Entomologist's Monthly Magazine **161**: 142–182 doi: 10.31184/M00138908.1612.4291

Palaearctic Anomaloninae (Hymenoptera: Ichneumonidae) in the National Museums of Scotland, with description of a new species, resurrection of another, and keys to the revised British fauna

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Article history: Received: 24 November 2024; Accepted: 17 March 2025; Published: 25 April 2025

ABSTRACT

Over 1200 specimens of 58 species of Palaearctic Anomaloninae in the National Museums of Scotland are reviewed, and many host records of British and European species are given, often with comments on the host repertoire and phenology of species. The British fauna is revised (involving also other collections), with 12 additions including description of *Camposcopus ruficoxis* Schnee & Shaw sp. n. and resurrection of *Agrypon cognatum* Förster,1860 stat. rev. Attention is drawn to British records from a previous publication (Gauld & Mitchell 1977) that are believed to be erroneous. Illustrated keys for the identification of all species recorded from Britain (including questionable records) and a few further species likely to occur are provided.

Keywords: Distribution, hosts, phenology, identification, correction of errors, *Camposcopus ruficoxis* sp. n., *Agrypon cognatum* stat. rev.

INTRODUCTION

Anomaloninae is a medium-sized ichneumonid subfamily, worldwide with around 780 described species currently classified in 43 genera in two tribes. The (now) 42 species certainly known from Britain (although two are considered to be extinct) fall into 13 genera, both tribes being represented (Broad 2016); a further five genera are recorded elsewhere in Europe. At least some species of the genus *Anomalon* are reputed to be parasitoids of tenebrionid Coleoptera, although there is little detailed observation to back this up, but otherwise as far as is known the hosts of Anomaloninae are Lepidoptera. They are solitary larva-pupal koinobiont endoparasitoids; that is, the egg is inserted into the host's larval stage (Fig. 1) but the parasitoid's development is not completed until after the host has pupated. The adult anomalonine eventually emerges from the host pupa (Fig. 2). Most, but not all, European Anomaloninae are univoltine and overwinter in the host pupa. Broad, Shaw & Fitton (2018) give a comprehensive outline of the classification and biology of the subfamily.

Most Anomaloninae are in the tribe Gravenhorstiini and have a rather characteristic general appearance; a slender build with an elongate laterally compressed metasoma combined with a more or less strongly reticulate/rugose propodeum. Their body length is 5–35mm and they are mostly coloured black and red, sometimes partly yellow (a few species are paler testaceous). The ovipositor is

Photo: J. Teumer (Fig. 1)

Figs 1, 2. — Anomaloninae. 1, *Trichomma fulvidens* ovipositing into a larva of *Noctua fimbriata*. 2, *Erigorgus procerus* with host pupal case of *Agrochola helveola* from which it emerged. (1, 2 ♀).

usually not longer than the apical depth of the metasoma. Most species are active by day, rarely at dusk. They fly with their long hind legs prominently splayed out behind, often made particularly conspicuous by having stout yellow tarsi. A few species crop up in light traps and indeed *Agrypon batis* (Ratzeburg) is perhaps most often collected in that way if not by rearing.

Gauld & Mitchell (1977) produced a Royal Entomological Society *Handbook for the Identification of British Insects* covering the subfamily, dealing with 33 supposedly British species. They cited in general terms the collections consulted for its preparation (I.D. Gauld pers. coll., Natural History Museum London (NHMUK), Manchester University Museum, Hunterian Museum Glasgow, Leicester City Museum, Castle Museum Norwich, National Museums of Scotland Edinburgh (NMS), Cambridge University Zoology Museum, and Oxford University Museum (OUM)), although unfortunately not the exact depositories for critical specimens. Several problems have arisen with that work, broadly falling into three categories: (i) taxonomy (inadequate characters for separating species, including in some cases lumping more than one species together and in other cases unjustified splitting); (ii) out-dated nomenclature and misidentifications; and (iii) inclusion of species whose occurrence in Britain seems highly unlikely. A particular reason for their mistakes is that they examined the types of only the three species described by British authors, and were not able to interpret many other species names correctly. A further problem is that Gauld seldom added determination labels to specimens he examined, even when the labelling already present was incorrect.

The present paper has two main aims. The first is to document the rich collection of Palaearctic (principally European) Anomaloninae in the National Museums of Scotland (NMS), which has concurrently been greatly improved by HS's donation of specimens of several species not (or scarcely) previously present and, because many of the over 1200 included specimens of 58 species are reared (39 species), to record the wealth of host data present and when possible outline the host repertoires of individual species. This is a continuation of a process of documenting the NMS Ichneumonidae collection started by Schwarz & Shaw (1998), who outlined the project that has subsequently run through several other groups.

The second aim is to clear up some uncertainties and correct errors arising from Gauld & Mitchell (1977), and to provide fresh keys for the identification of the

British fauna. In particular, we have sought to investigate the basis on which some records of scarce or improbable species had been regarded as British. In addition to a thorough search in NHMUK by MRS, in part assisted by I.D. Gauld in 2000, all the collection managers of the depositories cited by Gauld & Mitchell (1977) were contacted (by MRS, early in 2002) and specifically asked to search for particular cited specimens. However, none of these critical specimens could be located. Loans of other purported species of interest were made and the specimens re-determined by HS. The only other cited source was the private collection of I.D. Gauld himself but, when MRS asked for access to that, IDG was unable to account for its whereabouts (pers. comm: 29 February 2000 and 16 July 2002) speculating that he might have given it to the American Entomological Institute (for incorporation into the Townes Collection). This rather unlikely possibility was followed up, but the then AEI curator was adamant that that had not happened or even been discussed (D.B. Wahl, in litt. 11 April 2002). In the 1980s Gauld gave HS four specimens of an *Agrypon* species from his collection (which became paratypes of *A. hinzi* Schnee), but as far as we know these are the only specimens surviving from the Gauld collection of British Anomaloninae, which has to be presumed lost. The last part of the late IDG's personal collection was donated to NHMUK in 2020 by his son Darren Gauld, but no Anomaloninae were present (G. Broad, pers. comm.).

In the present treatment attention is drawn to the species cited by Gauld & Mitchell (1977) as British for which no evidence could be found. Several species are newly recorded as British on the basis of specimens detailed here and, in anticipation of this paper, Broad (1916) included some of them in his checklist of British Ichneumonidae. For species newly recorded from Britain details of material seen in other collections are also included; and, in trying to cover all species known from Britain, mention is made of the depositories of the few species absent from the NMS collection even if their presence in Britain was previously established.

METHODS

The taxonomy in this treatment is based on type revisions (Schnee 1978, 1989, 1993, 2008, 2018) and further extensive studies on Anomaloninae by HS over a long period. All still-existing types relating to the species occurring in Britain were examined. A recent, and well-illustrated, treatment of the French fauna of Anomaloninae (Pénigot 2021) also provides keys, but ours are not derived from that work.

Morphological terminology follows Broad, Shaw & Fitton (2018). In the hind wing we use the terms 'discoidella absent' and 'nervellus not intercepted' to refer to the second abscissa of CU (the discoidella) being respectively wholly lacking or not reaching the composite vein CU&cu-a (the nervellus). OOL = distance from lateral ocellus to compound eye; POL = distance between lateral ocelli; OD = diameter of posterior ocellus. The following terms are used to refer to ratios (indices): CI = in the fore wing, the length of the abscissa of CU between 1m-cu&M and 2cu-a divided by 2cu-a; ED (applied to female sex only) = distance between eyes at upper level of face divided by this distance at level of fovea; ET = in lateral view, greatest length (breadth) of compound eye divided by greatest length of temple.

The keys are illustrated by photos taken with a Leica Z6 macroscope and Canon M6 Mark II camera, except for Figs 40, 43 and 44 taken using a JVC KY-F75U camera on a Leica Z6APO zoom macroscope, Fig. 24 which was made on a Leica

M205C stereomicroscope and Leica DFC450 camera, and Fig. 3 taken with a Leica M205C stereomicroscope with a Canon EOS D7 Mark II camera attached. All were stacked using Helicon Focus 8.2.0 except that Fig. 40 was stacked with Combine ZP software. Fig. 1 is a single image taken with a Sony Alpha A 68 camera and Tamron SP 90 F2.8 Di USD macro objective.

PRESENTATION OF RECORDS

Unless there are fewer than four records or other special reasons to give information in full, the numbers of specimens of the species in the collection are given as several (4–10), many (11–25) or numerous (26 and upwards), and the vice-counties (Dandy 1969) in which they were collected are listed (as V.C. numbers). For Ireland (the whole Island) the prefix 'H' is used. Schwarz & Shaw (1998) provided a map of V.C.s but several versions are freely available online. Although not administratively correctly, but for brevity 'Britain', 'British' and 'British Isles' all refer to the archipelago including the whole of Ireland and the Isle of Man, but excluding the Channel Islands. For reared specimens the host concerned is followed by the number and sex of specimens. Because emergence dates are often influenced by the all-too-often uncontrolled conditions experienced during rearing, flight times are summarised only for wild-caught specimens. We add a comment when the rearing records given by Gauld & Mitchell (1977) seemed particularly doubtful to us and/or could not be confirmed from specimens we were able to examine, but in general we have not commented on, or incorporated, the host associations they give. For reasons outlined elsewhere (Shaw 1994) we have similarly disregarded literature sources of host records (as, for example, collated by Yu *et al*. 2016), which have very poor reliability. In a few cases we are able to comment on the stage in which the immature anomalonine passes the winter, though in most cases it is only known that it occurs inside the host pupa. We use the term 'plurivoltine' to imply that there can be generations without diapause in contrast with 'univoltine' in which there seems to be obligatory diapause in all cases: in practice plurivoltine species would normally be simply bivoltine, but 'plurivoltine' is less restrictive and better expresses the situation.

Keys to the British species (including those erroneously recorded from Britain, and some species likely to occur)

Key to the genera

1 2nd and 3rd metasomal tergites each with laterotergite separated by a longitudinal crease below the spiracle (Fig. 3); vein rs-m in the fore wing distal to vein 2m-cu (Fig. 4); mid tibia with one spur; hind ocelli separated from occipital carina by more than their diameter. [Clypeus apically with two sometimes indistinct teeth; mesosoma coarsely rugose and partly also striate; paired pointed metasternal protuberances present; tarsal claws minute; ♀ predominantly dark red, ♂ black; 23–30 flagellomeres; ovipositor sheath at least 2 times as long as 1st hind tarsomere; body length 8–12.5mm] . . . . . *Anomalon* Panzer (1 British species, *Anomalon cruentatum* (Geoffroy, 1785))

– 2nd but not 3rd metasomal tergite with longitudinal crease beneath the spiracle (Fig. 5); vein rs-m in fore wing proximal to vein 2m-cu (Fig. 6) or interstitial (Fig. 7) (except *Gravenhorstia* Boie, with yellow and black striped metasoma, Fig. 8); mid tibia with two spurs; hind ocelli closer to occipital carina than their diameter 2

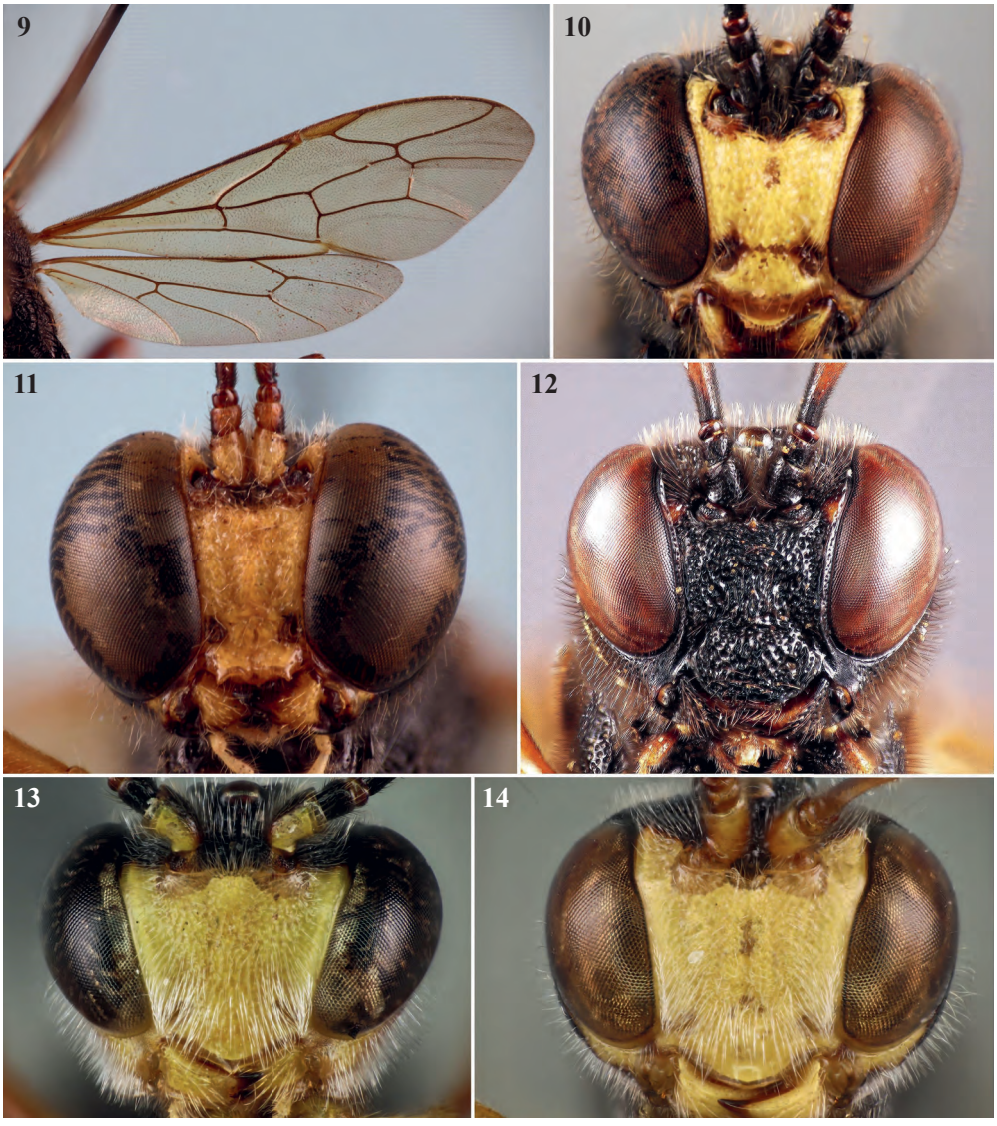
2 Fore wing with CU between 1cu-a and 1m-cu&M about as long as 1m-cu&M (Fig. 9); clypeus apically rounded or laterally excised, without a median tooth (Figs 10, 11, 12) . . 3
– Fore wing with CU between 1cu-a and 1m-cu&M distinctly shorter than 1m-cu&M (Figs 6, 7); clypeus apically with a median tooth (Fig. 13), sometimes inconspicuous (Fig. 14) and somewhat modified in *Gravenhorstia* (Fig 15) (in *Perisphincter*, not British, median tooth blunt, often inconspicuous, and small lateral teeth also present; see couplet 8) 4

3 Frons with a high lamella between antennal sockets (Fig. 16); postpectal carina of mesosternum complete in front of mid coxae; male with an impressed area on ventral surface of 2nd hind tarsomere; hind tarsal claws strongly geniculate; scutellum black . . . . . *Heteropelma* Wesmael (2 species)
– Frons with a carina or horn between antennal sockets and front ocellus (Fig. 17); postpectal carina of mesosternum interrupted in front of mid coxae; ♂ with ventral surface of 2nd hind tarsomere flattened, with a median carina; tarsal claws slightly curved; scutellum yellow or black . . . . . *Therion* Curtis (4 species)

Figs 3–8. — Anomaloninae. 3, 4, *Anomalon cruentatum*. 5, *Erigorgus melanops*. 6, *Agrypon flexorium*. 7, *Barylypa propugnator*. 8, *Gravenhorstia picta*. (3, 5 first to third metasomal segments. 4 habitus. 6, 7 wings. 8 wings and part of body. 3, 4, 6, 7 ♀; 5, 8 ♂).

4 Eyes distinctly setose, their inner margins strongly convergent ventrally (Fig. 18) ovipositor sheath as long as 1st metasomal tergite or distinctly longer; hind trochanter about twice as long as trochantellus . . . . . *Trichomma* Wesmael (4 species)
– Eyes bare or at most with very small and sparse pubescence, inner margins usually less convergent; ovipositor sheath shorter than 1st metasomal tergite; hind trochanter 1–1.5 times as long as trochantellus 5

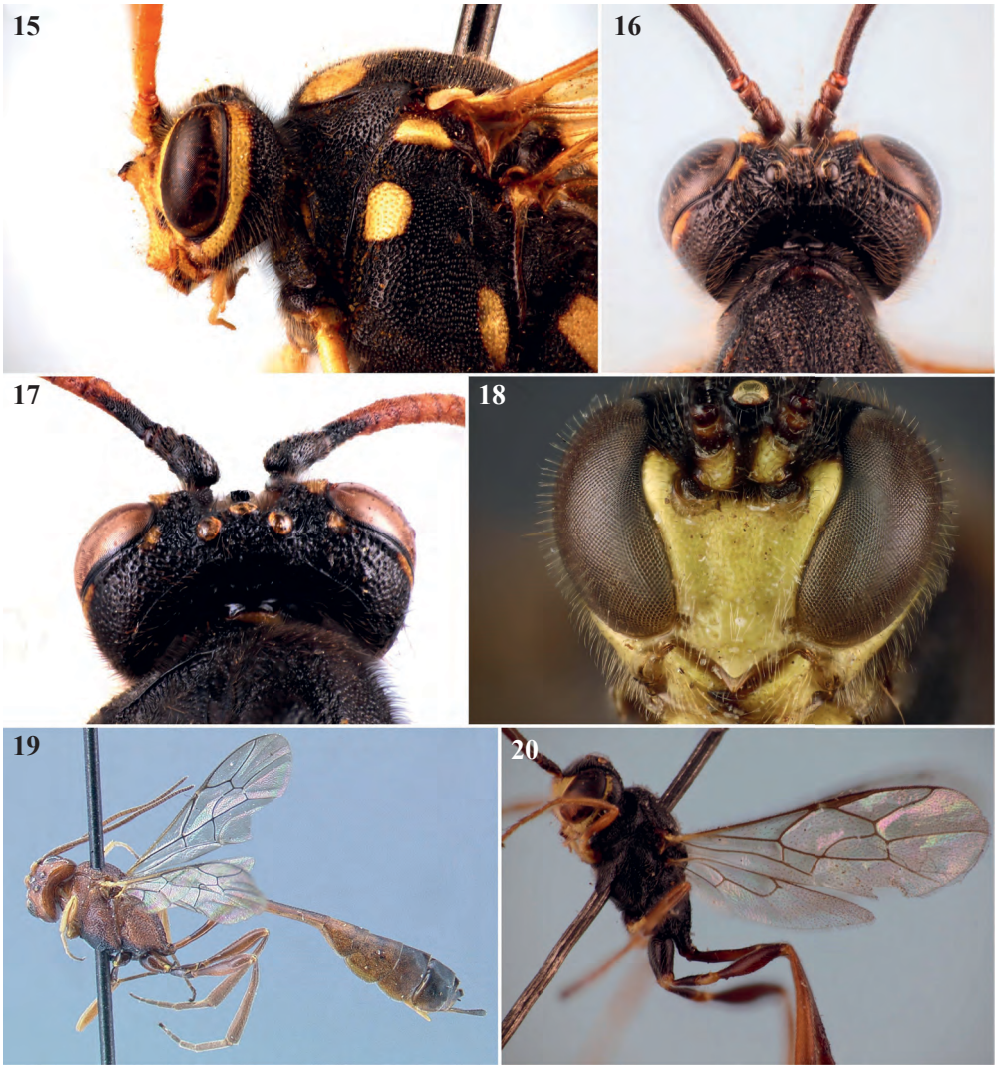
5 Veins 1m-cu&M and Cu in fore wing arising from a common point, so base of 2nd discal cell pointed (Figs 19, 20); postpectal carina complete 6
– Veins 1m-cu&M and Cu in fore wing separated basally, so base of 2nd discal cell truncate (Figs 6, 7, 21, 22, 23); postpectal carina interrupted, rarely complete 7



Figs 9–14. — Anomaloninae. 9, 11, *Heteropelma amictum*. 10, *Heteropelma megarthrum*. 12, *Therion brevicorne*. 13, *Agrypon flexorium*. 14, *Agrypon gracilipes*. (9 wings. 10–14 head in facial view. 10, 12, 13 ♀; 9, 11, 14 ♂).

6 Mesoscutum with a transverse suture before prescutellar groove and very coarsely rugose punctate; 1st subdiscal cell strongly explanate distally (Fig. 19). [Sexually dimorphic in head colour: to a large extent black or dark red in ♀ and yellow in ♂; pointed metasternal protuberances present; ovipositor sheath as long as 1st hind tarsomere; 35–39 flagellomeres; body length 10–12mm] . . . . . *Atrometus* Förster (1 species, *Atrometus insignis* Förster, 1878, probably not British)

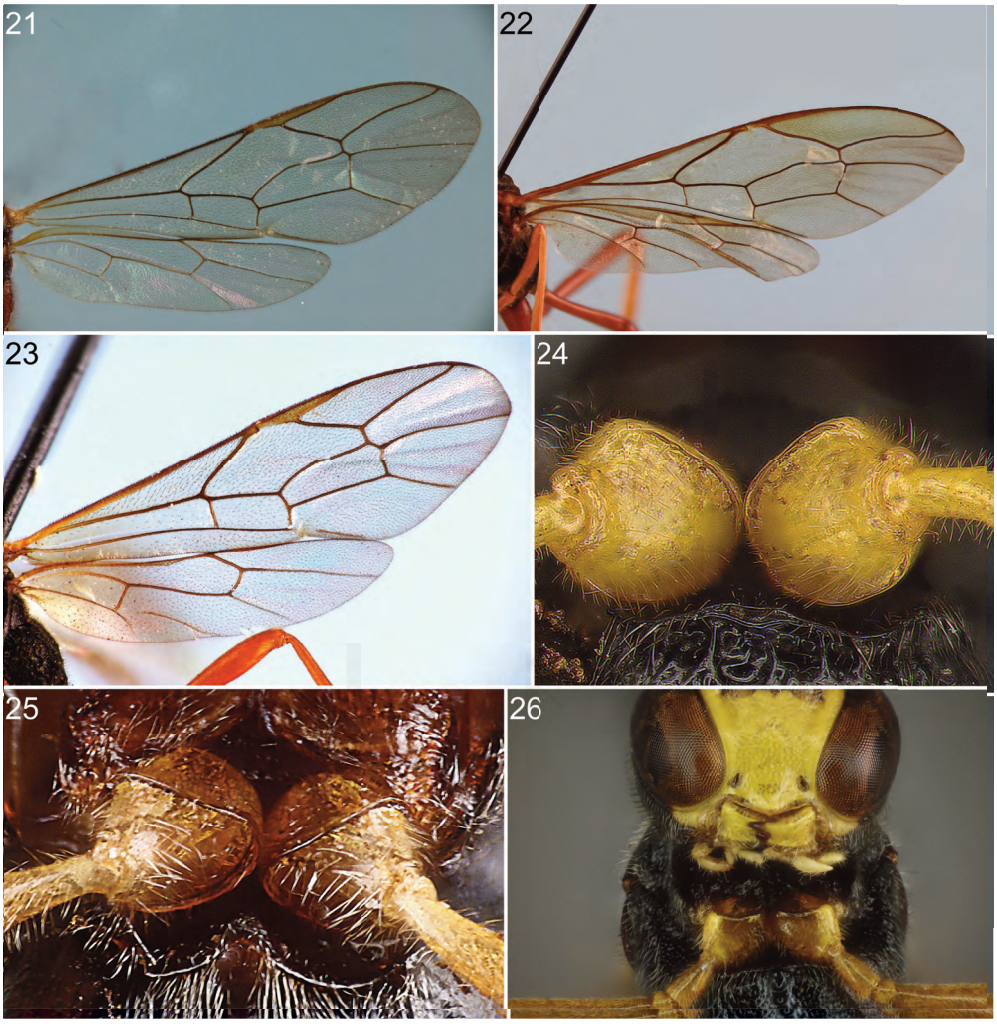
– Mesoscutum without transverse suture before prescutellar groove and densely punctate; 1st subdiscal cell weakly explanate distally (Fig. 20); very small species. [Outer orbits yellow; distinct metasternal humps present; ovipositor sheath 1.2 to 1.3 as long as 1st hind tarsomere; 23–28 flagellomeres; body length 5.6–6.3mm] . . . . . *Parania* Morley (1 species, *Parania geniculata* (Holmgren, 1857))



Figs 15–20. — Anomaloninae. 15, *Gravenhorstia picta*. 16, *Heteropelma amictum*. 17, *Therion giganteum*. 18, *Trichomma intermedium*. 19, *Atrometus insignis*. 20, *Parania geniculata*. (15 head and part of mesosoma in lateral view. 16, 17 head in posterodorsal view. 18 head in facial view. 19, 20 habitus. 16, 18–20 ♀; 15, 17 ♂).

7 Fore coxa with a carina on anterior and inner side (Figs 24, 25), or if carina absent then hind wing discoidella entirely absent (*A. flaveolatum*, Fig. 21) 8
– Fore coxa without such a carina [*Camposcopus ruficoxis* has a (variable) transverse angulation anteriorly (Fig. 26), but not a raised carina and not extending to inner side]; hind wing discoidella always present 9

8 Apex of clypeus with one more or less distinct apical tooth and no lateral teeth (Figs 13, 14); fore coxa with a carina on anterior and inner sides, but not extending past the insertion of the trochanter (Fig. 24, showing maximum development), or (*A. flaveolatum*) without such a carina and hind wing with discoidella entirely absent (Fig. 21) *Agrypon* Förster (16 species)
– Apex of clypeus with one small median tooth and two minute lateral teeth (Fig. 27); fore coxa with an almost encircling carina, extending past the insertion of the trochanter (Fig. 25) . . . . . *Perisphincter* Townes (2 species in Europe, not yet British)



Figs 21–26. — Anomaloninae. 21, *Agrypon flaveolatum*. 22, *Habronyx heros*. 23, 26, *Camposcopus ruficoxis*. 24, *Agrypon anxium*. 25, *Perisphincter gracilicornis*. (21–23 wings. 24, 25 fore coxae in ventral view. 26 part of head in facial view with fore coxae in anteroventral view. 21, 23, 24, 26 ♀; 22, 25 ♂).

9 Fore wing CI less than 0.6, usually less than 0.4 (Figs 7, 28); pronotum dorsally flat, without a transverse sulcus . . . . . *Barylypa* Förster (4 species)
– Fore wing CI more than 0.9 (Fig. 29); pronotum above with a transverse sulcus 10
10 Frons with a median vertical lamella before median ocellus (Fig. 30); mesoscutum in front with a shallow concavity (Fig. 30); tarsal claws fully pectinate . . . . . *Aphanistes* Förster (4 species)
– Frons without a lamella, but often with a central carina; mesoscutum without concavity (except in *Habrocampulum*); tarsal claws only partly or not pectinate 11
11 Metasoma stout, 2nd tergite in profile only a little longer than deep and without a longitudinal crease separating epipleuron, 3rd tergite deeper than long (Fig. 8); face with conspicuous

Figs 27–32. — Anomaloninae. 27, *Perisphincter brevicollis*. 28, *Barylypa delictor*. 29, *Aphanistes gliscens*. 30, *Aphanistes klugii*. 31, *Habrocampulum biguttatum*. 32, *Habronyx heros*. (27 head in facial view. 28, 29 wings. 30 head in dorsolateral view. 31 head and mesonotum in dorsal view. 32 head and part of mesosoma in lateral view. 27–32 ♀).

median bicornute process (Fig. 15); metasoma black and yellow banded. [Mesosoma richly yellow-spotted; flagellum yellow, 45–49 flagellomeres; ovipositor sheath very short, only 0.4 length of 1st hind tarsomere; body length 19–26mm] . . . . . *Gravenhorstia* Boie (1 species, *Gravenhorstia picta* Boie, 1836)

– Metasoma slender, 2nd tergite in profile more than twice as long as deep and with a crease, 3rd tergite longer than deep (Fig. 5); face without median bicornute process; metasoma red and black 12

12 Mesoscutum without notauli; epicnemial carina short, not reaching front edge of mesopleuron . . . . . *Erigorgus* Förster (7 species)

– Mesoscutum with distinct and long notauli (Fig. 31); epicnemial carina strong, reaching front edge of mesopleuron (Fig. 32) 13

13 Metanotum (postscutellum) longer than broad; lower anterior margin of pronotum with a tooth; hind trochantellus as long as trochanter; scutellum yellow (Fig. 31). [Outer orbits in lower half of temples, spots on vertex, apical half of antennae, tegulae, posterior sides of metapleuron and propodeum yellow; ovipositor sheath very short, only half as long as 1st hind tarsomere; 43–51 flagellomeres; body length 12–18mm] . . . . . *Habrocampulum* Gauld (1 species, *Habrocampulum biguttatum* (Gravenhorst, 1829))

– Metanotum broader than long; lower anterior margin of pronotum without a tooth; hind trochantellus shorter than trochanter; scutellum black 14

14 Sternite of petiole ending at level of spiracles or a little before; vein RS in fore wing 1.2 to 1.4 times as long as 2r&RS (Fig. 22); metapleuron with distinct bulges (as seen from above). [All coxae red or yellowish; metasoma almost entirely red; flagellum red with 58–61 flagellomeres; the biggest anomalonine in the Palaearctic region with body length 25 to 35 mm] . . . . . *Habronyx* Förster (1 species, *Habronyx heros* Förster, 1869)

– Sternite of petiole ending behind the spiracles; vein RS in the fore wing 1.7 to 2.0 times as long as 2r&RS; (Fig. 23) metapleuron without bulges; smaller specimens with body length up to 13mm . . . . . *Camposcopus* Förster (3 species)

Key to the species of *Agrypon* Förster

1 Anterior and inner side of fore coxa ventrally without carina; nervellus not intercepted (Fig. 21); 1st tarsomere of hind leg predominantly red to dark reddish brown to black, its apex and the following three tarsomeres yellow. [Notaulus distinct; CI 0.55 to 0.6; mesosoma usually mostly black, but sometimes more or less red spotted to almost all red; temple more or less extensively yellow below, varying from red to black upwards but vertex near eye always with a yellow mark; hind coxa varying black to red; 30–40 flagellomeres; body length 8–16mm] . . . . . *A. flaveolatum* (Gravenhorst, 1829)

– Anterior and inner side of fore coxa ventrally with carina (Fig. 24); nervellus various; 1st tarsomere of hind leg usually not so rich in contrasts, mostly reddish yellow (rarely brown or blackish) 2

2 Nervellus intercepted by discoidella although sometimes discoidella proximally only indicated (Fig. 6) (exceptionally not so in small specimens of *A. flexorium*, which have a characteristic red spot on the temple above) 3

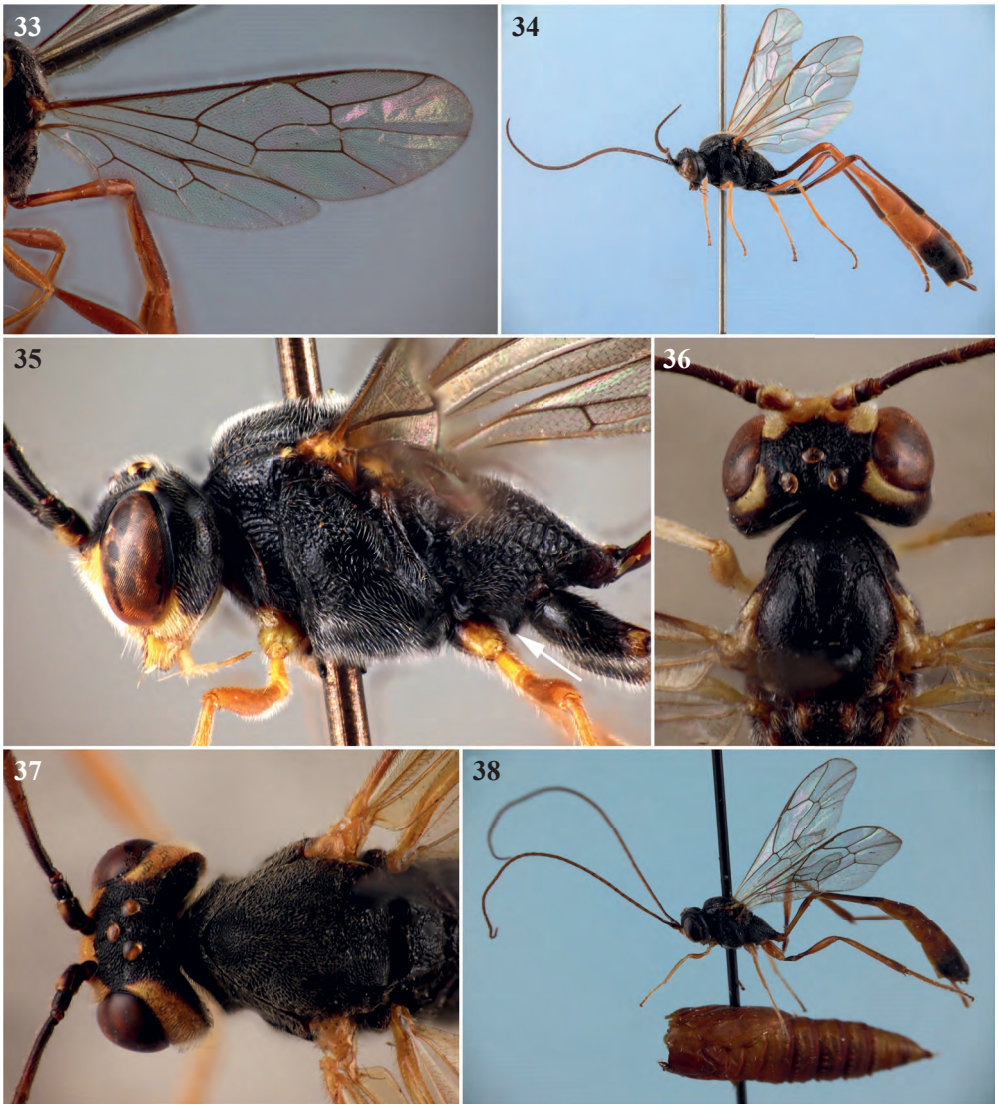
– Nervellus not intercepted; discoidella wholly absent (Fig. 33); temple above without an isolated red spot 6

3 Postpetiole as wide as long at spiracles; scutellum reticulately wrinkled and a little convex; nervellus intercepted at or somewhat above its middle (Fig. 34); ovipositor sheath shorter than apical depth of metasoma (Fig. 34). [Head behind eyes distinctly constricted; face and clypeus black with yellow inner orbits (♀), or yellow with black spots or streaks (♂); temple black with yellow spot on vertex near eye; no metasternal protuberances; 45–48 flagellomeres; body length 11–18mm] . . . . . *A. delarvatum* (Gravenhorst, 1829)

– Postpetiole longer than wide; scutellum more or less coarsely punctured and flat; if (usually) nervellus intercepted then below its middle (in *A. gracilipes* sometimes in the middle); ovipositor sheaths not shorter than apical depth of metasoma 4

4 Distinct (paired) metasternal protuberances present (Fig. 35); spots on vertex near eye and upper hind corner of pronotum yellow; antenna shorter than body. [Notaulus distinct; speculum shiny because hardly punctured; hind coxa red or black; nervellus intercepted far below its centre; 32–40 flagellomeres; body length 9–12mm] . . . . . *A. clandestinum* (Gravenhorst, 1829)

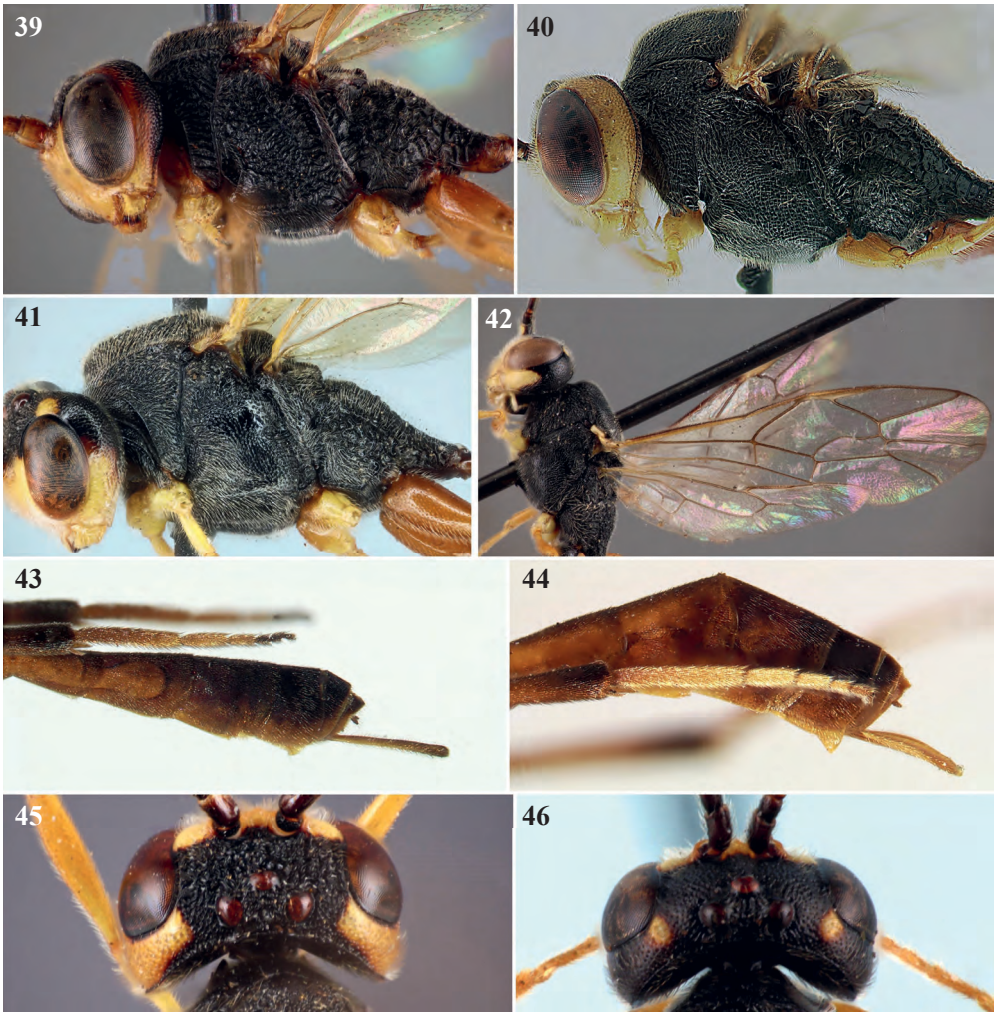
– Without or with only small metasternal protuberances; no yellow spot on vertex; upper hind corner of pronotum black; antenna as long as body or somewhat longer 5



Figs 33–38. — *Agrypon* species. 33, *A. canaliculatum*. 34, *A. delarvatum*. 35, *A. clandestinum*. 36, *A. varitarsum*. 37, *A. batis*. 38, *A. cognatum* (with host *Celypha rivulana* pupal case). (33 wings. 34, 38 habitus. 35 head and mesosoma in lateral view. 36, 37 head and mesoscutum in dorsal view. 33–35, 37, 38 ♀; 36 ♂).

5 Clypeus apically produced at an obtuse angle, with a strong pointed tooth at apex (Fig. 13); postpectal carina interrupted before mid coxa; temple black, above usually with red spot (rarely in upper half reddish-yellow); ovipositor sheath 0.6 to 0.7 times as long as 1st hind tarsomere; metasternal protuberances absent. [Genal carina more or less broadened as a flange near mandible; hind coxa red varying to black; hind tarsus often black on the last three to four tarsomeres; thorax and propodeum mostly black, more rarely more or less extensively red; 43–53 flagellomeres; body length 7–15mm] . . . . . *A. flexorium* (Thunberg, 1824)

– Clypeus apically more roundly produced, with or virtually without a minute apical tooth (Fig. 14); postpectal carina complete; temple above black, rarely wholly reddish yellow; ovipositor sheath 0.9 times as long as 1st hind tarsomere; small metasternal protuberances present. [Pronotum wrinkled to very densely punctured, rarely red; propodeum reaching to 0.8 length of hind coxa and mostly black, rarely completely red; hind coxa varying from red to black; 52–56 flagellomeres; body length 11–16mm] . . . . . *A. gracilipe*s (Curtis, 1839)



Figs 39–46. — *Agrypon* species. 39, *A. rugifer*. 40, *A. batis*. 41, *A. brachycerum*. 42, *A. interstitiale*. 43, *A. minutum*. 44, 45, *A. anxium*. 46, *A. hinzi*. (39–41 head and mesosoma in lateral view. 42 wings, head and mesosoma in lateral view. 43, 44 posterior part of metasoma with hind tarsus in lateral view. 45, 46 head in dorsal view. 39–46 ♀).

6 Antenna as long as body, 1st flagellomere shorter than 2nd and 3rd together; pronotum above almost impunctate and shiny; distinct notauli present (Fig. 36) 7
– Antenna significantly shorter than body, if the same length, then 1st flagellomere longer than 2nd and 3rd together; pronotum above either densely punctate or wrinkled and dull; notauli less pronounced (Fig. 37) 8

7 Vertex with large yellow spot (Fig. 36); temple in at least lower half to third also yellow; scutellum often with yellow spots on sides; upper posterior corners of pronotum yellow; 1st hind tarsomere blackish brown except for yellowish apex; eyes less strongly convegent below, ED 1.29–1.48. [Head behind eyes roundly narrowed; notauli reaching to behind middle of mesoscutum; small metasternal protuberances present; mesopleuron with distinct shining speculum; 43–47 flagellomeres; body length 10–12mm] . . . . . *A. varitarsum* (Wesmael, 1849)
– Vertex mostly black, rarely with small yellow spots, temple otherwise black (Fig. 38); scutellum and upper posterior pronotal corners black; 1st hind tarsomere reddish yellow; eyes more strongly convergent below, ED 1.45–1.59. [Additional features as for *A. varitarsum*; 39–44 flagellomeres; body length 7.5–10.5mm] . . . . . *A. cognatum* Förster, 1860 stat. rev.

8 Face and clypeus (apart from narrow yellow orbits) as well as all coxae black, rarely face in middle and clypeus basally reddish yellow; 2nd flagellomere 1.8 times as long as wide; mesoscutum irregularly coarsely punctate and partly (sometimes weakly) shining; propodeum reaching only to 0.3 length of hind coxae. [Head behind eyes not narrowed; vertex with small yellow spot; metasternal protuberances present; 34–39 flagellomeres; body length 11–13mm] . . . . . *A. anomelas* (Gravenhorst, 1829)
– Face and clypeus yellow; coxae usually yellow or red or blackish brown (in *A. interstitiale* hind coxa black); 2nd flagellomere 2.5 to more than 4 times as long as wide; mesoscutum predominantly wrinkled and dull; propodeum reaching at least to half length of hind coxa 9

9 Antenna as long as body; 1st flagellomere 2.1 times as long as 2nd and longer than 2nd and 3rd together; 2nd flagellomere 4.1 to 4.3 times as long as wide; flagellum yellowish red, apically somewhat darkened; postpectal carina complete. [Head narrowed behind eyes; temple light red, blackish in ♂ along occipital carina; epomia present; notaulus distinct; pronotum and mesopleuron coarsely wrinkled (Fig. 39); ovipositor longer than apical depth of metasoma; 41–45 flagellomeres; body length 12–15mm] . . . *A. rugifer* (Thomson, 1894)
– Antenna shorter than body; 1st flagellomere 1.6 to 1.8 times as long as 2nd and shorter than 2nd and 3rd together; 2nd flagellomere less than 4 times as long as wide; flagellum brown, apically almost black; postpectal carina complete or interrupted in front of mid coxa . . . . . (*A. anxium*-group) 10

10 Species with body length 13 to 18mm; antenna with 34 to 42 flagellomeres 11
– Species 5 to 12mm long; antenna with 23 to 36 flagellomeres 12

11 Whole mesopleuron coarsely striate to irregularly wrinkled (Fig. 40); mesoscutum very densely punctured and dull (Fig. 37); legs very slender, hind femur more than 10 times as long as wide; flagellum thin, 2nd flagellomere 3.2 to 3.6 times as long as wide. [Inner eye margins moderately convergent ventrally, ED 1.5; second recurrent vein (2m-cu) postfurcal by 1.0 length of intercubitus (2rs-m); temple above very densely punctate, in ♀ entirely reddish-yellow, in ♂ black above with yellow spots on vertex; body length 15–18 mm] . . . . . *A. batis* (Ratzeburg, 1844)
– Mesopleuron above wrinkled, otherwise more or less densely punctate with shining speculum (Fig. 41); mesoscutum with some lustre between the dense punctures; legs less slender, hind femur 7 to 8 times as long as wide; flagellum not so thin, 2nd flagellomere 2.2 to 2.5 times as long as wide. [Face broader, inner eye margins less convergent, ED 1.3; 2m-cu postfurcal by only 0.5 length of 2rs-m; both sexes with temple predominantly black and a yellow spot on vertex; body length 13–16 mm] . . . . . *A. brachycerum* Hellén, 1950

12 Fore wing with 1cu-a interstitial, rarely a little postfurcal (Fig. 42); epicnemial carina laterally absent; propodeum and metapleuron finely reticulate; hind coxa entirely black (♀) or black except for a ventroapical yellow spot (♂). [Apex of clypeus with a faint median tooth; head behind eye not constricted, temple arched, black; vertex with yellow spot; hind tarsus, especially in ♂, distinctly thickened; body length 9–10mm] . . *A. interstitiale* Schnee, 1989

– 1cu-a in fore wing distinctly postfurcal; epicnemial carina present laterally; propodeum and metapleuron coarsely reticulate; hind coxa red to blackish brown 13

13 1cu-a and 2cu-a parallel and 1st subdiscal cell not widened distally, 2.8 to 3.3 times as long as wide (Fig. 33); mesopleuron weakly irregularly striate. [Temple above very densely punctate, in ♀ quite yellow, in ♂ black with yellow spot on vertex (rarely less densely punctate and brownish-red spotted above as a ♀ variety); body length 7–10mm] . . . . . *A. canaliculatum* (Ratzeburg, 1844)

– 1st subdiscal cell widened distally, 1cu-a and 2cu-a convergent posteriorly; mesopleuron more or less densely wrinkled and punctate 14

14 Ovipositor sheath a little longer than 1st hind tarsomere (Fig. 43); 1cu-a and 2cu-a distinctly convergent posteriorly; head behind eyes not constricted. [Inner eye margins strongly convergent ventrally, ED 1.7–2.0; temple black with yellow spot on vertex; postpectal carina complete; hind tarsomeres 4 and 5 dark brown, hind tarsus, especially in ♂, thickened; body length 5–12mm] . . . . . *A. minutum* (Bridgman & Fitch, 1884)

– Ovipositor sheath shorter than 1st hind tarsomere (Fig. 44); 1cu-a and 2cu-a only a little convergent posteriorly; head behind eyes somewhat convexly narrowed 15

15 Frons and vertex next to hind ocellus coarsely rugose (Fig. 45); temple in ♀ entirely yellow, and in ♂ black with a yellow spot; inner eye margins more strongly convergent ventrally, ED 1.5 to 1.6; 2m-cu postfurcal by 0.5 times the length of 2rs-m. [1st subdiscal cell 2.3 to 2.5 times as long as wide; 1m-cu&M sometimes with a short ramulus; hind coxa red; body length 10–13mm] . . . . . *A. anxium* (Wesmael, 1849)

– Frons densely and vertex less densely punctate (Fig. 46), otherwise smooth, temple in ♀ partly black; inner eye margins less strongly convergent ventrally, ED 1.4 to 1.5; 2m-cu vein postfurcal by 1.0 times the length of 2rs-m. [1st subdiscal cell 2.0 to 2.1 times as long as wide; 1m-cu&M without ramulus; hind coxa brown to blackish brown; body length 8–10mm] . . . . . *A. hinzi* Schnee, 2018

Key to the species of *Aphanistes* Förster

1 Flagellum basally dark red to dark brown, in apical half becoming gradually black; frontal lamella smaller, rounded and obtusely triangular (Fig. 47); epicnemial carina sublaterally ending below lower corner of pronotum, without lateral branch on mesopleuron; smaller species with body length 10–18mm 2

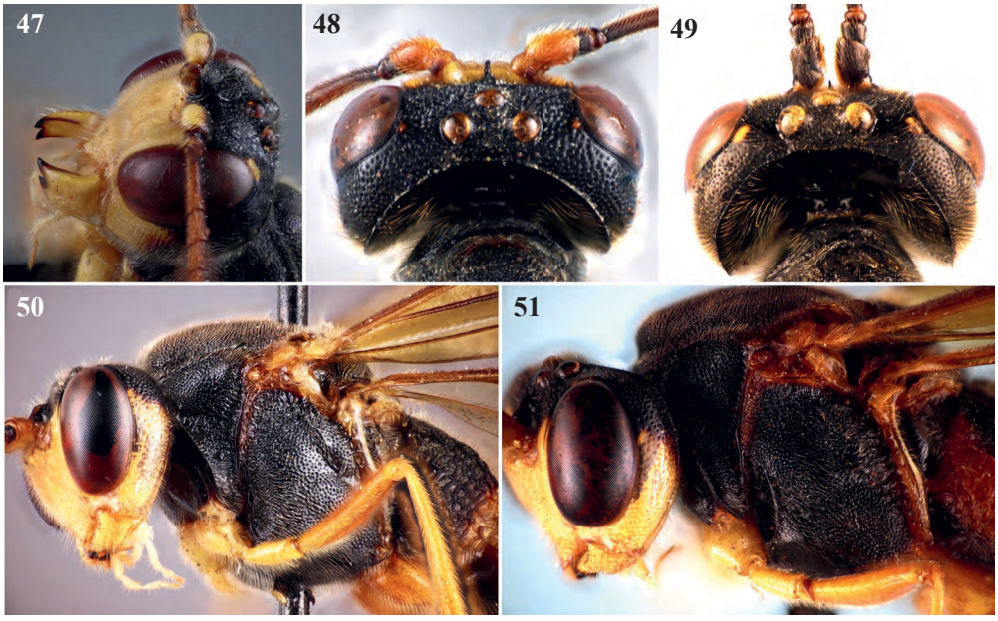
– Flagellum mostly red, becoming yellow subapically, sometimes in basal half brown, the last two to three flagellomeres often darkened; frontal lamella larger, more strongly and sharply angled (Fig. 30); epicnemial carina laterally (on mesopleuron) present or absent; larger species with body length 16–28mm 3

2 Scape entirely yellow to reddish (Fig. 48); temple narrower, ET 1.8–2.0 (♀) and 2.0–2.4 (♂); hind tarsus thinner, 1st tarsomere 8.3–10.6 times as long as wide in ♀ and 6.6–7.3 in ♂; flagellum thinner, 2nd flagellomere 2.1–2.8 (♀) and 2.2–2.5 (♂) times as long as wide. [Frontal lamella in dorsal view usually with somewhat flattened edge (Fig. 48); antenna with 32–38 flagellomeres; body length 10–16mm] . . . . . *A. bellicosus* (Wesmael, 1849)

– Scape above dark brown to black (Fig. 49); temple wider, ET 1.4–1.7 (♀) and 1.7–1.8 (♂); hind tarsus thicker, 1st tarsomere 6.7–7.4 (♀) and 5.2–6.1 (♂) times as long as wide; flagellum thicker: 2nd flagellomere 1.8–2.0 (♀♂) times as long as wide. [Frontal lamella in dorsal view sharp (Fig. 49); antenna with 32–41 flagellomeres; body length 10–18mm] . . . . . *A. gliscens* (Hartig, 1838)

3 Epicnemial carina laterally absent (Fig. 50) or only slightly indicated; flagellum thinner, 20th flagellomere 1.8–2.0 as long as wide; temple narrower, ET 1.8–2.1. [Temple in upper third to half black, yellow to reddish yellow below; sometimes a weak epicnemial carina laterally present, but not approaching front edge of mesopleuron (and temple black to a larger extent). As intermediate individuals occur it is currently not appropriate to formally separate such specimens (which have sometimes been referred to as 'var.' *wesmaeli*) from *A. ruficornis*, although the name *wesmaeli* (Holmgren, 1857) would be available. 40–46 flagellomeres; body length 16–21mm] . . . . . *A. ruficornis* (Gravenhorst, 1829)

– Epicnemial carina laterally always present, very distinct and rather thick, approaching front edge of mesopleuron (Fig. 51); flagellum thicker, 20th flagellomere 1.1–1.3 as long as wide; temple wider, ET 1.5–1.7. [48–54 flagellomeres; body length 25–28mm] . . . . . *A. klugii* (Hartig, 1838)



Figs 47–51. — *Aphanistes* species. 47, 49, *A. gliscens*. 48, *A. bellicosus*. 50, *A. ruficornis*. 51, *A. klugii*. (47 head in laterofrontal view. 48, 49 head in posterodorsal view. 50, 51, head and part of mesosoma in lateral view. 47, 48, 50, 51 ♀; 49 ♂).

Key to the species of *Barylypa* Förster

1 Antenna about as long as body; 1cu-a and 2cu-a convergent posteriorly (Fig. 7); hind tarsus not (♀) or only slightly (♂) thickened 2

– Antenna only 0.5 of the body length; 1cu-a and 2cu-a parallel (Fig. 28) or divergent posteriorly; both sexes with thickened hind tarsus 4

2 Smaller species with body length 9–13mm; temple near mandible excavated and genal carina here with a flange (Fig. 52); 1st hind tarsomere 2.3 to 2.5 times as long as 2nd. [46–50 flagellomeres; 1st flagellomere 2.5 times as long as 2nd and distinctly longer than 2nd + 3rd together; temples often more extensively black than in Fig. 52] . . . . . *B. rubricator* (Szépligeti, 1899)

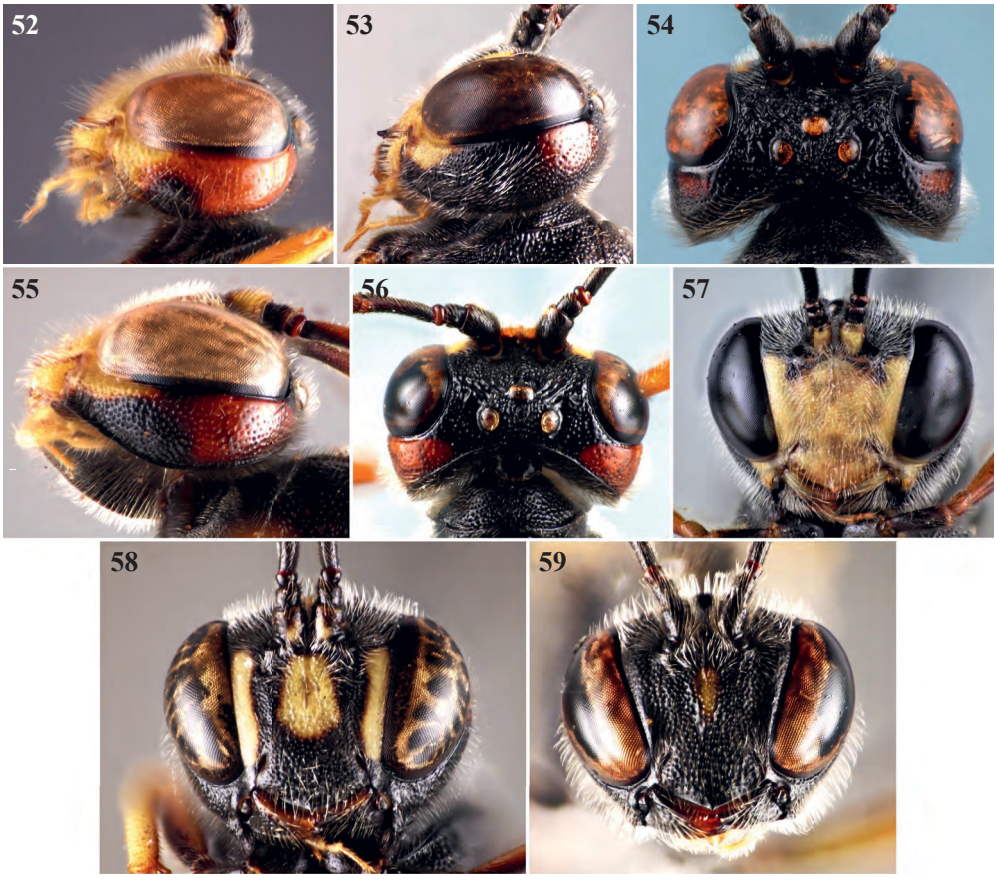
– Large species with body length 14–22mm; temple not excavated below and genal carina not raised; 1st hind tarsomere at least 3.0 times as long as 2nd 3

3 ET 1.27 to 1.39, temple wide, in lateral view almost equally so along its height (Fig. 53); head in dorsal view behind eyes not constricted (Fig. 54); 1st hind tarsomere 3.2 to 3.4 times as long as 2nd. [Not yet recorded from Britain, but in continental Europe a parasitoid of *Phalera bucephala* (Linnaeus) (Notodontidae) and quite likely to be found in Britain. 55–59 flagellomeres; face yellow but often with black streaks; 1st tergite and hind leg black, rarely tibia and 1st tarsomere brownish; body length 16–22mm] . . . . *B. mesozona* (Förster, 1878)

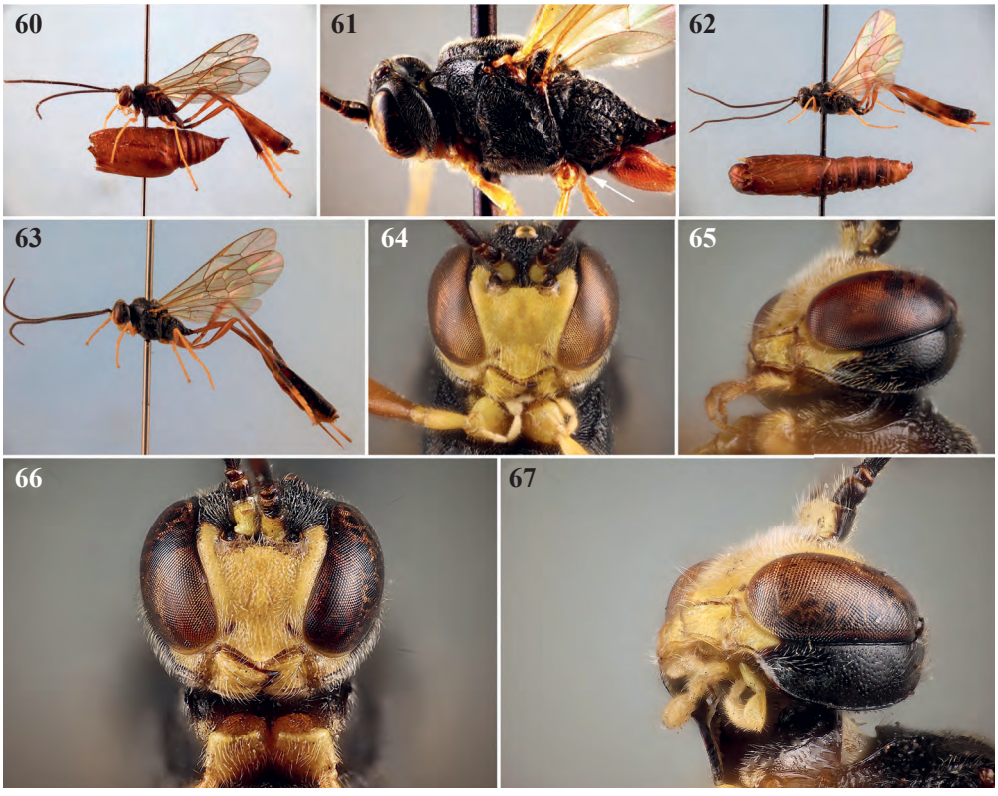
– ET 1.45 to 1.67, temple narrower and in lateral view widest in the middle (Fig. 55); head in dorsal view behind eyes distinctly constricted (Fig. 56); 1st hind tarsomere 3.0 to 3.1 times as long as 2nd. [52–59 flagellomeres; face yellow; 1st metasomal tergite red, hind leg with femur onwards predominantly red to brown, very rarely black; 1st flagellomere as long as 2nd + 3rd together; body length 14–19mm] . . . . . *B. propugnator* (Förster, 1855)

4 Larger species with body length 13–19mm; 38–40 flagellomeres; colour of head sexually dimorphic, face and clypeus in ♀ yellow (Fig. 57), in ♂ black with wide yellow inner orbits and a spot above on face (Fig. 58), and temple in ♀ yellow (below), black and dark red (above), in ♂ only black and dark red. [Metasoma red with base of 1st tergite and apical tergites black; tegula black; hind leg black but tarsus sometimes lightened brownish] . . . . . *B. delictor* (Thunberg, 1824)

– Smaller species with body length of 10–12mm; 32–34 flagellomeres; head with no colour dimorphism: ♀ and ♂ face mostly black with a yellow spot above and sometimes with very narrow yellow inner orbits (Fig. 59); temple black with dark red spot above. [Probably not British: a single record (Gauld & Mitchell 1977) could not be confirmed. Metasoma black, at most 3rd and sometimes 4th tergite basally reddish; tegula yellow; hind leg black but tibia basally with a small dorsal yellow spot] . . . . . *B. uniguttata* (Gravenhorst, 1829)



Figs 52–59. — *Barylypa* species. 52, *B. rubricator*. 53, 54, *B. mesozona*. 55, 56, *B. propugnator*. 57, 58, *B. delictor*. 59, *B. uniguttata*. (52, 53, 55 head in lateral view. 54, 56 head in dorsal view. 57–59 head in facial view. 52–57, 59 ♀; 58 ♂).



Figs 60–67. — *Camposcopus* species. 60, *C. perspicuous* (with host *Cabera pusaria* pupal case). 61, 63, (holotype), 66, 67, *C. ruficoxis*. 62, (with host *Acleris lipsiana* pupal case), 64, 65, *C. nigricornis*. (60, 62, 63 habitus. 61 head and mesosoma lateral. 64, 66 head in facial view. 65, 67 head in ventrolateral view. 60–67 ♀).

Key to the species of *Camposcopus* Förster

1 Pronotum anteroventrally rounded; vertex beside hind ocellus with yellow spot; metasternum without protuberances; hind tibia with spurs longer than apical tibial width; 1st hind tarsomere reddish yellow; ovipositor sheath short, only 0.5 to 0.6 times length of 1st hind tarsomere (Fig. 60); nervellus intercepted at lower 0.2–0.4, discoidella completely pigmented. [36–40 flagellomeres; body length 11–12mm] . . . . *C. perspicuus* (Wesmael, 1849)

– Pronotum anteroventrally angular; vertex black, without yellow orbital spots; metasternum with distinct paired protuberances (Fig. 61); hind tibia with spurs only as long as apical tibial width; 1st hind tarsomere for the most part black; ovipositor sheath longer (Figs 62, 63); nervellus intercepted at lower 0.1–0.25, discoidella basally complete but weakly indicated (Figs 62, 63) 2

2 Ovipositor sheath 0.7–0.8 times length of 1st hind tarsomere (Fig. 62); hind coxa black; face centrally shallowly punctate, with inner orbits shiny; clypeus very sparsely punctured and shiny; face somewhat broader, ED 1.43 to 1.53 (Fig. 64); lower temple less constricted near base of mandible, with genal carina hardly elevated (Fig. 65); fore coxa rounded, without transverse angle anteriorly (Fig. 64); hind tarsus slender, 1st tarsomere 6.4–7.6 times longer than wide. [32–40 flagellomeres; body length 10–13mm] . . *C. nigricornis* (Wesmael, 1849)

– Ovipositor sheath 0.9–1.1 times length of 1st hind tarsomere (Fig. 63); hind coxa red, very rarely blackish; face predominantly rugulose; clypeus dorsally densely punctate; face somewhat narrower, ED 1.62 to 1.7 (Fig. 66); lower temple strongly excavate near mandible, with genal carina distinctly elevated (Fig. 67); fore coxa with anterior transverse angle (Fig. 66);1st hind tarsomere thicker, 5.0–6.2 times longer than wide. [34–39 flagellomeres; body length 9–13.5mm] . . . . . ***C. ruficoxis*** Schnee & Shaw sp. n.

Camposcopus ruficoxis Schnee & Shaw sp. n.
(Figs 23, 26, 61, 63, 66, 67)

Diagnosis: In addition to the characters given in the key, there is a difference of 5.73% in CO1 barcode sequences (recoverable from BOLD with the codes shown) between *C. nigricornis* (specimens in Coll. Schnee: BC-ZSM-29772-C02; specimens in NMS: BC-ZSM-29762-E01; BC-ZSM-29762-E02; BC-ZSM-29762-E03) and *C. ruficoxis* sp. n. (specimens in Coll. Schnee: BC-ZSM-HYM-29762-B12 [now too damaged to be listed as paratype]; specimens in NMS: BC-ZSM-HYM-29762-E04; BC-ZSM-HYM-29762-E05; BC-ZSM-29816-H08; BC-ZSM-29816-H11).

Material examined

Holotype, ♀, Camposcopus ruficoxis ♀ sp. n. Schnee & Shaw 2023, 8.IX.63 Celle [GERMANY: Niedersachsen] (in Coll. Hinz, ZSM).

Paratypes 22♀♀, 20♂♂. In Coll. H. Schnee (GERMANY, and leg. *H. Schnee*, unless indicated otherwise): 1♀ 2.vi.1946 Göttingen (leg. *R. Hinz*); 1♀ DDR/Dübener Heide Torfhaus 10.vi.1980; 1♀ DDR/Dübener Heide Zadlitzbruch 16.viii.1978; 1♀ Dübener Heide Wöllnau 27.viii.1980; 1♀ DDR/Dübener Heide Wöllnau 28.viii.1986; 1♀ DDR/Dübener Heide nahe Jagdhaus 11.vi.1986; 1♀ Dübener Heide nahe Jagdhaus 26.v.1982; 1♀ 6.vii.81 Pfullinger Berg Pfullingen *E. Jansen* leg.; 1♂ Dübener Heide Zadlitzbruch e.p.10.vii.1973 ex *Clepsis spectrana*; 2♂♂ Dübener Heide Zadlitzbruch 26.vii.1978; 2♂♂ Dübener Heide Zadlitzbruch 15.viii.1979; 1♂ DDR/Dübener Heide/nahe Jagdhaus 11.vi.1986; 1♂ DDR/Dübener Heide/nahe Jagdhaus 19.ix.1983; 1♂ 17.vi.1964 Harz, leg. *R. Hinz*; 1♂ 20.vi.1954 Hils, leg. *R. Hinz*; 1♂ Rhön/Ibengarten Trockenhang 3.vi.1974; 1♂ Umgeb. Tharandt 13.vii.1982 Gelbschale, leg. *S. Walter*; 1♂ Neubrandenburg 26.v.1977, leg. *J. Oehlke*; 1♂ Umg. Berlin Friedrichshagen, ex *Diurnea fagella*, 14.v.1963 leg. *J. Oehlke*; 2♀♀ ČSR Bohem. Brandys 200m 12.vi.64 leg. *J. Oehlke*; 1♀ C-Rumänien Umg Brasov Timpa 1000m 7.vi.1985, leg. *J. Oehlke*. In NMS: ENGLAND: 1♀ Hampshire, Pamber Forest (V.C. 12) 20.ix.1978 (*M.R. Shaw*); 1♀ Surrey, Richmond Park (V.C. 17) 30.v.1985 (*N.E. Stork*); 1♀ Surrey, Richmond Park (V.C. 17) 18.viii.1983 (*N.E. Stork*); 1♀ Cheshire, Abbots Moss (V.C. 58) 12.x–29.xi.1986 (*R.R. Askew*); 1♀ Yorkshire, Ripley, Hollybank Wood SE 2759 (VC 64) 28.v. 2004 (*C. Fletcher*)//BC-ZSM-29816-H08; 1♂ Yorkshire, Elland (V.C. 63) xi–xii.2002 (*P. Talbot*)//BC-ZSM-HYM-29762-E04; 1♂ Devon (V.C. 3) ex indet. Tortricidae on *Salix*, em. vii.1989 (*J.L. Gregory*); 1♂ Norfolk, Catfield Fen (V.C. 27) ex *Epinotia caprana*, *Myrica gale*, 4.vi.2012, em. vi.2012 (*J.R. Langmaid*)//BC-ZSM-HYM-29762-E05. SCOTLAND: 1♀ Perthshire, Flanders Moss (V.C. 87) 11.vi.1981 (*M.R. Shaw*); 1♀ Perthshire, Errol, Paddockmuir Wood (V.C. 89) 8–15.vi.1988 (*D. Phillips*); 1♀ Aberdeenshire, Muir of Dinnet (V.C. 92) 30.vi.1982 (*M.R. Shaw*); 1♀ Aberdeenshire, Inver, ex pupa *Anacampsis populella*, *Populus tremula*, em. 28.viii.2002 (*C.W.N. Holmes*)//BC-ZSM-29816-H11; 1♂ Glasgow, Garscadden Wood (V. C. 77) ex indet. ?Tortricidae, *Betula*, 6.vi.1983, em. 1983 (*R.P. Knill-Jones*); 1♂ Glasgow, Cadder Wilderness (V.C. 77) ex indet. Tortricidae [ca 1900] (*P. Cameron*). Germany: 1♀ Baden-Württemberg, Murrhardt 18.vi.1903 (*J. Hermann*). ALBANIA: 1♀ Shkodra, Mal Kolai, Velipolje 29.ix.2018 (*S. Beshkov & A. Nahirnić*). BULGARIA: 1♂ Sinite Kamani, Sliven 14.vi.2019 (*S. Beshkov & A. Nahirnić*). In National Museum of Natural History, Sofia, Bulgaria: 1♀, 1♂ Sinite Kamani, Sliven 14.vi.2019 (*S. Beshkov & A. Nahirnić*).

Description

Holotype ♀. Body 11.7mm, fore wing 6.5mm, antennae 6.5mm long (Fig. 63 habitus).

Head: antenna with 35 flagellomeres, 1st flagellomere 1.7 times as long as 2nd and shorter than 2nd and 3rd together; face (Fig. 66) with inner eye margins distinctly converging downward (ED 1.63), under the bases of antennae wrinkled calloused, inner orbits finely and densely punctate; clypeus more densely punctate dorsally, punctures more scattered ventrally, triangularly protruding, with strong median tooth (Fig. 66); POD>OOD; temples densely punctate with punctures separated by their width, shiny, strongly indented below near base of mandible, genal carina here raised as a lamella (Fig. 67); ET 1.63; malar space only 0.14 times basal mandible width; mandibles with two teeth, lower 0.5 times as long as upper; maxillary palpi segments 2 and 3 thickened; frons with weak median keel and coarsely wrinkled; vertex between hind ocellus and eye with finely scattered punctures and shiny; head slightly convexly narrowed behind eyes.

Mesosoma: pronotum wrinkled below, densely punctate above, with some gloss, epomia present, collar with a deep transverse channel; mesoscutum densely punctate but still glossy, along side edges with short transverse wrinkles, deep notauli present, merging into wrinkles from middle onwards; scutellum barely elevated, with irregular lateral ridges; mesopleuron coarsely wrinkled immediately below subtegular ridge, below that longitudinally striate, otherwise predominantly densely punctate and shiny especially on speculum; epicnemial carina laterally reaching to 0.5 of posterior margin of pronotum; postpectal carina narrowly interrupted; mesosulcus deep; propodeum and metapleuron very coarsely reticulate; strong metasternal protuberances present (Fig. 61), propodeum reaching to 0.6 of hind coxa.

Legs: fore coxa somewhat angular but without transverse carina; hind coxa finely punctate and shiny; hind trochanter barely longer than trochantellus; hind femur 5.4, 1st hind tarsomere 5.2 and 2nd hind tarsomere 2.3 times as long as wide, respectively.

Wings: fore wing 1cu-a postfurcal by 0.3 of its length; CI 1.0; 2m-cu postfurcal by 0.38 of its length; hind wing with 10 hamuli; nervellus intercepted far below middle, at lower 0.23, discoidella proximally weakly pigmented (Fig. 23).

Metasoma: spiracles of 1st tergite situated at 0.76 of its length; 1st sternite ending at 0.3 of postpetiole length; postpetiole widest just behind spiracles, 1.3 times as long as wide; ovipositor sheath as long as first hind tarsomere.

Colour: black; yellow are face, clypeus, palpi, indented lower cheek area, mandibles, scape below, tegula, anterior coxa in part, on fore and mid legs tibiae and tarsi, apex of 1st hind tarsomere, hind tarsomeres 2-4 and ovipositor valves; reddish are remaining parts of fore and mid legs; red are hind coxa, trochanter, trochantellus, tarsomere 5, 1st tergite, following tergites laterally; hind tibia dark brown; pubescence of body short, dorsally light brown, ventrally whitish; fore wing pterostigma brownish-yellow, other venation dark brown.

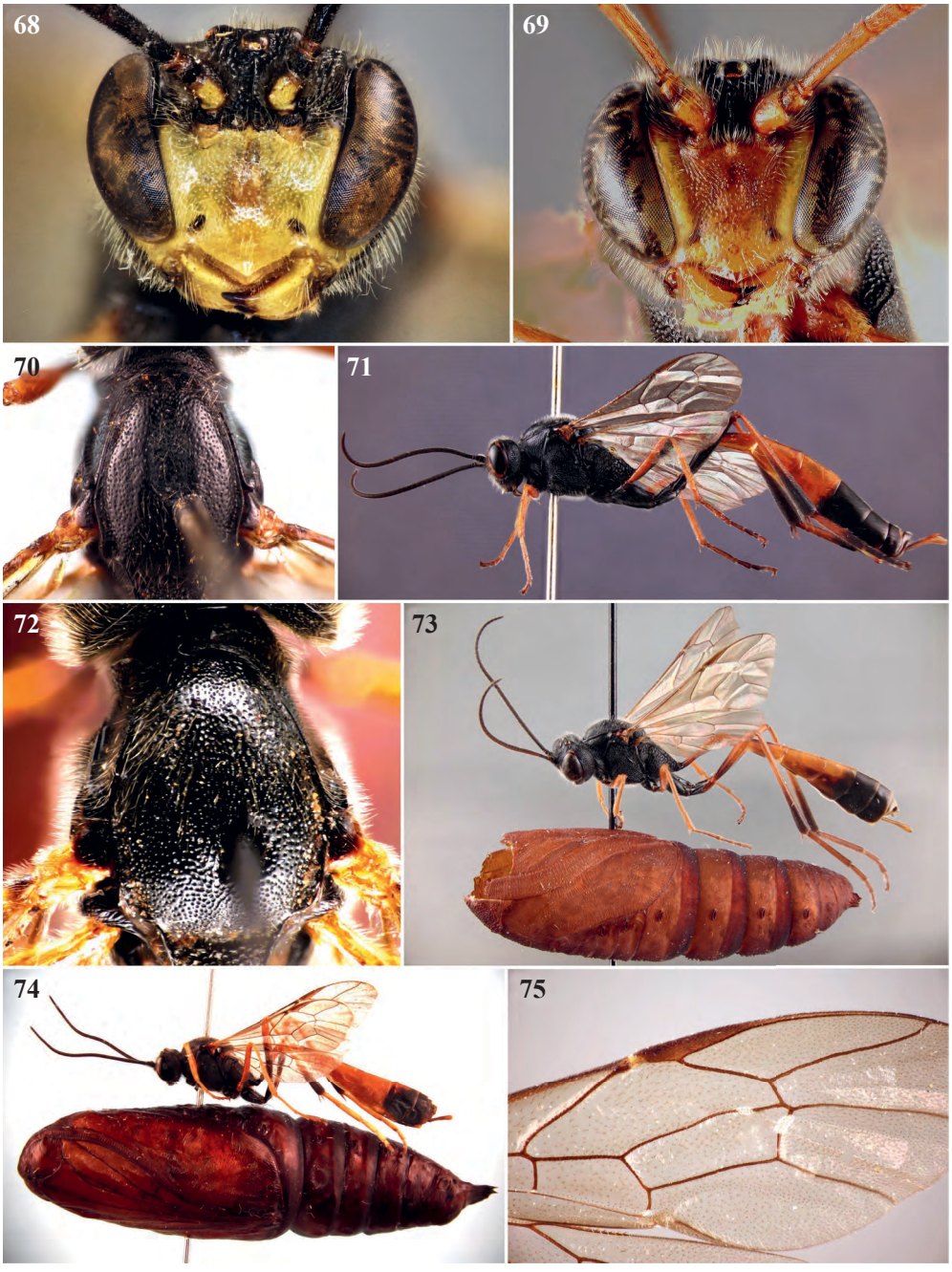
Variability: body 9–13mm, fore wing 4.8–7.0mm, antenna 5.5–7.5mm long respectively; antennae with 34–39 flagellomeres; ED 1.47–1.64 (♀); ET 1.6–1.8; frontal keel can be indistinct; hind femur 5.1–5.5, 1st hind tarsomere 5.2–6.4 times longer than wide respectively. 1st metasomal sternite can extend to 0.5 length of pospetiole. Colour of the legs and metasoma can be slightly lighter. ♂♂. The face is narrower than in ♀♀, the inner eye margins are more weakly ventrally convergent, ED 1.33–1.40; the German paratype from Neubrandenburg has as an aberration: small yellow spots next to the hind ocelli. In contrast to the ♀♀, the pedicellus of the ♂♂ is spotted yellow ventrally. The fore and mid coxae are usually completely yellow. The hind coxa can also be yellow ventrally.

Etymology: The species name refers to the red hind coxa.

Key to the species of *Erigorgus* Förster

1 Face and clypeus in both sexes yellow to reddish; vein 2m-cu in fore wing distinctly distal to (only exceptionally opposite) rs-m; antenna about half as long as body 2

– Face and clypeus in ♀ predominantly black, in ♂ yellow with more or less extended black stripes or spots; vein 2m-cu as a rule opposite rs-m (rarely proximal or distal by the thickness of the vein), except for *E. latro* with 2m-cu distal to rs-m; antenna usually shorter than half length of body. 4



Figs 68–75. — *Erigorgus* species. 68, *E. cerinops*. 69, *E. procerus*. 70, 71, *E. fibulator*. 72, 74, (with host *Polia bombycina* pupal case) *E. melanops*. 73, (with host *Diloba caeruleocephala* pupal case), 75, *E. latro*. (68, 69 head in facial view. 70, 72 mesoscutum in dorsal view. 71, 73, 74 habitus. 75 part of fore wing. 68–75 ♀).

2 Flagellum black; clypeus very characteristically dorsally somewhat convex and sparsely punctate, in ventral half smooth and shining and with a prominent tooth (Fig. 68); mesopleuron predominantly irregularly coriaceous; postpetiole short, only 1.0–1.3 times as long as wide. [Outer orbits red, yellow below; ovipositor sheath 0.5 length of first hind tarsomere; 34–39 flagellomeres; body length 14–20 mm] . *E. cerinops* (Gravenhorst, 1829)

– Flagellum mainly red; clypeus more flattened, more densely punctate, the apical tooth distinctly smaller (Fig. 69); mesopleuron very densely punctate; postpetiole 1.4–1.9 times as long as wide 3

3 Coxae red (♀) or yellow (♂) (except inner base of hind coxa black), hind trochanter, trochantellus and femur red (Fig. 2); head behind eyes distinctly constricted; postpetiole 1.8–1.9 times as long as wide. [Outer orbit as well as tegula red; ovipositor sheath 0.4 to 0.5 of the length of 1st hind tarsomere; 35–42 flagellomeres; body length 13–19mm] . . . . . *E. procerus* (Gravenhorst, 1829)

– Coxae black, hind trochanter black and trochantellus red (♀) or yellow (♂), hind femur black proximally and red distally; head behind eyes only a little constricted; postpetiole 1.4–1.5 times longer than wide. [Outer orbit mainly as well as tegula entirely black; ovipositor sheath 0.6 length of 1st hind tarsomere; 39–42 flagellomeres; body length 17–21mm] . . . . . *E. varicornis* (Thomson, 1894)

4 Mesoscutum centrally sparsely punctate, distance between punctures wider than their diameter (Fig. 70); 1st metasomal tergite and hind legs black, or sometimes with hind tibia and first tarsomere partly dark red (Fig. 71). [Ovipositor sheath 0.7 length of 1st hind tarsomere; 29–32 flagellomeres; body length 13–19mm] . . *E. fibulator* Gravenhorst, 1829)

– Mesoscutum densely punctate (Fig. 72); 1st metasomal tergite red to brown; hind leg with trochantellus red (exceptionally blackish), tibia red to partly black and tarsus dark brown or yellow (Figs 73, 74) 5

5 Fore wing with vein 2m-cu distinctly distal to rs-m, CI 1.8–2.0, 1cu-a vertical (Fig. 75); hind tarsus dark brown, only 1st tarsomere proximally reddish; face and clypeus with characteristic colour pattern in ♀ (Fig. 76), in ♂ entirely yellow [4th and partly 3rd metasomal tergite laterally black marked. Not yet recorded from Britain, but since its host *Diloba ceruleocephala* (Linnaeus) (Noctuidae) is widespread, the species might be found. Ovipositor sheath 0.6 as long as 1st hind tarsomere; 32–35 flagellomeres; body length 16–18mm . . . . . *E. latro* (Schrank, 1781)

– Vein 2m-cu opposite rs-m, CI 1.5-1.7, 1cu-a inclivous.; hind tarsus pure yellow or from distal third of 1st tarsomere dorsally darkened brownish; face and clypeus in both sexes variably coloured 6

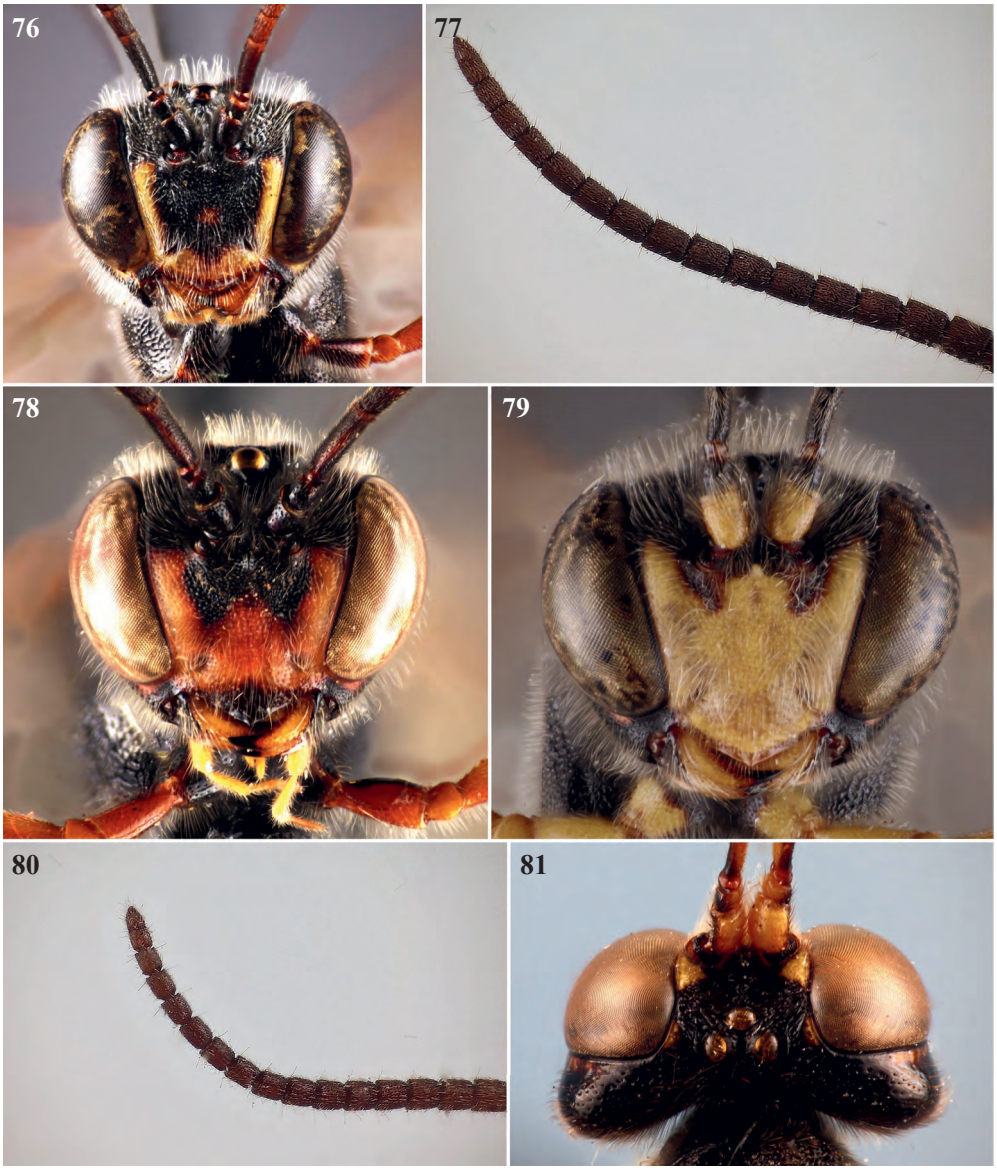
6 ♀ with flagellomeres all longer than wide (Fig. 77); Ovipositor sheath 0.5–0.6 length of 1st hind tarsomere; ♀ with face and clypeus black with reddish inner orbits, sometimes centrally red (Fig. 78), ♂ usually with face and clypeus yellow with more or less wide black streaks from bases of antennae to foveae but sometimes varying from black with yellow orbits to wholly yellow (Fig. 79). [Larger species, body length 13–18 mm; 27–35 flagellomeres; hind femur mostly black but sometimes varying to red; hind tarsus yellow to reddish yellow usually without dorsal darkening. Possibly an aggregate. ♂ not reliably distinguishable from *E. foersteri*] . . . . . *E. melanops* (Förster, 1855)

– ♀ with flagellomeres in apical third not or hardly longer than wide (Fig. 80); Ovipositor sheath 0.7–0.8 length of 1st hind tarsomere; ♀ with face and clypeus black with narrow reddish inner orbits without red centrally, ♂ with face and clypeus yellow with black streaks from bases of antennae to foveae. [Not recorded from Britain, but may occur; small species, body length 9–11 mm; 26–29 flagellomeres; hind leg with femur black and tarsus reddish yellow with brown dorsal darkening. ♂ not reliably distinguishable from *E. melanops*] . . . . . *Erigorgus foersteri* (Mocsáry, 1897)

Key to the species of *Heteropelma* Wesmael

1 Clypeus flat with rounded apical margin (Fig. 10); propodeum uniformly reticulate; 1st hind tarsomere 3.5 to 3.8 times as long as 2nd in ♀, 3.9 to 4.0 times in ♂. [All coxae in ♀ black, in ♂ fore and mid coxae yellow, sometimes basally black; 42–51 flagellomeres; body length 11.5–20mm] . . . . . *H. megarthrum* (Ratzeburg, 1848)

– Clypeus apically elevated and laterally produced as teeth (Fig. 11); propodeum very coarsely irregularly reticulate; 1st hind tarsomere 1.9 to 2.0 times as long as 2nd in ♀, 1.5 to 1.7 times



Figs 76–81. — Anomaloninae. 76–80, *Erigorgus* species: 76, *E. latro*. 77–79, *E. melanops*. 80, *E. foersteri*. 81, *Heteropelma amictum* var. *capitatum*. (76, 78, 79 head in facial view. 77, 80 apical part of antenna. 81 head in dorsal view. 76–78, 80 ♀; 79, 81 ♂).

in ♂. [All coxae in ♀ red with ventrobasal black spotting of hind coxa, in ♂ coxae yellow with hind coxa dorsally black; 54–62 flagellomeres; body length 18–25mm. In ♂ var. *capitatum* (Desvignes, 1856) the head is strongly broadened, with very inflated temples (Fig. 81), very unlike the ♀ (Fig. 16)] . . . . . *H. amictum* (Fabricius, 1775)

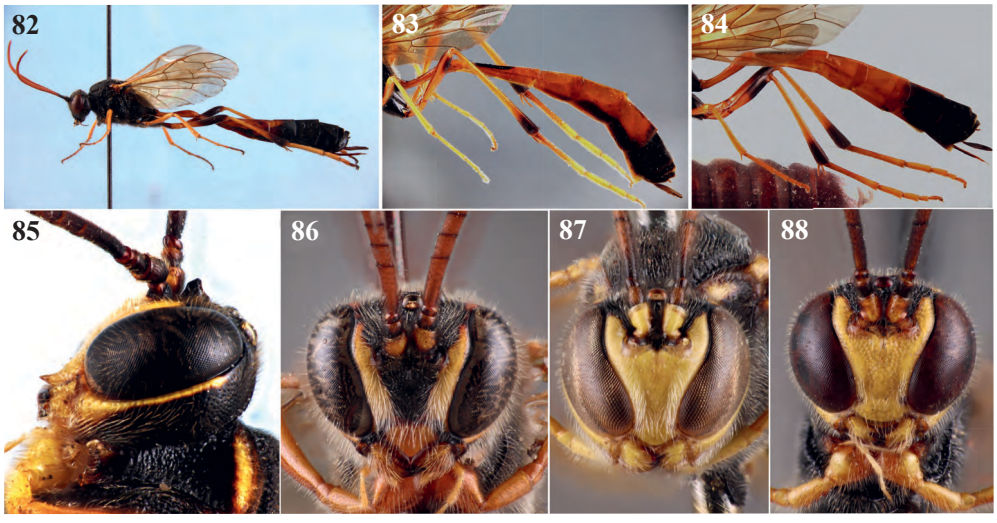
Key to the species of *Therion* Curtis

1 Antenna very short, only as long as head and mesosoma together (Fig. 82), all flagellomeres except 1st not longer than wide, in ♀ mostly strongly transverse; frons without a horn, but with a lightly elevated carina; tarsal claws except apically distinctly pectinate. [Not yet found in Britain, though it could occur; included in the key because Gauld & Mitchell (1977) erroneously recorded it. Face and clypeus black in ♀, yellow in ♂ with two black stripes; notaulus absent; mesoscutum and mesopleuron sparsely and shallowly punctured, strongly shining; scutellum black, rarely a little flushed reddish, hemispherically domed; 1cu-a interstitial; hind tarsomeres 4-5 in ♀, 2-5 in ♂ blackish; 34–37 flagellomeres; body length 16–21mm] . . . . . *T. brevicorne* (Gravenhorst, 1829)

– Antenna clearly surpasses head and mesosoma, most flagellomeres longer than wide, in ♀ centrally quadrate to a little transverse; frons with a horn between fore ocellus and antennal sockets (Fig. 17); claws only basally very weakly pectinate 2

2 Scutellum strongly humped and broadly yellow; 1st metasomal segment relatively deep, 4.1–4.5 times as long as high; outer orbits becoming more broadly yellow below, so that malar space is also yellow. [Not recorded from Britain, but included in the key because earlier British authors did not adequately resolve the taxonomy of *Therion*, and its host *Dendrolimus pini* (Linnaeus) (Lasiocampidae) may be native. Subtegular ridge yellow; in ♂ mid coxae below completely yellow, in ♀ yellowish-reddish spotted; mesopleuron posteriorly below and metapleuron in the middle mostly yellow to reddish spotted; head somewhat convexly narrowed behind eyes; notaulus only weakly indicated; 55–61 flagellomeres; body length 23–26.5mm] . . . . . *T. giganteum* (Gravenhorst, 1829)

– Scutellum moderately convex, often narrowly yellow or completely black; 1st metasomal segment slenderer, 4.8–6.3 times as long as high; outer orbits narrowly yellow, rarely reddish, the light colouration not reaching malar space 3



Figs 82–88. — Anomaloninae. 82–84, *Therion* species: 82, *Th. brevicorne*. 83, *Th. circumflexum*. 84, *Th. acronictum*. 85–88 *Trichomma* species: 85, *T. intermedium*. 86, *T. fulvidens*. 87, *T. enecator*. 88, *T. occisor*. (82 habitus. 83, 84 metasoma in lateral view. 85 head in lateral view. 86–88 head in facial view. 82–88 ♀).

3 In ♀, metasoma with a black stripe ventrolaterally on segments (3)4–5 connecting to mostly black segments 6–8, metasoma otherwise red (except black dorsal stripe on anterior two thirds of 2nd tergite) (Fig. 83) (in the more variable ♂ the ventrolateral stripe often weak or rarely absent and red may extend over all of segment 5 and even much of 6); pronotum anteroventrally in most specimens with a tooth, but occasionally without; scutellum usually yellow, rarely black; pubescence of head and mesosoma brown, rarely brownish black. [Notauli faintly indicated; subtegular ridge mostly black, rarely reddish yellow; mid coxa in both sexes black; hind tarsomeres 2 to 4 yellow in both sexes; 45–61 flagellomeres; body length 18–24mm] . . . . . *T. circumflexum* (Linnaeus, 1758)

– In ♀, metasoma with segments 1–4 red (apart from the black dorsal stripe of the 2nd tergite), sharply delineated from black segments 5–8 (Fig. 84) (we have not seen a ♂, but the sharp distinction in metasoma colour also applies (W. Pénigot, pers. comm.)); pronotum anteroventrally without a tooth; scutellum black; head and mesosoma with black pubescence. [Notauli absent; subtegular ridge and mid coxa always black; 55–59 flagellomeres; body length 19–22mm] . . . . . *T. acronictum* Pénigot, 2021

Key to the species of *Trichomma* Wesmael

1 Frons with a distinct horn (Fig. 85); lower anterior corner of pronotum modified with a claw- or hook-like process; mesopleuron with a wide smooth speculum. [Clypeal tooth very prominent; pronotum dorsally smooth and shining; flagellum with 41–44 segments; ovipositor sheath as long as first hind tarsomere; body length 12–16mm] . . . . . *T. intermedium* Krieger, 1904

– Frons without a horn; lower front corner of pronotum obtuse-angled or with a simple point; mesopleuron without speculum, fully sculptured 2

2 Light spots on head (Fig. 86) and mesosoma red; lower anterior corner of pronotum obtuse-angled; ovipositor sheath as long as 1st hind tarsomere; mesopleuron evenly and densely punctate. [Clypeal tooth very prominent (Fig. 86); scutellum strongly bituberculate; flagellum with 48–53 segments; body length 15–20mm] . . . . . *T. fulvidens* Wesmael, 1849

– Light spots on head and mesosoma yellow; lower front corner of pronotum pointed; ovipositor sheath distinctly longer than 1st hind tarsomere; mesopleuron otherwise 3

3 Apex of clypeus with a small median tooth (Fig. 87); entire mesopleuron with sharp longitudinal striae; pronotum dorsally smooth and with upper edge yellow. [Ovipositor sheath twice as long as 1st hind tarsomere; 31–35 flagellomeres; body length 9–13mm] . . . . . *T. enecator* (Rossi, 1790)

– Apex of clypeus rounded, toothless (Fig. 88); mesopleuron irregularly wrinkled to coarse and densely punctate; pronotum wrinkled throughout, its upper edge black. [Ovipositor sheath 1.8 times as long as 1st hind tarsomere; 39–42 flagellomeres; body length 11–13mm] . . . . . *T. occisor* Habermehl, 1909

MATERIAL IN NMS AND TAXONOMIC NOTES ON BRITISH SPECIES

Anomalonini

Anomalon cruentatum (Geoffroy, 1785)

(= *foliator* (Fabricius, 1798))

Many specimens. ENGLAND: 2♀♀, Kent, Graveney Marshes, TR0564 (V.C. 15), 17.viii.2009 (*L. Clemons*). FRANCE: Alpes-de-Haute-Provence, Ardèche, Aude, Var, Vaucluse. BULGARIA: Sliven. CROATIA: Dalmatia. MALTA. ITALY: Tuscany. Several times swept (MRS) from or below *Populus* on the continent, aggregations of males sometimes flying around the exposed distal sprays of foliage, in v, vi–vii and ix.

Anomalon ?*victorovi* Momoi, 1968

This is an eastern Palaearctic species, not found in Britain. RUSSIA: 1♀, Primorsky Kray, Lasovsky Zapoviednik, 526m, 14.vii–4.viii.2001 (*M. Quest*).

Gravenhorstiini

Agrypon anomelas (Gravenhorst, 1829)

ENGLAND: 1♂, Hampshire, Wickham, Botley Wood, SU 545105 (V.C. 11), ex *Favonius quercus* (Linnaeus) (Lycaenidae), em. 5.v.1978 (*A.M. George*). GREECE: 1♀, Macedonia, Mt. Orvilos, 1600-1700m, ex *Agrodiaetus* sp. (Lycaenidae), vii.2006, em. 2007 (*T. Lafranchis*). The first of these records was published by George (1978); the others of his reared series of four, and a further specimen from V.C. 11 reared from the same host (*G.T. Lyle*) are in NHMUK. This appears to be a specialist univoltine parasitoid of Lycaenidae.

Agrypon anxium (Wesmael, 1849)

SCOTLAND: 1♀, Dunbartonshire, Loch Lomond, Endrick Mouth NNR (V.C. 99), 27.vi.83 (*M.R. Shaw*); 1♀, Perthshire, Rannoch (V.C. 88), 2-13.vii.1984 (*R.M. Lyszkowski*); 1♀, Inverness-shire, Ben Nevis (V.C. 97), 1895 (*W.S. Bruce*). FRANCE: 1♀, Aude, Pouzols-Minervois, ex *Dryoboa labecula* (Esper) (Noctuidae) on *Quercus* (*ilex* etc.), coll. 26–31.v.2012, em. iii.2013 (*M.R. Shaw*). There are specimens from England in NHMUK and OUM but they are not reared. The interpretation of this name by Gauld & Mitchell (1977) was much wider, and included six other species found in Britain. Thus, none of the host records given by Gauld & Mitchell (1977) should be accepted. Further, their speculation that hybridization between *A. anxium* and *A. varitarsum* (also *A. varitarsum* and *A. flexorium*) may occur and prevent reliable determination is not our experience, and we put it down to their poor appreciation of species boundaries. The three species should separate reliably in the key we provide, and we have not seen specimens that we suspect to be hybrids.

Agrypon batis (Ratzeburg, 1855)

This species is here recorded from Britain for the first time. Several specimens. ENGLAND: V.C.s 3, 23, 34, 63. SCOTLAND: V.C.s 73, 88. Reared from Drepanidae (Thyatirinae): *Thyatira batis* (Linnaeus) on *Rubus idaea* (1♀) coll. 3.viii.2010 as small larva, em. 25.vi.2011 (*M.R. Shaw*), *Habrosyne pyritoides* (Hufnagel) (1♀) coll. 10.ix.1999, em. vii.2000 (*M. Townsend*). Non-reared specimens collected from vii-ix, univoltine. There are British specimens in NHMUK (additional V.C.s 3, 5, 6, 11, 20, 24 and IRELAND (V.C. H.13), including 1♀ from *H. pyritoides* (*L. Wakely*) and 1♀ from *T. batis*, 9.viii.1947 (*J. Cowley*). Also on the basis of several rearings in Germany from *T. batis* (*H. Schnee*), this seems to be a specialist univoltine parasitoid of Thyatirinae, overwintering in the host pupa. It is one of the few species that comes readily to light. Despite having more antennal segments this species seems to have been confused with *A. anxium* by Gauld & Mitchell (1977), as is revealed by their host record of *T. batis*.

Agrypon brachycerum Hellén, 1950

This species is here recorded from Britain for the first time. ENGLAND: 1♂, Hampshire, Pamber Forest (V.C. 12), 10.vi.1991 (*M. Edwards*). SCOTLAND: 1♂, Perthshire, Tummel Bridge (V.C. 88), ex *Archiearis parthenias* (Linnaeus) (Geometridae) on *Betula*, coll. 3.vii.1989, em. 26.v.1990 (*M.R. Shaw*); 1 ♂, Inverness-shire, Granish Moor (V.C. 96), ex same host and plant, coll. 24.vi.2006, em. 31.v.2007 (*M.R. Shaw*). IRELAND: 1♀, County Galway, Pantry (V.C. ?H5), labelled as ex *Bupalus piniaria* (Linnaeus), coll. 4.vi.1987 (*B.K West*). In addition, 1 ♂ reared from *A. parthenias* (England, Hampshire, New Forest 20.vi.1911 (*G.T. Lyle/E. Morris*)) is in NHMUK, and it has been reared from this host in Germany (*R. Hinz* seen by HS). This seems to be a specialist univoltine parasitoid of *Archiearis*, overwintering in the host pupa, and the supposed rearing from *Bupalus* (which lacks host remains) seems very improbable and should be discounted. *Agrypon brachycerum* was raised from synonymy under *A. anxium* by Schnee (2018) and would have been hidden under *A. anxium* by Gauld & Mitchell (1977).

'*Agrypon brevicolle* (Wesmael)' was included as British by Gauld & Mitchell (1977), but it is not clear to which species their record really belonged, and the cited female specimen (for which they give the data 'Killiecrankie, Scotland, viii.1969') could not be located. The correct generic placement and name for the specific epithet is *Perisphincter brevicollis* (Wesmael) (Schnee 1978) and for that reason *Perisphincter* is included in the key to genera. However, I.D. Gauld (pers. comm. to MRS 16 July 2002) was adament that the specimen referred to, which he had collected himself, was not a species of *Perisphincter*, although he was unable to say what had become of it. Gauld & Mitchell's (1977) suggestion that *Agrypon hilare* (Tosquinet), which has not been found in Britain, might be conspecific with their *brevicolle* seems improbable.

Agrypon canaliculatum (Ratzeburg, 1844)

The name *canaliculatum* was interpreted in a different way (as a species of *Habronyx* (*Camposcopus*)) by Gauld & Mitchell (1977), and they did not distinguish the present species from *A. anxium*. The hitherto unclear status of the name was established by designation of a neotype (Schnee 1993). The species is here recorded from Britain for the first time. Numerous specimens, almost all reared. ENGLAND: V.C.s 15, 20, 21, 22, 24, 34, 40. SCOTLAND: V.C.s 95, 98, 105. FRANCE: Dordogne. GERMANY: Sachsen-Anhalt. Reared from Yponomeutidae: *Yponomeuta cagnagella* (Hübner) on *Euonymus* sp. (11♀♀, 18♂♂) (*E.S. Bradford*, *D. Gibbs*, *B.T. Parsons*, *M.R. Shaw*, *I. Sims*), *Yponomeuta evonymella* (Linnaeus) on *Prunus padus* (5♀♀, 2♂♂) (*I. Sims*, *P. Wormell*), *Yponomeuta malinellus* Zeller (1♀) (*D.J. Poynton*), *Yponomeuta* sp. on *Euonymus europaeus* (1♀, 2♂♂) (*M.R. Shaw*, *R.A. Softly*); *Yponomeuta* sp. (4♀♀, 2♂♂) (*G. Hantke*) and Ypsolophidae: *Ypsolopha parenthesella* (Linnaeus) on *Betula* (1♀) (*M.R. Shaw*). Emergence has been in the year of host pupation, in about vii-viii from hosts collected in v-vi. Probably univoltine, though the means of overwintering are unclear. Additional English specimens reared from *Y. cagnagella* are in NHMUK and this is clearly a specialist parasitoid of *Yponomeuta*, despite the *bona fide* (with host remains) single rearing from *Ypsolopha*.

Agrypon clandestinum (Gravenhorst, 1829)

Numerous specimens. ENGLAND: V.C.s 7, 8, 12, 16, 17, 23, 24, 28, 38, 40, 57, 58, 64, 69. ISLE OF MAN: V.C. 71. SCOTLAND: V.C.s 86, 88, 89, 92, 95, 96, 106. IRELAND: County Galway (V.C. ?H5). NETHERLANDS: Gelderland. POLAND: Podlaskie Voivodeship. SPAIN: Madrid. SWEDEN: Västerbotten. Reared from Geometridae: *Bupalus piniaria* (Linnaeus) (1♂) (*B.K. West*), *Eupithecia assimilata* Doubleday on *Ribes rubrum* (1♂) (*F.D. Bennett*), *Eupithecia linariata* ([Denis & Schiffermüller]) (1♀) (Netherlands; *G. Bryan*), *Eupithecia millefoliata* Rössler on *Achillae millefolium* (1♀) (*P.A. Sokoloff*), *Eupithecia virgaureata* Doubleday on *Senecio* (1♀, 2♂♂) (*D. Parkinson*, *B. Statham*, *P.H. Sterling*), *Eupithecia* sp. on *Quercus* (1♀) (*M.R. Shaw*), *Gymnoscelis rufifasciata* (Haworth) on *Calluna*, *Erica* (2♀♀, 1♂) (*M.R. Shaw*), *Phaiogramma etruscaria* (Zeller) (1♀) (Spain; *G.E. King*); Ypsolophidae: *Ypsolopha parenthesella* (Linnaeus) on *Betula* (2♀♀, 1♂) (*K.P. Bland*, *M.R. Shaw*), *Ypsolopha scabrella* (Linnaeus) (1♀) (*S.N.A. Jacobs*), *Ypsolopha* ?*ustella* (Clerck) on *Corylus* (1♂) (*F.I. Smith & D.J. Poynton*), *Ypsolopha* sp. on *Quercus* (1♀) (*E.C. Pelham-Clinton*). Non-reared specimens collected in about vii-viii. Individuals reared from geometrids have usually overwintered in the host pupae, while those from *Ypsolopha* have emerged in the year of host pupation. However, this might reflect the overwintering habits of univoltine hosts parasitized in late summer rather than indicating plurivoltinism.

We take this opportunity to correct the determination of a reared specimen in OUM identified by Ferrière as 'Labrorychus clandestinus Gr.' as *Camposcopus nigricornis* (Wesmael) (det. HS). As a result of the initial misidentification, cephalic sclerites of the final instar parasitoid larva extracted from the host pupa were figured by Short (1978, fig. 647) under the misidentified name *Trichionotus* [recte *Agrypon*] *clandestinum*.

Agrypon cognatum Förster, 1860 (stat. rev.)

We are raising this species from synonymy under *A. varitarsum* – see further comment under that name. Numerous specimens. ENGLAND: V.C.s 7, 8, 22, 23, 24, 37, 38, 69, 70. SCOTLAND: V.C. 106. FRANCE: Dordogne. GERMANY: Bavaria. Reared from Geometridae: *Eupithecia* sp. on *Salix* (1♀) (*M.R. Shaw*); Incurvariidae: ?*Incurvaria oehlmanniella* (Hübner) (1♀) (*A.N.B. Simpson*); Tortricidae: *Acleris comariana* (Lienig & Zeller) on *Potentilla palustre* (3♂♂) (*A.N.B. Simpson*), *Acleris schalleriana* (Linnaeus) on low growth of *Viburnum opulus* (3♀♀) (*M.R. Shaw*); and in Coll. HS *Celypha rivulana* (Scopoli) on *Galium mollugo* (1♀). Non-reared specimens collected from v-viii. Plurivoltine, overwintering in the host pupa.

Agrypon delarvatum (Gravenhorst, 1829)

Probably not a British species. Many specimens. FRANCE: Dordogne, Var. GERMANY: Baden-Württemberg. GREECE: N. Peloponnese. ITALY: S. Tyrol. POLAND: Lower Silesian. RUSSIA: Primorsky Kray. Reared from Nymphalidae (Satyrinae): *Coenonympha* sp. (det. MRS) (1♂) (Poland; *C. Bystrowski*), *Lasiommata maera* (Linnaeus) (1♀) (Greece; *T. Lafranchis*). Non-reared specimens collected from v–viii. The Greek specimen emerged in the year of host pupation, and it is probably plurivoltine. Included by Gauld & Mitchell (1977) as a British species

but the only specimen seen by them and purporting to be *A. delarvatum* that we have been able to locate has been redetermined as a specimen of *A. clandestinum*, and there are no British specimens of *A. delarvatum* in NHMUK or NMS. The supposed host, *Eupithecia trisignaria* (Herrich-Schäffer), assigned by Gauld & Mitchell (1977) is clearly false.

Agrypon flaveolatum (Gravenhorst, 1807)

Numerous specimens. ENGLAND: V.C.s 7, 11, 12, 13, 14, 15, 16, 17, 20, 22, 23, 24, 27, 36, 58, 59, 60, 65, 66, 69. SCOTLAND: V.C.s 76, 77, 82, 83, 85, 86, 87, 88, 89, 92, 95, 96, 97, 98, 99, 101, 103, 105, 106, 107. BULGARIA: Blagoevgrad. ICELAND: Öraefi. ITALY: South Tyrol. POLAND: Podlaskie, Warmian-Masurian. SWEDEN: Bohuslän, Gästrikland. Reared from Geometridae: ?*Alsophila aescularia* ([Denis & Schiffermüller]) (1♀, 1♂) (*R.I. Lorimer*), *Pasiphila debiliata* (Hübner) on *Vaccinium myrtillus* (4♂♂) (Poland; *M.R. Shaw*), *Earophila badiata* ([Denis & Schiffermüller]) (1♀) (*K.P. Bland*), *Epirrita autumnata* (Borkhausen) on *Betula* (1♂) (*M.R. Shaw*), *Epirrita dilutata* ([Denis & Schiffermüller]) on *Crataegus*, *Quercus* (4♀♀, + 1 ♀ from ?this host) (*M.R. Shaw*, *P. Summers*), *Eupithecia pusillata* ([Denis & Schiffermüller]) on *Juniperus* (1♂) (*M.R. Shaw*), *Hydriomena furcata* (Thunberg) on *Corylus*, *Vaccinium myrtillus* (2 ♀, 3 ♂) (*H. McHaffie*, *M.R. Shaw*), *Macaria brunneata* (Thunberg) (5♀♀, 2♂♂) on *Vaccinium myrtillus* (Poland; *M.R. Shaw*), *Mesotype didymata* (Linnaeus) (1♀, 1♂) (*K.P. Bland*), *Operophtera brumata* (Linnaeus) on *Corylus*, *Crataegus*, *Prunus padus*, *Prunus spinosa* (11♀♀, 5♂♂) (*M.R. Shaw*), *Theria primaria* (Haworth) on *Prunus spinosa* (1♀, 2♂♂) (*M.R. Shaw*), *Trichopteryx carpinata* (Borkhausen) on *Betula*, *Salix* (2♀♀) (*M.R. Shaw*) [additionally 1♀ labelled as from *Ematurga atomaria* (Linnaeus) on *Myrica gale* but with a host pupa that was probably of a *Eulithis* sp. (det. MRS), from which indeed a parasitoid had emerged]; Noctuidae: *Brachylomia viminalis* (Fabricius) on *Salix caprea* (1♀) (*M.R. Shaw*); Nolidae: *Nola cucullatella* (Linnaeus) on *Prunus spinosa* (1♂) (*M.R. Shaw*). Almost all non-reared specimens collected in iv–vi, but very rarely in viii–ix, representing specimens that (unusually) emerged in the year of host pupation (e.g. one of the Polish specimens from *M. brunneata* listed above, coll. 22.v.2014, em. 20.ix.2014). Normally univoltine, parasitizing spring-feeding hosts on woody plants, mainly but not exclusively arboreal Geometridae, and overwintering in the host pupa.

Agrypon flexorium (Thunberg, 1824)

Numerous specimens. ENGLAND: V.C.s 7, 12, 16, 17, 22, 24, 25, 27, 40, 58. SCOTLAND: V.C.s 81, 87, 88, 97, 106, 108. FRANCE: Alpes-de-Haute-Provence, Côte-d'Or, Dordogne, Hautes-Alpes, Puy-de-Dôme. GREECE: E. Rhodopi. POLAND: Podlaskie. SPAIN: Barcelona. SWEDEN: Västerbotten. Reared from Chimabachidae: *Diurnea fagella* ([Denis & Schiffermüller]) on *Acer campestre*, *Betula*, *Quercus* (3♀♀, 3♂♂) (*M.R. Shaw*); Drepanidae: *Drepana falcatoria* (Linnaeus) (1♀) (*G.M. Haggett*), *Falcaria lacertinaria* (Linnaeus) on *Betula* (4♀♀, 2♂♂) (*A.A. Allen*, *K.P. Bland*, *M.R. Shaw*); Gelechiidae: *Teleiopsis diffinis* (Haworth) (1♂) (*R.J. Heckford*); Geometridae: *Cyclophora* ?*punctaria* (Linnaeus) (1♀) (*R.I. Lorimer*); Lycaenidae: *Callophrys rubi* (Linnaeus) on *Helianthemum*, 'vetches' (2♀♀) (France; *M.R. Shaw*); Pyralidae: *Ortholepis betulae* (Goeze) on

Betula (3♀♀, 2♂♂) (*J.R. Langmaid*, *E.C. Pelham-Clinton*); Psychidae: ?*Acanthopsyche* sp. (det. MRS) (1♂) (Spain; *J. Planas & C. Stefanescu*). Non-reared specimens collected v–viii. Apparently plurivoltine as emergence has been in the year following pupation when the host is a drepanid or *D. fagella* (*i.e.*, overwintering in the host pupa), but otherwise in the year of collection of the host larva. See under *A. anxium* for comment refuting Gauld & Mitchell's (1977) speculation that this species hybridizes with *A. varitarsum*.

Agrypon gracilipes (Curtis, 1839)

Many specimens. ENGLAND: V.C.s 1, 3, 4, 5, 6, 12, 22. WALES: V.C.s 35, 48. FRANCE: Dordogne. RUSSIA: Primorsky Kray. Reared from Crambidae: *Anania hortulata* (Linnaeus) (1♀) (*R.J. Heckford*), additionally 1♀ from a 'pyralid' [sensu lato] found crawling on a wall (*R.J. Heckford*); Depressariidae: *Depressaria daucella* ([Denis & Schiffermüller]) on *Daucus carota*, *Oenanthe aquatica* (2♀♀, 2♂♂) (*E.C. Pelham-Clinton*, *I. Sims*, *P.A. Sokoloff*). Non-reared specimens collected in v-viii. Plurivoltine; specimens from *D. daucella* have emerged in the year of collection while the ones from *A. hortulata* and the unidentified host (that might have been the same species) overwintered in the host prepupa.

Agrypon hilare (Tosquinet, 1889)

This species has not been found in Britain. FRANCE: 1♀, Ardèche, Darbres, 19.vii.1996 (*M.R. Shaw*). POLAND: 1♀, Podlaskie Voivodeship, Biebrza National Park, 17.vi-16.vii.1998 (*J. Hilszczanski*).

Agrypon hinzi Schnee, 2018

English and Welsh specimens were listed as paratypes of this species in the original description. ENGLAND: 1♀, Norfolk, Welborne (V.C. 27), viii.1986 (*R.E. Evans*). Wales: 1♂ (paratype), Glamorgan, Cardiff, Rhydlemis (V.C. 41) ex *Semioscopis steinkellneriana* ([Denis & Schiffermüller]) (Depressariidae) on *Sorbus aucuparia*, coll. viii.1984, em. 5.iv.1985 (*A.N.B. Simpson*). There are paratypes from V.C.s 26 or 28, and 27 or 29 in NHMUK. This species would have been included in Gauld & Mitchell's (1977) concept of *A. anxium*.

Agrypon interstitiale Schnee, 1989

This species is here recorded from Britain for the first time. SCOTLAND: 1♀, Ross-shire, Anoch Beag, NN 1870, 850m (V.C. 106) 12,vi–3.vii.1989 (*I. MacGowan*); 1♀, Perthshire, Errol, Paddockmuir Wood (V.C. 89), 22–29.v.1987 (*D. Phillips*); 1♀, Inverness-shire, summit of Ben Nevis (V.C. 97), 1895 (*W.S. Bruce*); 1♂, Lanarkshire, Cadder (V.C. 77), 28.v.1872 (*P. Cameron*). In addition there is 1♀, ENGLAND, Suffolk, Sudbury district (V.C. 26), 1916 (*Harwood*) in NHMUK. This is another species that would fall into Gauld & Mitchell's (1977) concept of *A. anxium*.

Agrypon minutum (Bridgman & Fitch, 1884)

Numerous specimens. ENGLAND: V.C.s 1, 2, 4, 11, 15, 17, 22, 29, 37. SCOTLAND: V.C.s 77, 83, 87, 88, 92, 111. IRELAND: V.C. H30. SWEDEN: Skåne.

Reared from Gelechiidae: *Anacampsis populella* (Clerck) on *Salix* (1♀, 1♂) (*M.R. Shaw*), *Pseudotelphusa paripunctella* (Thunberg) (1♂) (*K.P. Bland*); Gracillariidae: *Povolnya leucapennella* (Stephens) (1♀) (*R.J. Heckford*); Nolidae: *Earias clorana* (Linnaeus) (1♀, 1♂) (*P.H. Sterling*); Pyralidae: *Acrobasis consociella* (Hübner) (1♀) (*J.M. Chalmers-Hunt*), ?*Phycita roborella* ([Denis & Schiffermüller]) (1♀) (*A.N.B. Simpson*); Schreckensteiniidae: *Schreckensteinia festaliella* (Hübner) (1♀, 5♂♂) (*K.P. Bland*, *J.L. Gregory*, *M.R. Shaw*); Tortricidae: *Acleris lorquiniana* (Duponchel) on *Lathyrus* (3♀♀) (*P.H. Sterling*), *Acleris hastiana* (Linnaeus) (1♀) (*P.A. Sokoloff*), *Epinotia subocellana* (Donovan) (1♀) (*J.M. Chalmers-Hunt*); Yponomeutidae: *Pseudoswammerdamia combinella* (Hübner) (1♀) (*J.L. Gregory*). Non-reared specimens collected from vi–ix. Plurivoltine, overwintering in the host pupa. The host repertoire is taxonomically broad, but the above hosts all feed on more or less woody plants. Included in their concept of *A. anxium* by Gauld & Mitchell (1977), in common with several previous authors.

Agrypon polyxenae (Szépligeti, 1899)

This is not a British species. Numerous specimens. CZECH REPUBLIC. FRANCE: Hautes-Alpes, Hérault, Var. GREECE: Lesbos. ISRAEL: Canada Park. SERBIA: Pirot. SICILY: Catania. SPAIN: Teruel, Málaga. Reared from Papilionidae: *Archon apollinus* (Herbst) (2♀♀) (Greece, Israel; *D. Benyamini*, *P.J.C. Russell*), *Zerynthia polyxena* ([Denis & Schiffermüller]) (14♀♀, 6♂♂, + 1♀ from ?this host) (Czech Republic, France, Serbia, Sicily: *E. Baletto*, *V. Cameron-Curry*, *M. Gascoigne-Pees*, *P. & B. Kan*, *O. Lewis*, *C.J. Luckens*), *Zerynthia rumina* (Linnaeus) (9♀♀, 4♂♂) (France, Spain: *D. Chanselme*, *P. & B. Kan*, *C.J. Luckens*, *N. Maurel*, *J. Pateman*, *P.J.C. Russell*). Univoltine, overwintering in the host pupa. This is a rather common species where its few papilionid hosts occur.

Agrypon rugifer (Thomson, 1894)

This species is here recorded from Britain for the first time. WALES: 1♂, Merioneth, Pennal (V.C. 48), ex indet. Noctuidae, larva coll. (but not feeding) on *Corylus*, 13.ix.1980, em. 14.vi. 1981 (host remains not preserved) (*E.C. Pelham-Clinton*). A regular host in Germany is the hypenine erebiid *Hypena crassalis* (Fabricius); univoltine, overwintering in the host pupa (*H. Schnee*). This species is figured by Gauld & Mitchell (1977, fig. 79), but it was not included in the key and their interpretation of the name is unclear.

Agrypon varitarsum (Wesmael, 1849)-aggregate

Specimens in NMS that had been under *A. varitarsum* all appear to fit *A. cognatum* and are recorded under that name. The true *A. varitarsum* appears, however, be a British species, based on a ♀ in NHMUK from Ashurst, Hampshire (V.C. 11). There are specimens of undoubted *A. varitarsum* in the Horstmann collection (ZSM) reared from the arboreal tortricids *Archips crataegana* (Hübner), *Archips rosana* (Linnaeus) and *Choristoneura hebenstreitella* (Müller) (all host remains verified by HS), which may suggest a more specialised host repertoire than that seen in *A. cognatum.* Barcodes of three specimens each of these two segregates from Germany form discrete clusters with a difference averaging 7.4% (S. Schmidt,

pers. comm.). However, the situation is further complicated by considerable morphological variation within the *A. varitarsum*-aggregate as a whole, whose overall characteristics are: antenna as long as body, with 1st flagellomere shorter that 2nd and 3rd together; conspicuous smooth areas on pronotum and mesopleuron; small metasternal protuberances; posteriorly narrowed petiole. See comment under *A. anxium* refuting the speculation by Gauld & Mitchell (1977) that *A. varitarsum* hybridizes with *A. anxium* and *A. flexorium*.

Aphanistes bellicosus (Wesmael, 1849)

The true *A. bellicosus* is here recorded from Britain for the first time. Several specimens. Reared from Geometridae: ENGLAND: 1♀, Cornwall, SX0455 (V.C. 2), ex *Ectropis crepuscularia* ([Denis & Schiffermüller]), em. 22.iii.2005 (*J.L. Gregory*), AUSTRIA: 1♀, Tirol, ex *Eupithecia subfuscata* (Haworth), em. 21.v.2021 (*M. Leipnitz*). FINLAND: Pohjois-Savo. SWEDEN: Västerbotten. Voltinism unclear, but it overwinters in the host pupa. The names *bellicosus* and *xanthopus* were both applied incorrectly by Gauld & Mitchell (1977) to the species properly called *Aphanistes gliscens*.

Aphanistes gliscens (Hartig, 1838)

(= *bellicosus* and *xanthopus* sensu Gauld & Mitchell, misidents)

Numerous specimens. ENGLAND: V.C.s 7, 17, 58, 60. SCOTLAND: V.C.s 74, 83, 87, 88, 95, 97, 104, 107, 110, 111. BULGARIA: Blagoevgrad, Varna. FRANCE: Aude, Hautes-Alpes. HUNGARY: Vas. SWEDEN: Härjedalen. Reared from Geometridae: *Agriopis marginaria* (Fabricius) on *Myrica* (2♀♀, 2♂♂) (*M.R. Shaw*), indet. geometrid on *Vaccinium* (1♀) (Hungary; *M.R. Shaw*); Noctuidae: *Dryobota labecula* (Esper) on *Quercus* (2♂♂) (France; *M.R. Shaw*), *Orthosia cruda* ([Denis & Schiffermüller]) on *Quercus* (1♂) (*W.A. Watson*), *Panolis flammea* ([Denis & Schiffermüller]) on *Pinus* (1♀) (*J. Hobart*) and from pupae of this host collected below *Pinus* in winter (51♀♀, 48♂♂) (from several intensive surveys, *S.R. Leather*, *P.F. Entwistle*), indet. green noctuid (1♀) (*M.R. Shaw*). The hosts are arboreal medium-sized noctuids and geometrids, and it is known as a particularly regular parasitoid of *P. flammea*. Non-reared specimens collected in (v)vi–vii. Univoltine, overwintering in the host pupa. Gauld & Mitchell (1975) incorrectly referred specimens of this taxon to *A. bellicosus* and '*A. xanthopus*', which last is a junior synonym of *Heteropelma amictum* (Schnee 1989).

Aphanistes ruficornis (Gravenhorst, 1829)

Several specimens. SCOTLAND: V.C.s 73. 95. IRELAND: V.C. H20. BULGARIA: Silven. FRANCE: Dordogne, Haute-Marne. Reared from Noctuidae: *Moma alpium* (Osbeck) on *Fagus*, *Quercus* (2♀♀, 2♂♂) (France; *M.R. Shaw*); Notodontidae: pupa of *Notodonta dromedarius* (Linnaeus) (det. HS) coll. below *Betula* (1♀) (*K.P. Bland*). Non-reared specimens collected from vi-ix but rearing data suggest that it is univoltine. Overwinters in the host pupa. The Bulgarian specimen (Sinite Kamani, 480m, 14.vi.2019, *S. Beshkov & A. Nahirnić*)

is of the form having a weak epicnemial carina present laterally for which (if formal recognition were to be justified) the name *wesmaeli* (Holmgren, 1857) is available.

Aphanistes klugii (Hartig, 1838)

This species has only very recently been found in Britain (B. Hargreaves, in prep.). FRANCE: 1♀, Calvados, St Laurent-sur-Mer, coll. 14.ix.2013 (*J.C. Warwick*). In Germany it is a regular parasitoid of the sphingid *Sphinx pinastri* Linnaeus (*H. Schnee*).

Atrometus insignis Förster, 1878

Probably not a British species. Many specimens, all reared. ALGERIA: Batna. FRANCE: Pyrénées-Orientales, Var. UZBEKISTAN: Hissar. Reared from Zygaenidae: *Zygaena cocandica* Erschoff on *Caragana* sp. (2♀♀, 2♂♂) (Uzbekistan; *A. Hofmann*), *Zygaena occitanica* (Villers) (1♀) (France; *J.A. Guilloton*), *Zygaena rhadamanthus* (Esper) on *Dorycnium pentaphyllum* (1♂) (France; *P. & B. Kan*), *Zygaena favonia thevestis* Staudinger (3♀♀, 1♂) (Algeria; *A. Hoffmann & G. Reiss*), *Zygaena* ?*trifolii* (Esper) on *Dorycnium pentaphyllum* (1♂) (France; *P. & B. Kan*). Adults emerge in the year of host pupation. Presumably univoltine, overwintering in the host larva. Gauld & Mitchell (1977) included this as a British species, but we have been unable to trace a British specimen. As the hosts of this specialist parasitoid of *Zygaena* are so frequently reared, the lack of British specimens must be telling.

Barylypa delictor (Thunberg, 1824)

Many specimens, almost all reared. ENGLAND: V.C. 69. SCOTLAND: V.C.s 88, 103, 107. Reared from Noctuidae: *Acronicta menyanthidis* (Esper) on *Myrica* (4♀♀, 6♂♂) (*B. Barr*, *S.D. Beavan*, *K.P. Bland*, *M. Townsend*), *Acronicta rumicis* (Linnaeus) (1♀) (*K.P. Bland*). FRANCE: 1♂, Lozère, Mas-Saint-Chély, 1064m, ex Lasiocampidae: *Malacosoma castrensis* (Linnaeus) (det. MRS/HS), coll. as cocoon 13.vii.1993, em. 5.viii.1993 (*A. Rouch*). This seems to be largely a submontane and moorland species in Britain. From *Acronicta* species it is univoltine, overwintering in the host pupa, but the labelling of the French rearing from *Malacosoma* suggests a different phenology. In Germany it has been reared from the noctuid *Calophasia lunula* (Hufnagel) (*H. Schnee*).

Barylypa helleni Schnee, 1989

This species has not been found in Britain. Several specimens, all reared. FRANCE: Hérault; Puy-de-Dôme. IRAN: Kordestan, Mazandaran. ITALY: L'Aquila. Reared from Zygaenidae: *Zygaena carniolica* (Scopoli) (1♂) (France; *W.G. & S.M. Tremewan*), *Zygaena carniolica demawendi* Holik (1♀) (Iran; *C. Naumann*), *Zygaena filipendulae* (Linnaeus) (1♀) (France; *A. Migeon*), *Zygaena punctum* Ochsenheimer (1♀) (Italy; *W.G. Tremewan*), *Zygaena tamara* Christoph (3♂♂) (Iran; *A. Hoffmann*). This specialist parasitoid of *Zygaena* is univoltine and presumably overwinters in the host larva.

Barylypa mesozona (Förster, 1878)

This species has not been found in Britain. GERMANY: 1♀, 1♂, Sachsen-Anhalt, Petersroda, ex *Phalera bucephala* (Linnaeus) (Notodontidae), coll. 15.ix.1974, em. 12.vii.1975 (1♀) and coll. 12.ix.1975, em. 31.vi.1976 (1♂) (*H. Schnee*). From German rearings (*H. Schnee*) this appears to be a univoltine specialist parasitoid of *P. bucephala*, overwintering in the host pupa.

Barylypa pallida (Gravenhorst, 1829)

This species has not been found in Britain. GERMANY: 1♀, Baden-Württemberg, Hessigheim, 13.viii.1906 (*J. Hermann*).

Barylypa propugnator (Förster, 1855)

(= *insidiator* (Förster, 1878), = *carinata* (Brischke, 1880)) (Schnee 2008)

Several specimens. ENGLAND: V.C.s 11, 17, 22, 28, 30, 40. Reared from Erebidae (Arctiinae): *Tyria jacobaeae* (Linnaeus) on *Senecio* (1♀, 2♂♂) (*A. Spicer*); Noctuidae: *Anarta myrtilli* (Linnaeus) on *Calluna* (1♀) (*B.T. Parsons*), *Ceramica pisi* (Linnaeus) (1♀) (*M.S. Parsons*). Non-reared specimens collected from vi–viii; at least partly plurivoltine, overwintering in the host pupa. In Germany it is a frequent parasitoid of *A. myrtilli*, potentially in two generations. The rearings from *T. jacobaeae* (a late summer host) demonstrate an interesting disjunction in its host range (one from this host in Germany also in Coll. HS (*R. Hinz*)), in which it overwinters as an early instar larva in the host pupa. This is a variable species: the nominate form occurs in Britain and may be somewhat darkened (as in the specimen from *C. pisi*, somewhat resembling *B. mesozona*).

Barylypa rubricator (Szépligeti, 1899)

Although the relevant specimens are not in NMS, we take the opportunity to record this species from Britain for the first time on the basis of a specimen in the Hunterian Museum (Glasgow University) from ENGLAND: 1♀, Norfolk, Catfield (V.C. 27), 14.vii.1920 (*J.J.F.X. King*), and 1♂, British Isles (Stephens Coll.) in NHMUK. In NMS, ITALY: 1♂, South Tyrol, Burgeis, 11.vii.2004 (*M.R. Shaw*).

Barylypa rufa (Holmgren, 1857)

This species has not been found in Britain. HUNGARY: 1 ♀, Szeged, 24.v.2001 (*M.R. Shaw*).

Barylypa uniguttata (Gravenhorst, 1829)

This is probably not a British species. FRANCE: 1 ♀, Dordogne, St Alvère, 20.iv.2000 (*R.R. Askew*). GERMANY: 2♂♂, Sachsen, Dübener Heide, Pressel, 8.iv.1990 and 13.iv.2022 (*H. Schnee*). Included as British by Gauld & Mitchell (1977) on the basis of a single specimen from north Norfolk, but we have not been able to locate this or any other British specimen.

Camposcopus nigricornis (Wesmael, 1849)

(= *Habronyx* (*Camposcopus*) *canaliculatus* sensu Gauld & Mitchell, misident. and in part)

Numerous specimens. ENGLAND: V.C.s 1, 3, 4, 7, 9, 11, 13, 14, 16, 17, 20, 22, 23, 24, 27, 34, 37, 38, 58, 59, 63, 64. SCOTLAND: V.C.s 89, 90, 92, 95, 99, 101. WALES: V.C. 52. BULGARIA: Sliven. DENMARK: Sjaelland. SERBIA: Stara Planina. Reared from Gelechiidae: *Scrobipalpa acuminatella* (Sircom) on *Cirsium vulgare* (1♀) (*S.D. Beavan*), Tortricidae: *Acleris hastiana* (Linnaeus) on *Salix cinerea* (3♀♀) (*J.R. Langmaid*, *E.C. Pelham-Clinton*, *M.R. Young*), ?*Acleris sparsana* ([Denis & Schiffermüller]) on *Nothofagus* (1♀) (*J.N. Greatorex-Davies*), *Aphelia viburnana* ([Denis & Schiffermüller]) on *Myrica gale* (1♀) (*J.R. Langmaid*), *Archips rosana* (Linnaeus) on *Ulmus* (1♂) (*A.N.B. Simpson*), *Epiphyas postvittana* (Walker) (1♀) (*J.L. Gregory*), ?*Pandemis cerasana* (Hübner) on *Betula* (1♀) (*A.N.B. Simpson*), ?*Ptycholoma lecheana* (Linnaeus) (1♀) (collector unknown), indet Tortricidae on *Myrica* (1♀, 1♂) (*M.R. Shaw*), indet. Tortricidae pupa on *Populus alba* (2♂♂) (*J.R. Langmaid*). Non-reared specimens in NMS collected from viii-x, but in Germany (HS) in every month from v-x. Almost all rearings of NMS specimens are from hosts collected in vi/vii with emergence in viii/ix, but once in v from a host collected earlier that month. Apparently at least largely plurivoltine; from material seen by HS in wider museum collections it is clear that this species can overwinter in the host pupa (ex *Epinotia tetraquetrana* (Haworth), em. [indoors ?] late ii; Copenhagen Museum), with the possibility of overwintering in the larva of some of its other hosts also open. Short (1978, fig. 647) figured the larval cephalic sclerites of *C. nigricornis*, but misidentified as *Agrypon* (as *Trichionotus*) *clandestinum* (see note under that species).

Camposcopus perspicuus (Wesmael), was included as British (as *Habronyx* (*Camposcopus*) *perspicuus*) by Gauld & Mitchell (1977), clearly on the basis of several specimens. Although quite what was meant by this name is not clear, it was evidently a misidentification as there are no specimens accurately determined as being this species in the collections of NMS, NHMUK, or any of the other collections cited by Gauld & Mitchell (1977) as having been examined, so we are deleting it from the British list.

Camposcopus ruficoxis Schnee & Shaw sp. n. (described above)

Paratypes in NMS summarised here for consistency with the other species treated:

Many specimens. ENGLAND: V.C.s 3, 12, 17, 27, 58, 63, 64. SCOTLAND: V.C.s 77, 87, 89, 92. ALBANIA: Shkodra. BULGARIA: Sliven. GERMANY: Baden-Württemberg. Reared from Gelechiidae: *Anacampsis populella* (Clerck) (1♀) (*C.W.N. Holmes*); Tortricidae: *Epinotia caprana* (Fabricius) on *Myrica* (1♂) (*J.R. Langmaid*); indet. tortricids on *Betula* (1♂) (*R.P. Knill-Jones*) and *Salix* (1♂) (*J.L. Gregory*). Additionally (but non-paratype because locality data are missing) *Tortrix viridana* Linnaeus (1♂) (*K.P. Bland*). All the above emerged in the year of host pupation. Non-reared specimens in NMS collected in v–vi and ix–xi but in Germany (HS) adults have been collected in every month from v-x. Presumably plurivoltine; one paratype (q.v.) emerging in v from *Diurnea fagella* ([Denis & Schiffermüller]) (Chimabachidae) shows that this species can overwinter in the host

pupa (see also *C. nigricornis*). Gauld & Mitchell (1977) presumably included this species in their concept of *Habronyx* (*Camposcopus*) *canaliculatus*.

Clypeocampulum barbarae Schnee, 2014

This is not a British species. Several specimens, comprising the ♀ holotype and 6♀♀, 1♂ paratypes. SPAIN: Barcelona. Reared from Pieridae: *Anthocharis euphenoides* Staudinger on *Biscutella laevigata*, larvae coll. v–vii, em. v the following year (7♀♀, 1♂) (Spain: *C. Stefanescu*). Univoltine, overwintering in the host pupa. One ♀ of this apparently monophagous species was seen attacking a fourth instar host larva in v (*C. Stefanescu*).

Clypeocampulum lubricum (Atanasov, 1975)

This species is not British. ISRAEL: 1♀, Kadar South, 540m, ex *Zegris eupheme* (Esper) (Pieridae) on *Erucaria* sp., coll. 29.iii.2013, em. 16.iv.2014 (*D. Benyamini*), 1♀, Nahal Gorfary, Hurhonia valley, 146m, same host on *Reboudia pinnata*, coll. 27.iii.2013, em. 11.iv.2014 (*D. Benyamini*). UKRAINE: 1♀, 1♂, Crimea, Voikovo, same host, em. iii.1999 (*M. Gascoigne-Pees*). Univoltine, overwintering in the host pupa. This would appear to be another monophagous *Clypeocampulum* species.

Erigorgus annulitarsis (Thomson, 1892)

This is not a British species. GREECE: Peloponnese, 1♀, Sparti, Mistras, 3.v.2007 and 1♂, Kalendzi, 29.iv.2001 (*H. Schnee*).

Erigorgus cerinops (Gravenhorst, 1829)

Many specimens. ENGLAND: V.C.s 7, 23, 60, 62, 67. IRELAND: V.C. H23. SCOTLAND: V.C.s 72, 91, 97, 103. WALES: V.C.s 49, 52. FRANCE: Hautes-Alpes. GERMANY: Baden-Württemberg, Upper Bavaria. Reared from Erebidae (Arctiinae): *Parasemia plantaginis* (Linnaeus) (5♀♀) (*N.W. Harwood*, *T.M. Melling*); Noctuidae: *Xestia ashworthii* (Doubleday) (1♂) (*N.L. Birkett*), *Xylena exsoleta* (Linnaeus) (1♀) (France; *M.R. Shaw*), *Xylena vetusta* (Hübner) (1♀) (*A.J. Halstead*). Non-reared specimens collected from vii–ix. Emergence was in the year of host pupation in all of the above, and some ♀♀ lived for at least 30 days after emergence without feeding. The phenology of *E. cerinops* differs significantly from that of the other species of the genus *Erigorgus*. It is the only species in the West Palaearctic region which is on the wing during the summer from June to the beginning of October. It is plurivoltine and has a wide host repertoire (Schnee 1991). Frequent hosts in Germany are the noctuids *Agrotis segetum* ([Denis & Schiffermüller]) and *A. exclamationis* (Linnaeus); overwintering is then as an early instar in the host larva and not as an adult inside the host pupa. The hosts are all moderately large species feeding on low plants.

Erigorgus fibulator (Gravenhorst, 1829)

Although the relevant specimens are not in NMS, we take the opportunity to record this species from Britain for the first time on the basis of two series in NHMUK from ENGLAND: 4♀♀, 2♂♂ Somerset, Berrow (V. C. 6) 17.iv.1952 (*N.J.*

Cowley) and WALES: 5♀♀, 1♂ Glamorgan, Gower (V. C. 41) 1926 (*P. Harwood*), in addition to 2♀♀ with less clear data. In NMS, NETHERLANDS: 1♀, Gelderland, Planken Wambuis, 12.vi.2015 (*J. Voogd*). RUSSIA: 2♀♀, Primorsky Kray, 3m, Lasovsky Zapoviednik, 13.vi–6.vii.2001 (*M. Quest*).

Erigorgus foersteri (Mocsáry, 1897)

This species has not been found in Britain. GERMANY: Sachsen, Dübener Heide, Pressel, 1♀ 16.iv.1988, 1♂ 1.iv.1990 (*H. Schnee*).

Erigorgus laecertosus Atanasov, 1975

This is not a British species. IRAN: 1♀, Azerbayjan, Sarqi, pass 7km, SWW Nir (SW Ardabil), coll. 6.v.2002 (*M. Rejzek*).

Erigorgus latro (Schrank, 1781)

Despite an unconfirmed record from Ireland (Johnson 1919), there is no compelling evidence that this widely distributed European species has been found in the British Isles. GERMANY: 1♂, Thuringia, Schönau vor dem Walde, 13.vi.1985 (*H. Schnee*). Also 1♀ reared in experimental culture from the noctuid *Diloba caeruleocephala* (Linnaeus), oviposited 12.vi.1986, em. 29.vii.1987 (*H. Schnee*); many others of both sexes reared from this host, both from the wild and in culture, are in Coll. HS, mostly emerging in vi.

Erigorgus melanops (Förster, 1855)

(= *melanobata* sensu Gauld & Mitchell, misident.)

Many specimens. ENGLAND: V.C.s 17, 20, 23. SCOTLAND: V.C.s 83, 93, 107. BELGIUM: Antwerp. FRANCE: Dordogne. GERMANY: Sachsen, Dübener Heide, Pressel. SPAIN: Zaragoza. Reared from Geometridae: *Isturgia miniosaria* (Duponchel) on *Genista* (1♀, 1♂) (Spain; *G.E. King*); Noctuidae: *Mythimna* ?*impura* (Hübner) (1♂) (*M.R. Shaw*), *Xestia xanthographa* ([Denis & Schiffermüller]) (1♀) (*M.R. Shaw*), *Xestia baja* ([Denis & Schiffermüller]) (det. HS), coll. as pupa, 16.iv.2013, em. 7.v.2013 (*T. Prescott*); this specimen is abnormally coloured, having totally black hind trochanter and darkened hind tarsus, which might be connected with unusually rapid development. Also present are specimens reared in experimental culture from the noctuids *Agrotis segetum* ([Denis & Schiffermüller]) (1♂) and *Polia bombycina* (Hufnagel) (1♂) (*H. Schnee*). Non-reared specimens collected from iii-v. Univoltine, overwintering as an adult in the host pupa following rapid development from the egg to that state (Schnee 1991).

Erigorgus melanops var

Reared from Nymphalidae (Satyrinae): ENGLAND: 1♀, Oxfordshire, Burford, Bradwell Grove (V.C. 23), ex *Aphantopus hyperanthus* (Linnaeus), coll. 21.iv.2002, died as adult in host pupa (*M.R. Shaw*), 1♂, same location, ex *Maniola jurtina* (Linnaeus), coll. 31,v.2002, em. 4.iv.2003 (*M.R. Shaw*), 1♀, same location, ex *Pyronia tithonus* (Linnaeus), coll. 31.v.2002, em. 25.iii.2003 (*M.R. Shaw*),

FRANCE: 3♀♀, 1♂ (+ 1♀, 1♂ transferred to H. Schnee coll.), Dordogne, St. Alvère, ex *Melanargia galathea* (Linnaeus) (*M.R. Shaw*). Univoltine, overwintering in the host pupa. The specimens from *M. galathea* have more slender hind tarsi and longer/thinner flagella than those reared from Noctuidae and, despite only a small barcode separation, may represent a different species. Note, however, that barcoding European specimens in the genus *Erigorgus* has often given inconsistent and confusing results (Stefan Schmidt, pers. comm.). The French and English series also seem possibly different from one another. Further material, and if possible experimental rearings, are needed to elucidate this.

Erigorgus procerus (Gravenhorst, 1829)

Although the relevant specimen is not in NMS, we take the opportunity to record this species from Britain for the first time on the basis of 1♂, ENGLAND: Kent, Kingston, Covert Wood TR182494 (V.C. 15) 24.iv.2009, (*L. Clemons*) in NHMUK. In NMS, GERMANY: 1♀, Sachsen, Dübener Heide, Pressel, 26.v.1987 (*H. Schnee*). POLAND: 1♀, Świetokrzyskie, Jedrzeiów, Lasków, ex ?*Agrochola litura* (Linnaeus) (Noctuidae), coll. 13.v.2014, em. 14.iv.2015 (*M.R. Shaw*). Also present is 1 ♂ reared experimentally from the noctuid *Agrotis segetum* ([Denis & Schiffermüller]), oviposition 25.vi.1988, em. 14.iii.1989 (*H. Schnee*). *Agrochola helvola* (Linnaeus) has proved to be a natural host in Germany (*H. Schnee*).

Erigorgus varicornis (Thomson, 1894)

Although no relevant specimen is in NMS, we take the opportunity to record this species from Britain for the first time on the basis of specimens in NHMUK: 1♂, ENGLAND: Kent, Wye (V.C. 15), 10–13.v.1949, 1♂, SCOTLAND: Inverness-shire, Glen Einich (V.C. 96) 6.vi.1934 (*R.B. & J.E. Benson*), 1♂, Inverness-shire, Nethy Bridge (V.C. 95) 8.vi.1931 (*P. Harwood*). This species has been widely misidentified as *E. propugnator*, but *propugnator* Förster, 1855, belongs to the genus *Barylypa* (Schnee 2008).

Gravenhorstia picta Boie, 1836

1♀, Dufresne Collection [No data, but presumed not British]. Although this conspicuous species may have occurred in Britain, it has not been recorded for many decades and it appears to be extinct. This is true also of Germany (*H. Schnee*), and evidently France (Pénigot 2021).

Habrocampulum biguttatum (Gravenhorst, 1829)

There are 1♀, 1♂ labelled British Isles (C. Morley Coll.) in NHMUK. Neither is reared, but there are also continental specimens reared from the conifer-feeding geometrid *Bupalus piniaria* (Linnaeus), which is a frequent host in Germany (*H. Schnee*). In NMS, GERMANY: 1♀ Sachsen, Tharandt, 5.x.1992, and 1♂ Brandenburg, Melchow, 6–9.ix.1966 (*Ebert*). Gauld & Mitchell (1977) record it from the noctuid *Panolis flammea* ([Denis & Schiffermüller]), which also feeds on conifers, but we have not found any British specimen on which this might be based.

Habronyx heros (Wesmael, 1849).

No specimens in NMS. In NHMUK there two old supposedly British specimens of this very large species, 1♀ labelled merely 'British Isles' and 1♂ additionally labelled as from the Stephens Collection. Gauld & Mitchell (1977) evidently believed they had seen more recent material, citing the New Forest in Hampshire and the date 1920 as the last British specimen seen but, once again, these specimens cannot be found in any of the depositories cited. It is presumed to be extinct in Britain.

Heteropelma amictum (Fabricius, 1775)

Numerous specimens. ENGLAND: V.C.s 1, 2, 3, 10. SCOTLAND: V.C.s 88, 102. IRELAND: V.C.s H1, H2, H5, H19. FRANCE: Dordogne, Lot-et-Garonne, Var. ITALY: Cuneo. SWITZERLAND: Nidwalden. Reared from Erebidae (Arctiinae): *Spilosoma* sp. (1♂) (Italy: *G.E. King*); Noctuidae: ?*Colocasia coryli* (Linnaeus) (1♂) (*J.L. Gregory*). Non-reared specimens collected from iv–viii. At least partly univoltine, overwintering in the host pupa. In Germany *Callimorpha dominula* (Linnaeus) (Erebidae: Arctiinae) is a frequent host (*H. Schnee*).

Heteropelma megarthrum (Ratzeburg, 1848)

(= *calcator* Wesmael, 1849)

Numerous specimens. ENGLAND: V.C.s 9, 17, 69. SCOTLAND: V.C.s 72, 77, 86, 90, 92, 96, 97, 99, 105. GERMANY: Baden-Württemberg. POLAND: Podlaskie Voivodeship. Reared from Geometridae: ?*Cabera pusaria* (Linnaeus) on *Alnus* (1♂) (*T.H. Ford*), *Ematuga atomaria* (Linnaeus) on *Myrica* (5♀♀) (*M. Brooks*, *M.R. Shaw*), indet. geometrid on *Betula* (1♀) (*K.P. Bland*). Non-reared specimens collected from vi–viii. Univoltine, overwinters in the host pupa. The geometrid *Bupalus piniaria* (Linnaeus) is a regular host in Germany, where it has also been reared from the small noctuid *Deltote bankiana* (Fabricius) (*H. Schnee*).

Heteropelma grossator Shestakov, 1923

This is not a British species. RUSSIA: 1♂, Primorsky Kray, 526m, Lasovsky Zapoviednik, 14.vii–4.viii.2001 (*M. Quest*).

Parania geniculata (Holmgren, 1857)

ENGLAND: 1♂, Kent, East Blean, Childs Forstal (V.C. 15), on dead wood, 29.vi.1984 (*E.S. Bradford*). Also 1♀ in Hunterian Museum (Glasgow University), Hampshire, Brockenhurst (V.C. 11), 4.vii.1975 (*J.J.F.X. King*). There are no British specimens in NHMUK. The host record given by Gauld & Mitchell (1977) presumably stems from specimens in NHMUK labelled as reared in Italy from *Paranthene tabaniformis* (Rottemburg) (Sesiidae), but it seems highly unlikely that such a small (presumably larva-pupal) parasitoid would develop in such a large moth (and host remains are not present).

Perisphincter brevicollis (Wesmael, 1849)

This species has not been found in Britain. SERBIA: 1♂, Stara Planina Mts, 1069m. above Ravno Bučje village, 28.vi.2020 (*S. Beshkov & A. Nahrnić*).

Perisphincter gracilicornis Schnee, 1978

Another species unknown in Britain. GERMANY: 1♀, 1♂, Sachsen, Dübener Heide, Pressel, Zadlitzbruch, 15.viii.1978 (♀) and 20.viii.1978 (♂) (*H. Schnee*).

Therion acronictum Pénigot, 2021

(including *brevicorne* sensu Gauld & Mitchell 1977, misident. and probably Morley 1915, misident.)

Three ♀♀ paratypes are in NMS: SCOTLAND: Aberdeenshire, Muir of Dinnet (V.C. 92) ex *Acronicta leporina* (Linnaeus) on *Betula* coll. 24.viii.1981, em. 19.vii.1982 (*M.R. Shaw*), Perthshire, Rannoch (V.C. 88) ex *A. leporina*, vi.1943 (*A. Richardson*), and SWEDEN: Västmanland, Lindesberg, in flight searching *Rhamnus*, 9.viii.1995 (*C.U. Eliasson*). The characters given by Gauld & Mitchell (1977) for *T. brevicorne*, in particular the high number of antennal flagellomeres, apply to *T. acronictum* but not to *T. brevicorne*. Morley (1915) assigned a British specimen reared from 'Acronycta myricae' (recte *Acronicta cinerea* (Hufnagel)) to *T. brevicorne*, which also seems likely to be *T. acronictum*, but he gave insufficient morphological detail for this to be certain. There is no evidence that the true *T. brevicorne* (Gravenhorst, 1929) is a British species.

Therion circumflexum (Linnaeus, 1758)

Numerous specimens. ENGLAND: V.C.s 28, 38, 69. SCOTLAND: V.C.s 72, 73, 75, 78, 81, 84, 88, 92, 93, 96, 97, 107. WALES: V.C.s 46, 48, 49, 52. AUSTRIA: Oberösterreich, Niederösterreich. BELGIUM: Luxembourg. BULGARIA: Stara Planina. FRANCE: Alpes-de-Haute-Provence, Dordogne, Lot-et-Garonne, Var, Vaucluse, Vienne. GERMANY: Baden-Württemberg, North Rhine Westphalis. NETHERLANDS: Limburg. PORTUGAL: Alentejo. SPAIN: Segovia, Zamora. SWEDEN: Gotland, Västerbotten, Västmanland. SWITZERLAND: Nidwalden. Reared from Noctuidae: *Ceramica pisi* (Linnaeus) (1♀) (*M. Innes*), *Hoplodrina ambigua* ([Denis & Schiffermüller]) (1♂) (Austria; *J. Connell*), *Lycophotia porphyrea* ([Denis & Schiffermüller]) (1♂) (*M.R. Shaw*), *Mamestra brassicae* (Linnaeus) (2♂♂) (Germany, *L. Wirooks*), *Noctua fimbriata* (Schreber) (1♂) (*G.M. Haggett*), *Phlogophora meticulosa* (Linnaeus) (3♀♀, 1♂) (Austria, France; *M.R. Shaw*), *Panolis flammea* ([Denis & Schiffermüller]) (6♀♀, 6♂♂) (Scotland; pupae collected below *Pinus*, *P.F. Entwistle*), indet. noctuid on *Armeria transmontaria* (1♀) (Portugal; *M.F.V. Corley*). Frequent in heathland and similar habitats; its Noctuidae hosts often occur on low vegetation, but in Germany as in Scotland *P. flammea* is a frequent host on *Pinus* (*H. Schnee*). Non-reared specimens collected mostly from vii-ix, but some in v (France). Overwinters in the host pupa, or in the host larva. At least partly plurivoltine; a series of 2♀♀, 1♂ from Austria resulted from *P. meticulosa* collected as larvae in 2nd and 3rd instars on 25.vi.2016, emerging in viii of the same year, as did 2♂♂ from *M. brassicae* collected in similarly early instars on 26.vi.2024 in Germany. However, from caterpillars of the 2nd generation of *M. brassicae* collected in Germany on 9.ix.2019 1♀, 1♂ emerged after hibernation on 20.iv.2020 (Coll. HS), and it is clear that while the parasitoid necessarily overwinters in the pupa of univoltine hosts with diapausing pupae, such as *P. flammea*, in non-diapausing early generations of plurivoltine hosts it may develop rapidly to emerge in the same year. This indicates the crucial role played by

the host's endocrine status in the development of the parasitoid. Gauld & Mitchell (1977), clearly including non-British records, cite the lasiocampid *Dendrolimus pini* (Linneaus) as host but most likely in error for *Therion giganteum* (Gravenhorst), a non-British species that not only has been much confused with *T. circumflexum* but also frequently parasitizes *D. pini.*

Trichomma enecator (Rossi, 1790)

Several specimens. ENGLAND: V.C.s 28, 37. CROATIA: Split-Dalmatia. FRANCE: Vaucluse. GERMANY: Baden-Württemberg, Sachsen-Anhalt. CANARY ISLANDS: Tenerife. Reared from Tortricidae: ?*Acleris* sp. (1♂) (Tenerife; *J.L. Gregory*), *Epinotia tetraquetrana* (Haworth) on *Betula* (3♂♂) (*A.N.B. Simpson*), *Xerocnephasia rigana* (Sodoffsky) on *Clematis* (1♀) (France; *M.R. Shaw*), ? *Cacoecimorpha pronubana* (Hübner) on *Opopanax chironium* (1♀) (Croatia; *S.D. Beavan)*, indet. tortricid on *Clematis*, *Myrica gale* (1♀, 2♂♂) (*E.C. Pelham-Clinton*, *M.R. Shaw*). This appears to be a specialist parasitoid of Tortricidae, and can be an important parasitoid of *Cydia pomonella* (Linnaeus) in orchards (*H. Schnee*). Non-reared specimens collected in vi-vii. Overwinters in the host pupa; partly plurivoltine.

Trichomma fulvidens Wesmael, 1849

Several specimens; although none in NMS is British, there is 1♀ in NHMUK with clear data; ENGLAND: Shropshire, Wyre Forest (V. C. 40), 13.v.1956 (*K.G.V. Smith*). In NMS, FRANCE: Dordogne, Lot-et-Garonne. GERMANY: Norden. POLAND: Świetokrzyskie, Warmian-Masurian, Wielkopolska. Reared from Noctuidae: *Conistra* sp. on *Vaccinium* understory in open coniferous forest, coll. 22.v.2014, em. 7.iv.2015 (1♂) (Poland; *M.R. Shaw*), *Cerapteryx graminis* (Linneaus) coll. as pupa in coniferous forest xii.1986, em. 9.iii.1987 (1♀) (Germany; *H. Schnee*). Also present are 1♀, 2♂♂ reared experimentally from *Agrotis segetum* (*H. Schnee*). An account of natural and experimental rearings in Germany is given by Schnee (1991). Univoltine, flying from the end of iii to early vi and overwintering as an adult in the host pupa.

Trichomma intermedium Krieger, 1904

ENGLAND: 1♀, Buckinghamshire, Hell Coppice (V.C. 24), ex ?*Selenia* sp. (Geometridae) on ?*Betula*, coll. 18.viii.1974, em. 8.vi.1975 (*M.R. Shaw*). Probably univoltine, overwintering in the host pupa.

Trichomma occisor Habermehl, 1909

No specimens in NMS, but there are several English specimens in NHMUK, one from Isle of Wight (V.C. 10) and others with unclear data.

ACKNOWLEDGEMENTS

We are grateful to Gavin Broad for access to the NHMUK collection, and to the following for searching the collections in their care for critical specimens and for

loans, in response to requests made in 2002: Colin Johnson (Manchester University Museum), Maggie Reilly and Geoff Hancock (Hunterian Museum Glasgow), Jan Dawson (Leicester City Museum), Tony Irwin (Castle Museum Norwich), William Foster (Cambridge University Zoology Museum), and George McGavin (Oxford University Museum); additionally Jim Brock (Horniman Museum). MRS is especially indebted to the many donors, whose names appear in the text, of reared material now in the NMS collection. The late and much-missed Stefan Schmidt (ZSM) kindly undertook CO1 sequencing on our behalf. Andrew Liston helpfully took the image for Fig. 24. Jem Birrell kindly assembled the plates, and the MS was improved through helpful reviews by Gavin Broad and William Pénigot. We are also grateful to Dr Jörg Teumer for allowing us to use his excellent photo of *Trichomma fulvidens* ovipositing into *Noctua fimbriata.*

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