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## A SURVEY OF MADEIRAN CHALCIDOIDEA (INSECTA: HYMENOPTERA) WITH ADDITIONS AND DESCRIPTIONS OF NEW TAXA.

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### ABSTRACT

General features of the Chalcidoid fauna of Madeira are surveyed, particularly in relation to the island's vegetational zones. From material collected in 1980 by the author and his wife, one new genus (*Mauleus* gen. n.) is described, also the following species new to science: *Systasis basiflava*, *Mauleus maderensis*, *Pteromalus speculifer*, *P. ametrus*, *Diglyphus eleanorae*, *Cirrospilus nephelodes*. Forty three other species are added to the Madeiran list. Some additional records of species already on the list are included. *Cyrtogaster vulgaris* Walker is deleted from the list. After discussion of its identity the genus *Cleptimorpha* Walker, 1872 is placed in synonymy with *Podagrion* Spinola, 1811.

### SUMARIO

No presente trabalho, são estudadas as características gerais da fauna Chalcidoidea da Madeira, particularmente em relação com as zonas florestais da Ilha.

Do material colhido em 1980 pelo autor e sua mulher, é descrito um novo género (*Mauleus* gen. n.) bem como as seguintes espécies novas para a ciência: *Systasis basiflava*, *Mauleus maderensis*, *Pteromalus speculifer*, *P. ametrus*, *Diglyphus eleanorae* e *Cirrospilus nephelodes*. Quarenta e três outras espécies são adicionadas à lista das espécies Madeirenses. São referidas também, observações adicionais de espécies já incluídas anteriormente na mesma lista, da qual é retirada a espécie *Cyrtogaster vulgaris* Walker. Após discussão sobre a sua iden-

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tidade, o género *Cleptimorpha* Walker, 1872 é colocado como sinónimo do género *Podagrion* Spinola, 1811.

#### INTRODUCTION

In 1980 I had the opportunity of returning to Madeira and continuing a study of the island's Chalcidoidea, which had begun to interest me several years before. My wife and I spent a very pleasant three weeks in Funchal, from 6th to 27th May. With the aid of a hired «Mini» we were able to visit some parts of the island most interesting for a study of the fauna. I have already reported (Graham, 1981) on two new species taken by us. We still have some species and a genus apparently new to science, as well as additions to the Madeiran list and further notes on species already recorded, which I now put forward.

The weather during our stay was mainly sunny and warm at lower levels, though in the mountains mist and rain were frequent and opportunities for collecting rather few.

My concern has been not just to make additions to the list, although these are often interesting and useful. I have tried especially to form a better acquaintance with the fauna and to gain some idea of its relationship with those of Europe and North Africa. May I say that the campaign has only just begun! We paid some attention to the flora, especially the plant communities which appeared to support a richer fauna of the parasitic Hymenoptera. The situation is complicated by the fact that many plants have been introduced to Madeira from various parts of the world, not to mention a considerable number of insects.

Again I have the pleasure of thanking my wife Nora M. Graham who greatly assisted both as driver of the car and by collecting in some of the localities we visited. My thanks are also offered to Mr. G. E. Maul, Museu Municipal do Funchal, who kindly contributed much information and practical assistance. Dr. B. H. Cogan (British Museum (Nat. Hist.)) was good enough to identify the Tephritid flies we found.

In the text I have mostly used initials for my name and my wife's (M. de V. G. and E. M. G.).

I should correct one point in my paper of 1979, where I stated that Wollaston had visited the Madeira islands four times. I have since found that he was in Madeira again on three later occasions: winter and spring 1859, a brief visit in December 1865, and a long one from January to May 1870.

#### VEGETATION ZONES OF MADEIRA

The zones of vegetation in Madeira and adjacent islands were summarised, with accompanying lists of cultivated, naturalized, and indigenous plants, by Lowe (1868: iii-vii). His book, though covering only part of the flora and needing much annotation to bring the nomenclature up to date, contains interesting information. Unfortunately

it is extremely rare. Its chief importance is that it provides some idea of the flora at the time when Wollaston was collecting insects in the island. A more recent summary of the vegetation zones of Madeira, and their characteristic Orthoptera (s. lat.) was published by Chopard (1937). For practical purposes I have found Hansen's *Checklist* (1969) most useful, in conjunction with *Flora Europaea* and other floras. The recent volumes by Franquinho and da Costa, illustrated by beautiful colour photographs, with scientific names and popular names in four languages, country of origin, altitudinal range in Madeira, etc., provide more information.

Chopard's zones serve very well as a basis for the present study. They are as follows:

1. Littoral. In Madeira, unlikely to offer much to the hymenopterist because most of the island is bounded by sheer cliffs. The eastern promontory of São Lourenço, where a sandy beach occurs with rough grassland above and many flowering plants, should be interesting; I took some Chalcidoidea there in 1972-3.

2. Zone of cultivation. This is greatly developed on the south side of the island where it ascends to 800 m. or more. Here banana plantations occupy much ground, with patches of sugar cane, vine, tropical fruits and vegetables. In the eastern half of the north side there is extensive cultivation, slightly different in character as bananas and sugar cane are absent, but maize and vegetables common. Untouched areas in this zone are small and scattered; they produce a moderately rich Hymenopterous fauna, of which a fair percentage is probably introduced. We found a few such areas on the low hills to the west of Funchal near São Martinho, others near Machico and Santo da Serra. In the São Martinho district, Pico da Cruz has been adversely affected by quarrying and was very poor. On the other hand Pico das Arrudas where we did much collecting, is probably as good an area as any for Chalcidoidea within the lower cultivated zone. It is dominated by grasses, particularly *Hyparrhenia hirta*, with some *Lagurus ovatus*, *Briza maxima* and others. Cactus (*Opuntia tuna* L.) are frequent, also bushes of *Rhus coriaria* L., *Lytanthus salicinus* (Lam.) Wettst.; a little broom (*Sarthothamnus scoparius* L.). Amongst herbs we noted *Psoralea bituminosa* L., *Phagnalon saxatile* (L.) Cass., *Galactites tomentosa* Moench, Fennel (*Foeniculum vulgare* Mill.), *Silene* spp., *Sanguisorba* and clovers. Several of the plants noted above appear to have been recorded from Madeira as early as 1698, by Sir Hans Sloane. Characteristic Chalcidoidea were *Podagrion* sp., *Dimeromicrus kiesewetteri*, *Ericydnus atriceps* and other Encyrtidae, *Systasis* sp. (perhaps associated with the broom), *Homoporus* sp., *Pteromalus (Habrocytus)* spp., one of which seem to be associated with *Galactites*, some synanthropic Pteromalidae, *Elasmus maderae*, several *Tetrastichus* spp. Probably a number of the species occurring at this level are introduced. There were vast numbers of an unidentified species of Dryinidae. I saw *Dimeromicrus kiesewetteri*.

*wetteri* frequenting the flowers of *Argyranthemum pinnatifidum* (L.) Lowe in gardens around Funchal.

3. Pinewood (pinhal) and maquis. The maritime pine (*Pinus pinaster* Ait.) has been extensively planted at various levels up to 1500 m. There is also a fair quantity of Eucalyptus. I have not found much of the Chalcidoidea group in pinewood, *Tetracnemoidea peregrina* being one species.

4. Native forest composed essentially of various Lauraceae and the tree heath *Erica arborea*, with associated herbs. Fine remnants occur on the north side, between 1,000 and 1,400 m. at Encumeada, and around Rabagal in the western part of the island, where we saw some magnificent specimens of the tree heath with trunks nearly half a metre in diameter. Some of the most interesting endemic Chalcidoidea probably occur in this forest, and in the transitional areas between it and the pinewood-maquis zone.

The *Castanea* woods (*Castanea sativa*, introduced) which no doubt hold some interesting species, were not investigated.

5. High mountain. This is mostly denuded and the only conspicuous shrubs are the giant *Vaccinium padifolium* Sm. (= *maderense* Link) the foliage of which assumes a glorious russet tint in winter, and stunted *Erica arborea*. The *Vaccinium* produced no Hymenoptera, but upon low bushy *Erica arborea* at 1800 m. just below the summit of Pico do Arieiro, I took a few Chalcidoidea including *Tetrastichus arboreae* which seems to be associated with this heath.

6. Dry region of eastern promontory (São Lourenço). This is characterized by sandy areas and has already been mentioned above zone 1 (littoral).

Some localities at a moderate altitude with a mixed flora derived both from lower levels and the native forest, produce a good variety of insect life. A strip of shady woodland in a small valley near Curral dos Romeiros at about 700 m. for example, provided us with some of the best collecting of our stay (though my wife, who suggested it, says that I looked at it rather disdainfully at first!). There was some pine, a number of oaks (*Quercus robur* L.) a few of them dead and decaying, two *Tilia*, some *Myrica faya* Ait., *Erica arborea*, a few Madeiran holly *Ilex perado* Ait.), and some broom, bracken and ferns. Amongst herbs, several thistles including the ubiquitous *Galactites*, the endemic *Sibthorpia peregrina* L., many plants of familiar European genera such as *Digitalis*, *Plantago (lanceolata* L.), *Galium*, *Geranium*, *Trifolium*, *Rumex*, *Sonchus* and *Vicia*; as well as the introduced species *Eupatorium adenophorum* Spreng. («Abundância») as usual bearing stemgalls (from which on our 1972-73 trip I reared a Tephritid fly *Procecidochares utilis* Stone), and *Erigeron karwinskianus* DC. The carpet had a lush growth of grasses, with *Brachypodium* abundant. Some of the more interesting native Chalcidoidea were found here. Characteristic species appeared to be: *Tetramesa* spp., *Dipara?* *petiolata*, *Cyrtogaster*

*degener*, *Rhincocoelia impar*, *Makaronesa* spp., *Epiclerus femoralis*, *Cirrospilus* sp., *Elachertus marginalis*, *Pediobius acantha*, *Chrysocharis* spp. including *centralis* and *discalis*, *Tetrastichus flavifrons*. Some of these species begin to appear at about 300 m. but range up to at least 900 m. for instance at Queimadas.

#### GENERAL FEATURES OF THE CHALCIDOID FAUNA

The fauna as at present known shows several gaps when compared with that of Europe. For example a number of species associated with willows (*Salix* spp.) are not likely to be represented, they are mainly northern while the few *Salix* species found in Madeira are introduced and grown for basket-making. The family Torymidae is poorly represented, the only species as yet on the list being *Podagrion? pachymerum* and *Dimeromicrus kiesewetteri*. European species of *Quercus* have been introduced into Madeira (*Q. robur*, *petraea*, *suber*) and are represented by isolated trees or small groups of them, chiefly in gardens. It is not clear how many insects from the vast oak fauna of Europe have found their way into Madeira, though we did encounter large numbers of one Chalcidoid, *Mesopolobus tibialis* at Curral dos Romeiros. A number of plants of the thistle tribe and other Compositae which are common in Europe and support a variety of Chalcidoidea, are absent from Madeira. Only a few introduced *Centaurea* are present, apart from *C. massoniana* which appears to be rare. Of the many grasses (Gramineae) which in Europe support phytophagous or parasitic Chalcidoidea, only the following occur in Madeira: *Arrhenatherum elatius*, *Brachypodium sylvaticum*, *Cynodon dactylon*, *Elymus* (= *Agropyron*) *repens*, *Phragmites australis* (rare), *Poa pratensis*, *P. trivialis*, as natives; and the introduced *Arundo donax*, *Dactylis glomerata*, *Festuca rubra* and *Lolium perenne*. In this connexion it will be interesting to see how many Eurytomidae of the genus *Tetramesa* eventually turn up in Madeira. One might have expected to find more species of the extremely large Eulophid genus *Tetrastichus*. Many of these are parasites of Diptera Cecidomyiidae. Little seems to be known about the Madeiran representatives of the latter family; perhaps they are not numerous in the island?

A notable feature of the Madeiran representatives of some European species of Chalcidoidea is their darker pigmentation. As long ago as 1851 Vernon Harcourt remarked «all the birds of Madeira are darker than their European brethren». Barker (1891: 200) stated that the usual Madeiran form of the Small Copper butterfly (*Lycæna phlaeas* L.) was darker than any European form. He thought that humidity might be a potent factor in causing melanic variation in Madeira.

#### THE IDENTITY OF THE GENUS CLEPTIMORPHA WALKER, 1872

This genus, described (Walker, 1872: 84-85) from one male of its type-species, *binotata* Walker (1872: 85) taken in Madeira and

almost certainly by Wollaston, has hitherto been a mystery. The holotype male appears to be lost, and the interpretation of Walker's description presents some difficulties.

The generic description mentions amongst other characters «Hind coxae very long; hind femora much incrassated, armed beneath with three long stout teeth, of which the third and subapical one is double; hind tibiae curved, subclavate; middle tarsi slightly incrassated towards the base». This combination of characters limits the possibilities amongst known forms very considerably. Only four families of Chalcidoidea include forms which have the hind femora swollen and toothed, beneath, and the hind tibiae curved. These are Chalcididae, Leucospidae, Torymidae (Podagrioninae) and Pteromalidae (Chalcedectinae). Chalcididae and Leucospidae are ruled out because Walker described *Cleptimorpha binotata* as blue-green, whereas Chalcididae and Leucospidae are non-metallic or at most bronze-tinged; most of them do not have long hind coxae, or if they do then they disagree with Walker's description in several respects. Pteromalidae (Chalcedectinae) do not have long hind coxae, nor are their mid tarsi thickened basally.

This leaves only the Torymid group Podagrioninae in consideration. Both I and Dr. Boucek have speculated for some years on what *Cleptimorpha* might have been. We independently came to the view that the description best fitted a male *Podagrion*, except for the generic character given by Walker (1872: 84) «Antennae... apud os insertae», because *Podagrion* has antennae inserted fairly high on the face. After more thought, however, I believe that this difficulty can be resolved. Assuming that the holotype of *binotata* was captured by Wollaston (almost a certainty) it would have been mounted on a card in his usual style, flat on its face; possibly the head was gummed down so that the insertion of the antennae was not clearly visible. If this suggestion is accepted nearly all difficulty vanishes, because otherwise Walker's generic and species descriptions fit a male *Podagrion* very well (especially the very long hind coxae) and do not agree with any other known genus.

I therefore formally propose the following synonymy: *Podagrion* Spinola, 1811 (= *Cleptimorpha* Walker, 1872, syn. n.).

It is not yet possible to say whether *Cleptimorpha binotata* is a synonym of any other described species of *Podagrion*. It could have been a species native to Madeira, or on the other hand an introduced species (perhaps from Africa). The interest of this question is emphasised for me because I recently captured in Madeira a *Podagrion* near to or identical with *pachymerum* (Walker). This unfortunately does not solve the problem of the specific identity of *binotata* because the male of the Madeiran species is much darker in colour than Walker's description requires, and does not have the mid tarsi thickened basally, or the «four posterior tarsi black towards the base». On the other hand I have taken a male in France which has the first segment of the

mid tarsi elongated and thickened, fuscous in colour, while the first segment of the hind tarsi is very thick and black; other features of this specimen agree very well with the description of *binotata*. This French male appears to be a form of *pachymerum* (Walker). I say «appears» because in some species of *Podagrion* the male is dimorphic with respect to the tarsal characters mentioned, as shown by Habu (1962: 183-191, figs. 359-364) so, that further collecting on Madeira and more evidence from rearing is desirable.

#### DESCRIPTIONS OF NEW TAXA

##### Family Pteromalidae

##### Subfamily Miscogasterinae, tribe Ormocerini

##### *Systasis basiflava* sp. n.

♀. Body bright green to bluish-green, sometimes with a slight golden or brassy tinge in places; hind margins of gastral tergites often purplish. Antennal scape black with metallic gloss, its basal third to half yellowish; rest of antenna black, the pedicellus with metallic tinge. Coxae, and femora black with metallic tinge, tips of femora yellowish (fore femora broadly, mid ones less broadly, hind femora narrowly); legs otherwise yellowish with pretarsi and fifth segment of mid and hind tarsi fuscous; hind tibiae black with base narrowly and tip broadly pale, mid tibiae usually with a fuscous ring beyond the middle. Tegulae black. Wings whitish-hyaline, pilosity pale and hard to see, venation yellowish to testaceous. Length 1.8-2.1 mm.

Agrees in structure with the ♀ of *angustula* Graham (1969; 262) except as follows:

Antenna (fig. 3): scape very slightly broader above the middle than below it (in *angustula* very slightly broader below the middle than above it) fifth funicular segment tending to be a little shorter than the first claval segment; clava usually slightly longer than the three preceding funicular segments. Forewing: postmarginal vein not longer than the stigmal. Gaster slightly less elongate, 1.7-1.9. times as long as broad.

*S. parvula* Thomson differs from *basiflava* in having scape black, shaped as in *angustula*; postmarginal vein longer than the stigmal; gaster broader and shorter, 1.3-1.6 times as long as broad.

♂. Differs from ♀ in having scape more broadly yellow (usually about the proximal half yellow), fore and mid tibiae pale, hind tibiae less darkened; antennal scape (fig. 4) broader, funicle more slender, clava more elongate; gaster at most as long as thorax, oval to subcircular, bluntly pointed; without a ventral plica.

A number of *Systasis* species have been described from Asia, Africa and elsewhere, but so far as I can see none is identical with *basiflava*.

Holotype ♀, Madeira, São Martinho, 21.v.1980 (E. M. Graham)

in BMNH. Paratypes, same locality 8.v.1980, 21.v.1980, 26.v.1980, several ♂♂ and ♀♀ (E. M. & M. de V. G.).

Subfamily Miscogasterinae, tribe Miscogasterini

**Mauleus** gen. n.

Gender, masculine.

♀. Head: occiput not margined; genae without a hollow; malar sulcus subobsolete; clypeus reticulate, anterior margin with two sharp teeth separated by an incision (the left tooth in one specimen shows a slight tendency to become bifid) Both mandibles with 4 teeth. Antennae inserted well above ventral edge of eyes, 11263; sutures of clava not oblique, area of micropilosity confined to third segment.

Pronotal collar not margined, or with just a trace of a ridge in the middle. Notauli reaching hind margin of mesoscutum, but very superficial. Scutellum: frenum not marked off, except weakly at sides. Propodeum reticulate; median carina present, plicae sharp at hind margin but vague anteriorly; spiracular sulci deep, spiracles oblong and separated by much less than their length from hind margin of metanotum; nucha a narrow, transversely aciculate strip. Prepectus higher than broad, reticulate, without an oblique carina. Mesopleuron with smooth shiny band along its upper edge. Mesosternal mesolcus shallow. Hind coxae bare dorsally; hind tibiae with one distinct apical spur and a rudimentary second. Forewing with basal cell bare, basal vein nearly so; speculum rather large, open below; marginal vein slightly longer than postmarginal and fully twice as long as stigmal, stigma small.

Gaster (fig. 2): petiole nearly as long as propodeum, subrectangular, reticulate; gaster proper ovate, acute, slightly longer than thorax; hind margin of basal tergite quite deeply sinuate and with a small nick medially, the following segments progressively shorter, except the last which is about as long as the two preceding tergites together.

♂. Differs from ♀ only in its shorter, apically subtruncate gaster, and slightly in its antennae.

Much resembles *Thinodytes* Graham (see Graham, 1969: 150, 167) especially in the antennae. It differs in having the basal tergite of the gaster deeply excised posteriorly, the propodeal spiracles oblong instead of shortly oval, and the marginal vein longer than the postmarginal instead of slightly shorter.

The genus is named after Mr. G. E. Maul, as a token of gratitude for his kind assistance and advice.

**Mauleus maderensis** sp. n.

♀. Black; head and thorax with dark bluish tint; basal tergite of gaster greenish anteriorly, its hind edge and those of middle tergites purplish-tinged. Antennal scape reddish, pedicellus and flagellum black. Coxae, and femora except their tips narrowly, black with bluish tinge; tibiae testaceous (mid and hind ones more yellowish basally), infuscate



medially; fore tarsi brown, mid and hind tarsi yellowish with fifth segment and pretarsus fuscous. Tegulae obscurely reddish. Wings hyaline, venation brownish. Length 2.0 mm.

Head slightly wider than mesoscutum, in dorsal view about 2.5 times as broad as long; temples 0.2 length of eyes, converging strongly; ocelli in strongly obtuse-angled triangle, POL twice OOL, lateral ocelli separated from eyes by about 1.5 times their own diameter. Head in front view subtrapeziform, broader than high, vertex gently arched, genae slightly curved and converging moderately. Eyes about 1.5 times as long as broad, separated by hardly 1.2 times their length. Malar space nearly half length of eye. Head rather dull, reticulation very fine but slightly raised, on clypeus and genae excessively fine. Lower edge of antennal toruli distinctly above ventral edge of eyes; scape (fig. 1) not reaching median ocellus; combined length of pedicellus and flagellum slightly less than breadth of head; pedicellus slightly longer than first funicular segment, about 1.5 times as long as broad; flagellum proximally hardly stouter than the pedicellus, but thickening; funicular segments subquadrate except the fifth and sixth which are very slightly transverse; clava slightly more than twice as long as broad, somewhat pointed, as long as funicular segments 6,5, and half of 4; sensilla numerous, slender, relatively long, in one row on each segment; hairs of flagellum mostly long and curved, a row near the base of each segment short and straight.

Thorax about 1.6 times as long as broad. Pronotal collar sloping vertically in front, medially almost 0.25 length of mesoscutum, but longer at sides, rather dull, with moderately fine raised reticulation. Mesoscutum about 1.7 times as broad as long, moderately convex, rather dull, reticulation distinctly raised, moderately fine on mid lobe, very fine on side lobes. Scutellum fully as long as mesoscutum, slightly longer than broad, both it and the axillae reticulate much like side lobes of mesoscutum; the lateral margins of scutellum converge strongly so that the scutellum touches the mesoscutum only at a point. Dorsellum a sharp transverse reticulate ridge, separated from scutellum by a longitudinally-costate groove. Propodeum medially about 0.5 length of scutellum; median area convex, reticulate much like the scutellum; spiracles nearly twice as long as broad; callus only moderately thickly pilose. Mesepisternum with femoral groove having fine but distinctly raised reticulation, that of the other sculptured parts hardly raised. Metapleuron smooth dorsally, otherwise with very fine slightly raised reticulation. Legs of medium length and thickness. Forewing a little more than twice as long as broad, hardly reaching beyond tip of gaster; costal cell about 8 times as long as broad, upper surface bare, lower with one row of hairs which runs along the middle of the cell; marginal vein thin, about 2.3 times length of stigmal vein; postmarginal vein slightly shorter than the marginal; stigmal vein very thin, curved, stigma small and subrhomboidal; speculum on upper surface of wing

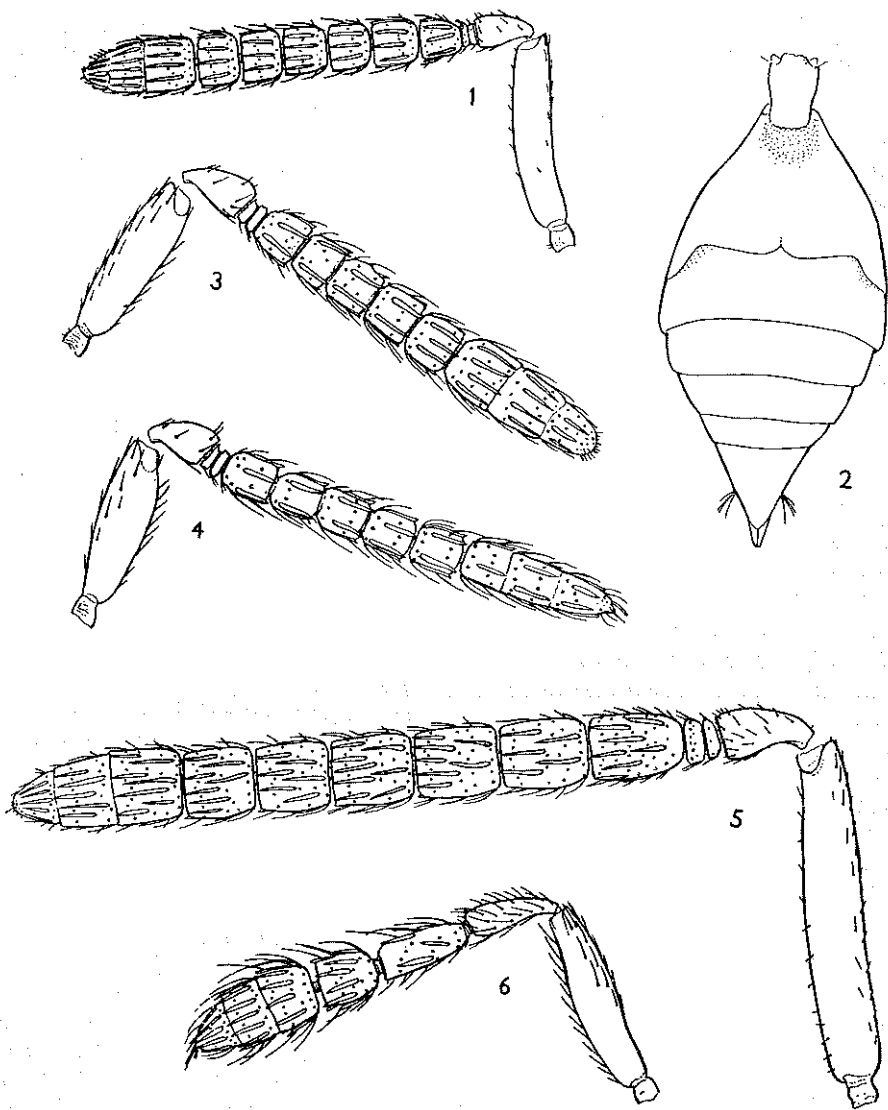


Fig. 1. — *Mauleus maderensis* gen. et sp. n., ♀, left antenna. Fig. 2. — *Mauleus maderensis* gen. et sp. n., ♀, petiole and gaster. Fig. 3. — *Systasis basiflava* sp. n., ♀, right antenna. Fig. 4. — *Systasis basiflava* sp. n., ♂, right antenna. Fig. 5. — *Pteromalus (Habrocytus) speculifer* sp. n., holotype ♀, left antenna. Fig. 6. — *Cirrospilus nephelodes* sp. n., ♀ holotype, left antenna.

reaching level of middle of marginal vein, but on lower surface only to parastigma; wing beyond speculum moderately thickly pilose, more thickly distad.

Gaster (fig. 2) with petiole dull, very finely reticulate, widening a little towards the base, at the widest point forming a projection on each side, bearing a hair; surface of gaster proper smooth except for some weak alutaceous sculpture at the bases of the middle segments and on the whole of the last tergite; tip of hypopygium slightly beyond half length of gaster.

♂. Differs from ♀ as follows:

Length 1.7-1.8 mm. Malar space about 0.25 length of eye. Antennae with combined length of pedicellus and flagellum slightly greater than breadth of head; pedicellus hardly longer than broad, slightly shorter than or as long as first funicular segment; flagellum slightly stouter than pedicellus, virtually cylindrical; funicular segments quadrate, or the proximal ones very slightly longer than broad; clava about 2.7 times as long as broad, more pointed, micropilosity confined to tip of third segment; sensilla more numerous. Gaster: petiole a little longer than propodeum; basal tergite occupying fully half the total length, the following segments very short and strongly transverse.

Holotype female, and paratype males, in the writer's collection. Holotype ♀: Madeira, Funchal district, Pico das Arrudas, near São Martinho, 26.v.1980. Paratypes same locality, one ♂ 8.v.1980, one ♂ 10.v.1980. All were swept by the writer from an area of rough grassland with *Hyparrhenia hirta* (L.) Stapf dominant.

#### Subfamily Pteromalinae

The two following new species of *Pteromalus* belong to the genus *Habrocytus*, and within that to the species-group of *albipennis* Walker. The species of this group parasitise Tephritid flies. The Madeiran species *integer* Walker belongs to the same group. All three species are characterized by having an unusually long pronotum, whose median length is about one quarter that of the mesoscutum.

#### *Pteromalus (Habrocytus) speculifer* sp. n.

♀. Head and thorax olive-green to fairly bright green; vertex often slightly bronze-tinged; collar of pronotum, parts of mesoscutum, scutellum, and mesopleuron dorsally, often with a bronze suffusion. Gaster usually mainly bright green, sometimes golden-green or with some bronze to coppery flecks; the three tergites following the basal one (i.e., the fourth, fifth and sixth abdominal) each with a purplish transverse band which usually does not reach the sides, seventh and eighth tergites sometimes with similar but weaker bands. Antennal scape testaceous; pedicellus and flagellum brown, the latter usually testaceous beneath. Coxae coloured like the body; rest of legs testaceous, except all femora which are at least infuscate proximally, often broadly

or mainly black; hind tibiae reddish to fuscous medially; fifth tarsal segment and pretarsus of all legs fuscous. Tegulae testaceous; wings usually hyaline, sometimes slightly yellowish in basal part; venation yellowish-testaceous, stigma brown. Length 2.6-3.7 mm.

Malar space about 0.5 length of eye. POL 1.55-1.67 OOL; lateral ocelli separated by about twice their diameter from eyes. Antenna (fig. 5): scape reaching about to level of middle of median ocellus; first funicular segment not or hardly longer than pedicellus, varying from quadrate to 1.4 times as long as broad, second and third sometimes a little longer than broad, but usually segments 2 to 6 are quadrate, sometimes even 6 is slightly transverse; sensilla numerous, usually in two partly overlapping rows on each funicular segment, but only one irregular row in small specimens.

Pronotal collar long as in *integer* Walker, about one-quarter the length of the mesoscutum, not or hardly margined in front. Upper part of mesepisternum (just below base of hindwing) mainly or wholly smooth and shiny.

Gaster sublanceolate to lanceolate, slightly longer than head plus thorax, strongly acute (apical angle about 40°) but not or hardly acuminate, 2.2-2.6 times as long as broad; length of last tergite varying from 0.8 to 1.3 times its basal breadth.

♂. Not definitely associated. Some males captured in the same place as the females may be conspecific, but in view of the difficulty of correlating males in this group, it is best not to describe them at present.

Holotype ♀, Madeira, São Martinho, Pico das Arrudas, 21.v.1980 (M. de V. Graham) in BMNH.

Paratypes, same locality, 9.v.1980, 4 ♀♀, 21.v.1980, 6 ♂♂ (E. M & M. de V. G.), in author's collection.

Closely resembles *integer* Walker, which differs as follows: Head and thorax usually tinged with bronze or copper, often strongly so; gaster coppery-bronze, without greenish colour or with only hind margins of some of the tergites greenish. Legs apart from coxae, fulvous to reddish, rarely with a dusky flush on hind femora. Forewings often yellowish tinged. Upper area of mesepisternum mainly or wholly reticulate, not very shiny. Antennal scape reaching only to lower edge of median ocellus; funicular segments tending to be a little shorter, sixth slightly transverse, fifth sometimes very slightly so. POL 1.35-1.5 times OOL. Gaster much longer than head plus thorax, on average more strongly acute and acuminate, 2.5-3.3 times as long as broad; last tergite 1.3-2 times as long as its basal breadth.

#### ***Pteromalus (Habrocytus) ametrus* sp. n.**

♀. Differs from *speculifer* sp. n. as follows:

Size greater, length 4.0-4.4 mm. POL: OOL ratio only 1.4-1.48:  
1. Antenna: first funicular segment very slightly longer than the pedi-

cellus and 1.3-1.5 times as long as broad, segments 2 to 5 progressively shorter but all a little longer than broad, 6 usually quadrate, sometimes also 5; sensilla even more numerous, in three overlapping rows on first funicular segment, in two rows on the other segments.

♂. Not recognized yet.

Holotype ♀, Madeira, São Martinho, 9.v.1980 (M. de V. Graham) in BMNH.

Paratypes, same locality and date, 3 ♀ ♀, in author's collection.

#### Family Eulophidae.

#### *Diglyphus eleanorae* sp. n.

♀. Closely resembles the very common and widely distributed Palearctic species *isaea* Walker, from which it differs as follows:

Mesoscutum green to blue; scutellum contrasting, purplish-coppery to purple; axillae usually coppery-tinged. Forewing slightly grey-tinged, sometimes lightly infumate medially; venation greyish-yellow to brownish. Sublateral lines of scutellum a little farther apart: ratio of length of scutellum to distance between the lines (measured at their greatest distance apart) 1.6-1.7. Bristles of pronotum, mesoscutum and scutellum all blackish, tending to be slightly longer than in *isaea*.

♂. Colour as in ♀. Sublateral lines of scutellum even farther apart (ratio 1.45-1.55). Hind tibiae broadly to very broadly black medially.

In *isaea* the mesoscutum, axillae and scutellum do not contrast in colour and vary from green through olive and bronze-green to coppery; the bristles of the pronotum, and the anterior pair on the mesoscutum, tend to be pale. The scutellar line ratio is 1.8-2.0 in the female, 1.7-1.9 in the male. The hind tibiae of the male are sometimes broadly black medially, but often this black zone is divided in the middle by a paler or yellow ring or band.

Earlier I thought that *eleanorae* was a local colour form of *isaea*, but that is not so because we took several typical *isaea* on Madeira during 1980, in one case from the same locality.

Holotype ♀, Madeira, Cural dos Romeiros, 13.v.1980 (Mrs. E. M. Graham) in BMNH. Paratypes, ♂ and ♀, in the writer's collection and in Museu Municipal do Funchal, as follows: Madeira, Cural dos Romeiros, 13.v.1980, 1 ♂ 7 ♀ ♀, 15.v.1980, 2 ♂ ♂ 5 ♀ ♀, swept from grass in shady woodland (E. M. G. & M. de V. G.); Rabaçal, 24.v.1980, 3 ♀ ♀ (M. de V. G.); Machico, Rocha Alta, 1.i.1973, 2 ♀ ♀ (M. de V. G.). The two females from Machico were recorded erroneously as *isaea* by me (Graham, 1979: 280). *D. eleanorae* is probably a common and widely distributed species in Madeira, at least in the forest zones.

I have pleasure in naming this species after my wife, who has greatly assisted my study of Madeiran Chalcidoidea.

*Cirrospilus nephelodes* sp. n.

♀. Head yellow, with genae, clypeus and middle of face, ocellar triangle, and most of occiput, black; thorax black, with greenish tinge on pronotum, mesoscutum, and scutellum; side lobes of mesoscutum yellow except in front, axillae yellow with a circular black spot anteriorly, upper angle of mesopleuron yellow; gaster black. Antennae ochreous, the pedicellus slightly darker basally. Legs yellow; basal half of fore coxae, most of mid coxae, and whole of hind coxae black; femora black proximally, the fore pair narrowly, mid pair more broadly, hind pair over basal half; pretarsi brown. Tegulae yellowish, hind edge darker. Forewings grey-tinged, with a large median subtriangular fuscous blotch, the apex of which touches the stigmal vein whilst the base lies on the anal margin. Hindwings slightly infumate medially. Length 1.9 mm.

Vertex with numerous dusky bristles, length of the longest distinctly greater than diameter of an ocellus. Antenna (fig. 6): combined length of pedicellus and flagellum almost equal to breadth of head; pedicellus very slightly longer than first funicular segment, about 2.5 times as long as broad; first funicular segment hardly broader than pedicellus and fully twice as long as broad, second slightly broader but much shorter, about 1.5 times as long as broad; clava including terminal spine about 2.5 times as long as broad, slightly shorter than the funicle, pointed, its first segment occupying about one third of the whole and slightly transverse, second slightly shorter, third still shorter and triangular, terminal spine 0.6 length of third segment; bristles on dorsal surface of flagellum relatively long, curved.

Pronotum, mesoscutum and scutellum moderately shiny (as in *pictus* (Nees)) with superficial or almost engraved isodiametric reticulation, extremely fine on pronotum, very fine on mesoscutum and scutellum. Bristles of mesoscutum and scutellum dusky, those of the former long, those of scutellum still longer, their length almost as great as their distance apart. Sublateral lines of scutellum distinct, enclosing a space about 1.6 times as long as broad. Dorsellum shiny, with fine engraved isodiametric reticulation. Propodeum medially slightly longer than dorsellum, rather dull, with very fine slightly raised isodiametric reticulation; median carina thin, sharp; plicae absent; callus with many bristles, extending its whole length. Forewings similar to those of *pictus* but speculum very narrow, sublinear, closed below; wing surface beyond it quite densely pilose.

Gaster ovate, as long as and slightly broader than the thorax, about 1.5 times as long as broad, subobtuse apically except for the slightly projecting ovipositor sheaths; most of the surface has fine and delicate alutaceous sculpture.

♂ unknown.

Holotype ♀, Madeira, Rabaçal, 24.v.1980 (M. de V. Graham) in the writer's collection.

Although it most resembles *pictus* this species differs obviously from it and other European species in having the forewing conspicuously dark-clouded.

ADDITIONS TO MADEIRAN LIST.

Chalcididae

*Brachymeria minuta* (L.). São Martinho, ♀ 9.v.1980.

Eurytomidae

*Tetramesa szelenyii* Graham. Curral dos Romeiros, 11.v.1980, 15.v.1980, ♀♀ amongst grass in woodland (E.M. & M. de V.G.).

*T.* sp. group of *angustata* (Walker). São Martinho, 21.v.1980, ♀ (E.M.G.).

*T.* sp. near *brevicollis* (Walker). Ribeira Brava, near Serra de Água, ♀, 19.v.1980.

Torymidae

*Podagrion* ? *pachymerum* (Walker). São Martinho, ♂ ♀, 26.v.1980.

These are relatively darker than *pachymerum* from Mediterranean Europe, with antennal scape infusate, flagellum dark, legs relatively dark. I do not know whether this species is likely to be native to Madeira, though its presumed host, *Mantis religiosa* L., has been recorded there at least since the beginning of this century, on the grassy hills to the west of Funchal, such as Pico da Cruz and Pico das Arrudas where I took the parasite. See also remarks above on *Cleptimorpha*.

Encyrtidae

*Doliphoceras belibus* (Walker). Below Encumeada, 18.v.1980, ♂♂ on a grassy slope.

*Cerchysius subplanus* (Dalman). Curral dos Romeiros, 11.v.1980, ♀; São Martinho, 9.v.1980, ♀.

*Microterys flavus* (Howard). Funchal, 16.v.1980, ♀. A cosmopolitan species, parasitising various soft-scales (Coccoidea).

*Parechthrodryinus* (= *Protyndarichus*) *comara* (Walker). São Martinho, 26.v.1980, ♀; a common and widely distributed species in Europe.

*Homalotylloidea dahlbomii* (Westwood). Curral dos Romeiros, 15.v.1980, ♀. Widely distributed in Europe.

*Monodiscodes intermedius* (Mayr). São Martinho, ♂ 21.v.1980, ♀♀ 8.v.1980, 21.v.1980, several specimens swept on a warm southern slope, thinly covered with grass, of Pico das Arrudas.

*Tachinaephagus zealandicus* Ashmead. São Martinho, 21.v.1980, ♀ (E.M.G.). Possibly introduced; a parasite of various Muscid flies, widely distributed in the warmer regions of the world.

*Procheiloneurus ? javanicus* (Ferrière). São Martinho, 8.v.1980, ♀. This agrees with the description of *javanicus* but I record the name provisionally because the species of this genus are variable and sometimes difficult to determine. Probably introduced.

#### Pteromalidae

*Dipara ? petiolata* Walker. Curral dos Romeiros, 13.v.1980, ♀. Slightly darker in colour than European *petiolata*, but may be that species.

*Cyrtogaster degener* (Walker) (*Sphegigaster degener* Walker, 1872: 117, ♀; *Cyrtogaster mallorcensis* Askew, 1975: 13, ♂, syn. n.). Curral dos Romeiros, 11.v.1980., ♂♂♀, 15.v.1980, ♀ (E. M. G.); Queimadas, 14.v.1980, ♀, in shady parts of woods.

When writing my monograph of the Pteromalidae of north-western Europe (1969: 142, 143) I considered *degener* to be the same as *vulgaris* Walker. Our capture of the very distinctive male and a comparison of Madeiran females with the type of *degener* show that the latter is a valid species. It is now reinstated on the list for Madeira; originally taken on the Northern Deserta, the present records are the first for the main island. They are also the only captures in the Madeiran group since Wollaston's. Otherwise the species is known (as *mallorcensis* Askew) only from two males taken in Majorca by Dr. Askew.

*Merismus megapterus* Walker. Curral dos Romeiros, 11.v.1980, ♀. Frequent in Europe.

*Halticoptera circulus* (Walker). São Martinho, 10.v.1980, ♂, 21.v.1980, ♀; Curral dos Romeiros 13.v.1980, ♂♂. A common European species.

*Rhynocoelia impar* (Walker). Curral dos Romeiros, 11.v.1980, ♂♂♀♀. A local species in Europe.

*Callitula bicolor* Spinola. Curral dos Romeiros, 11.v.1980, ♀. Common European species.

*Psilocera crassispina* (Thomson). Machico, Rocha Alta, 12.v.1980, ♀♀ beaten from foliage of *Erica arborea* L. All have the antennal pedicellus infuscate, two have the scape extensively darkened; the basal cell of the forewing is bare, the basal vein varies from bare to wholly pilose. The ♀ which I took on 5.i.1973 in the same locality and recorded (1979: 277) as «sp. near *obscura* Walker» appears to be just a dwarf of *crassispina*.

*Pteromalus (Habroclytus) integer* Walker. São Martinho, 9.v.1980, ♂♀♀, 10.v.1980, ♀♀ on flower heads of *Galactites tomentosa* Moench (Compositae). I suspect that the host of this handsome species might be the conspicuously-patterned Te-



phritid fly *Acanthophilus walkeri* Woll., which I took in company with *integer* on *Galactites*. The original specimens of *integer* were taken on Porto Santo by Wollaston; it is now recorded for the first time from Madeira itself. *Galactites* was recorded in Wollaston's day from both islands (Lowe, 1868: 496). In my monograph of European Pteromalidae (Graham, 1969: 538) I placed another Walker species from Porto Santo, *Pteromalus contaminatus*, in synonymy with *integer*, and at the same time pointed out that the type specimen of the latter was male and not female as described by Walker. I should add that the male type has the acutely pointed genital armature projecting somewhat, and it could have been mistaken for an ovipositor; also the antennae are relatively short and somewhat female-like.

*Mesopolobus tibialis* Westwood. Curral dos Romeiros, 11.v.1980, 13.v.1980. Both sexes in great numbers, on grass beneath *Quercus robur* L. of which there were several trees (E. M. & M. de V. G.). Presumably introduced. Reared in Europe from several species of Cynipid gall; but we could not find any in this Madeira locality.

*M. laticornis* (Walker) aggr. Below Encumeada, 18.v.1980, ♂. This belongs to a complex of «sibling species» associated with various grasses.

*Stinopus* sp. São Martinho, 21.v.1980, ♂. Males of this genus seem to be rather rare, hence are poorly known.

*Dibrachys cavus* (Walker). Curral dos Romeiros, 11.v.1980, ♀. A common and well known species in Europe, with a long list of hosts.

*Rhopalicus tutela* Walker. Curral dos Romeiros, 11.v.1980, ♀. In Europe, a parasite chiefly of Scolytid beetles, occasionally of Curculionidae.

*Hemitrichus seniculus* (Nees). São Martinho, 10.v.1980, ♂. A synanthropic species, often found in stored products.

*Pachyneuron aphidis* (Bouché). Funchal, in hotel window, 7.v.1980, ♀. Usually hyperparasitic on Braconidae which attack aphids.

*P.* sp. near *albutius* Walker. Curral dos Romeiros, 15.v.1980, ♀ (E. M. G.). Very like *albutius*, but propodeal nucha shorter, lightly aciculate-reticulate instead of smooth.

#### Elasmidae

*Elasmia elongatus* Ferrière. São Martinho, 26.v.1890, ♀. Fairly common in southern Europe.

#### Eulophidae

*Prigalio soemius* (Walker). São Martinho, 8.v.1980, ♀. Rather less common in Europe than *pectinicornis*.

*P. pectinicornis* (L.). Curral dos Romeiros, 11.v.1980, ♀♀. Ribeira

- ra Brava, near Serra de Água, 19.v.1980, ♀♀. A common species in Europe.
- Necremnus folia* (Walker). Curral dos Romeiros, 13.v.1980, ♂. Local in Europe; sometimes found in house windows.
- Hemiptarsenus semialbiclavus* (Girault). São Martinho, 8.v.1980, ♀. A widely distributed species in warmer parts of the Old World, almost cosmopolitan. The Madeira specimen has a dark bronze thorax, legs more infuscate than in those from Africa, Asia and the Pacific area, but I can see no other differences.
- H. dropion* (Walker). Curral dos Romeiros, 13.v.1980, ♀; Curral das Freiras, 22.v.1980, ♂.
- Entedon? hercyna* Walker. Curral dos Romeiros, 11.v.1980, ♀ (E. M. G.). This resembles *hercyna* in all respects except that it has an unusually short gaster, hardly more than twice as long as broad; perhaps an aberrant specimen.
- Pediobius acantha* (Walker). Curral dos Romeiros, 15.v.1980, ♂♀♀ (E. M. G.). Queimadas, 14.v.1980, ♀. These do not differ from European specimens except that the disc of the forewing is sometimes faintly infumate.
- Achrysocharoides parva* (Delucchi). Curral dos Romeiros, 15.v.1980, ♀♀ (E. M. G. & M. de V. G.).
- Euderus* sp., probably *albitarsis* (Zett.). Queimadas, 14.v.1980, ♂.
- Tetrastichus* sp. near *viridimaculatus* (Full.). São Martinho, 8.v.1980, ♂♀♀, 26.v.1980, ♀♀.
- This species and the following are being dealt with in my forthcoming monograph of European Tetrastichinae; they belong to a difficult group and some synonymy is involved. I suspect that both may be native in Madeira.
- T.* sp. near *szelenyii* (Erdös). São Martinho, 8.v.1980, ♂♂♀ (E. M. G.), 21.v.1980, ♂♀♀.
- T. grylli* (Erdös). São Martinho, 8.v.1980, several ♂♂♀♀, 26.v.1980, ♀♀ (E. M. G. & M. de V. G.). Rather common amongst stands of the grass *Hyparrhenia hirta* (L.) Stapf; the specimens originally described from Hungary by Erdös were swept from a related grass, *Chrysopogon gryllus* L. Probably native to Madeira, like *Hyparrhenia*; the latter was found in Madeira as long ago as 1698, by Sir Hans Sloane.
- T. pronomus* (Walker). Funchal, 16.v.1980, ♀ in hotel window. A parasite of Triozidae (Psylloidea). In Europe it and related species are often found on windows.

#### Trichogrammatidae

- Oligosita subfasciata* Westwood. São Martinho, 21.v.1980, ♀ (E. M. G.). I am indebted to my wife's keener eyes for the detection of this minute species.

## NOTES ON SOME SPECIES ALREADY RECORDED FROM MADEIRA

## Eurytomidae

*Tetramesa aequalis* (Walker). Curral dos Romeiros, 15.v.1980, ♀ ♀. These agree with the lectotype female of *aequalis*, which is very close to *angustata* (Walker) but differs in the sculpture of the propodeum. Probably a common species in Madeira.

## Encyrtidae

*Ericydnus atriceps* (Walker). São Martinho, 8.v.1980, ♀ ♀ (M. de V. G.), 9.v.1980, ♀ ♀ (E. M. G.). The first record of this species since it was described. We found it on sunny slopes of Pico das Arrudas, on ground almost bare except for a sparse covering of short grass. It is extremely close to *sipylus* (Walker) but the antennae of both sexes are slightly different.

## Pteromalidae

*Miscogaster glabricula* Graham. Several specimens were taken at Curral dos Romeiros, by my wife and me.

## Tetracampidae

*Epiclerus femoralis* (Walker). Curral dos Romeiros, 11.v.1980, ♂ ♀ ♀ amongst grass in woodland. First record since the species was described.

## Elasmidae

*Elasmus maderae* Graham. Additional specimens taken at São Martinho, 8.v.1980, ♀ ♀, 21.v.1980, ♀ ♀.

## Eulophidae

*Elachertus marginalis* (Woll.). Curral dos Romeiros, 15.v.1980, ♀ ♀ (E. M. G.). The first records since its description by Wollaston in 1858, from specimens taken «in the sylvan districts (Cruzinhas, Lombo de Vaca, etc.) of intermediate and lofty altitudes».

*Necremnus artynes* (Walker). São Martinho, 21.v.1980, ♀. Not recorded since its capture by Wollaston in the last century.

*Chrysocharis centralis* (Walker). Curral dos Romeiros, v.1980, ♀ ♀ common.

*C. discalis* Graham. Curral dos Romeiros, both sexes common, in company with the preceding species (E. M. & M. de V. G.).

*Tetrastichus flavifrons* Walker. Curral dos Romeiros, v.1980, fairly common (E. M. & M. de V. G.).

## SPECIES TO BE DELETED FROM MADEIRAN LIST

*Cyrtogaster vulgaris* Walker. Erroneously recorded for Madeira on the basis of the type specimen of *Sphегigaster degener*

Walker, which was thought to be the same as *vulgaris*. *C. degener* has now been reinstated as a valid species (see above).

#### ADDENDUM TO EARLIER PAPER

In my paper of 1981 (*Bocagiana*, No. 53: 5) I omitted to designate a holotype for *Tetrastichus asperulus* sp.n. This can be rectified by inserting on line 8 from the bottom, after «11 ♀ ♀» the words «(one the lectotype)». All the other specimens mentioned under *asperulus* are now designated paralectotypes.

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