidoid genus *Makaronesa*, so far known only from Madeira. My catch also included a few Proctotrupeoidea and some Lauxaniid flies.

In the late afternoon we went a few more kilometres until the sea and the village of Ribeira da Janela were visible. Somewhere here I hoped to find the giant *Euphorbia* mentioned by Wollaston; however, I could not locate any and they may in fact no longer be there.

On the way back we stopped briefly at Wollaston's locality «Cruzinhas», where the old path to Seixal branches off, and I collected several Hymenoptera. But it was now getting late and the weather deteriorating. With clouds of red dust blowing up by the strong wind, we tramped back to Rabçal, reaching it about 8 p.m. after a round trip of 34 kilometres. We then lit the stove in the rest-house with twigs of giant heath and cooked soup for our evening meal.

3. QUEIMADAS AND CALDEIRÃO VERDE

This area has a very high precipitation and is frequently enveloped in cloud. A visit on August 5 1982 was abortive because of steady rain. We tried again on August 9 and although whilst collecting before noon at Queimadas it was still misty, we continued to Caldeirão Verde in a gloriously sunny afternoon. On the way we saw many interesting native plants, including the giant *Euphorbia mellifera* and *Sonchus fruticosus*. From Caldeirão Verde there was a magnificent view along the savage cleft of Ribeira Grande, with the stream far below and opposite, the forbidding mass of Lombo dos Pecegueiros towering above. I swept the vegetation at various points, including Caldeirão Verde itself. Parasitic Hymenoptera were rather few but included, amongst Chalcidoidea, a beautiful new species *Chrysocharis miranda* (described below)

as well as some Proctotrupeoidea and Braconidae. Most of the material obtained was swept from clumps of *Brachypodium sylvaticum* and *Carex* spp. and from the handsome *Pteris arguta* and other ferns. Diptera were much in evidence, especially small Tipulidae and Dolichopodidae. Caddis (Trichoptera) were abundant. We saw more Speckled Wood butterflies (*Pararge xiphia* F.) here than anywhere else.

On August 11, thanks to transport kindly provided by the Câmara Municipal do Funchal (Funchal Town Council), we again visited Queimadas and collected in several places around the Casa. This gave us a good idea of the local fauna and was particularly interesting for our encounter with the great swarm of the Chalcidoid *Chrysocharis centralis* referred to above.

4. FAJÁ DA NOGUEIRA

On July 25 my wife drove us to the powerhouse at Fajã da Nogueira, then we walked through the lovely native forest to the top of the great ridge and along the levada across Ribeira Seca at Cabeço do Lapão, collecting at some places on the way. One or two Chalcidoidea new to our list were found. Thick forest at about 800 m. with good carpet vegetation proved interesting, producing *Makaronesa obumbrata*, *Psilocera crassispina* and other species, with *Miotropis unipuncta* common and apparently associated with a tall *Juncus* of the *effusus*-group. One handsome Tephritid fly (possibly a *Sphenella* and apparently not previously recorded) was taken. A remarkable sight was the largest Til (*Ocotea foetens*) we had seen, a magnificent tree 4 m. in diameter, although completely divided like an arch in its lower part.

5. PICO RUIVO DE SANTANA

My wife and I climbed this peak on 22nd July 1982. As a thick blanket of cloud lay between 1000 m. and 1500 m. we started from Achada do Teixeira, which was above the cloud. During the whole of our walk we had brilliant sunshine, and a glorious view with the high peaks jutting above the cloud on every side. On the way we saw many sand-wasps (*Podalonia*), one carrying a caterpillar as large as itself. Many butterflies appeared, including *Vanessa indica*, but chiefly *Colias crocea*: single specimens of *Hipparchia aristaeus*, a worn Blue (probably *Lampides boeticus*) and a large White which may have been *Pieris brassicae wollastoni*. Right at the summit I found several Chalcidoidea (*Diglyphus eleanorae*, *Trichomalus rufinus*, *Tetrastichus arboreae*); also two species of ladybird (Coccinellidae). A few Ichneumonidae were hovering at flowers of the native *Erica maderensis* but as the clumps of this heath were mostly perched at the edge of sheer precipice, risky for wielding a net, I took only one specimen. We were very lucky to be able to view the scene admired by Wollaston when, in August 1850, as he

reported in a letter to Haliday «I took my tent to the very utmost point of Madeira (6200 ft. above the sea) & pitched it for 3 days in the clear sunshine, 3000 ft. above the constant cloud-line».

DESCRIPTIONS OF NEW SPECIES

Euchalcidia aeneonitens sp. n.

♀. Black; body with a distinct bronze tinge; distal half or more of scape, pedicellus, first segment of funicle, trochanters, bases and tips (bases narrowly) of fore and mid femora, fore tibiae wholly or mainly, bases and tips of mid tibiae, tips of hind tibiae, and all tarsi except the pretarsi, reddish. Tegulae black. Forewings grey, with about their middle third smoky. Length 1.9-2.6 mm.

Head shaped as in *nigripes* (Fonsc.) but slightly broader than high (38 : 35) and with piliferous very small and shallow; frons including scrobes moderately shiny, with extremely fine superficial reticulation, punctures at sides small, shallow and sparse; genae and temples with small, shallow, poorly-defined punctures; vertex shiny, with extremely fine engraved reticulation (in ocellar triangle obsolescent), occiput with very fine slightly raised reticulation and numerous very small piliferous punctures. Antenna (fig. 1); scape reaching level of vertex; pedicellus plus flagellum 1.5-1.6 breadth of head; pedicellus 3.3-3.8 times as long as broad, 1.5-1.7 times length of first funicular segment; funicle very slender, its first segment 2.0-2.3 times, second 1.8-2.0 times as long as broad, following segments hardly decreasing in length, eighth about 1.6 times as long as broad; clava 3.4-3.8 times as long as broad, about as long as funicular segments 7 plus 8.

Pronotum, mesoscutum, scutellum and axillae moderately shiny (hind part of mesoscutum and disc of scutellum rather strongly shiny), with excessively fine and delicate engraved reticulation; piliferous punctures of pronotum and front part of mesoscutum minute, those of hind part of mesoscutum and the scutellum very small (fig. 3). Propodeum moderately shiny; submedian and sublateral longitudinal carinae as in *nigripes*, but the interspaces with extremely fine slightly raised reticulation and only traces of some fine wrinkles. Sides of propodeum, and mesopleuron, with weaker sculpture than in *nigripes*, the piliferous punctures shallow. Gaster as in *nigripes*. Hind femora slightly less stout than in *nigripes*, 1.7-1.9 times as long as broad, slightly less shiny, their pilosity rather denser. Longitudinal carina on outer surface of hind tibia sharp in about proximal half but weakening or fading out distally. Forewing 2.5-2.8 times as long as broad.

♂. Colour as ♀ but scape black, rest of antenna dark brown. Length 1.8 mm. Sculpture of body as in ♀. Antenna (fig. 2): scape not nearly reaching median ocellus, its anterior edge sinuate in upper half but not toothed; pedicellus plus flagellum about 1.5 times breadth of

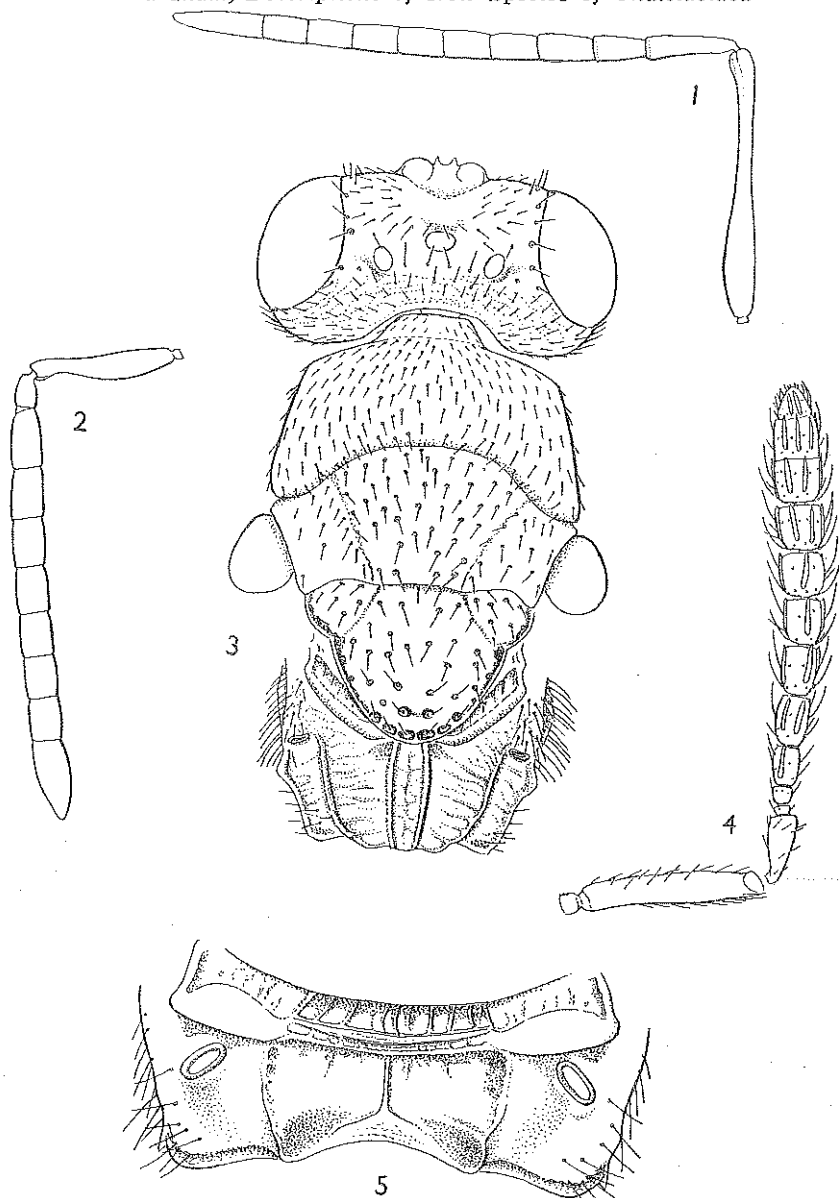


Fig. 1. — *Euchalcidia aeneonitens* sp. n., ♀, left antenna. Fig. 2. — The same, ♂, left antenna. Fig. 3. — The same, ♀, head and thorax. Fig. 4. — *Makaronesa obscuripes*, sp. n., ♀, left antenna. Fig. 5. — *Pteromalus (Habrocytus) poisensis* sp. n., ♀, metanotum and propodeum.

head; pedicellus in dorsal view 1.5 times as long as broad, slightly more than half length of first funicular segment; flagellum proximally stouter than pedicellus, its segments gradually decreasing in length, first and second about 1.7 times, seventh 1.2 times, as long as broad; clava 2.25 times as long as broad, about as long as funicular segments 6 plus 7.

Holotype ♀, and paratype ♂, in BMNH. Paratype ♀♀ in author's collection.

Madeira: São Lourenço promontory, on an arid hill near the chapel of Nossa Senhora da Piedade, 31.vii.1982, one ♂, six ♀♀ (one the holotype); Cabo do Judeo, near Caniçal, one ♀ (M. de V. Graham).

The hill where I took most of the specimens had been cropped almost bare by cattle, and they were found in an area where a number of dried cow-pats were present; otherwise only sparse stunted grass and some thistles (*Cynarus cardunculus* L. var. *ferocissima* Lowe). Very little is known about the biology of *Euchalcidia* species.

E. aeneonitens differs from the other species of the genus that I have seen in its more shiny head and thorax, which have a relatively weak and sparse puncturation.

Makaronesa obscuripes sp. n.

♀. Head and thorax very dark green; gaster with bronze reflections, basal tergite greenish. Antennae blackish, scape reddish. Coxae, and femora except tips, black with metallic tinge; trochanters mainly fuscous; tibiae, except bases and tips narrowly, blackish (other parts of femora and tibiae testaceous); fore tarsi fuscous, mid and hind tarsi yellowish with fifth segment fuscous. Tegulae brown. Forewing with a diffuse brownish discal cloud; venation pale brown. Length 1.9mm.

Head slightly broader than thorax, 2.2 times as broad as long; temples converging moderately, 0.27 length of eyes; POL 1.4 OOL; lateral ocelli 2.2 times their diameter from eyes. Eyes 1.3 times as long as broad; malar space 0.63 length of eye. Mandibles similar, both 3-dentate with inner tooth truncate. Antenna (fig. 4); scape 0.9 length of eye, reaching lower edge of median ocellus; pedicellus plus flagellum equal to breadth of head

Pronotal collar medially 0.1 length of mesoscutum, the latter moderately shiny, with distinctly raised reticulation, coarse over middle third, finer laterally. Scutellum hardly broader than long, with very fine slightly raised reticulation. Propodeum medially 0.65 length of scutellum; with very fine distinctly raised reticulation; spiracles shortly oval; callus rather sparsely pilose; a trace of plicae near base of propodeum and at sides of nucha. Forewing slightly more than twice as long as broad; marginal vein 1.9 times length of stigmal vein, latter at 45° to costal edge and hardly curved; stigma small, slightly longer than high, its height about half the distance between its upper edge and the lower edge of the postmarginal vein, latter nearly as long as marginal vein;

basal vein pilose, basal cell open below, speculum open below except distally.

Gaster slightly more than twice as long as broad, slightly longer than head plus thorax, as broad as thorax, acute and slightly acuminate; last tergite hardly as long as its basal breadth.

♂. Differs from ♀ as follows: head and thorax olivaceous or bronze; gaster violet with base greenish; antennal scape fuscous with at most base reddish; forewing grey-tinged but without distinct cloud. Length 1.5 - 1.7 mm. Temples more rounded and convergent. Malar space 0.55 eye-length. Antenna: sensilla of distal part of flagellum sparser; third segment of clava with more numerous curved white hairs, otherwise very like that of ♀. Pronotal collar 0.18 length of mesoscutum. Forewing: marginal vein 1.35 times length of stigmal vein; stigma subcircular, larger, its height 0.75 the distance between its upper edge and the lower edge of postmarginal vein. Gaster oblong, obtuse, as long as but narrower than thorax, with ventral plica.

Holotype ♀ in BMNH. Paratype ♂♂ in author's collection.

Madeira: Queimadas, 14.v.1980, one ♀ (the holotype); Curral dos Romeiros, 13.v.1980, 15.v.1980, in shady woodland, two ♂♂. All taken by the author.

For diagnostic characters separating this species from the others of the genus, see keys to species below.

KEYS TO SPECIES OF MAKARONESIA GRAHAM

(Females)

1. Hind tibiae yellow with their distal fifth to third fuscous. Forewing with a brownish spot on disc some distance below the marginal vein, another below the first spot, a third on disc below stigmal vein, a fourth near wing-tip; the proximal spots sometimes joined. Antenna with pedicellus at least very slightly shorter than first funicular segment, the latter 2.0 - 2.5 times as long as broad. Moderate-sized species, length 2.75 - 3.8 mm.
 *tetraspila* Graham
- Tibiae wholly pale, or more or less infuscate medially, but not pale with dark tips. Forewing indefinitely infumate or yellowish, or with a diffuse brownish cloud about in the middle 2
2. Basal panels of median area of propodeum relatively shiny, smooth or with some wrinkles. Moderately large species, length 3.0 - 4.0 mm. *carinus* (Walker)
- Whole of median part of propodeum, including the basal panels, uniformly reticulate and rather dull 3

3. Gaster about 4.5 times as long as broad, very strongly acuminate; last tergite about three times as long as its basal breadth. First funicular segment 2.3 - 2.5 times as long as broad and somewhat longer than the pedicellus. Very large species, length nearly 6 mm.
 *tinctipennis* (Walker)
- Gaster 2.0 - 3.1 times as long as broad, less strongly acuminate; last tergite at most slightly longer than its basal breadth. First funicular segment at most twice as long as broad, shorter than or at most as long as pedicellus. Smaller species, length at most about 3.5 mm. 4
4. Antenna: first funicular segment about as long as the pedicellus, 1.8 - 2.0 times as long as broad. Legs, except coxae, fulvous. Length about 3.0 mm. *basicyanea* (Walker)
- Antenna: first funicular segment distinctly shorter than the pedicellus, 1.2 - 1.5 times as long as broad. Femora extensively or mainly fuscous to black; tibiae broadly infusate or mainly black. Length 1.9 - 2.4 mm. 5
5. Gaster 2.7 - 3.1 times as long as broad. Forewing: basal cell closed below; stigma larger, its height slightly to distinctly greater than half the distance between its upper edge and the lower edge of the postmarginal vein. Left mandible with 3 teeth, right mandible with 4 *obumbrata* (Walker)
- Gaster slightly more than twice as long as broad. Forewing: basal cell open below; stigma smaller, its height about half the distance between its upper edge and the lower edge of the postmarginal vein. Both mandibles with 3 teeth *obscuripes* sp. n.

(Males)

(The males of *tinctipennis* and *basicyanea* are unknown)

1. Antenna: combined length of pedicellus and flagellum 1.6 - 1.7 times breadth of head; flagellum virtually filiform, with rather strongly outstanding hairs; pedicellus 0.5 - 0.66 length of first funicular segment; all funicular segments longer than broad, first 2.7 - 3.0 times, sixth 1.8 - 2.0 times, as long as broad; clava 3.5 - 4.0 times as long as broad. Hind tibia yellowish with distal fifth to half fuscous. Forewing with a small dark spot on disc some distance below stigma, often two others somewhat basad the first, occasionally a fourth nearer wing-tip (in small males the spots may be evanescent) *tetraspila* Graham
- Combined length of pedicellus and flagellum 1.05 - 1.15 breadth of head; flagellum slightly clavate, with less outstanding or subdecumbent hairs; pedicellus from nearly as long as, to slightly longer than, the first funicular segment, the latter 1.5 - 2.0 times

- as long as broad, sixth funicular segment varying from slightly transverse to slightly longer than broad. Tibiae either wholly pale, or more or less broadly infusate medially. Forewing indefinitely infumate, or with a diffuse discal cloud 2
2. Basal panels of median area of propodeum shiny, nearly smooth or with a few wrinkles *carinus* (Walker)
- Basal panels of propodeum reticulate like the rest and not shiny 3
3. Larger species, length 1.8 - 2.4 mm. Gaster with yellowish sub-basal transverse band. Tibiae testaceous, femora testaceous or more or less infusate (most often the hind femora). Malar space 0.39 - 0.45 length of eye. Left mandible with 3 teeth, right mandible with 4 *obumbrata* (Walker)
- Smaller species, length 1.5 - 1.7 mm. Gaster dark, immaculate. Tibiae mainly fuscous; femora mainly black. Malar space 0.55 length of eye. Both mandibles with 3 teeth *obscuripes* sp. n.

M. tetraspila Graham. New records: both sexes at Curral dos Romeiros in May, 1980; and males on 20.vii.1982 (Mrs. E. M. Graham).

M. obumbrata (Walker). In an earlier paper (Graham, 1975 : 52) I suggested that the type male of *obumbratus* was probably conspecific with the type female of *M. basicyanea* (Walker). Since then I have taken females which I am certain must belong to *obumbrata* but which differ from Walker's type female of *Pteromalus basicyanea*. The former should therefore be regarded as a valid species, *Makaronesa obumbrata* (Walker). *M. obumbrata* seems to be a more common and widespread species than the others, at moderate and high altitudes, particularly in remnants of the old forest. I captured both sexes at Curral dos Romeiros and Balcões, males also at Queimadas, Fajã da Nogueira, Vinte-cincofontes near Rabaçal, and at the Lagoa do Fanal during July 1982.

M. tinctipennis (Walker) and *M. basicyanea* (Walker) must be rare, since only their respective type specimens are known.

Makaronesa species appear to be essentially forest-dwellers, possibly parasitic on some wood-inhabiting beetles or Diptera.

Pteromalus (Habrocytus) poisoensis sp. n.

♀. Head, and thorax mainly, olive- or bronze-green, propodeum green to brassy, mesopleura dark bluish; basal tergite of gaster bright green with hind margin broadly purple in middle, rest of gaster mainly purplish, with bases of tergites more or less brassy to greenish. Antennal scape, and pedicellus beneath and apically, reddish; flagellum brown, sometimes reddish beneath. Coxae, and femora mainly, coloured as body; tips of femora narrowly, tibiae and tarsi yellow, fore tarsi becoming

gradually darker distally, mid and hind tarsi with fifth segment fuscous. Tegulae obscurely testaceous with hind edge broadly black. Wings hyaline, venation pale testaceous. Length 2.6 - 2.65 mm.

Head slightly broader than thorax, 2.1 - 2.2 times as broad as long; temples about 0.33 length of eyes, moderately convergent; POL about twice OOL, lateral ocelli not quite twice their diameter from eyes. Malar space 0.4 - 0.45 length of eye. Anterior margin of clypeus deeply incised. Antenna: scape 0.8 - 0.85 length of eye, reaching lower edge of ocellus or slightly above; pedicellus plus flagellum virtually equal to breadth of head; pedicellus about as long as first funicular segment and 1.6 times as long as broad; funicle filiform, first segment quadrate to slightly elongate, 2 to 5 quadrate, 6 (and sometimes 5) very slightly transverse; clava 1.85 - 2.1 times as long as broad, slightly longer than funicular segments 5 plus 6.

Thorax about 1.5 times as long as broad. Pronotal collar 0.14 - 0.18 length of mesoscutum, slightly margined except at sides. Mesoscutum about 1.5 times as broad as long, moderately finely reticulate in middle, finely at sides. Scutellum and axillae very finely reticulate, the scutellar frenum less finely. Propodeum (fig. 5) medially about 0.25 length of scutellum, polished and smooth except for a few wrinkles; median area 2.3 - 3.8 times as broad as long; plicae weak, obsolescent in middle; nucha a narrow transverse nearly smooth strip. Forewing: costal cell bare above, lower surface with row of hairs widely broken medially; basal and cubital veins bare, speculum open below, large and extending below marginal vein as far as stigmal vein; a bare area between bases of postmarginal and stigmal veins; marginal vein about 1.6 times length of stigmal and 1.25 - 1.3 times length of postmarginal; disc moderately thickly pilose. Spur of mid tibia nearly 0.5 length of basitarsus.

Gaster long-ovate, 2.0 - 2.25 times as long as broad, slightly longer than head plus thorax, acute and slightly acuminate; last tergite about as long as its basal breadth.

♂. Unknown.

Holotype in BMNH. Paratypes in author's collection.

Holotype ♀: Madeira, pine forest plantation about 3 km. E. of Poiso, 26.vii.1982 (M. de V. Graham).

Paratypes: 4 ♀♀, same data as holotype.

In my key to females of West European *Habrocystus* and *Pteromalus* (Graham, 1969: 495 - 514) *poisoensis* runs to couplet 6 and «sp. indet. J» (which I now consider to be *medicaginis* (Gahan)). It differs from it in its longer pronotal collar and weak or partly obsolescent propodeal plicae. From *sequester* Walker it differs in its shorter antennal scape and weak propodeal plicae; *sequester* also has a shorter gaster on average, whilst its tibiae are usually more or less infuscate medially.

Hyssopus cracens sp. n.

♀. Black, non-metallic; tip of antennal scape very narrowly pale; trochanters partly, tips of femora more or less broadly, tibiae wholly or mainly, mid and hind tarsi except their tips, testaceous (tibiae sometimes infuscate just before the middle); wings slightly tinged with grey, venation brown to fuscous. Length 1.7 - 1.8 mm.

Body (fig. 7) notably elongate and slender. Head very slightly broader than the mesoscutum, 1.9 - 2.0 times as broad as long; temples strongly curved, 0.28 - 0.4 length of eyes; POL 1.7 - 1.9 OOL; lateral ocelli separated by about 1.4 their diameter from eyes. Head (front view) transverse oval with vertex slightly arched, genae converging moderately and slightly curved. Eye about 1.35 times as long as broad. Malar space 0.4 - 0.43 length of eye. Antenna (fig. 6): scape slightly shorter than eye, not nearly reaching ocellus; pedicellus plus flagellum slightly less than breadth of head; pedicellus (dorsal view) 1.9 - 2.2 times as long as broad, 1.3 - 1.7 times length of first funicular segment; funicle proximally hardly as stout as pedicellus, but thickening very gradually distad; funicular segments subequal in length, or the fourth very slightly longer than the others, first 1.3 - 1.6 times, second 1.2 - 1.5 times as long as broad, third about quadrate, fourth very slightly transverse; clava 1.5 - 1.7 times as long as broad, as long as or hardly longer than funicular segments three plus four.

Thorax 1.8 - 2.0 times as long as broad, rather less strongly arched dorsally than in *nigritulus* (Zett.) but more strongly so than in *geniculatus* (Hartig), the propodeum sloping at about 40° to plane of mesoscutum and scutellum. Pronotum distinctly longer than mesoscutum, the latter 2.2 - 2.7 times as broad as long with its mid lobe not very shiny, with extremely fine engraved isodiametric reticulation and four long bristles. Scutellum distinctly longer than broad, quite strongly convex in the transverse axis, shiny, with reticulation weaker than that of mesoscutum and tending to be obsolescent posteriorly; space enclosed by sublateral lines 1.7 - 1.9 times as long as broad (breadth taken as greatest distance between the lines). Dorsellum and propodeum polished and smooth. Legs of medium length and thickness. Forewing reaching slightly beyond tip of gaster, about 2.3 times as long as broad; marginal vein rather thin, 2.35 - 2.5 times length of stigmal vein, the latter forming an angle of 45° with costal edge, very thin near base but thickening from about half its length to form an oblong stigma which has a long uncus and appears bifid; postmarginal vein 1.25 - 1.35 times length of stigmal vein; basal vein pilose, basal cell nearly closed below; speculum on upper surface of wing small but extended as a very narrow strip below marginal vein as far as stigmal vein, on lower surface effaced by scattered hair-bases; wing beyond speculum thickly pilose with dark hairs.

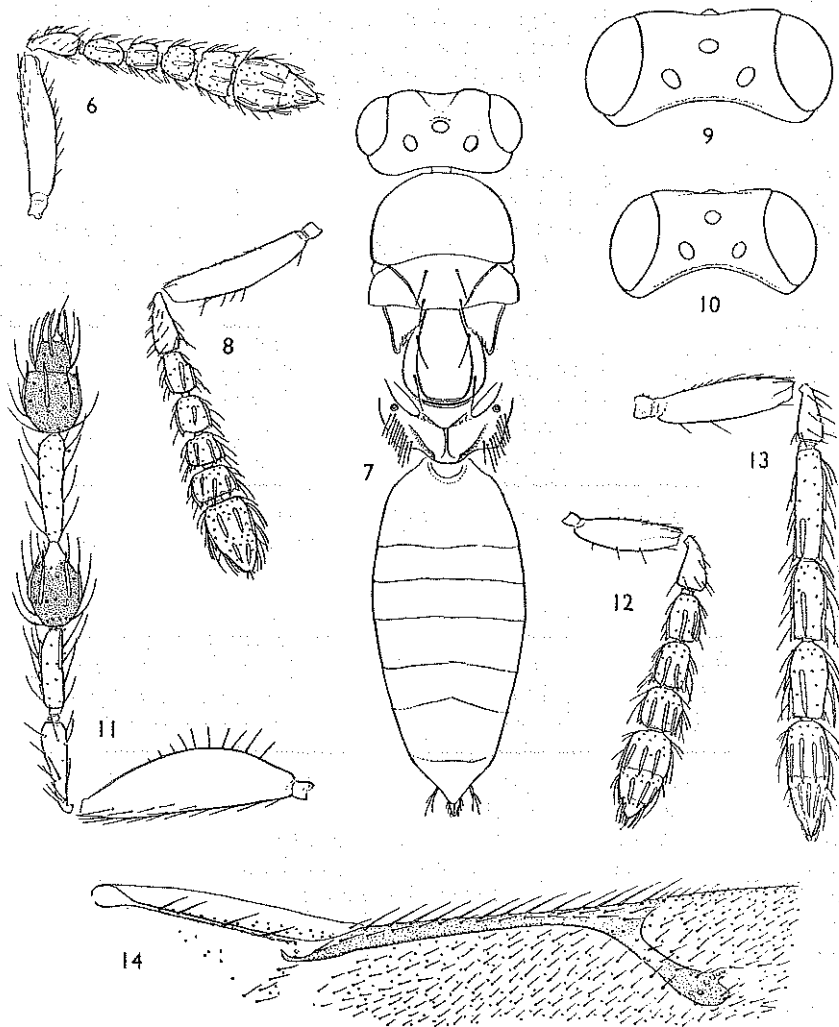


Fig. 6. — *Hyssopus cracens* sp. n., ♀, right antenna. Fig. 7. — The same, ♀, body. Fig. 8. — *Elachertus sylvarum* sp. n., ♀, left antenna. Fig. 9. — *Pediobius laticeps* sp. n., ♀, head. Fig. 10. — *Pediobius acantha* (Walker), ♀, head. Fig. 11. — *Chrysocharis miranda* sp. n., ♂, right antenna. Fig. 12. — *Aprostocetus hians* sp. n., ♀, part of forewing. Fig. 13. — The same, ♀, right antenna. Fig. 14. — *Aprostocetus phloeophthori* sp. n., ♀, right antenna.

Gaster long-ovate, acute but not acuminate, about as broad as thorax, slightly shorter than head plus thorax, 2.2 - 2.8 times as long as broad; last tergite distinctly shorter than its basal breadth.

♂. Differs from ♀ as follows: tibiae fuscous to black with only bases and tips pale; scape very slightly broader (3.8 - 4.0 times as long as broad); pedicellus somewhat less than twice as long as broad; pedicellus plus flagellum very slightly greater than breadth of head; flagellum very slightly less clavate; gaster oval, flattened, obtuse (not counting the projecting genitalia) as broad as but shorter than thorax.

H. cracens is near *nigritulus* (Zetterstedt) which has the head slightly more than twice as broad as long, temples slightly shorter and more convergent; flagellum thicker, even proximally slightly stouter than the pedicellus, first funicular segment not longer than broad, third and fourth slightly transverse; thorax somewhat shorter and rather more strongly arched dorsally; scutellum virtually smooth; forewing speculum rather more distinct and the wing itself slightly broader; gaster (unless distorted) at least slightly less than twice as long as broad, less acute apically.

The only other *Hyssopus* known from Madeira, *tumidiscapus* (Askew), differs from *cracens* in its more transverse head, slightly thicker flagellum, much shorter and more flattened thorax, broader and distinctly reticulate scutellum, and much broader ♂ antennal scape.

Holotype ♀ in BMNH. Paratypes, ♂ and ♀, in author's collection.

Madeira: Rabaçal district, near Vintecincofontes, 27.vii.1982, one ♂ two ♀♀ (one ♀ the holotype); Risco levada near Rabaçal, 29.vii.1982, one ♀; Balcões de Ribeiro Frio, 21.vii.1982, one ♂, one ♀; Caldeirão Verde, 9.viii.1982, one ♂, one ♀ (M. de V. Graham).

Biology unknown, but the species might be associated with some Lepidopterous host on *Juncus* (species believed to be *J. tenuis* and *J. effusus* were present in the localities mentioned).

Elachertus sylvarum sp. n.

♀. Bronze-black; axillae and front part of scutellum usually dull bluish; antennal scape testaceous, sometimes more or less infuscate, pedicellus and flagellum black; coxae coloured as body, legs otherwise testaceous with about proximal half (in a small specimen three-quarters) of femora infuscate; fore tarsus, and fourth segment of mid and hind tarsi, brown; mid and hind tibiae in the smallest specimen broadly infuscate medially. Tegulae black; forewing with its proximal and distal thirds subhyaline, the median third or rather more occupied by a smoky cloud which extends from the parastigma to level of tip of stigmal vein, and right across the wing; middle of hindwing with a weak infumate cloud. Length 1.0 - 1.4 mm.

Head very slightly broader than mesoscutum, 2.35 - 2.45 times as broad as long; temples about 0.15 length of eyes; POL 1.5 - 1.6 OOL,

lateral ocelli separated by about twice their diameter from eyes. Head (front view) transversely oval, about 1.3 times as broad as high; eyes prominent, separated by about 1.2 times their length; genae converging strongly and nearly straight. Eye about 1.4 times as long as broad. Malar space 0.4 length of eye. Mouth about 1.5 times malar space. Pilosity of head grey and not very conspicuous. Antenna (fig. 8): scape distinctly shorter than an eye, not reaching the median ocellus; pedicellus plus flagellum not quite equal to breadth of head; pedicellus about twice as long as broad, 1.6 - 2 times length of first funicular segment; funicle proximally about as stout as pedicellus, thickening distad; first funicular segment 1.1 - 1.3 times as long as broad, second and third subquadrate, each as long as or hardly shorter than first, fourth very slightly transverse; clava 1.5 - 1.6 times as long as broad, hardly longer than funicular segments three plus four.

Thorax 1.4 - 1.5 times as long as broad. Pronotum, mesoscutum and scutellum moderately shiny. Pronotum nearly 0.5 length of mesoscutum, with extremely fine superficial reticulation and numerous inconspicuous grey hairs. Mesoscutum 2.4 - 2.6 times as broad as long, its hind edge moderately sinuate (about as in *inunctus* (Nees)); with fairly numerous reclinate bristles, those in front short, some in hinder part moderately long, arising from minute warts which are not very conspicuous; notauli fine; mid lobe about 2.5 times as broad as long. Scutellum 1.3 - 1.5 times length of mesoscutum, its base equal to half distance between hind ends of notauli. Mesoscutum and scutellum with very fine-meshed engraved reticulation, the areoles not or hardly longer than broad. Axillae wholly reticulate, the sculpture over the front half excessively fine and engraved, over hind half rather coarse and slightly raised. Dorsellum and propodeum very shiny, with very fine obsolescent reticulation; median carina of propodeum fine but sharp, tending to be bifid at base; spiracles circular, separated by slightly less than their diameter from metanotum. Legs of medium length, moderately stout; spur of mid tibia 0.5 length of basitarsus. Forewing twice as long as broad; submarginal vein with 3 - 4 dorsal bristles; marginal vein thin, 2.7 - 2.85 times length of stigmal vein, the latter at about 45° to costal edge; postmarginal vein very thin, 1.3 - 1.5 times length of stigmal; stigmal vein nearly straight, bifid at apex, with long uncus; basal vein pilose, basal cell closed below; speculum narrow, partly effaced on lower surface of wing by scattered hairs, closed below; disc beyond it rather thickly pilose.

Gaster ovate, as long as or slightly longer than thorax, 1.4 - 2.0 times as long as broad, acute; sides of tergites rather sparsely pilose.

♂. Unknown.

Holotype ♀, Madeira: Curral dos Romeiros, 23.vii.1982 (Mrs. E. M. Graham) in BMNH.

Paratype ♀♀, Madeira: Curral dos Romeiros, 15.v.1980, one ♀ (Mrs. E. M. Graham), 23.vii.1982, two ♀♀ (M. de V. G.); wood 3

km. east of Poiso, 1.viii.1982, one ♀ (M. de V. G.), all in author's collection.

Nearest to *arenarius* Erdős, which is a larger species with gaster more or less testaceous at base and ventrally, forewing infumate except basally, without a defined cloud; pronotum and mesoscutum more roughly sculptured, with denser and more conspicuous pilosity, sides of gaster thickly pilose.

Necremnus fumatus sp. n.

♀. Body black with strong bronze tinge especially on head, thorax and base of gaster. Antennal scape bronze-black, its tip very narrowly pale; pedicellus and flagellum fuscous, the former with slight metallic tinge. Coxae, and femora except tips narrowly, coloured as body, tibiae reddish with extreme base paler, or partly to mainly fuscous; mid and hind tarsi pale testaceous with fourth segment brown, or with first segment pale and the rest progressively darker. Tegulae brown with hind edge fuscous. Forewing lightly infumate over about proximal quarter, the rest moderately strongly infumate, the infumation forming two vaguely defined darker clouds beneath the stigmal vein and the base of the marginal vein. Length 1.62-2.43 mm.

Antennal scape slightly shorter than an eye, not reaching ocellus; pedicellus plus flagellum 1.25-1.3 times breadth of mesoscutum; pedicellus 2.2-2.3 times as long as broad, very slightly shorter than first funicular segment; first funicular segment 1.85-2.5 times, second 1.5-1.8 times, third 1.4-1.5 times, as long as broad; clava 2.5-2.65 times as long as broad, equal in length to funicular segments two plus three.

Thorax 1.25-1.45 times as long as broad, moderately arched dorsally, the propodeum sloping at about 35°. Mesoscutum and scutellum only moderately shiny; mesoscutum with very fine, uniform, slightly raised reticulation; scutellum slightly broader than long, with extremely fine reticulation. Propodeum very slightly more shiny than that of *metalarus* (Walker), with extremely fine and very slightly raised reticulation; plicae traceable at hind margin; spiracles small, short-oval, separated by about half their length from hind margin of metanotum. Legs rather slender; spur of mid tibia 0.35-0.45 length of basitarsus. Forewing not quite reaching tip of gaster, 2.5-2.6 times as long as broad; marginal vein 3-4 times length of stigmal vein, postmarginal vein 1.5-1.7 times length of stigmal; speculum extremely narrow.

Gaster lanceolate, strongly acute, 1.2-1.45 times length of head plus thorax, 3.0-3.4 times as long as broad; last tergite nearly or just as long as its basal breadth; ovipositor sheaths projecting very slightly.

♂. Unknown. It would probably be recognizable by the position of the propodeal spiracles.

Holotype ♀, Madeira, about 3 km. east of Poiso, at 1000 m., 26.vii.1982, in BMNH. Taken by the author.

Paratypes, Madeira, Fajã da Nogueira, 25.vii.1982, at ca. 800 m., one ♀; Balcões de Ribeiro Frio, 21.vii.1982, one ♀, in author's collection.

Biology unknown; all the specimens were swept in or at the edge of native forest.

Distinguished from females of other species of *Necremnus* by its elongate gaster combined with propodeal spiracles distinctly separated from metanotum, extensively infumate wings and bronze body. In several respects it resembles *metalarius* (Walker) which differs in having propodeal spiracles close to metanotum, gaster less elongate, funicular segments relatively longer, wing-markings reduced to at most a cloud beneath the stigma and very rarely another just beyond the speculum. From *artynes* (Walker) it differs in its much shorter flagellum and funicular segments, less shiny propodeum and extensively infumate forewing. *N. leucarthros* (Nees), *N. cosconius* (Walker), *N. tidius* (Walker) and *N. folia* (Walker) all have larger propodeal spiracles which touch the metanotum, much shorter gaster, hyaline or less infumate forewing.

Pediobius laticeps sp. n.

♀. Dark green to blue-green or, occasionally, slightly bronzed on head and thorax; the propodeum and basal tergite of gaster usually more brightly coloured; frons below fork dull, black or violet-black, often narrowly bluish along the orbits. Antennae and legs black with metallic tinge; fore tarsi brownish basad, mid and hind tarsi cream with fourth segment blackish, occasionally the third brownish, rarely the second slightly darkened. Forewing slightly grey-tinged, occasionally with a very weak infumate cloud on disc; venation brownish to fuscous. Length 1.5 - 2.0 mm.

Runs in the keys of Graham (1959) and Bouček (1965) to *acantha* (Walker), from which it differs as follows:

Head (fig. 9) more transverse, 2.07 - 2.23 times as broad as long; ocelli usually in a very slightly obtuse-angled triangle, occasionally nearly a right angle. Petiole 1.2 - 1.5 times as long as broad. Gaster 1.5 - 1.8 times as long as broad; basal tergite occupying 0.3 - 0.45 the whole length; the three gastral tergites following the large basal tergite have their hind half to three-quarters smooth and polished, their basal part very weakly alutaceous.

In ♀ *acantha* the head (fig. 10) is 1.87 - 2.04 times as broad as long, the ocelli are in a triangle of 80° - 90°; the petiole is sometimes relatively longer, the three gastral tergites following the basal one often have their hind margins only narrowly smooth (and rarely more than the hind half) whilst their anterior part tends to be more strongly alutaceous than in *laticeps*. In both European and Madeiran *acantha*

females the vertex is usually more or less tinged with violet-black at least behind the ocellar triangle, whilst the body colour often tends towards blue or violet, sometimes even partly violet-black. European females of *acantha* often have mid and hind tarsi pale with fourth segment blackish, but this coloration is uncommon in Madeiran females which usually have the tarsi extensively or even wholly infuscate.

P. laticeps female is also very close to those of *dorycniellae* Erdős and *helianthemellae* Erdős, especially in head-shape. These species, however, have head, and thorax excluding propodeum, violet-bronze-black (in their types); in *dorycniellae* the basal tergite occupies 0.45 the total length of the gaster, but the three tergites following the basal tergite are mainly alutaceous and dull; in *helianthemellae* the basal tergite occupies 0.6-0.65 the total length. In these two species the gaster is only 1.25-1.5 times as long as broad and more obtuse apically; their average size is less (1.9-1.54 mm. in the type-material). They were reared from Lepidopterous hosts (*Nepticula* spp.) upon *Helianthemum*, *Tetragonolobus* and *Dorycnium*, plant genera not recorded from Madeira.

♂. Differs from ♀ in antennae and shape of gaster. Antenna as described for *acantha* (Walker) by Graham (1959) and Bouček (1965), but combined length of pedicellus and flagellum 1.03-1.1 times breadth of head (1.15-1.25 times in *acantha*). Gaster obovate to sub-circular; epipleura not inflexed.

Holotype ♀, Madeira, Curral dos Romeiros, 15.v.1980 (Mrs. E. M. Graham) in BMNH.

Paratypes (in author's collection), Madeira: Curral dos Romeiros, 13.v.1980, one ♂, 15.v.1980, one ♀ (E. M. G.), 20.vii.1982, four ♀♀ (E. M. and M. de V. G.), 23.vii.1982, five ♀♀, 26.vii.1982, one ♀; Balçôes, 21.vii.1982, two ♀♀; between Camacha and Poiso, 23.vii.1982, two ♀♀; between Poiso and Santo da Serra, 1.viii.1982, three ♀♀, 5.viii.1982, one ♀, 7.viii.1982, five ♀♀; 15.viii.1982 and 24.viii.1982, two ♂♂ reared from leaf-mines of *Cerodontha* (*Poemyza*) *pygmaea* (Mg.) (Dipt., Agromyzidae) on *Brachypodium sylvaticum* (Huds.) Beauv. (M. de V. G.).

***Chrysocharis miranda* sp. n.**

♂. Head bright green; vertex coppery-red, upper part of occiput tending to be brassy. Thorax green to blue-green; mid lobe of mesoscutum suffused with golden or copper; scutellum mainly purplish; upper angle of mesopleuron with a square yellow mark; gaster golden with disc coppery, sides of basal tergite greenish. Antennal scape and pedicellus orange-yellow; first and third segments of funicle pale yellow, second segment black with its short apical neck pale yellow; clava black with its terminal spine white; flagellum clothed with white hairs. Legs yellow with bases of hind coxae infuscate; pretarsus of all legs brown. Teg-

lae and basal plate of forewing yellow; forewing slightly brownish-tinged, especially between levels of basal and stigmal veins; venation testaceous to brownish. Length 1.5 - 1.8 mm.

Belongs to the species-group of *gemma* (Walker), characterized by having several bristles on the propodeal callus, anterior margin of mesepimeron strongly curved, etc. Structurally resembles the male of *gemma*, except for its highly characteristic antenna (fig. 11). This has scape approximately as long as an eye, reaching well above vertex, 2.8 - 3.2 times as long as broad; pedicellus plus flagellum nearly 1.5 times breadth of mesoscutum; pedicellus as long as or very slightly longer than first funicular segment, 2.8 - 3.1 times as long as broad; first anellus discoid, second slightly larger and about twice as broad as long; first funicular segment cylindrical, hardly as stout as the pedicellus, 2.8 - 3.6 times as long as broad, second about as long as but twice as broad as first, subcircular with its apex tapering to form a short peduncle, third slightly longer than second but hardly broader than first, tending to be a little broader apically than basally, 3.0 - 3.9 times as long as broad; first claval segment as broad as long and as broad as second funicular segment, second claval segment about half as long and half as broad as the first, truncate apically; terminal spine as long as second claval segment; hairs of funicle standing out at an angle of about 45°, those of clava mostly less outstanding. Pronotal collar indistinctly margined in middle only.

♀. Unknown.

Holotype ♂, Madeira, near Caldeirão Verde, 9.viii.1982, swept from coarse grass (probably *Brachypodium*) by the levada (M. de V. Graham) in BMNH.

Paratypes (same data as holotype) two ♂♂, in author's collection.

This beautiful species has male antennae quite unlike those of any other *Chrysocharis*. The female will probably be less distinctive, and may prove to be very like that of *gemma*.

Aprostocetus hians sp. n.

♀. Black with olive-greenish metallic tinge; upper angle of mesopleuron testaceous. Antennal scape and pedicellus black, flagellum fuscous. Coxae, and femora except their tips broadly, metallic-black; legs otherwise fuscous with bases and tips of tibiae testaceous. Tegulae blackish. Wings subhyaline, venation brown with basal third of stigmal vein slightly paler. Length 1.6 - 1.9 mm.

Head slightly broader than mesoscutum, nearly 3 times as broad as long; temples extremely short; POL about twice OOL; lateral ocelli separated by about 1.5 their diameter from eyes. Head (front view) much as in *eurystoma* Graham (see Graham, 1961 : fig 32) with large clypeal teeth and falcate mandibles. Eye about 1.4 times as long as broad. Malar space 0.36 - 0.5 length of eye. Mouth 2.5 - 3 times malar

space. Antenna (fig. 12); scape much shorter than eye, not reaching ocellus; pedicellus plus flagellum hardly greater than breadth of mesoscutum; pedicellus about twice as long as broad and about equal in length to first funicular segment; funicle proximally slightly stouter than pedicellus, thickening a little distad, its first segment about 1.5 times, second 1.3 - 1.4 times as long as broad, third almost quadrate; clava about twice as long as broad, equal to or slightly longer than funicular segments two plus three, pointed, terminal spine about one-third length of third claval segment, its hair slightly shorter than the spine.

Thorax about 1.5 times as long as broad, structure as in *eurystoma* but scutellum only a little broader than long, submedian lines slightly nearer to sublaterals than to each other, propodeum less broadly emarginate above petiole, distinctly shorter than dorsellum, callus with 2 - 4 bristles. Forewing 2.1 - 2.2 times as long as broad; row of hairs in costal cell complete; marginal vein (fig. 14) thick, 2.7 - 3.2 times length of stigmal vein, its front margin with 10 - 12 bristles; stigmal vein rather thick, hardly curved, forming an angle of about 50° with costal margin, expanding gradually almost from base to form a wedge-shaped stigma having a short uncus; postmarginal a distinct stub; apical cilia about 0.2 length of stigmal vein; speculum small, but produced as a narrow wedge nearly to stigmal vein, closed below; disc moderately thickly pilose. Hindwing subobtusate; cilia about 0.2 breadth of wing.

Gaster long-ovate, strongly acute, somewhat longer than head plus thorax, about as broad as thorax, 2.1 - 2.6 times as long as broad; last tergite slightly shorter than, or at most as long as, its basal breadth; longest bristle of each cercus about 1.5 times length of next longest, slightly curved, dark. Other details as in *eurystoma* Graham (1961 : 24 - 26).

♂. Unknown.

Holotype ♀, Madeira, forest plantation east of Poiso, near João do Prado, 26.vii.1982 (M. de V. Graham) in BMNH.

Paratype ♀♀ : same data as holotype, one ♀; Curral dos Romeiros, 20.vii.1982, one ♀ (M. de V. G.); São Martinho, 26.v.1980, one ♀ (Mrs. E. M. Graham), in author's collection.

Belongs to species-group of *caudatus* Westwood (for diagnosis of which see Graham, 1961 : 23 - 24). Differs from the known Palaeartic species of that group, except *eurystoma* Graham (1961), in its very broad mouth-opening, short malar space and large falcate mandibles. From *eurystoma* it differs mainly in its even broader mouth, slightly shorter funicular segments and rather stouter flagellum, thick marginal and stigmal veins, longer gaster, shorter cercal bristles, and darker legs.

Aprostocetus phloeophthori sp. n.

♀. Body non-metallic, black, nearly always with some tan or reddish markings, as follows; mouth-edge, usually face partly and a line along the posterior orbits; usually the lateral borders of mid lobe of mesoscutum, a spot in front of scutellum, outer part of side lobes of mesoscutum, and the prepectus (the Madeiran ♀ is wholly black). Coxae black, fore coxae sometimes mainly tan; legs otherwise usually reddish-testaceous with fore tarsi brown and tips of mid and hind tarsi brownish; femora in one British ♀ mainly fuscous, all femora infuscate proximally in Madeiran ♀. Tegulae partly to mainly testaceous. Wings slightly grey-tinged, venation brownish. Length 1.2-1.4 mm.

Head 1.15-1.2 times as broad as mesoscutum; temples very short and strongly receding; POL nearly 1.5 OOL (head slightly distorted). Head in front view subtriangular, slightly broader than high, genae slightly curved and converging moderately. Eyes separated by a little more than their length. Malar space about 0.6 length of eye, sulcus not foveate. Mouth only slightly greater than malar space. Antenna (fig. 13): scape 0.75-0.8 length of eye, about 3.5 times as long as broad; pedicellus plus flagellum 1.4-1.5 times breadth of mesoscutum; pedicellus 2.0-2.1 times as long as broad, distinctly shorter than first funicular segment; funicle hardly stouter than pedicellus, filiform or nearly so; funicular segments decreasing in length, the first 2.8-3.2 times, second 2.2-2.5 times, third 1.7-1.8 times, as long as broad; clava 2.7-2.9 times as long as broad, distinctly to much shorter than funicular segments two plus three, pointed, its first segment occupying nearly half the total length; sensilla of flagellum rather sparse, in one irregular row on each segment, or in two rows on the first (and sometimes on the second) segment.

Thorax 1.5 times as long as broad. Pronotum short. Mid lobe of mesoscutum slightly broader than long, with very fine though rather sharp engraved reticulation composed of elongate areoles; median line fine, evanescent in front; 3-4 adnotaular bristles on each side. Scutellum about 1.3 times as broad as long, moderately strongly convex, sculpture finer and less sharp than that of mesoscutum, submedian lines slightly nearer to each other than to sublateral lines, enclosed space 2.5-2.75 times as long as broad; anterior bristles about in middle. Propodeum about as long as dorsellum; petiolar foramen neither deeply nor broadly emarginate; median carina fine though sharp, with a minute basal fovea; callus with 3 bristles. Legs not stout; hind femora about 3.5 times as long as broad; spur of mid tibia about 0.66 length of basitarsus, fourth segment of mid and hind tarsi slightly shorter than first. Forewing about 2.25 times as long as broad, reaching well beyond tip of gaster; submarginal vein with 3 dorsal bristles; costal cell rather narrow, 12-13 times as long as broad, row of hairs on its lower surface diverging somewhat from submarginal vein only distally; marginal vein thin, distinctly longer than costal cell and 3.0-3.2 times length of stigmal vein,

latter forming an angle of about 45° with costal edge, straight, very thin proximally and expanding gradually but the stigma not distinctly defined; speculum narrow, closed below. Hindwing bluntly pointed; cilia 0.3 - 0.45 wing breadth.

Gaster ovate, acute, as long as or very slightly longer than head plus thorax, nearly as broad as thorax, 1.9 - 2.3 times as long as broad; last tergite slightly shorter than its basal breadth; longest bristle of each cercus about twice the length of the others; ovipositor sheaths projecting slightly; tip of hypopygium at about 0.5 length of gaster.

♂. Unknown.

The ♀ can be distinguished from those of other species in its group by the following combination of characters: submedian lines of scutellum slightly nearer to each other than to sublateral lines; antennal clava obviously shorter than combined length of funicular segments two and three, first segment of clava occupying nearly half the total length, first funicular segment very long; sculpture of mesoscutum relatively sharp.

Holotype ♀: England, Berkshire, Sihwood Park, 27.ii.1957, reared from gallery of *Phloeophthorus rhododactylus* (Marsham) (Col., Scolytidae) (M. R. Smith) in BMNH.

Paratypes: same data as holotype but reared 9.vii.1956, one ♀, 8.viii.1956, two ♀♀ 27.ii.1957, four ♀♀, 30.iv.1957, one ♀ (M. R. Smith); same locality, reared 30.viii.1960, one ♀ (J. R. Parnell); Madeira, between Camacha and Poiso, near Pico da Silva, 23.vii.1982, one ♀ swept in forest (M. de V. Graham); in BMNH and author's collections.

The presumed host genus *Phloeophthorus* was actually described from a Madeiran species by Wollaston (1854).

ADDITIONS TO MADEIRAN LIST

Eurytomidae

Tetramesa ? *longula* (Dalman). Curral dos Romeiros, 15.v.1980, one ♀.

Torymidae

Pseudotorymus sp. São Martinho, 18.vii.1982, one ♀ (Mrs. E. M. Graham). Species of this genus are difficult to determine.

Encyrtidae

Anagyrus pseudococci Girault. São Martinho, 6.viii.1982, one ♀.

Anthemus sp. Lagoa do Fanal, 28.viii.1982, one ♂. This may be *leucaspidis* Mercet, but males are hard to identify.

Aphidencyrtus aphidivorus (Mayr). Near Lagoa of Santo da Serra, 1.viii.1982, one ♀; Caldeirão Verde, 9.viii.1982, one ♀.

- Ectroma dalmatinum* Hoffer. One km. west of Caniçal, on dry grassy slope, 31.vii.1982, two ♀♀. Described from Yugoslavia and apparently not recorded from elsewhere. An interesting addition, probably native to Madeira.
- Habrolepis dalmani* (Westwood). Curral dos Romeiros, 20.vii.1982, two ♀♀, 23.vii.1982, two ♀♀ (E. M. and M. de V. G.).
- Homalotylus quaylei* Timb. São Martinho, 18.vii.1982, one ♀.
- Leptomastix epona* (Walker). Fajã da Nogueira, 25.vii.1982, one ♀; wood 3 km. east of Poiso, 7.viii.1982, one ♀. Both are darker than average British females, the head being almost wholly black, the axillae and in one ♀ also the scutellum, black.
- Mayridia formosula* Mercet. São Martinho, 18.vii.1982, one ♀; Curral dos Romeiros, 23.vii.1982, one ♀ (Mrs. E. M. G.).
- Mercetencyrtus ambiguus* (Nees). Near Lagoa of Santo da Serra, 1.viii.1982, one ♀.
- Ooencyrtus telenomicida* Vass. São Martinho, 18.vii.1982, one ♀.

Pteromalidae

- Dibrachys ? boarmiae* (Walker). Curral dos Romeiros, 23.vii.1982, one ♀. Has the whole forewing very slightly infumate, but quite distinctly so below the marginal vein. Funicular segments 3 to 6 are paler than the rest of the flagellum, subtetaceous with dark apical borders. Bouček (1977 : 34 - 35) has treated *boarmiae* as a form of *cavus* but I still believe that it may be a distinct species.
- Gastrancistrus fuscicornis* Walker. São Martinho, 6.viii.1982, one ♀.
- G.* sp. near *hirtulus* Graham. Balcões de Ribeiro Frio, on levada path, 21.vii.1982, one ♂.
- Homoporus laeviusculus* Erdős. Curral dos Romeiros, 15.v.1980, two ♀♀. These differ from the holotype (which I have seen) in smaller size (1.6 instead of 1.91 - 2.24 mm.), slightly darker antennae and legs (scape dark except basally, fore and mid coxae dark basally), but these are differences which might be expected in Madeiran specimens, to judge by analogy with its representatives of other Mediterranean species. Probably native, with some host in grass stems.
- H. titanes* Szélenyi (= *elegans* Delucchi, *syn. n.*). Near Lagoa of Santo da Serra, 5.viii.1982, two ♀♀ (Mrs. E. M. Graham). The first funicular segment is variable in size, sometimes only slightly shorter than second, sometimes much shorter (the two Madeiran specimens show this).
- Mesopolobus fuscipes* (Walker). Curral dos Romeiros, 23.vii.1982, one ♀ with wings of right side shrivelled.

- Pachyneuron groenlandicum* Holmgren. Curral dos Romeiros, 23.vii.1982, one ♀.
- Picroscytoides cerasiops* Masi. Curral dos Romeiros, 26.vii.1982, one ♀, with gaster wholly dark.
- Pteromalus (Habrocytus) semotus* Walker. Near Lagoa of Santo da Serra, 1.viii.1982, 7.viii.1982, ♀ ♀.
- Spalangia cameroni* Perkins. Queimadas, near Casa, 9.viii.1982, one ♀. A widely distributed synanthropic species. Probably attacking some Dipteran associated with stock (there were cattle in the vicinity).
- Trichomalus elongatus* Delucchi & Graham. São Martinho, 26.v.1980, one ♀.
- T. lucidus* (Walker). Curral dos Romeiros, 23.vii.1982, one ♀ (Mrs. E. M. G.).

Aphelinidae

- Aphelinus chaonia* Walker. About 3 km. east of Poiso, 1.viii.1982, one ♂. Forewing slightly infumate below marginal vein (unlike European specimens).
- A. humilis* Mercet. Curral dos Romeiros, 20.vii.1982, three ♀ ♀ (E. M. and M. de V. G.); 3 km. east of Poiso, 1.viii.1982, one ♀ (M. de V. G.). Relatively dark specimens like British females, gaster at most yellow at base and apex, head only partly yellowish.
- A. varipes* (Förster). Balcões de Ribeiro Frio, 21.vii.1982, one ♀; Montado dos Pecegueiros, 3.viii.1982, one ♀.
- Encarsia* (= *Prospaltella* auctt.) near *aspidiocola* (Mercet). Queimadas, 14.v.1980, one ♀. Taxonomically the species of *Encarsia*, especially the section usually known as *Prospaltella*, are difficult, and little is known about the variation of individual species; possibly a number of «sibling species» exist.

Eulophidae

- Aprostocetus pausiris* (Walker). About 3 km. east of Poiso, 1.viii.1982, one ♀. It is remarkable that only one specimen has turned up in Madeira. In Europe it is often extremely abundant in areas of untouched grassland.
- A. viridimaculatus* (Full.). São Martinho, 18.vii.1982, one ♀ (Mrs. E. M. Graham), 6.viii.1982, one ♀ (M. de V. G.). Probably associated with some Dipterous host on grass.
- Diglyphus chabrias* (Walker). São Martinho, 21.v.1980, one ♀ (Mrs. E. M. Graham). I believe this is *chabrias* in spite of the fact that

the fore tibia is dark on both aspects; I have a similarly coloured male from Britain.

Neochrysocharis aratus (Walker). East of Poiso, near João do Prado, 26.vii.1982, one ♀; near Lagoa of Santo da Serra, 1.viii.1982, one ♀.

Pediobius bruchicida (Rondani). São Martinho, 6.viii.1982, two ♂♂.

Sympiesis dolichogaster Ashmead. Lagoa of Santo da Serra (on roof of white Peugeot car), 5.viii.1982, one ♀.

S. thapsianae Boucek. São Martinho, 18.vii.1982, one ♀.

Mymaridae

Anagrus sp. 3 km. east of Poiso, 7.viii.1982, one ♂.

Gonatocerus ? *ater* Forster. São Martinho, 18.vii.1982, eight ♀♀. These resemble my European specimens of *ater*, but have distal funicular segments a little more elongate; possibly this is within the range of variation.

Stephanodes similis Förster. Cural dos Romeiros, 26.vii.1982, two ♂♂.

NEW RECORDS OF OTHER SPECIES OF SPECIAL INTEREST

Pteromalidae

Mauleus maderensis Graham. Montado dos Pecegueiros, near edge of Ribeiro do Inferno, 3.viii.1982, one ♀; São Martinho, 6.viii.1982, one ♀.

Psilocera crassispina (Thoms.). Montado dos Pecegueiros, in native forest between 1100 and 1300 m., 3.viii.1982, ♂ and ♀; Fajã da Nogueira, 25.vii.1982, two ♂♂; Terreiro da Luta, 7.viii.1982, ♂ and ♀.

Note: I have concluded that my previous association of the males of two species (Graham, 1969: 463-465) was incorrect; males referred to «*atra*» in my key really belong to *crassispina*, those referred to «*crassispina*» belong to *atra*.

Spilomalus biquadratus (Wollaston). Near João do Prado, east of Poiso, 26.vii.1982, one ♀. Previously recorded only by Wollaston (1858: 27) from Lombo [= Montado] dos Pecegueiros, taken either in 1850 or 1855.

Pteromalus (Habrocytus) integer Walker and *P. (H.) ametrus* Graham. Males and females of both species were found on flower-heads of *Galactites tomentosa* L. near the Lagoa of Santo da Serra, 1.viii.1982, 5.viii.1982, 7.viii.1982, in company with the Tephritid fly *Acanthiophilus walkeri* (Woll.) two of which were reared from the heads. Since I described *ametrus* (Graham, 1981) my friend Mr.

G. J. Gijswijt has shown me specimens from the Canary Islands, reared from the above fly. Whether *P. integer* is also associated with it, as I suggested earlier (1981 : 16 - 17) remains to be proved.

P. amage (Walker). Near João do Prado, east of Poiso, 26.viii.1982, one ♂.

Eumacepolus dulcis (Walker), comb. n. (= *Pteromalus dulcis* Walker, 1872 : 121, ♂). I have re-examined the lectotype male of *dulcis* which belongs to *Eumacepolus* and is near *pulcher* Graham. It differs from that species in its thinner wing-veins and small stigma, more matt head, mesoscutum and scutellum, more shiny propodeum which lacks plicae (these represented only by elongate basal foveae). *E. dulcis* has so far been recognized only from Madeira.

Mesopolobus laticornis (Walker) agg. Balcões de Ribeiro Frio, 21.vii.1982, one ♀; Montado dos Pecegueiros, 3.viii.1982, three ♂♂, one ♀. The Pecegueiros specimens, swept from tufts of the grass *Brachypodium sylvaticum* in native forest at about 1100 m., are extremely small (males 1.0 - 1.5 mm., female 1.5 mm.) probably due to unfavourable conditions at the high altitude.

Tetracampidae

Platynocheilus cuprifrons (Nees). Confirmed for Madeira proper: near Lagoa of Santo da Serra, 1.viii.1982, one ♀ (M. de V. G.), 5.viii.1982, one ♀ (Mrs. E. M. Graham). Previously taken only on Porto Santo by Wollaston, although I included it in my Madeira list (Graham, 1979 : 299).

Eulophidae

Cirrospilus nephelodes Graham. Rabaçal, 29.vii.1982, several ♀♀ swept from tufts of *Brachypodium sylvaticum* and *Carex* sp.; Vintecincofontes, 27.vii.1982, two ♀♀; Caldeirão Verde, 9.viii.1982, two ♂♂, four ♀♀. Associated with native forest at higher levels.

Elachertus sobrius (Walker). Casa de Rabaçal, 27.vii.1982, 28.vii.1982, 29.vii.1982, ten ♀♀, crawling sluggishly on panes and woodwork of windows, towards dusk and in the very early morning (about 6.30 a. m.). Possibly a synanthropous species.

Pnigalio pectinicornis (L.) Montado dos Pecegueiros, 3.viii.1982, two ♀♀; about 3 km. east of Poiso, reared from puparia of *Cerodontha pygmaea* (Mg.) (Dipt., Agromyzidae) on leaves of *Brachypodium sylvaticum* (Huds.) Beauv., 8.viii.1982, one ♀, 10.viii.1982, one ♂, one ♀, 13.viii.1982, one ♂, one ♀, 16.viii.1982, one ♀. A common and widely distributed species in the native forest zones.

Chrysocharis centralis (Walker). Wood about 3 km. east of Poiso, reared from puparia of *Cerodontha pygmaea*, (Mg.) on *Brachypodium syl-*

vaticum, 18.viii.1982, one ♀, 19.viii.1982, one ♀, 22.viii.1982, one ♂, 26.viii.1982, one ♀. A widely distributed and locally abundant species in native forest. The ♂ of *centralis* differs from that of *gemma* (Walker) only in having hind coxae more or less infuscate at base, forewing sometimes weakly tinged with yellowish and sometimes with a slight discal cloud below the stigmal vein, body length 0.95 - 1.5 mm. (1.2 - 1.6 mm. in *gemma*). The genitalia do not differ from those of *gemma*. The ♀ of *centralis* differs from that of *gemma* in having (when mature) the forewing discal cloud darker and often better defined, often reaching the marginal vein; head, thorax and basal tergite of gaster green to greenish-blue, dorsellum occasionally slightly brassy, propodeum rarely slightly purplish; average size less (length 1.3 - 2 mm., in *gemma* 1.8 - 2.25 mm.). In ♀ *gemma* the head, thorax (except dorsellum and propodeum) and basal tergite are green to golden-green, often with brassy flecks; dorsellum usually brassy or purplish, propodeum nearly always purple, rarely partly green; the forewing cloud is usually less dark and often diffuse, not reaching the marginal vein (almost touching it in a very dark specimen); I have seen a few mature females with forewing immaculate.

The small distinctions between *gemma* and *centralis* suggest that the latter may be a local race of *gemma*. In view of the isolation of *centralis* from the European continent, however, it will be difficult to ascertain whether the two will interbreed or not.

C. discalis Graham. Wood about 3 km. east of Poiso, reared from puparia of *Cerodontha pygmaea* on *Brachypodium sylvaticum*, 17.viii.1982, two ♀♀, 20.viii.1982, one ♀, 7.xi.1982, three ♂♂, two ♀♀, 9.xi.1982, four ♀♀, 12.xi.1982, two ♀♀, 15.xi.1982, one ♀, 17.xi.1982, one ♀, 7.xii.1982, one ♂, one ♀, 9.xii.1982, one ♀, 15.xii.1982, one ♀, 27.xii.1982 one ♀. Also a widely distributed and common species in native forest.

Aprostocetus asperulus (Graham), **comb. n.** (= *Tetrastichus asperulus* Graham, 1981). Ribeiro do Inferno, 3.viii.1982, one ♀; near João do Prado, east of Poiso, 26.vii.1982, several ♀♀.

Aprostocetus flavifrons (Walker), **comb. n.** (= *Tetrastichus flavifrons* Walker). Montado dos Pecegueiros, 3.viii.1982, three ♀♀ swept from *Brachypodium sylvaticum*; wood about 3 km. east of Poiso, reared from puparium of *Cerodontha pygmaea* (Mg.) on *Brachypodium sylvaticum*, 27.viii.1982, one ♀. I took a gynandromorph at Queimadas on 11.viii.1982; it has male antennae but female gaster.

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