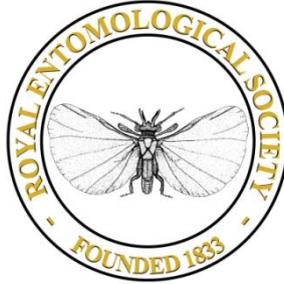


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# ICHNEUMONIDAE

ORTHOPELMATINAE & ANOMALONINAE

I. D. Gauld & P. A. Mitchell



**HYMENOPTERA**  
**ICHNEUMONIDAE (Part)**  
**ORTHOPELMATINAE & ANOMALONINAE**

By  
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Editor: Allan Watson

1977  
ROYAL ENTOMOLOGICAL SOCIETY OF LONDON  
41 Queen's Gate  
London SW7 5HU

Published by the Royal Entomological Society of London  
41 Queen's Gate London SW7 5HU

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*First published 1977*

Printed in Great Britain  
by Adlard and Son Ltd, South Street  
Dorking, Surrey

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Cover-figure: *Gravenhorstia (Erigorgus) cerinops* (Gravenhorst)



# HYMENOPTERA

## Family ICHNEUMONIDAE

### Subfamilies ORTHOPELMATINAE and ANOMALONINAE

I. D. GAULD & P. A. MITCHELL

#### INTRODUCTION

This handbook is the third dealing with the Ichneumonidae. The first two by Dr J. F. Perkins include a key to subfamilies of the Ichneumonidae and cover British species of the subfamilies Ichneumoninae, Alomyinae, Agriotypinae and Lycorininae. The present volume provides keys to, and brief biological notes about the British species of the subfamilies Orthopelmatinae and Anomaloninae, a checklist of species in which six new synonymies are proposed, and a list of recorded host species.

The Orthopelmatinae was adequately defined in Perkins' (1959) key but the extent of the Anomaloninae requires some clarification. Perkins used the subfamily Ophioninae in a broad sense and included six tribes: Therionini, Anomalonini, Campoplegini, Cremastini, Ophionini and Tersilochini. Since his work was completed a number of changes have been made in the supra-generic classification, culminating in the division of the Ichneumonidae into 25 subfamilies by Townes (1969). This system of classification is currently accepted by most ichneumonologists although there is some disagreement over the naming of several groups. In this classification the Ophioninae *sensu* Perkins is divided into five subfamilies. The Anomaloninae (spelt Anomalinae by Townes) corresponds to the tribes Anomalonini and Therionini. The Campopleginae (Porizontinae *sensu* Townes), Cremastinae, Ophioninae and Tersilochinae correspond respectively to Perkins' remaining four tribes.

To use the present work it is necessary to be able to recognise the Anomaloninae. For this purpose a key to the five subfamilies formerly included in the Ophioninae is given (p. 3).

#### TERMINOLOGY

The terminology in this work follows that of Richards (1956) except that the naming of the wing cells follows the system proposed by Eady (1974) (fig. 1). It is necessary to define a few specialist morphological terms here.

The lower face is that part of the face and clypeus below the antennal insertion. Its height is measured from the median apex of the clypeus to the centre of the subantennal ridge; its width is the shortest distance between the eyes.

The gaster is the petiolar and following segments of which the petiolar segment is numbered 1 and so on (the term gaster is not synonymous with abdomen, as in all petiolate Hymenoptera the first true abdominal segment, the propodeum, is fused with the thorax).

The flagellum is that part of the antenna distal to the basal three segments. The subterminal flagellar segments are defined as those distal to the mid point of the flagellum but excluding the apical five segments. The subterminal segments are usually very uniform in size and shape.

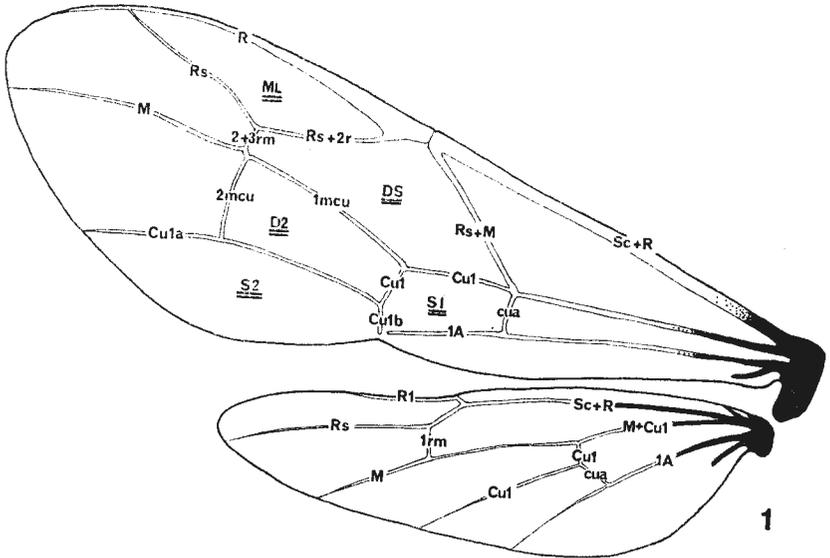


FIG. 1. Left fore and hindwings of Anomaloniinae labelled to show venation and wing cells. Abbreviations used for wing cells: ML marginal cell; DS discosubmarginal cell; D2 second discal cell; S1 first subdiscal cell; S2 second subdiscal cell.  $2+3r-m$  is intercubital vein.

The malar space is the shortest distance between the eye margin and the mandible base.

The basitarsus is the most proximal of the five tarsal segments.

Certain indices quantifying the position of some wing veins are used here. These are:

$$\text{CI (Cubital index of forewing)} = \frac{\text{length of } Cu_1 \text{ between } 1m-cu \text{ and } Cu_{1a}}{\text{length of } Cu_{1b}}$$

$$\text{NI (Nervellar index of hindwing)} = \frac{\text{length of } Cu_1 \text{ between } M+Cu_1 \text{ and } cu-a}{\text{length of } cu-a}$$

The distal abscissa of  $Cu_1$  in the hindwing is that part of  $Cu_1$  distal to the intersection of  $Cu_1$  and  $cu-a$ . One problem in the nomenclature of veins in ichneumonid wings is the name to apply to the intercubital veins ( $r-m$ ). Where both are present they are generally designated  $2r-m$  and  $3r-m$ . Where a single vein is present this may represent either 2 or  $3r-m$  or a fusion of  $2+3r-m$ . In the present work such a single vein is called the intercubital vein but this should not be interpreted as an indication of homology of this vein between subfamilies. All the remaining veins are referred to by short-hand notation.

#### MATERIAL EXAMINED

The keys are based on material examined in the British Museum (Natural History) and specimens in the authors' personal collection. The collections

of the University Museum, Manchester, the University Museum, Glasgow, the City Museum, Leicester, the Castle Museum, Norwich, the Royal Scottish Museum, Edinburgh, the University Museums at Cambridge and the Hope Department of Entomology, Oxford, were examined and the keys modified where necessary to accommodate all material seen. We are grateful to Mr A. Brindle, Dr R. Crowson, Miss J. Dawson, Mr B. McWilliams, Mr E. C. Pelham-Clinton, Dr J. Smart and Professor G. C. Varley for permission to examine these collections. The senior author would like to thank the Trustees of the British Museum (Natural History) for a grant from the Godman Fund which enabled him to collect in Scotland and visit the Scottish museums mentioned above.

With each species' description we include an estimate of abundance, notes on the seasonal and geographical distribution and habitat preferences. This information was deduced from museum collections and collecting experience. Little material was available from Wales, southern Scotland and northern England, so that our statements 'more common in the south' may be incorrect for several species and indicate merely an imbalance in regional collecting.

#### THE OPHIONINAE *sensu* PERKINS (1959)

This group is characterized by having the gaster more or less laterally compressed, the petiole slender with the spiracles close to the hind margin of the tergite and generally having the second submarginal cell (or areolet) of the forewing, if present, obliquely quadrate, rhombic or petiolate, not regularly pentagonal. The key below is intended for the placement to sub-family of specimens keying out as Ophioninae in Perkins (1959).

- 1 2nd submarginal cell absent; intercubital vein distal to  $2m-cu$  by at least 0.5 of its own length; 2nd subdiscal cell with a vein extending from vannal notch to tornus (Perkins, 1959; fig. 30); hindwing with distal abscissa of  $Cu_1$  present

#### OPHIONINAE *sensu stricto*

(Antennae elongate; ocelli unusually large; hind tarsal claws densely pectinate; ovipositor not longer than apical depth of gaster; clypeus apically rounded with labrum exposed; often pale red-brown species; forewing length 10–30mm).

- 2nd submarginal cell present or absent, when absent with intercubital vein usually either proximal or opposite  $2m-cu$ , if very rarely distal to  $2m-cu$  then either with hindwing lacking distal abscissa of  $Cu_1$  or clypeus bearing a median apical tooth; 2nd subdiscal cell without a vein extending from vannal notch to tornus, sometimes with a vein like area of discoloration present; hindwing with distal abscissa of  $Cu_1$  present or absent . . . . . 2
- 2 Propodeum without areas bounded by regular carinae, generally coarsely reticulate, or in a few species finely reticulate but in such species the intercubital vein is distal to  $2m-cu$ ; 2nd submarginal cell absent, intercubital vein proximal, less commonly opposite or distal to  $2m-cu$ ; distance separating posterior ocelli from occipital carina usually less than maximum ocellar diameter

#### ANOMALONINAE (p. 6)

(Clypeus often with a median apical tooth; generally slender insects with gaster in profile exceptionally elongate (fig. 50); ovipositor abruptly constricted before apex (Perkins, 1959; fig. 24) or rarely hastate; ♂ with hind tarsi often somewhat swollen.)

- Propodeum usually with carinae delimiting a small number of areae, or if not distinctly areolated then with fine sculpture; 2nd submarginal cell present or absent, if absent then either with intercubital vein proximal to or opposite  $2m-cu$  or rarely with this vein very short and very slightly distal to  $2m-cu$ ; distance separating

- posterior ocelli from occipital carina always more than maximum ocellar diameter ..... 3
- 3 Posterior transverse carina of mesosternum absent or interrupted in front of each mid coxa; clypeus separated from face by a groove, apically with a fringe of long parallel bristles (fig. 4); forewing with marginal cell about 0.5 times as deep (from wing margin to junction of  $R_s+2r$  and  $R_s$ ) as long (from base of  $R_s+2r$  to junction of  $R_s$  and  $R_1$ ) (Perkins, 1959; fig. 32) **TERSILOCHINAE**  
(Hindwing with length of  $R_s$  between  $R_1$  and  $r-m$  very much shorter than length of  $r-m$ ; forewing with 2nd submarginal cell absent, intercubital vein often short; usually small insects, forewing length seldom exceeding 5mm).
- Posterior transverse carina of mesosternum complete, or if rarely interrupted in front of each mid coxa then with face and clypeus confluent and marginal cell about 0.3 times as deep as long; clypeus without an obvious fringe of long parallel bristles; forewing with marginal cell variously shaped ..... 4
- 4 Hindwing with length of  $R_s$  between  $R_1$  and  $r-m$  usually less than 0.5 times length of  $r-m$  (fig. 3), if rarely longer than hind femur with a large ventral tooth; tergite 2 of gaster usually without thyridia, often finely longitudinally striate; tibial spurs inserted in area separate from that of the basitarsus, thus each tibial apex having two insertion areas separated by a sclerotized bridge **CREMASTINAE**
- Hindwing with length of  $R_s$  between  $R_1$  and  $r-m$  about equal to length of  $r-m$  (fig. 2), or if rarely about 0.6 times as long as  $r-m$  then hind femur simple, tergite 2 with thyridia and alutaceous; hind femur never with a ventral tooth; tergite 2 with thyridia, polished, alutaceous or finely punctate; tibial spurs inserted in a common area with basitarsus, thus each tibial apex having a single membranous insertion area **CAMPOPLEGINAE**

The Campopleginae, Cremastinae, Tersilochinae and Ophioninae are not discussed further in this handbook.

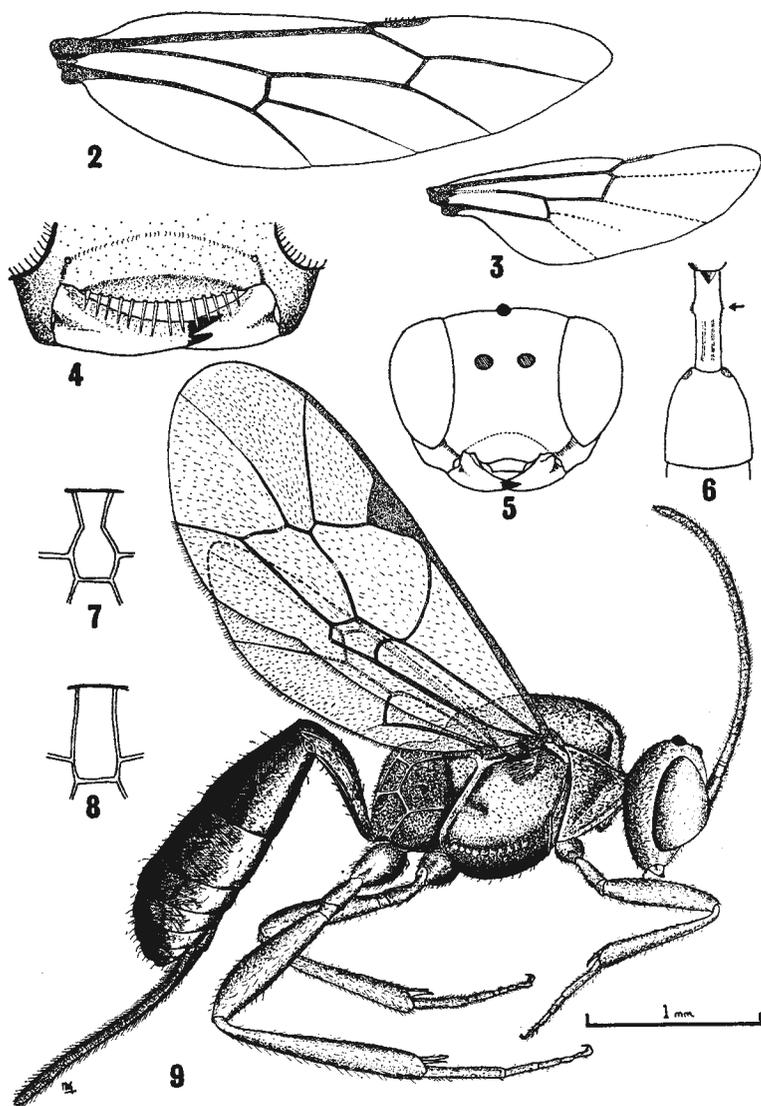
### Subfamily ORTHOPELMATINAE

The Orthopelmatinae contains a single known genus *Orthopelma*. The species are structurally rather similar to small Hemitelinae and Morley (1907) included them within this subfamily, but Beirne (1941) observed that the form of the larval head capsule was unlike those of the Hemitelinae but had some similarities with those of the Ichneumoninae with which the adults have no obvious affinity. Beirne and subsequent authors have regarded the Orthopelmatinae as a separate subfamily.

### Genus ORTHOPELMA Taschenberg

In the British fauna the distinguishing features of this genus are the concave clypeus exposing the labrum (fig. 5), the twisted mandibles with the lower tooth obscured anteriorly, the strong mesepisternal furrows (fig. 9), the narrow parallel-sided petiole with spiracles before the centre (fig. 6), and the forewing with  $2m-cu$  bowed and with two widely spaced bullae (fig. 9).

This genus is known only from the Holarctic region. Species are parasites of Cynipini and occur in galls of *Diplolepis* on *Rosa*, and *Diastrophus* on *Rubus*. There is no adequate account of the biology of any species, but Beirne (1941) interpreted the structure of the final instar larva and suggested that *O. mediator* may be endoparasitic on *Diplolepis rosae* (L.). Callan (1943) gave a comparative account of the external morphology of the two British species.



FIGS 2-9. 2-3, Right hindwings. 2, *Dusona* sp. (Campopleginae). 3, *Cremastus* sp. (Cremastinae). 4, *Tersilochus* sp., clypeus and mandibles. 5-7, *Orthopelma mediator* (Thunberg) ♀. 5, head, anterior. 6, gastral tergites 1 and 2, dorsal (arrow indicates position of spiracle). 7, areae basalis and superomedia. 8, *O. brevicorne* Morley, areae basalis and superomedia. 9, *O. mediator* (Thunberg), ♀, entire.

## KEY TO BRITISH SPECIES

- 1 Antennae short, less than 0.5 times as long as forewing, with about 14 flagellar segments; flagellar segments 7-12 broader than long; combined areae basalis and supermedia of propodeum more or less rectangular, slightly narrowed anteriorly (fig. 8); gaster when viewed dorsally with ovipositor protruding beyond apex by a distance subequal to median dorsal length of tergite 3 **brevicornis** Morley  
*Rare; vi-vii; southern England; parasite of Diplolepis eglanteriae (Hartig) and D. spinosissimae Giraud.*
- Antennae of moderate length, 0.7 times as long as forewing, with about 18 flagellar segments; flagellar segments 7-12 longer than broad; combined areae basalis and supermedia of propodeum flask shaped, constricted centrally slightly dilated anteriorly (fig. 7); gaster when viewed dorsally with ovipositor protruding beyond apex by a distance equal to about 1.4 times the median dorsal length of tergite 3 (= *luteolator* Gravenhorst) **mediator** (Thunberg)  
*Moderately common; v-vii; all regions but apparently more common in southern half of Britain as a parasite of Diplolepis rosae (L.), D. spinosissimae Giraud, D. mayri (Schlechtendal) and D. eglanteriae (Hartig). Morley (1907) recorded this species as a parasite of Cynipini on Quercus but we have not seen material reared from this source.*

## Subfamily ANOMALONINAE

The Anomaloninae is a moderately large subfamily with 35 currently accepted genera. Many of these are restricted to either tropical forests or the drier subtropics, with only a few rare species occurring in temperate regions. A number of genera are, however, primarily holarctic with most species either in North America or in the eastern Palaearctic region. It is these genera which include most of the British species.

The Anomaloninae were traditionally included within the Ophioninae *sensu lat.* and generally placed close to the Ophionini which they superficially resemble in general facies. The discovery of striking differences in the structure of the final instar larvae and in the biologies of the two groups led some authors to regard them as separate subfamilies (Short, 1959; Townes, 1971) and this opinion is now generally accepted.

In Britain the Anomaloninae are inconspicuous insects and were previously generally considered to be rare (Morley, 1915). Several species, however, are quite common in Malaise trap collections and, although frequently overlooked in the field, are by no means as rare as is generally supposed. The Anomaloninae show marked habitat preferences and many species are restricted to a very particular habitat type. Most species are found either in woodlands or on *Calluna* moorlands, where they may constitute a noticeable proportion of the late summer Ichneumonid fauna. A few species of the sylvan genus *Agrypon* occur along hedgerows and in scrubland but generally remain in the proximity of shrubby vegetation. It is these species with a wider habitat type tolerance which are most commonly encountered.

Kloet and Hincks (1945) list 39 British species in 14 genera in the tribes Therionini and Anomalonini. Gauld (1976b) recently revised the genera of the Anomaloninae on a world basis and following this work only 11 genera are represented in Britain.

Of the 39 British species, we have seen no specimens of *Gravenhorstia (Erigorgus) procerum* (Gravenhorst), *G. (E.) latro* (Schrank), *G. (E.) fibulator* (Gravenhorst), *Agrypon tenuitarsum* (Gravenhorst) and *Atrometus arquatus* (Gravenhorst) from Britain. The specimens we have seen labelled as

these species (upon which, no doubt, the recording of these species as British is based) were all incorrectly determined specimens of other established British species. We therefore have deleted the above mentioned five species from the British list. [See also note on p. 22.]

Five species are here recorded for the first time as British: *Trichomma occisor* Habermehl, *T. intermedium* Krieger, *Agrypon brevicolle* (Wesmael), *A. delarvatum* (Gravenhorst) and *Barylypa uniguttata* (Gravenhorst).

The names of five species recorded as British are now considered to be synonyms of other species. These, together with a few synonymies overlooked by Kloet & Hincks and the correct placement of the several British species are listed below. We are grateful to Dr M. G. Fitton for information about the type material of Anomaloninae described by British authors.

## CHECKLIST OF BRITISH ANOMALONINAE

## Tribe ANOMALONINI

- Genus *Anomalon* Panzer, 1804  
*foliator* (Fabricius, 1798)

## Tribe THERIONINI

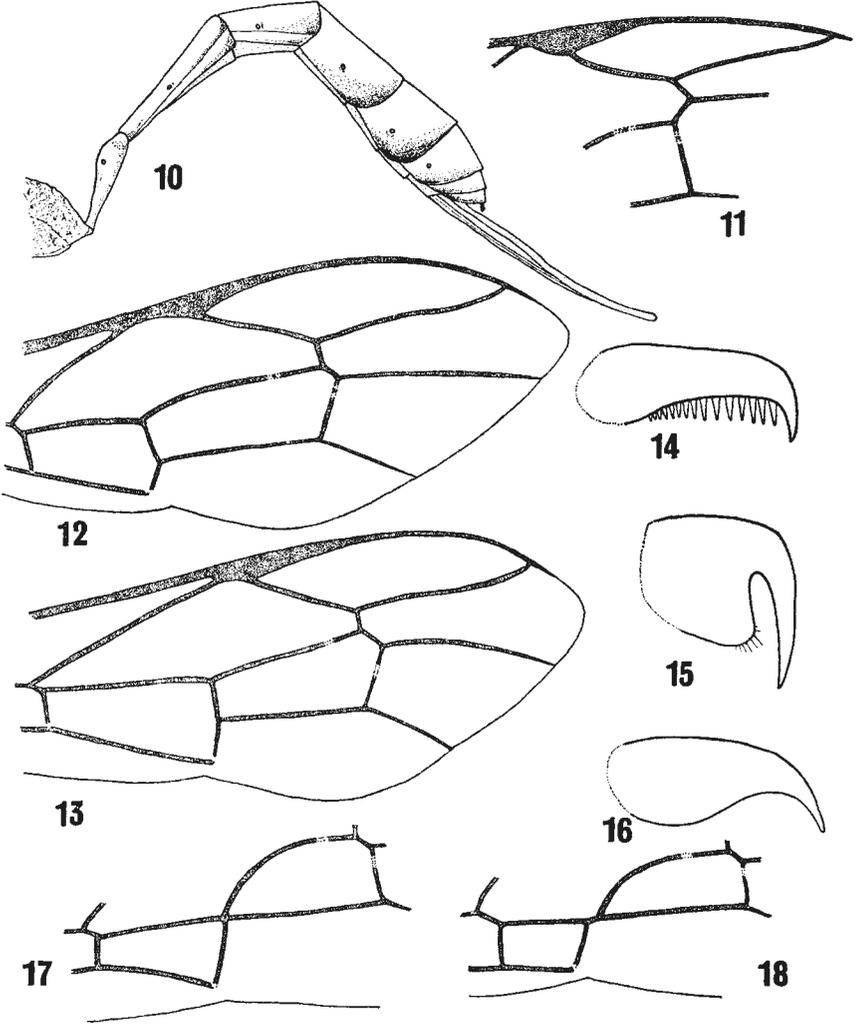
- Genus *Heteropelma* Wesmael, 1849  
*calceator* Wesmael, 1849  
*amictum* (Fabricius, 1775)  
*capitatum* (Desvignes, 1856)
- Genus *Therion* Curtis, 1829/30  
*circumflexum* (Linnaeus, 1758)  
*brevicorne* (Gravenhorst, 1829)
- Genus *Trichomma* Wesmael, 1849  
*enecator* (Rossi, 1790)  
*fulvidens* Wesmael, 1849  
*occisor* Habermehl, 1920  
*intermedium* Krieger, 1904
- Genus *Habronyx* Foerster, 1868  
 subgenus *Habronyx* Foerster, 1868  
*heros* (Wesmael, 1849)  
*mirabile* (Desvignes, 1856)  
 subgenus *Camposcopus* Foerster, 1868  
*canaliculatus* (Ratzeburg, 1844)  
*nigricornis* (Wesmael, 1849)  
*perspicuus* (Wesmael, 1849)  
 subgenus *Habrocampulum* Gauld, 1976  
*biguttatus* (Gravenhorst, 1829)
- Genus *Aphanistes* Foerster, 1868  
*ruficornis* (Gravenhorst, 1829)  
*xanthopus* (Schrank, 1781)  
*bellicosus* (Wesmael, 1849)
- Genus *Gravenhorstia* Boie, 1856  
 subgenus *Gravenhorstia* Boie, 1856

- picta* Boie, 1856  
*fasciatum* (Marshall, 1873)  
 subgenus *Erigorgus* Foerster, 1868  
*cerinops* (Gravenhorst, 1829)  
*melanobata* (Gravenhorst, 1829)
- Genus *Barylypa* Foerster, 1868  
*delictor* (Thunberg, 1822)  
*uniguttata* (Gravenhorst, 1829)  
*insidiator* (Foerster, 1878)  
*carinata* (Brischke, 1880)  
*cylindrica* (Bridgman & Fitch, 1884) **syn. n.**  
*cylindrica* (Bridgman, 1884)  
**syn. n.**
- Genus *Agrypon* Foerster, 1860  
*flaveolatum* (Gravenhorst, 1807)  
*flexorium* (Thunberg, 1822)  
*tenuicorne* (Gravenhorst, 1829)  
*gracilipes* (Curtis, 1839)  
*debile* (Wesmael, 1849) **syn. n.**  
*clandestinum* (Gravenhorst, 1829)  
*anomelas* (Gravenhorst, 1829)  
*varitarsum* (Wesmael, 1849)  
*nigripes* (Bridgman, 1887) **syn. n.**  
*anxium* (Wesmael, 1849)  
*minutum* (Bridgman & Fitch, 1884) **syn. n.**  
*minutum* (Bridgman, 1884) **syn. n.**  
*delarvatum* (Gravenhorst, 1829)  
*brevicolle* (Wesmael, 1849)
- Genus *Paramia* Morley, 1913  
*geniculata* (Holmgren, 1857)
- Genus *Atrometus* Foerster, 1868.  
*insignis* Foerster, 1878

## KEY TO THE GENERA AND SUBGENERA OF BRITISH ANOMALONINAE

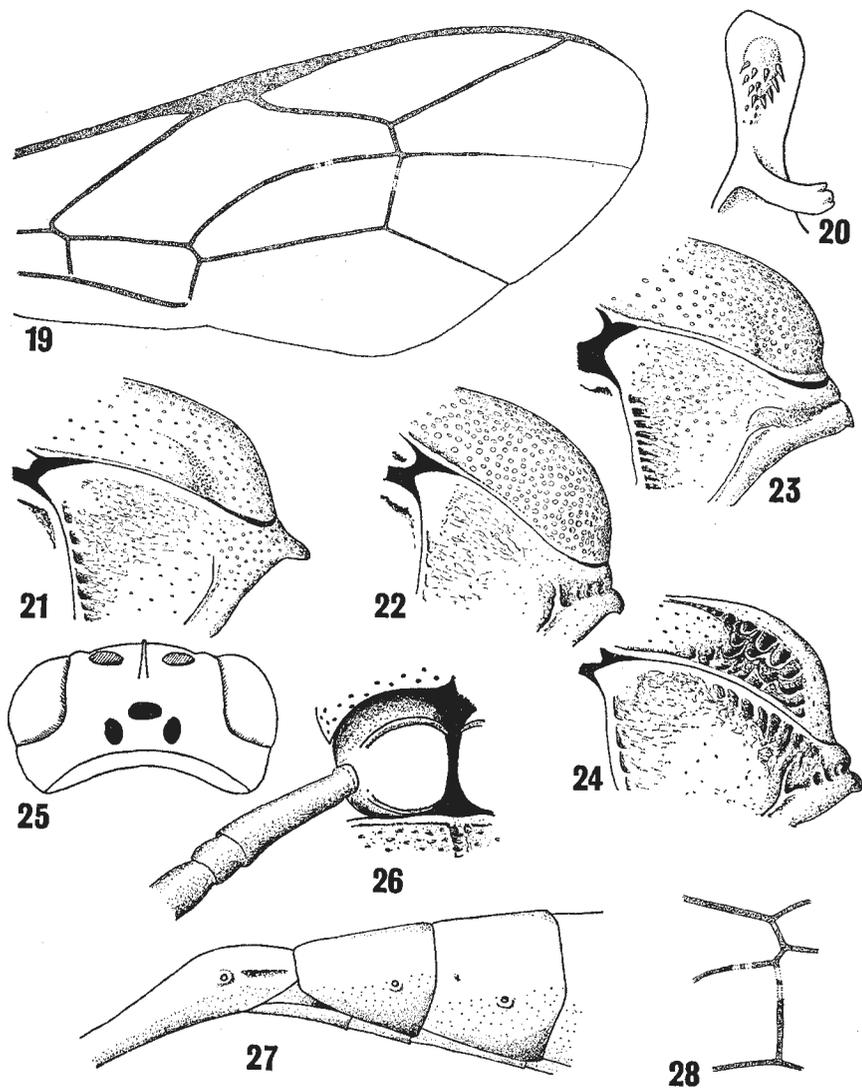
1. Tergite 3 of gaster with epipleura separated by a longitudinal crease immediately ventral to spiracle (fig. 10); posterior ocelli separated from occipital carina by more than maximum ocellar diameter; forewing with intercubital vein separated from base of *2m-cu* by more than 0.8 of its own length (fig. 11) and hindwing with distal abscissa of *Cu*<sub>1</sub> absent **ANOMALON** (p.11)

- Tergite 3 of gaster without a longitudinal crease separating the epipleura (fig. 50); posterior ocelli usually closer to occipital carina than maximum ocellar diameter (fig. 25); forewing usually with intercubital vein proximal to or opposite  $2m-cu$ , if rarely distal to  $2m-cu$  then separated from base of  $2m-cu$  by less than 0.5 its own length and hindwing with distal abscissa of  $Cu_1$  present; distal abscissa of  $Cu_1$  otherwise present or absent .....



FIGS 10-18. 10-11, *Anomalon foliator* (Fabricius), ♀. 10, gaster, lateral. 11, central part of forewing. 12-13, Distal part of forewing. 12, *Aphanistes xanthopus* (Schränk). 13, *Therion circumflexum* (L.). 14-16, ♀ outer hind tarsal claw. 14, *Aphanistes xanthopus* (Schränk). 15, *Heteropelma amictum* (Fabricius). 16, *Therion circumflexum* (L.). 17-18, ♂ forewing, discal and subdiscal cells. 17, *Atrometus insignis* Foerster. 18, *Parania geniculata* (Holmgren).

- 2 Forewings with  $1m-cu$  and  $Cu_{1a}$  basally separated by an abscissa of  $Cu_1$  (figs. 12, 13); hindwing with distal abscissa of  $Cu_1$  present or absent. . . . . 3
- Forewing with  $1m-cu$  and  $Cu_{1a}$  either arising at the same point or basally fused, not separated by an abscissa of  $Cu_1$  (figs. 17, 18); hindwing with distal abscissa of  $Cu_1$  absent . . . . . 13
- 3 Forewing with  $Cu_1$  between  $cu-a$  and  $1m-cu$  0.8 or more as long as  $1m-cu$  (fig. 13); clypeus apically rounded or laterally excised, never with median acute tooth; hindwing with distal abscissa of  $Cu_1$  present; hind tarsal claws not pectinate. . . . . 4
- Forewing with  $Cu_1$  between  $cu-a$  and  $1m-cu$  0.7 or less of length of  $1m-cu$  (figs. 12, 41, 42); clypeus usually with median apical acute tooth, or rarely if this tooth is absent the hindwing lacks the distal abscissa of  $Cu_1$ ; distal abscissa of  $Cu_1$  otherwise either present or absent; hind tarsal claws often with an obvious pecten. . . . . 5
- 4 Posterior transverse carina of mesosternum complete; hind tarsal claw strongly geniculate and basally with a large lobe (fig. 15); lower face usually entirely yellow and scutellum black; ♂ with an impressed area bounded laterally by grooves present on ventral surface of 2nd hind tarsal segment **HETEROPELMA** (p. 13)
- Posterior transverse carina of mesosternum interrupted before each mid coxa; hind tarsal claws evenly curved and with a weak basal lamella (fig. 16); lower face often black marked, scutellum usually yellow; ♂ with ventral surface of 2nd hind tarsal segment flattened, with a median longitudinal carina **THERION** (p. 13)
- 5 Surface of eyes bearing elongate conspicuous hairs, centrally with these hairs longer than distance separating their bases (figs 32-34); ♀ with ovipositor sheath longer than length of tergite 2 of gaster; ♂ with distivolsella centrally swollen bearing a cluster of long spines on this swelling (fig. 20) **TRICHOMMA** (p. 14)
- Surface of eyes at most with short sparse pubescence, centrally with these hairs much shorter than the distance separating their bases; ♀ with ovipositor sheath shorter than tergite 2 of gaster; ♂ with distivolsella flattened bearing small spines on peripheral or diagonal ridge (cf. fig. 69) . . . . . 6
- 6 Fore coxae with a carina on anterior and inner face (fig. 26) or if smooth and without a carina then hindwing with distal abscissa of  $Cu_1$  entirely absent (fig. 72) and vertex yellow marked **AGRYPON** (p. 21)  
CI=0.15-0.65; vertex variously coloured; small to moderate sized insects, forewing length 3-14 mm.
- Fore coxae smooth without carinae; hindwing with distal abscissa of  $Cu_1$  present, very rarely weakly pigmented and not reaching  $Cu_1+cu-a$  but in such specimens the vertex is entirely black . . . . . 7
- 7 CI less than 0.6, usually less than 0.4; pronotum medio-dorsally flat or slightly concave but without an impressed transverse sulcus (fig. 21); ♂ with aedeagus evenly sclerotized except at extreme apex **BARYLYPA** (p. 18)
- CI more than 0.7, usually more than 0.9; pronotum medio-dorsally with a transverse impressed sulcus (figs. 22-24); ♂ with aedeagus extensively membranous. . . . . 8
- 8 Frons with a median vertical lamella below anterior ocellus (fig. 25); hind tarsal claws pectinate to extreme apices (fig. 14); mesoscutum with a small concavity centrally just behind the anterior margin (fig. 23) **APHANISTES** (p. 16)
- Frons without a lamella, either smooth or with a median vertical carina or rarely with a weak tooth; hind tarsal claws simple or pectinate at most on basal 0.7; mesoscutum without a concavity (figs 22, 24) . . . . . 9
- 9 Notauli completely absent; mesoscutum in profile evenly rounded and rather evenly punctate (fig. 22); hind tarsal claws often long and weakly curved **GRAVENHORSTIA** . . 10
- Notauli distinctly impressed; mesoscutum in profile abruptly rounded, usually in part rugose (fig. 24); hind tarsal claws various, often rather small and strongly curved **HABRONYX** . . . 11
- 10 Gaster stout, tergite 2 in profile about as long as deep posteriorly, tergite 3 slightly deeper than long (fig. 27); lower face with conspicuous median cornute process (fig. 45); forewing usually with intercubital vein distal to  $2m-cu$  (fig. 28); large insect with yellow and black banded gaster  
subgenus **GRAVENHORSTIA** (p.17)
- Gaster slender, tergite 2 in profile more than twice as long as deep posteriorly, tergite 3 clearly longer than deep (fig. 50); lower face at most with minute central tubercle; forewing with intercubital vein opposite or proximal to  $2m-cu$ ; moderate to large sized insects, usually with gaster centrally red, terminally black  
subgenus **ERIGORGUS** (p. 17)



FIGS 19-28. 19, *Barylypa uniguttata* (Gravenhorst) forewing. 20, *Trichomma fulvidens* Wesmael distivolsella. 21-24, Anterior part of thorax, antero-lateral. 21, *Barylypa uniguttata* (Gravenhorst). 22, *Gravenhorstia (Erigorgus) cerinops* (Gravenhorst). 23, *Aphanistes xanthopus* (Schrank), 24, *Habronyx (Camposcopus) canaliculatus* (Ratzeburg). 25, *Aphanistes ruficornis* (Gravenhorst) ♀ head, dorsal. 26, *Agrypon anxium* (Wesmael) ♀ fore coxa. 27-28, *Gravenhorstia (Gravenhorstia) picta* Boie ♀. 27, basal segments of gaster. 28, central part of forewing.

- 11 Hind trochantellus ventrally as long as trochanter (fig. 43); postscutellum longer than broad (fig. 47); lower anterior margin of pronotum produced to form weak tooth (fig. 46); hind tarsal claws rather small, those of ♀ basally, of ♂ vestigially pectinate; scutellum yellow subgenus **HABROCAMPULUM** (p. 15)
- Hind trochantellus less than 0.8 as long as trochanter (fig. 44); postscutellum broader than long; lower anterior corner of pronotum without trace of a tooth; hind tarsal claws of both sexes pectinate to or just beyond centre; scutellum generally black. .12
- 12 Marginal cell short, *Rs* sinuate, 1.2-1.3 times as long as *Rs+2r*; 1st subdiscal cell distally strongly explanate (fig. 41); hindwing with  $NI=0.7-1.0$ ; large species, forewing length 15 mm + subgenus **HABRONYX** (p. 15)
- Marginal cell longer, *Rs* almost straight, 1.7-2.1 times as long as *Rs+2r* (fig. 42); 1st subdiscal cell distally weakly explanate; hindwing with  $NI=3.5+$ ; smaller species, forewing length 10 mm or less subgenus **CAMPOSCOPUS** (p. 15)
- 13 1st subdiscal cell distally weakly explanate; *Im-cu* and *Cu<sub>1a</sub>* arising from a short common stalk; abscissa of *Cu<sub>1</sub>* between *cu-a* and *Cu<sub>1b</sub>* less than 0.6 of length of *Cu<sub>1a</sub>* (fig. 18); mesoscutum without a transverse suture before scuto-scutellar groove; ♂ with gonolacinia and distivolsella of normal proportions (fig. 69).  
**PARANIA** (p. 24)
- 1st subdiscal cell distally strongly explanate; *Im-cu* and *Cu<sub>1a</sub>* arising from junction of *Cu<sub>1</sub>* and *Cu<sub>1b</sub>* more than 0.7 of length of *Cu<sub>1b</sub>* (fig. 17); mesoscutum with a transverse suture before scuto-scutellar groove; ♂ with gonolacinia and distivolsella long and slender (fig. 68) **ATROMETUS** (p. 25)

### Tribe ANOMALONINI

This tribe contains two valid genera, one of which is represented in Britain. The host preferences of most species are unknown but the few that are known are parasites of coleopterous larvae. They are most common in arid regions of the world where they may constitute a large proportion of the total ichneumonid fauna.

### Genus ANOMALON Panzer

The form of the 3rd gastral tergite, the characteristic venation and position of the posterior ocelli distinguish this genus from other British Anomaloninae. A single species has been recorded from Britain.

Clypeus apically rounded with or without a pair of lateromedian teeth; occipital carina often wanting centrally; ovipositor longer than tergite 2 of gaster; flagellum shorter than forewing, unusually slender; reddish yellow to badious species

**foliator** (Fab.)

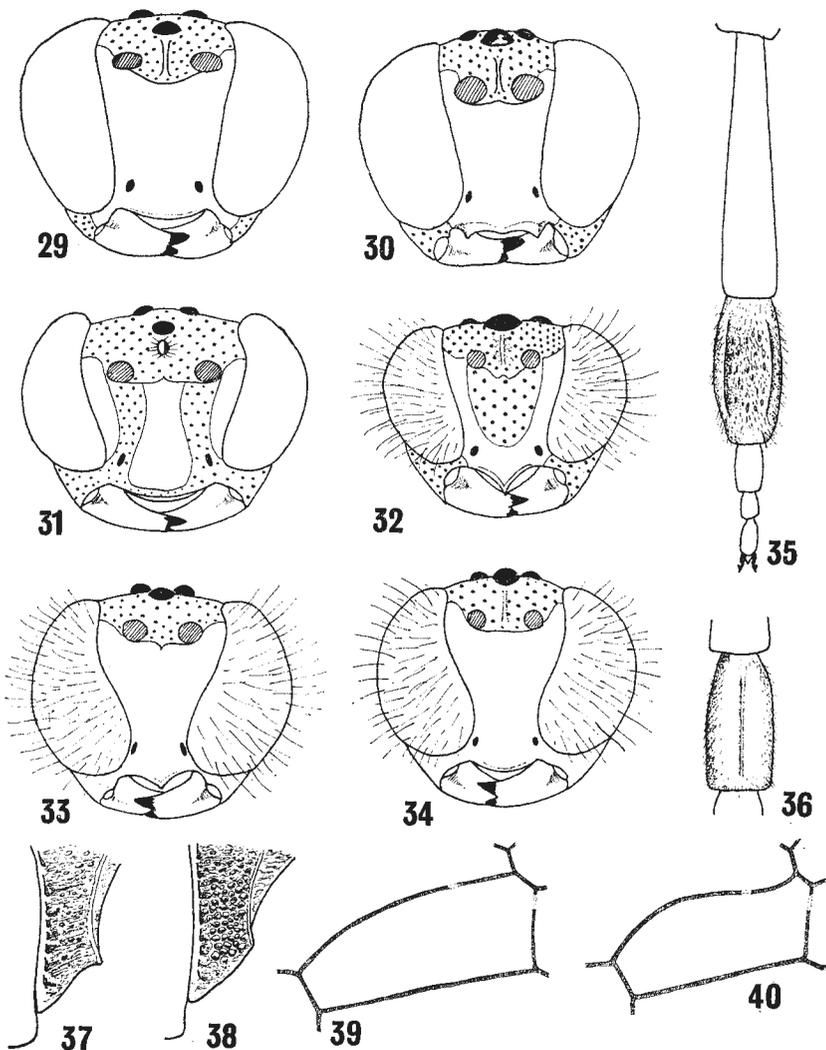
*This species is a parasite of tenebrionid larvae; it is primarily a Mediterranean insect but occasional specimens have been taken in southern England. It is not thought to be established in this country.*

### Tribe THERIONINI

This tribe contains the majority of genera and species in the subfamily. Most are rather similar in general appearance, being delicate slender insects. Males usually have a somewhat swollen second hind tarsal segment. In flight these insects adopt a characteristic position with the antennae outstretched, the gaster elevated and the hind legs splayed out posteriorly. The flight is generally rather erratic, the insect rising and falling slowly, then suddenly darting away and then repeating the sequence. Under favourable conditions they seldom alight on vegetation and then only for brief periods.

This flight pattern coupled with the cryptic coloration and slenderness of most species makes them very difficult to observe in the field and is possibly the reason why they are generally considered to be rare.

As far as is known all species are parasites of lepidopterous larvae.



FIGS 29-40. 29-34, Head, anterior. 29, *Heteropelma calcator* Wesmael. 30, *H. amictum* (Fabricius). 31, *Therion circumflexum* (L.). 32, *Trichomma fulvidens* Wesmael. 33, *T. enecator* (Rossi). 34, *T. occisor* Habermehl. 35-36, 2nd hind tarsal segment of ♂ ventral. 35, *Heteropelma amictum* (Fabricius). 36, *Therion circumflexum* (L.). 37-38, Lower corner of pronotum. 37, *Therion circumflexum* (L.). 38, *T. brevicorne* (Gravenhorst). 39-40, 2nd discal cell of forewing. 39, *Trichomma fulvidens* Wesmael. 40, *T. intermedium* Krieger.

Oviposition is usually into early instar host larvae. The eggs of many species are attached to the host internally by means of a mushroom shaped barb (Gauld, 1976c). The parasite remains as a 1st instar larva until the host pupates. It then completes larval development and spins a very rudimentary cocoon within the host pupa. The perfect insect emerges by biting off the anterior end of the host pupa.

Unlike many other Ichneumonidae there is very little sexual dimorphism in this tribe. Some males may have more slender tarsal claws and a paler face than the female but such species are exceptional.

Several of the Therionini are parasites of economically important pest species of Lepidoptera and consequently a number of studies of their biologies have been published. Some of the more notable of these are Plotnikov (1914) on *Heteropelma*, Tothill (1922) on *Therion* and Rosenberg (1934) on *Trichomma*.

#### Genus HETEROPELMA Wesmael

The hook-like process on the pronotum, complete posterior mesosternal transcarina and geniculate hind tarsal claws distinguish species of this genus from other British Anomaloninae. *Heteropelma* species are amongst the commonest species of Therionini. They are parasites of medium to large sized exposed lepidopterous larvae (e.g. Geometridae and Noctuidae). The world species have recently been revised by Gauld (1976c) who includes some notes on the biology of British species. Two species occur in Britain.

#### KEY TO BRITISH SPECIES

- 1 Hind basitarsus 3.0 or more times as long as 2nd tarsal segment; clypeus evenly rounded, not laterally produced (fig. 29) **calcator** Wesmael  
*Common; vii-ix; coniferous woodlands (especially as a parasite of Bupalus piniaria L.) southern England to northern Scotland.*
- Hind basitarsus less than 2.4 times as long as 2nd tarsal segment; clypeus swollen, with lateral corners produced (fig. 30) **amicium** (Fabricius)  
*Moderately common; vii-x; open moorlands and heaths; south-western England becoming rarer northwards. Occasional ♂♂ of this species have the genae exceptionally strongly inflated. Previously such specimens were placed in a separate species, capitatum Desvignes, but are now considered to be conspecific with amicum (Gauld, 1976c).*

#### Genus THERION Curtis

The venation, simple curved claws and characteristic facial aspect (fig. 31) distinguish species of this genus from other British Anomaloninae. *Therion* species are parasites of medium to large sized exposed lepidopterous larvae; many species apparently show preference for hairy caterpillars (Tothill, 1922). In this work two species are considered to be British although it is possible that *T. brevicorne* is an aberrant variant of *circumflexum*. A number of additional species are recorded from Western Europe. Of these *T. giganteum* (Gravenhorst) and *T. tarsatum* (Shestakov) are good species (Šedivý, 1956; Viktorov and Atanasov, 1974) but neither has been found to occur in Britain. Other western Palaearctic 'species' are almost certainly variants of *T. circumflexum*. The only characters for distinguishing these 'species' are the extent of red colour on the meso- and metapleurae, the gross head shape and the flagellum length (Bauer, 1967). We have observed several populations of *T. circumflexum* in Britain which exhibit a wide

range of variation in each of these characters. We therefore do not consider such differences are an indication of specific distinction. (It is not within the scope of this work to propose new synonymies for species which are neither previously recorded as British, nor, as they are junior names, will in future alter the nomenclature used here.)

#### KEY TO THE BRITISH SPECIES

- 1 Scutellum black, all coxae black; lower anterior margin of pronotum with tooth weak to absent (fig. 38); lower part of pronotum usually coarsely punctate or reticulate; flagellum with 52-59 segments **brevicorne** (Gravenhorst)  
*Very rare; vii-viii; moorlands; widely distributed northwest of Wash-Exe line.*
- Scutellum yellow; fore coxae often pale marked; lower anterior margin of pronotum with a moderately to strongly developed tooth (fig. 37); lower part of pronotum striate or puncto-striate; flagellum with 45-56 segments **circumflexum** (L.).  
*Moderately common; vii-ix; open moorland; southern England to northern Scotland more common north-west of Wash-Exe line.*

In the collections of the British Museum (Natural History) there is a specimen of the Nearctic *Therion morio* (Fabricius) collected at Bootle, Lancashire. This species resembles *T. circumflexum* in external morphology but differs in being black and having violet or blackish wings and bright yellow antennae. This species is not thought to be established in Britain.

#### Genus TRICHOMMA Wesmæl

The dense elongate ocular pubescence, and in the females the unusually elongate ovipositor distinguish species of this genus from other British Therionini.

*Trichomma* species are rare in Britain. They are parasites of concealed lepidopterous larvae such as fruit miners and leaf rollers. The long ovipositor of the ♀ is used to reach the prospective host larva. *T. intermedium* and *T. occisor* have not previously been recorded as British.

#### KEY TO BRITISH SPECIES

- 1 Frons with a cornute process below median ocellus; forewing with *1m-cu* sinuous (fig. 40) **intermedium** Krieger  
Clypeus with median apical tooth; lower face entirely yellow; forewing length 10mm.  
*Very rare; vii-viii; too few specimens available to allow conclusions to be drawn concerning habitat preference or distribution.*
- Frons without a cornute process either flat or with a median vertical carina; forewing with *1m-cu* evenly arcuate (fig. 39) ..... 2
- 2 Clypeus evenly rounded apically, without a median apical tooth (fig. 34); mesoscutum punctate, the area between the punctures smooth and polished; lower face entirely yellow **occisor** Habermehl  
Pronotum entirely black; forewing length 5-7 mm.  
*Rare; v-vii; southern England. Previously this species was often confused with *T. enecator*, but it belongs to a quite separate species-group (Gauld 1976a). In Eastern Europe this species seems to be restricted to coniferous woodlands.*
- Clypeus with a median apical tooth (figs 32, 33); either with mesoscutum finely rugose between punctures or with lower face black marked. .... 3
- 3 Lower face broad, 0.6-0.7 times as wide as high, coarsely punctate, black marked at least centrally (fig. 32); mesoscutum punctate, the area between the punctures smooth and polished; large species, forewing length 10-12 mm **fulvidens** Wesmæl  
*Rare; vi-vii; southern England.*
- Lower face narrow, 0.4-0.5 times as wide as high, with obsolescent puncturation,

entirely yellow (fig. 33); mesoscutum punctate, the area between the punctures finely but conspicuously rugose; small species, forewing length 4-7mm

*Rare; v-vii; damper wooded areas or thick hedgerows, occasionally also orchards; England south-east of Wash-Exe line.*

**enecator** (Rossi)

### Genus HABRONYX Foerster

This genus is difficult to define on a world basis but the British species are characterized by the presence of notauli, value of CI and absence of frontal lamella. Smaller species may possibly be confused with *Agrypnon flaveolatum* (the only British species of *Agrypnon* without carinate fore coxae). *Habronyx* species differ from *A. flaveolatum* in having at least a trace of the distal abscissa of  $Cu_1$  present in the membrane of the hindwing. The species with this vein most poorly developed have the vertex entirely black while that of *A. flaveolatum* is yellow marked.

Four subgenera are currently recognized, three of which are represented in the British Isles.

#### Subgenus Habronyx Foerster

This subgenus is represented in Britain by a single species, *H. heros*.

Exceptionally large species, forewing length 15mm+; pronotum ventrally acute

*Rare; vi-viii; southern England, particularly New Forest. This species has not been recorded from Britain since 1920. Recent searches of the localities in which specimens had been collected have not revealed additional specimens.*

**heros** (Wesmael)

#### Subgenus Camposcopus Foerster

This subgenus is considered as a distinct genus by some workers (Horstmann, 1972) but examination of the genitalia has shown a close affinity to *Habronyx* (Gauld, 1976b).

Two species are recorded from Britain. Both are apparently restricted to woodlands, particularly oak woods where they are commonly reared as parasites of Tortricidae and other smaller lepidopterous larvae.

#### KEY TO BRITISH SPECIES

- 1 Vertex entirely black; distal abscissa of  $Cu_1$  weak, often not joining  $Cu_1+cu-a$ ; hind tibial spurs about as long as width of tibial apex **canaliculatus** (Ratzeburg)  
*Common; viii-x; widely distributed, possibly commoner in the south and west of England.*

Almost all authors have used the name *nigricornis* Wesmael for this species but Horstmann (1972) placed this species as a synonym of *canaliculatus* (the type material of which has been lost). This interpretation is followed in this work.

- Vertex with yellow mark; distal abscissa of  $Cu_1$  strong, clearly joining  $Cu_1+cu-a$ ; hind tibial spurs clearly longer than apical tibial width **perspicuus** (Wesmael)  
*Uncommon; vii-ix; widely distributed throughout Britain.*

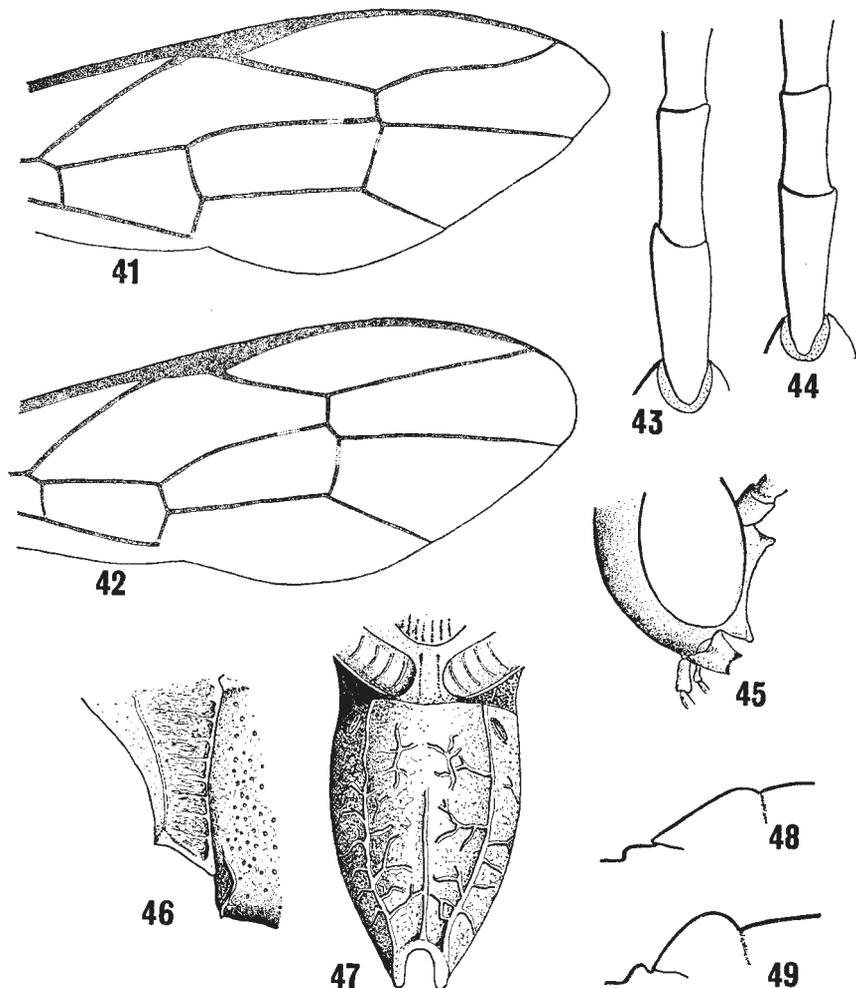
#### Subgenus Habrocampulum Gauld

A single species is referable to this subgenus. It has occasionally been recorded from Britain but is commoner in Central Europe.

Vertex with a yellow mark; propodeum long, rather evenly tapered (fig. 47); scutellum yellow; CI=0.8-1.1; NI=0.8-1.0 **biguttatus** (Gravenhorst)  
*Very rare; vii-viii; coniferous woodlands; widely distributed throughout Britain.*

### Genus APHANISTES Foerster

The frontal lamella, pectinate claws and anteriorly concave mesoscutum distinguish species of this genus from other British Anomaloniinae. Three



FIGS 41-49. 41-42, distal part of forewings. 41, *Habronyx (Habronyx) heros* (Wesmael). 42, *H. (Camposcopus) canaliculatus* (Ratzeburg). 43-44, ♀ hind trochanteral segments, ventral. 43, *Habronyx (Habrocampulum) biguttatus* (Gravenhorst). 44, *H. (Camposcopus) canaliculatus* (Ratzeburg). 45, *Gravenhorstia (Gravenhorst) picta* Boie, ♀ head, lateral. 46-47, *Habronyx (Habrocampulum) biguttatus* (Gravenhorst). 46, lower corner of pronotum. 47, postscutellum and propodeum, dorsal. 48-49, Profile of scutellum. 48, *Aphanistes bellicosus* (Wesmael). 49, *A. xanthopus* (Schrank).

species are recorded as British. Of these *A. xanthopus* and *A. bellicosus* are morphologically very similar and their status needs further investigation. *Aphanistes* species are restricted to deciduous woodlands where they parasitize medium to large sized exposed lepidopterous larvae.

#### KEY TO THE BRITISH SPECIES

- 1 Flagellum entirely yellow, 1.1 or more times as long as forewing; flagellum with 42-46 segments **ruficornis** (Gravenhorst)  
*Uncommon; viii-x; widely distributed but most frequently found in Welsh border counties.*
- Flagellum blackish or brown, rarely with basal segments yellowish, 0.9 or less times length of forewing, with 32-37 segments. . . . . 2
- 2 Scutellum in profile posteriorly flattened (fig. 48); hindwing with *Rs* between  $R_1$  and  $r-m$  2.0-2.5 times as long as  $r-m$ ; basal segments of antenna usually red or yellow **bellicosus** (Wesmael)  
*Rare; iv-vi, possibly also a second generation ix-x; widely distributed throughout Britain.*
- Scutellum in profile weakly to moderately convex (fig. 49); hindwing with *Rs* between  $R_1$  and  $r-m$  1.7-2.0 times length of  $r-m$ ; basal segments of antenna dorsally black **xanthopus** (Schrank)  
*Rare; vi-vii; widely distributed throughout Britain.*

#### Genus GRAVENHORSTIA Boie

This genus is characterized by the lack of notauli, the value of CI and the presence of large, usually weakly curved, sexually dimorphic claws. Four subgenera are recognized, two of which are recorded from Britain.

#### Subgenus Gravenhorstia Boie

A single species is referable to this subgenus. It has occasionally been recorded from Britain but is primarily a Mediterranean insect.

Large species, forewing length 13mm+; gaster stout (fig. 27) with conspicuous yellow and black bands; flagellum short and thick; lower face with a median cornute process below antennae (fig. 45) **picta** Boie

*Very rare; vii-viii; coastal districts of southern England; probably a chance immigrant, temporarily establishing itself locally in hot summers.*

#### Subgenus Erigorgus

This genus is retained by many workers as a distinct genus. It is, however, clearly closely related to *Gravenhorstia picta* and to include it as a subgenus is concomitant with the classification of the group as a whole. There are a large number of described western Palaearctic species, five of which are recorded as British. We have re-examined most of the material on which these identifications were based and conclude only two species are represented in Britain. The colour characters used by older authors to separate species are wholly unreliable as extensive colour variation has been observed within a species.

#### KEY TO BRITISH SPECIES

- 1 Clypeus rather evenly rounded with a weak median apical tooth (fig. 51); hind tarsal claws very long and slender (figs 54, 55); hind trochanter and trochantellus usually black; lower face of ♀ black, of ♂ usually yellow **melanobata** (Gravenhorst)  
*Uncommon; iv-vi; moorlands and woodland margins; widely distributed but probably most common in Scotland.*

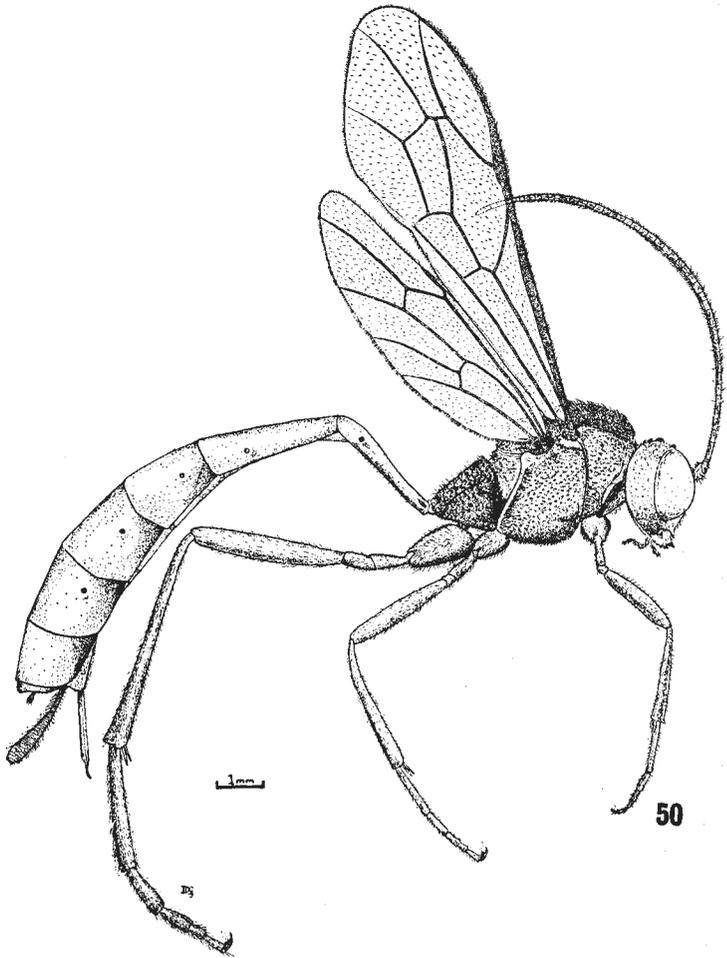


FIG. 50, *Gravenhorstia (Erigorgus) cerinops* (Gravenhorst) ♀, lateral.

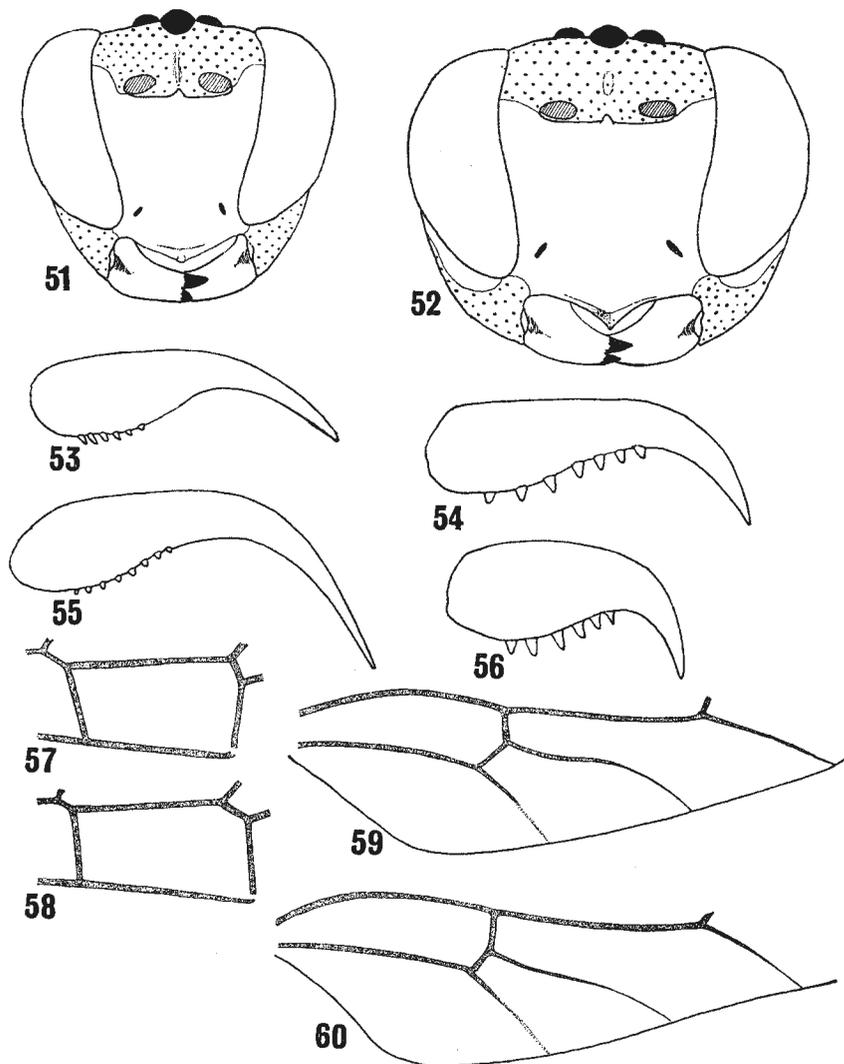
- Clypeus pointed, with strong median apical tooth (fig. 52); hind tarsal claws of moderate length (figs 53, 56); hind trochanter black, trochantellus usually yellow; lower face of both sexes usually yellow **cerinops** (Gravenhorst)  
*Uncommon; vii-ix; woodlands; widely distributed, probably commoner in southern England.*

#### Genus **BARYLYPA** Foerster

The value of CI, the smooth fore coxae, the presence of a distal abscissa of  $Cu_1$  in the hindwing and the flattened pronotum distinguish species of this genus from other British Anomaloniinae. Three species occur in Britain, one of which, *B. uniguttata* is recorded for the first time as British. All are very rare and little reliable data is available about habitat preference although it seems that these species prefer dry sandy areas.

## KEY TO BRITISH SPECIES

- 1 1st subdiscal cell with  $LA$  0.9 times or less as long as  $Cu_1$  between  $cu-a$  and  $1m-cu$  thus with the antero-proximal angle about  $75^\circ$  (fig. 57); hindwing with  $NI=0.9$  or less (fig. 59) **insidiator** Foerster

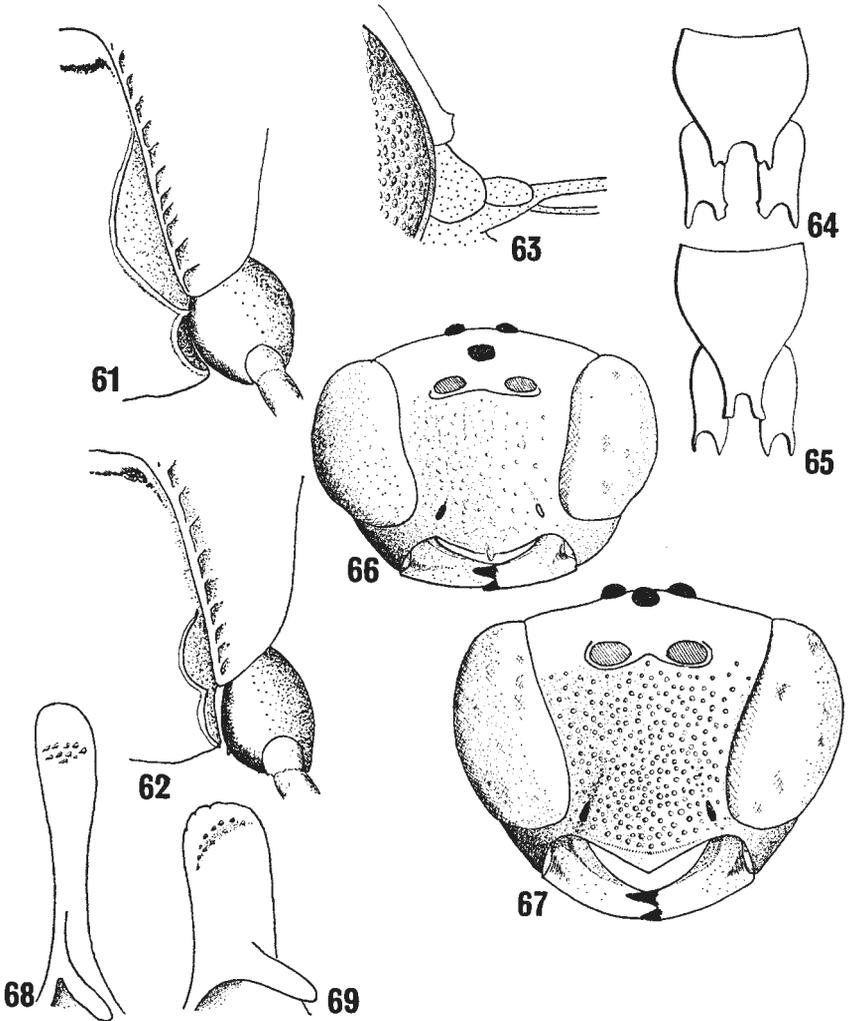


FIGS 51-60. 51-52, ♂ head, anterior. 51, *Gravenhorstia (Erigorgus) melanobata* (Gravenhorst). 52, *G. (E.) cerinops* (Gravenhorst). 53-56, Outer hind tarsal claw. 53, *Gravenhorstia (Erigorgus) cerinops* (Gravenhorst) ♂. 54, *G. (E.) melanobata* (Gravenhorst) ♀. 55, the same ♂, 56, *G. (E.) cerinops* (Gravenhorst) ♀. 57-58, 1st subdiscal cell: 57, *Barylypa insidiator* (Foerster). 58, *B. delictor* (Thunberg). 59-60, Posterior part of hindwing. 59, *Barylypa insidiator* (Foerster). 60, *B. delictor* (Thunberg)

Antennae about 1.5 times as long as forewing; lower face entirely yellow or with black marks below antennal bases.

Rare; vi-viii; widely distributed in southern England.

The name *carinata* Brischke has been and still is widely used for this species. Krieger (1904) included *carinata* as a synonym of *insidiator* on the grounds that the small difference in colour between the two species was merely intraspecific variation. We agree with Krieger's interpretation. We have examined the type



Figs 61-69. 61-62, Lower corner of pronotum: 61, *Agrypon flexorium* (Thunberg). 62, *A. gracilipes* (Curtis). 63, Posterior corner of pronotum, dorsal, *Agrypon flaveolatum* (Gravenhorst). 64-65, Propodeum and hind coxae, dorsal. 64, *Agrypon delarvatum* (Gravenhorst). 65, *A. flexorium* (Thunberg). 66-67, Heads, anterior. 66, *Barylypa delictor* (Thunberg). 67, *B. uniguttata* (Gravenhorst). 68-69, Distivolsella. 68, *Atrometus insignis* Foerster. 69, *Parania geniculata* (Holmgren).

- material of *Anomalon cylindricum* Bridgman & Fitch (which is isotypic with *A. cylindricum* Bridgman) and found it to be referable to this species.
- 1st subdiscal cell with  $1A$  1.0 or more times as long as  $Cu_1$  between  $cu-a$  and  $1m-cu$  thus with the antero-proximal corner about  $90^\circ$  (fig. 58); hindwing with  $NI=1.1$  or more (fig. 60) . . . . . 2
  - 2 Large species, forewing length 14mm+; lower face more than 0.85 times as broad as long with obsolete punctures or often weakly coriaceous; clypeus evenly rounded with a strong median apical tooth (fig. 66); face of ♀ yellow with black marks beneath antennae, of ♂ black with central and pair of lateral stripes yellow  
**delictor** (Thunberg)  
*Very rare; v-vii; widely distributed throughout southern England.*
  - Small species, forewing length 12mm or less; lower face less than 0.75 times as broad as long, regularly and deeply punctate (fig. 67); clypeus produced to a median point; face of ♀ black except for median yellow fleck, that of ♂ black with central and pair of very narrow lateral stripes yellow  
**uniguttata** (Gravenhorst)  
*Extremely rare; vii; known only from a single specimen collected in north Norfolk.*

### Genus **AGRYPON** Foerster

Species of this genus may be distinguished from other British Anomaloninae by the venation and usually by the presence of a carina on the fore coxae. This is one of the largest genera in the subfamily including some of the commonest species. Some authors (Townes, 1971; Atanasov, 1974) have divided *Agrypnon* into two separate genera, *Agrypnon* and *Trichionotus*. The latter genus is characterized by having carinae on the fore coxae while the fore coxae of the former genus are smooth. Some S.E. Asian species are intermediate between the two genera. Furthermore, the placing together in *Agrypnon* only of those species without fore coxal carinae leads on a world scale to the erection of an artificial group, many members of which are clearly more closely related to species of *Trichionotus* than to other *Agrypnon* species. Gauld (1976b) placed all the species in *Agrypnon*, an interpretation which is followed in the present work.

In Britain *Agrypnon* species are the most commonly collected Anomaloninae. Several species occur along hedgerows in agricultural land. Several keys have been produced, but all are unreliable as they place considerable emphasis on the presence or absence of the distal abscissa of  $Cu_1$  in the hindwing. Atanasov (1974) noted that *A. flexorium* may or may not have this vein present. In long series of specimens the distal abscissa of  $Cu_1$  may be present or absent not only in *A. flexorium* but also in *A. varitarsum*, *A. anxium* and rarely *A. clandestinum*.

We have observed that specimens of allopatric species show relatively little intraspecific variation. When two or more synchronous species are sympatric a small number of specimens are intermediate in some characteristics between the two species (e.g. *A. varitarsum* and *A. anxium*, and *A. flexorium* and *A. varitarsum*). These specimens are possibly interspecific hybrids. Such specimens will of course not key out satisfactorily and can be recognized as hybrids only when a worker is familiar with the normal range of intraspecific variation.

### KEY TO BRITISH SPECIES

- 1 Fore coxae ventrally smooth, without carinae; posterior transverse carina of mesosternum usually present only laterally, or laterally and centrally, as vestiges  
**flaveolatum** (Gravenhorst)
- Distal abscissa of  $Cu_1$  absent; hind corner of pronotum when viewed dorsally

out-turned (fig. 63); CI=0.5-0.7; vertex yellow or with a moderate sized yellow mark.

*Common; v-vi, with a possible second generation viii-ix; hedgerows, scrubs and woodland margins; widely distributed throughout Britain.*

[*Note.* The holotype of *Anomalon interruptum* Desvignes (regarded by some workers as a junior synonym of *A. flaveolatum*) has been found recently in the British Museum (Natural History). This insect is an exotic species of Cremastinae.]

- Fore coxae with a carina on anterior and inner surfaces (fig. 26); posterior transverse carina of mesosternum complete, or interrupted before mid coxae. . . . . 2
- 2 Forewing with CI=0.3 or less (fig. 75); flagellum short to very long, 1.2-2.4 times length of forewing, with subterminal segments more than 1.5 times as long as broad (figs 80, 82); propodeum usually extending distinctly beyond centre of hind coxae (fig. 65); face invariably yellow . . . . . 3
- Forewing with CI=0.4-0.6 (fig. 74); flagellum short, less than 1.3 times length of forewing, with subterminal segments less than 1.5 times as long as broad (fig. 81); propodeum never reaching beyond centre of hind coxae (fig. 64); face often black marked. . . . . 8
- 3 Flagellum short, less than 1.5 times as long as forewing, with less than 40 segments, subterminal segments 1.5-2.2 times as long as broad; petiole with spiracles remote from hind margin of segment, when viewed ventrally with spiracles separated from anterior margin of sternite by more than interspiracular distance (fig. 77). . 4
- Flagellum longer, 1.6 or more times length of forewing, usually with more than 41 segments, the terminal ones 2.0-3.0 times as long as broad; petiole with spiracles closer to posterior margin, when viewed ventrally with spiracles closer to anterior margin of sternite than interspiracular distance (fig. 76). . . . . 5
- 4 Hind corner of pronotum when viewed dorsally swollen, generally yellow; mesoscutum finely and generally rather sparsely punctate with the notauli strongly impressed (fig. 70); distal abscissa of  $Cu_1$  usually present, NI about 4.0-6.0  
**clandestinum** (Gravenhorst)

Vertex with small yellow marks; antennae black at least dorsally; hind coxae often black.

*Moderately common; vii-x; hedgerows and scrublands; southern England, less common in the north.*

- Hind corner of pronotum flat when viewed dorsally, black; mesoscutum coarsely and closely punctate with weakly impressed notauli (fig. 71); distal abscissa of  $Cu_1$  generally absent  
**anxium** (Wesmael)

Colour of vertex from black with small yellow spots, to entirely yellow; hind coxae usually red; very variable in size, forewing length 3-14mm.

*Common; v-vii; hedgerows and scrubs, particularly on Quercus, Thelycrania and Crataegus; all regions, possibly commoner in the south.*

There is a very large range of intraspecific variation within this species and a possibility that several sibling species are confused here. We have examined the type material of *A. minutum* Bridgman & Fitch (which is isotypic with *minutum* Bridgman) and conclude that it is conspecific with *anxium*.

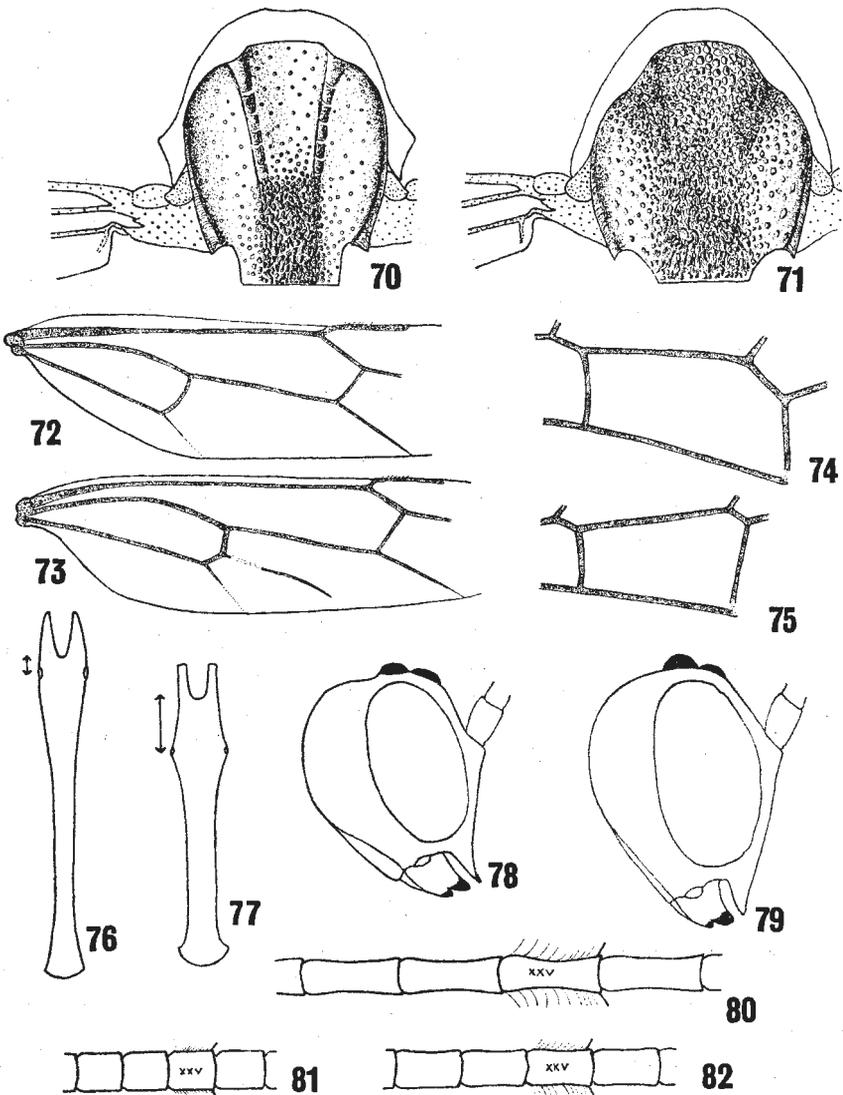
- 5 Basal flagellar segment less than 2.0 times as long as second; mesoscutum highly polished with sparse punctures; notauli strongly impressed extending beyond centre of mesoscutum  
**varitarsum** (Wesmael)

Flagellum 1.7-2.2 times as long as forewing, subterminal segments 2.5-3.0 times as long as broad; genal carina forming a weak flange ventrally; epicnemial carina strong, reaching about centre of pleuron, sometimes forming a tooth opposite lower corner of pronotum; vertex with yellow mark; hind coxae black or red; distal abscissa of  $Cu_1$  usually absent.

*Common; vi-vii; wet deciduous woodlands; southern Britain.*

Most specimens have the hind corner of the pronotum yellow, the hind coxae red and the epicnemial carina centrally raised into a pair of small medioventral teeth. A few specimens have a black pronotum, black hind coxae and a centrally weakly developed epicnemial carina. It is not clear whether these are specimens of *varitarsum* or an undescribed species. We have examined the type material of *A. nigripes* Bridgman and found it to be conspecific with *A. varitarsum*.

- Basal flagellar segment generally more than 2.0 times as long as second, rarely 2.0 times as long; mesoscutum matt or weakly polished with rather coarse close puncturation; notauli usually weak and not impressed beyond centre of mesoscutum. . . . . 6



Figs 70-82. 70-71, Pronotum and mesoscutum, dorsal. 70, *Agrypon clandestinum* (Gravenhorst). 71, *A. anxium* (Wesmael). 72-73, Proximal part of hindwing. 72, *Agrypon flaveolatum* (Gravenhorst). 73, *A. flexorium* (Thunberg). 74-75, 1st subdiscal cell. 74, *Agrypon anomalas* (Gravenhorst). 75, *A. anxium* (Wesmael). 76-77, Petiole, ventral. 76, *Agrypon flexorium* (Thunberg). 77, *A. anxium* (Wesmael). 78-79, Head, lateral. 78, *Agrypon flexorium* (Thunberg). 79, *A. rugifer* Thomson. 80-82, Subterminal flagellar segments. 80, *Agrypon gracilipes* (Curtis). 81, *A. anomalas* (Gravenhorst). 82, *A. anxium* (Wesmael).

- 6 Genal carina ventrally broadened into a flange which is between 0.5 and 1.0 times length of malar space in height at its broadest point (fig. 78); epicnemial carina reaching above centre of mesopleuron, forming a conspicuous tooth behind lower corner of pronotum (fig. 61) **flexorium** (Thunberg)  
 Vertex with a large reddish brown mark; flagellum very long, 1.8–2.4 times as long as forewing; distal abscissa of  $Cu_1$  present or absent, if present  $NI=1.5-2.0$ ; hind coxae usually black.  
*Common; vi-viii; deciduous woodlands, often found around Betula and Quercus; widespread in England, Wales and southern Scotland, rarer in extreme north.*
- Genal carina at most weakly broadened so with a flange, if present, less than 0.5 times as high as length of malar space (fig. 79); epicnemial carina usually not reaching above centre of mesopleuron and usually not forming a tooth behind lower corner of pronotum (fig. 62).....7
- 7 Vertex entirely black; distal abscissa of  $Cu_1$  present but weak,  $NI$  about 1.2; hind legs at least partially black; propleuron black; ovipositor sheath longer than apical abdominal depth **gracilipes** (Curtis)  
*Rare; vi-vii; woodlands; southern England.*  
 This species has generally been referred to as *A. debile* Wesmael. We have examined the type material of *A. gracilipes* Curtis and found it to be conspecific with *debile*. The Curtis name has priority.
- Vertex broadly red marked; distal abscissa of  $Cu_1$  absent; hind legs entirely pale red; propleuron red; ovipositor sheath as long as apical abdominal depth. **brevicolle** (Wesmael)  
*Very rare; we have seen one specimen, a ♀ from Killiecrankie, Scotland viii. 1969.*  
 This is a poorly known and often overlooked species. In a recent work (Atanasov, 1974) this species was not mentioned and our specimen would key out as *hilare* (Tosquinet) an Eastern European species. It is possible that *hilare* is conspecific with *brevicolle*.
- 8 Distal abscissa of  $Cu_1$  entirely absent; flagellum very short, about 1.1 times as long as forewing, with subterminal segments about 1.2 times as long as broad. **anomelas** (Gravenhorst)  
*Rare; v-vii; mature deciduous woodland; southern England.*
- Distal abscissa of  $Cu_1$  present ( $NI$  about 0.6); flagellum moderately short, about 1.3 times as long as forewing, with subterminal segments 1.3–1.5 times as long as broad **delarvatum** (Gravenhorst)  
*Rare; viii; southern England.*

### Genus PARANIA Morley

The characteristic venation of the forewing (fig. 18) distinguishes species of this genus from all other British Anomaloniinae. Superficially *Parania* species appear to be closely related to *Agrypnon*. There are however striking differences between the male genitalia of the two groups (Gauld, 1976b).

*Parania* is a small genus, most species of which occur in the New World. A single species, *A. geniculata*, is known to occur in Britain. The identity of *Atrometus arquatus* Gravenhorst (included by Kloet & Hincks, 1945 as British) has not been satisfactorily established, but it may be a species of *Parania*. The specimens of *arquatus* upon which the British records are based have been found to be red marked specimens of *Agrypnon flaveolatum* and *arquatus* is deleted from the British list.

Flagellum short, 20–23 segments, about as long as forewing; posterior ocelli widely interspaced, inter-ocellar distance 1.5–1.7 times orbital-ocellar distance; notauli absent; small species, forewing length 6mm or less **geniculata** (Holmgren)  
*Very rare; vi-viii; southern England.*

Genus **ATROMETUS** Foerster

The venation of the forewing and the transverse mesoscutal suture are characters which distinguish this species from other British Anomaloninae. Only a single species is recorded as British. It is primarily a Mediterranean species and is probably not established in Britain.

Head yellow except for occiput and inter-ocellar area which are black; inter-ocellar distance equal to orbital-ocellar distance; moderately small species, forewing 7-8 mm **insignis** (Foerster)

*Extremely rare; vi-vii; coastal regions of southern England. The female of this species is unknown.*

## HOSTS OF BRITISH ANOMALONINAE

We have only included records when we have examined the reared ichneumonids. It has not been possible to verify the identities of hosts of these specimens and we have assumed the identity of the host, as determined by the persons rearing the specimens, is correct.

We are particularly grateful to Professor G. C. Varley for permission to use a number of his unpublished records. These are marked (GCV).

Ichneumonid	Host	
<i>Anomalon foliator</i>	—	
<i>Heteropelma calcator</i>	<i>Bupalus piniaria</i> (L.)	Geometridae
	<i>Panolis flammea</i> (D. & S.)	Noctuidae
	<i>Pseudoips fagana britannica</i> Warren	Noctuidae
<i>Heteropelma amictum</i>	<i>Acronycta euphorbiae myricae</i> Guenée	Noctuidae
	<i>Callimorpha dominula</i> (L.)	Arctiidae
	<i>Colocasia coryli</i> (L.)	Noctuidae
	<i>Dasychira pudibunda</i> (L.)	Lymantriidae
	<i>Lacanobia oleracea</i> (L.)	Noctuidae
	<i>Polia hepatica</i> (Clerck)	Noctuidae
	<i>Polia nebulosa</i> (Hufnagel)	Noctuidae
	<i>Pseudopsis fagana britannica</i> Warren	Noctuidae
<i>Therion circumflexum</i>	<i>Dendrolimus pini</i> (L.)	Lasiocampidae
	<i>Sphinx ligustri</i> L.	Sphingidae
<i>Therion brevicorne</i>	<i>Acronycta euphorbiae myricae</i> Guenée	Noctuidae
<i>Trichomma enecator</i>	<i>Acleris hastiana</i> (L.)	Tortricidae
	<i>Acleris shepherdana</i> (Stephens)	Tortricidae
	<i>Acrobasis</i> sp.	Pyralidae
	<i>Archips betulana</i> (Hübner)	Tortricidae
	<i>Cydia pomonella</i> (L.)	Tortricidae
	<i>Epinotia caprana</i> (Fabricius)	Tortricidae
	<i>Epinotia tetraquetana</i> (Haworth)	Tortricidae
	<i>Pachythelia villosella</i> (Ochsenheimer)	Psychidae
<i>Trichomma fulvidens</i>	—	
<i>Trichomma occisor</i>	—	
<i>Trichomma intermedium</i>	—	
<i>Habronyx</i> ( <i>Habronyx</i> ) <i>heros</i>	—	
<i>Habronyx</i> ( <i>Camposcopus</i> ) <i>canaliculatus</i>	<i>Aphelia paleana</i> (Hübner)	Tortricidae
	<i>Aphelia viburnana</i> (D. & S.)	Tortricidae
	<i>Archips podana</i> (Scopoli)	Tortricidae
	<i>Archips xylosteanana</i> (L.)	Tortricidae
	<i>Choristoneura hebenstreitella</i> (Müller)	Tortricidae (GCV)
	<i>Cleorodes lichenaria</i> (Hufnagel)	Geometridae

Ichneumonid	Host	
	<i>Diurnae fagella</i> (D. & S.)	Oecophoridae (GCV)
	<i>Tortrix viridana</i> (L.)	Tortricidae (GCV)
<i>Habronyx (Camposcopus)</i>		
<i>perspicuus</i>	—	
<i>Habronyx (Habrocampulum)</i>		
<i>biguttatus</i>	<i>Panolis flammea</i> (D. & S.)	Noctuidae
<i>Aphanistes ruficornis</i>	—	
<i>Aphanistes xanthopus</i>	<i>Panolis flammea</i> (D. & S.)	Noctuidae
<i>Aphanistes bellicosus</i>	—	
<i>Gravenhorstia</i>		
( <i>Gravenhorstia</i> ) <i>picta</i>	<i>Lasiocampa trifolii trifolii</i> (D. & S.)	Lasiocampidae
<i>Gravenhorstia</i>		
( <i>Erigorgus</i> ) <i>cerinops</i>	<i>Heliothis peltigera</i> (D. & S.)	Noctuidae
	<i>Heliothis virescens</i> (Hufnagel)	Noctuidae
	<i>Orthosia gracilis</i> (D. & S.)	Noctuidae
<i>Gravenhorstia</i>		
( <i>Erigorgus</i> )	—	
<i>melanobata</i>	—	
<i>Barylypa delictor</i>	<i>Acronycta menyanthidis menyanthidis</i> (Esper)	Noctuidae
	<i>Macrothylacia rubi</i> (L.)	Lasiocampidae
<i>Barylypa uniguttata</i>	—	
<i>Barylypa insidiator</i>	<i>Panolis flammea</i> (D. & S.)	Noctuidae
<i>Agrypon flaveolatum</i>	<i>Bupalus piniaria</i> (L.)	Geometridae
	<i>Eupithecia trisignaria</i> H-S.	Geometridae
	<i>Operophtera brumata</i> (L.)	Geometridae
	<i>Orthosia incerta</i> (Hufnagel)	Noctuidae
	<i>Theria rupicaprararia</i> (D. & S.)	Geometridae
	<i>Ypsolopha ustella</i> (Clerck)	Yponomeutidae
<i>Agrypon flexorium</i>	<i>Acrobasis consociella</i> (Hübner)	Pyralidae
	<i>Chrysoesthia sexguttella</i> (Thunberg)	Gelechiidae
	<i>Clostera pigra</i> (Hufnagel)	Notodontidae
	<i>Diurnea fagella</i> (D. & S.)	Oecophoridae (GCV)
	<i>Falcaria lacertinaria</i> (L.)	Drepanidae
	<i>Phycita roborella</i> (D. & S.)	Pyralidae
	<i>Selenia lunularia</i> (Hübner)	Geometridae
	<i>Tortrix viridana</i> (L.)	Tortricidae (GCV)
	<i>Yponomeuta evonymella</i> (L.)	Yponomeutidae
	<i>Yponomeuta padella</i> (L.)	Yponomeutidae
<i>Agrypon gracilipes</i>	<i>Depressaria pastinacella</i> (Duponchel)	Oecophoridae
<i>Agrypon clandestinum</i>	<i>Chloroclystis v-ata</i> (Haworth)	Geometridae
	<i>Coleophora lutipennella</i> (Zeller)	Coleophoridae (GCV)
	<i>Eupithecia absinthiata</i> (Clerck)	Geometridae
	<i>Eupithecia goossensii</i> Mabille	Geometridae
	<i>Eupithecia linariata</i> (D. & S.)	Geometridae
	<i>Eupithecia subfuscata</i> (Haworth)	Geometridae
	<i>Eupithecia tripunctaria</i> H-S.	Geometridae
	<i>Eupithecia valerianata</i> (Hübner)	Geometridae
	<i>Gymnoscelis rufifasciata</i> (Haworth)	Geometridae
	<i>Hemithea aestivaria</i> (Hübner)	Geometridae
	<i>Hydriomena impluviata</i> (D. & S.)	Geometridae
	<i>Ypsolopha parenthesesella</i> (L.)	Yponomeutidae (GCV)
	<i>Ypsolopha ustella</i> (Clerck)	Yponomeutidae (GCV)
<i>Agrypon anomelas</i>	—	
<i>Agrypon varitarsum</i>	—	
<i>Agrypon anxium</i>	<i>Acleris hastiana</i> (L.)	Tortricidae
	<i>Acleris schalleriana</i> (L.)	Tortricidae
	<i>Brachyolomia viminalis</i> (Fabricius)	Noctuidae

Ichneumonid	Host	
	<i>Orthosia incerta</i> (Hufnagel)	Noctuidae
	<i>Schreckensteinia festaliella</i> (Hübner)	Schreckensteiniidae
	<i>Thyatira batis</i> (L.)	Thyatiridae
	<i>Yponomeuta cagnagella</i> (Hübner)	Yponomeutidae
	<i>Yponomeuta plumbella</i> (D. & S.)	Yponomeutidae
	<i>Eupithecia trisignaria</i> H.-S.	Geometridae
<i>Agrypon delarvatum</i>	—	
<i>Agrypon brevicolle</i>	—	
<i>Parania geniculata</i>	<i>Paranthrene tabaniformis</i> (Rottemburg)	Sesiidae
<i>Atrometus insignis</i>	—	

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