

Notes on some European Microgastrinae (Hymenoptera: Braconidae) in the National Museums of Scotland, with twenty species new to Britain, new host data, taxonomic changes and remarks, and descriptions of two new species of *Microgaster* Latreille

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Synopsis

Based largely on the collection in the National Museums of Scotland, and concentrating on poorly understood taxa, 20 species of Microgastrinae are newly recorded from Britain, and host and/or other biological information is given for about 60 European species (in most cases the first host records; in some others refuting previous misconceptions). Among numerous taxonomic remarks on European species, three species are reinstated from synonymy (*Dolichogenidea coniferae* (Haliday, 1834), *Dolichogenidea coniferoides* (Papp, 1972), and *Microgaster acilia* Nixon, 1968), and *Choeras adjunctus* (Nees, 1934) is proposed as a new combination. Two new species are described from reared British material: *Microgaster arctostaphylica* sp. nov. and *Microgaster raschkiellae* sp. nov.

Key words: Microgastrinae, Braconidae, *Apanteles*, *Choeras*, *Dolichogenidea*, *Illidops*, *Pholetesor*, *Cotesia*, *Deuterixys*, *Diolcogaster*, *Glyptapanteles*, *Protapanteles*, *Venanides*, *Hygroplitis*, *Iconella*, *Microgaster*, *Paroplitis*, *Microplitis*, distribution, hosts, taxonomy, *Microgaster arctostaphylica* sp. nov., *Microgaster raschkiellae* sp. nov.

Introduction

The substantial collection of European Microgastrinae in the National Museums of Scotland (NMS) is almost entirely of fairly recent origin (accumulated since about 1975) and contains a large amount of reared material with a good standard of data and specimen preparation. Partly in support of the upcoming revised checklist of British Hymenoptera (Broad, G. R., Shaw, M. R. & Godfray, H. C. J. – <http://www.nhm.ac.uk/resources-rx/files/braconidae-checklist-final-34139.pdf>), I have recently re-curated this material, making a renewed effort to identify all that I could. This paper will not do justice to the material as a whole – for example, the rearing data for several of the relatively abundant species could be used to infer realistic summaries of host range and phenology, and there are several series of probably undescribed species, but neither of these avenues is pursued here. Rather, on the whole this paper gives information on already described species, including some that are little known or new to Britain, and also comments on reared material that seems particularly significant for one reason or another. In a few instances it has been necessary to go into the taxonomy more deeply, in particular to deal with species or series that had hitherto been confused or misidentified or names that had been misinterpreted in the literature, and two new species are described for that reason. The genera in which the most taxonomic problems remain are undoubtedly *Microgaster* and especially *Microplitis*.

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Identifications were based largely on the numerous papers by Nixon, Papp and Wilkinson (cf. Yu, van Achterberg & Horstmann, 2005), with some use also made of Mason (1981) and Kotenko & Tobias (1986), as well as by reference to the extensive named collections both in NMS and in the Natural History Museum (BMNH), London, and to particular specimens borrowed from other institutions. It is noted if a specimen has been compared with type material.

Instead of transcribing outdated host Lepidoptera names from specimen data labels, updated nomenclature, according to Bradley (2000) or, for non-British species, Karsholt & Razowski (1996), has been applied when ambiguity will not arise. Some comments on previous perceptions of hosts relate to Papp's (1988) list, taken from all literature sources, of recorded hosts of species in genera that had been included in '*Apanteles*' s.l., i.e. in the sense current before Mason (1981) that comprised all microgastrines lacking a closed areolet (second submarginal cell) in the fore wing. Papp's entries lack attribution, though hosts are listed in two categories of supposed reliability, the higher of which includes abstraction of all relevant publications by Wilkinson and Nixon. Papp did not perform the same service for the genera *Microgaster* and *Microplitis*, and in these cases my comments are based on perceptions given by Nixon (1968; 1970), since unfortunately in his taxonomic papers Papp almost never recorded host information with the examined specimens, at least some of which were presumably reared.

The notes that follow are arranged in the alphabetical (tribes, genera, species) order followed in the checklist mentioned above, and similarly largely follow Mason (1981) and Papp (1988) for generic placement, with further nomenclatural updating according to van Achterberg (1997). The proposal by van Achterberg (2003) that many of the generic names created or adopted by Mason should be synonymised is not followed here as it seems to be an over-reaction to the admittedly difficult generic placement of some of the European species (especially between *Apanteles* sensu Mason and *Dolichogenidea*, and also in a few cases between *Glyptapanteles* and *Protapanteles*).

Unless otherwise indicated, all hosts are Lepidoptera and the newly cited parasitoids are deposited in NMS. 'Britain' is used in the sense of the British Isles, i.e. without the exclusion of the Republic of Ireland. Morphological terminology largely follows Nixon (1965 *et seq.*) but for the new species wing venation according to van Achterberg (1993) is also given in normal brackets, and that according to Shaw & Huddleston (1991) in square brackets if confusion might arise. See also Shaw (2007; 2009).

APANTELINI

APANTELES Foerster

Apanteles contaminatus (Haliday, 1834)

All five specimens in NMS were reared solitarily, on four separate occasions (three sites), from the tortricid *Epinotia nemorivaga* (Tengström) mining *Arctostaphylos uva-ursi* in Perthshire (V.C. 89) (*K. P. Bland*), Angus (V.C. 90) (*K. P. Bland*) and Aberdeenshire (V.C. 92) (*R. J. Heckford*). All were collected in spring/early summer and the parasitoid adult emerged in the same year, from the mine of the host.

These records are consistent with that of Marshall (1885), i.e. reared from an unidentified [microlepidopterous] host mining *A. uva-ursi*, but not with the very surprising record from the nepticulid *Fomoria weaveri* (Stainton) given by Nixon (1976). Despite the fact that the latter supposed host was determined by so able and respected a lepidopterist as E. C. Pelham-

Clinton, it should be questioned as probably the result of human error (in the early part of his career, 1951) on the grounds that the inflated mines of *F. weaveri* are superficially similar to those of *E. nemorivaga*, and occur on a superficially similar plant (*Vaccinium vitis-idaea*) likely to be found in the same place. There are good physical and physiological reasons for believing that if it had been the parasitoid that made the mistake, of attacking so abnormal a host, it would have been unsuccessful or at the very least of noteworthy minute size. Unfortunately the specimen cited by Nixon (1976) could not be found in the BMNH collection (sought in i.2011).

***Apanteles galleriae* Wilkinson, 1932**

New to Britain. 2 ♀, 7 ♂, England, East Sussex, Battle, Henley's Down (V.C. 14), collected dead on 3.i.2011 in debris in a hive of the honeybee *Apis mellifera* Linnaeus in which the pyralids *Galleria mellonella* (Linnaeus) and *Achroia grisella* (Fabricius) had both been active (*J. Feltwell*), and subsequently a long series from this source emerging ca xii.2011 and i.2012 from debris collected in ix/x.2011; 1 ♀, England, Devon, Wotter (V.C. 3), ex content of honeybee hive coll. late 2010, em. 26.ii.2011 (*C. Turner*). This widely recorded parasitoid of *G. mellonella* is, as stated by Nixon (1976), 'likely to extend over the range of this cosmopolitan host'. Nevertheless, these appear to be the first specimens recorded from Britain. The leg colour of all British specimens seen is darker than suggested by Nixon (1976): hind coxa and femur essentially black (reddish brown in French material in BMNH, including the type (examined)).

***Apanteles hemara* Nixon, 1965**

Represented in NMS by specimens from France, Spain, Portugal, Madeira and the former Yugoslavia. Where both occur, it is evidently a regular solitary parasitoid of the choreutid *Tebenna micalis* (Mann) (seven specimens from Spain on four separate occasions (*G. E. King*); one from Portugal probably from this host (*M. F. V. Corley*); two from Madeira from an unidentified choreutid on an unidentified Asteraceae (*J. L. Gregory*)). There are, however, also two specimens in NMS from incompletely identified pyralid hosts, suggesting a wider host range. Most of the material is labelled as emerging in the year of collection; others lack the relevant data.

***Apanteles lacteus* (Nees, 1834)**

There seems to be no basis for this species having been listed as British by Fitton *et al.* (1978), but its presence here (i.e. **new to Britain**) is established by 1 ♀, England, Devon, Billacombe, SX5154 (V.C. 3) reared from the pyralid *Phycitodes maritima* (Tengström) on *Senecio*, coll. 1.viii.2007, em. 17.viii.2007 (*R. J. Heckford*). It is recorded from related hosts in Germany (Reinhard, 1880). Papp (1988) placed this species in *Dolichogenidea* but Mason's (1981) previous placement in *Apanteles* (s.str.) seems more appropriate.

***Apanteles lenea* Nixon, 1976**

I take this opportunity to clarify a determination I gave for a specimen reared from the cosmopterigid *Pancalia schwarzeella* (Fabricius) in Scotland (*R. J. Heckford*) that was published as *Apanteles* sp. near *evander* Nixon, 1965 (Heckford, 2006), which I now confidently believe to be *Apanteles lenea* (a species with several other low-feeding hosts). Incidentally, Papp (1981) had synonymised *Apanteles evander* under *Apanteles naso* Marshall, 1885 (now placed in the genus *Illidops*), which I had overlooked at the time.

***Apanteles myron* Nixon, 1973**

2 ♀, 2 ♂ reared solitarily from microlepidopterous hosts in shoots of *Juniperus communis*, probably in all cases *Argyresthia* sp. (Yponomeutidae), from three sites in Scotland (*K. P. Bland*, *P. F. Entwistle*, *M. R. Shaw*). Nixon (1973) described this species from specimens swept from *J. communis* in England: the above rearings confirm that its host(s) feed on that plant.

CHOERAS Mason

***Choeras adjunctus* (Nees, 1834) comb. nov.**

Having examined the neotype of the poorly understood nominal taxon *Microgaster adjunctus* Nees (designated by Papp, 1980), I take this opportunity to transfer it from *Dolichogenidea*, where it was placed by Papp (1988), to *Choeras*. The neotype lacks most or all of both hind

tarsi, but is otherwise more or less intact, though dirty. Although having the stub at the junction of the first abscissa of the radius and the first intercubitus very weak it is closest to *C. parasitellae* (Bouché), but differs in its broader first tergite (basally parallel-sided with the apical, turned-over part narrowing but remaining twice the length of the basal field; i.e. more as in *C. arene* (Nixon) than in *C. parasitellae*), its rectangular (but still very transverse) basal field, and the substantially denser setosity of the remainder of tergites 2+3. The last two characters also distinguish it from *C. arene*, as do the middle tarsal claws (the hind ones are missing) that are less bent and lack the pecten present in *C. arene*. It also differs from both of the above in having (as far as can be judged from its grimy condition) a less sculptured and more matt first tergite and basal field. The antenna appears similar to that of *C. parasitellae*; if anything even shorter. Neither the facial sculpture nor the width of the ovipositor sheath seems compatible with the description of *Apanteles gnarus* Tobias & Kotenko, 1984 (cf. Kotenko & Tobias, 1986). Given the robustness of the first tergite and the unicolorous pterostigma, there are no other described species in Europe with which it might be compared, and I conclude that *Choeras adjunctus* (Nees) is a distinct and valid species.

Choeras gielisi (van Achterberg, 2002)

Van Achterberg (2002) described this species from a single specimen reared in The Netherlands from the terrestrial larva of the caddis-fly *Enoicyla pusilla* (Burmeister) (Trichoptera: Limnophilidae). In NMS is a female from France (Var) labelled as reared from an unidentified psychid beaten from *Prunus* twigs 29.vi.1998, em. ?viii/ix.1998 (*M. R. Shaw*). I recall that the living and dead twigs were algae- and lichen-encrusted but, most distressingly, the host's case is not preserved with the adult (about a dozen apparently identical powdery cases had been collected and reared together, with only this single outcome) – a failing that frustrates knowing for certain that Psychidae of whatever kind can serve as a host for this interesting species (the alternative possibility being that I had failed to identify the host correctly as *E. pusilla*).

Another female in NMS from Madeira, coll. 12.vii.1981 (*R. R. Askew*), closely agrees with *C. gielisi* apart from having a substantially more transverse head and larger ocelli, which suggests that it belongs to a different species.

Choeras ?tedellae (Nixon, 1961)

1 ♀, England, Devon, Budshad Wood, SX4653 (V.C. 3) reared from the tortricid *Lobesia reliquana* (Hübner) on withered *Quercus* leaves in the canopy, coll. 9.viii.2010, em. 19.viii.2010 (*R. J. Heckford*). The specimen differs slightly from typical *C. tedellae* (in BMNH) in being darker in colour overall, with the basal field of the second metasomal tergite rather smooth and the mesoscutum slightly less shining. [*Choeras*] *tedellae* was described (Nixon, 1961) as a parasitoid of the tortricid *Epinotia tedella* (Clerck), a pest of *Picea*, but (apart from *Chamaecyparis* in an adjacent housing estate) there were no conifers of any kind in the wood where the above specimen was found (*R. J. Heckford*, pers. comm.). While *C. tedellae* is rather variable, it is possible that the above specimen represents an undescribed species.

DOLICHOGENIDEA Viereck

Dolichogenidea agilla (Nixon, 1972)

New to Britain. 1 ♀, England, Northumberland, Scremerston (V.C. 68), reared from the tortricid *Dichrorampha plumbagana* (Treitschke) in *Achillea millefolium* roots, coll. 3.i.1985, em. 25.vii.1985 (*K. P. Bland*). Papp (1988) does not list a host. This species was described from two slightly dissimilar non-reared Finnish specimens (Nixon, 1972). The above specimen is clearly conspecific with the paratype in BMNH (examined).

Dolichogenidea appellator (Telenga, 1949) (= *litae* (Nixon 1972))

New to Britain (its listing by Fitton *et al.* (1978) appears to have been without foundation). 1 ♀, 1 ♂, England, Devon, near Instow, saltmarsh at SS478324 (V.C. 4), reared solitarily from the gelechiid *Scrobipalpa ?salinella* (Zeller) on *Suaeda maritima*, coll. 5.viii.2006, em. 23.viii.2006 (♀) (*R. J. Heckford*) and by 27.ix.2006 (♂) (*S. D. Beavan*); 1 ♂, same locality but from *Scrobipalpa ?nitentella* (Fuchs) on *Atriplex* sp., coll. 18.viii.2006, em. 8.ix.2006 (*R. J. Heckford*).

Nixon (1972) described [*D.*] *litae* from German material reared from *S. salinella*, and the above material is clearly referable to that taxon. Papp (1988) notes, but does not follow (see also Papp, 1996), the view that *D. appellator* (Telenga, 1949) may be the valid name (cf. Kotenko & Tobias, 1986). The situation is complicated by Nixon's (1972) treatment of some series (from a different host in Cyprus, and from Egypt) as '*[D.] litae* var. *operculellae*', and it is this that Papp (1988) lists as a junior synonym of *D. appellator*, perhaps at least in part because Kotenko & Tobias (1986) list (no doubt as secondary citations) the known host of *D. litae* var. *operculellae* at species level but not that of *D. litae* s.str. for *D. appellator*, and thus with the implication that *D. litae* and its var. *operculellae* were not regarded as conspecific. Having recently received specimens reared from the plutellid *Plutella xylostella* (Linnaeus) in Iran (*Z. Kazemzadeh*), which is listed as a host of *D. appellator* by Kotenko & Tobias (1986), I believe that the synonymy with *D. litae* itself is correct (*pace* Papp, 1996), as the specimens in NMS from *Scrobipalpa* and *Plutella* seem to be conspecific. This synonymy appears also to have been accepted by *Fauna Europaea* (i.e. in which only *Apanteles appellator* is listed). The material referred to by Nixon (1972) as 'var. *operculellae*' from Cyprus and Egypt in BMNH (examined) is extremely variable, with some specimens in the series not differing significantly in colour from the typical form, and it seems improbable that more than one species is involved.

Dolichogenidea artissima (Papp, 1971) (= *abila* (Nixon, 1972))

For this species Papp (1988) lists as host only the nepticulid *Nepticula spiraeae* Gregor & Povolný, which seems highly improbable. All 28 of the reared specimens in NMS are from Coleophoridae feeding on low plants: *Coleophora paripennella* Zeller (13 specimens, 10 separate occasions) (*K. P. Bland, G. B. Corbet, R. P. Knill-Jones, H. N. Michaelis, A. N. B. Simpson, P. A. Sokoloff, M. R. Young*); *C. trochilella* (Duponchel) (6 specimens, 4 occasions) (*R. P. Knill-Jones, J. R. Langmaid*); *C. chalcogrammella* Zeller (4 specimens, 3 occasions) (*E. S. Bradford, J. M. Chalmers-Hunt, E. C. Pelham-Clinton*); *C. lithargyrinella* Zeller (4 specimens on separate occasions) (*S. D. Beavan, R. J. Heckford, B. P. Henwood, A. N. B. Simpson*); and *C. stratipennella* Nylander (1) (*J. M. Chalmers-Hunt*). All specimens emerged in the year of host collection, except that the *C. stratipennella* host had overwintered in captivity: collected 30.viii.1965, parasitoid emerged vii.1966. This solitary parasitoid is evidently univoltine and overwinters as a larva in its partly grown and similarly univoltine hosts.

Dolichogenidea coniferae (Haliday, 1834), **sp. rev.**

Van Achterberg (1997) synonymised *Microgaster coniferae* Haliday under *Microgaster candidatus* Haliday, 1834, but this was the inadvertent result of a drafting error (*C. van Achterberg, pers. comm.*) and the two species are distinct (and not closely similar).

Dolichogenidea coniferoides (Papp, 1972) (= *trogos* (Nixon, 1973)), **sp. rev.**

Papp (1984a) synonymised *Apanteles coniferoides* Papp and *Apanteles trogos* Nixon under *Apanteles mycale* Nixon, 1972, and subsequently (Papp, 1988) transferred these nominal species to *Dolichogenidea*. Having examined the holotypes of the two Nixon species and a paratype of *D. coniferoides* (all in BMNH), I concluded that, while *D. coniferoides* and *D. trogos* appear to be identical, *D. mycale* is a different species (having, among other things, the first metasomal tergite less strongly narrowed posteriorly, the basal field of the second tergite more transverse and more [though weakly] sculptured, the ovipositor longer, and the hind spurs very short and subequal). Therefore I am raising *D. coniferoides* (= *trogos*) from synonymy, but its placement in *Dolichogenidea* rather than in *Apanteles* is somewhat arbitrary.

Dolichogenidea exilis (Haliday, 1834)

1 ♀, England, Huntingdonshire, Monks Wood NNR, TL1979 (V.C. 31), 13–14.v.2009 (*M. R. Shaw*). This poorly-known species was not included in Nixon's treatment, nor was it dealt with by Papp. The above specimen has been compared with the lectotype (in NMI, Dublin), with which it agrees closely. *Dolichogenidea exilis* is a distinctive species, particularly on account of the curiously sooty appearance of the metasomal tergites and the characteristic sculpture of the mesoscutum. In Nixon's (1972) key it would run smoothly to couplet 28, but then founders. Further characters which, taken together with those leading up to Nixon's couplet 28, will readily distinguish it from other European species are: face matt, somewhat roughened; ocelli

in a rather high triangle, tangent to posterior pair not cutting anterior one; antenna unmodified, about as long as body, penultimate segments about 1.3 times as long as wide; mesoscutum dull, with rather large, shallow and widely-spaced punctures underlying a satiny sheen (scutellum more shiny); mesopleuron weakly sculptured; propodeum rather strongly rugulose; wings slightly brownish, venation on the whole pigmented; metacarp more than 4 times as long as its distance from the apex of the radial cell; vannal lobe only slightly convex, with a distinct but short hair fringe; hind leg predominantly blackish (femur centrally, tibia sub-basally and basitarsus basally orange-brown, extreme base of hind tibia and spurs whitish); spines on outer aspect of hind tibia of two kinds but not particularly dense; inner hind tibial spur clearly longer than outer but not reaching the middle of the basitarsus; first metasomal tergite weakly narrowing behind, dull, finely but strongly rugose-striate; basal field of second tergite with very weak sculpture, matt, strongly transverse, anteriorly roundly narrowed and posteriorly about 4 times wider than long; remainder of tergites 2+3 about twice as long as basal field and equally dull, evenly but not densely setose; following tergites also dull; setose part of ovipositor sheath somewhat fusiform, about 0.7 times as long as the hind tibia; ovipositor evenly weakly downcurved.

Dolichogenidea faucula (Nixon, 1972)

1 ♀, England, Plympton, Devon (V.C. 3) reared from the sesiid *Synanthedon tipuliformis* (Clerck) in a stem of *Ribes rubrum*, coll. v.1991, em. 27.vi.1991 (R. J. Heckford). The specimen agrees well with the type in BMNH (examined), which was reared from the prodoxid *Lampronia fuscataella* (Tengström) galling *Betula*, apart from having somewhat paler legs.

Dolichogenidea gagates (Nees, 1934)

2 ♀, 1 ♂, England, Tilshead, Wiltshire, SU021474 (V.C. 8), reared solitarily from the pterophorid *Stenoptilia bipunctidactyla* (Scopoli) on *Knautia arvensis*, coll. 5.vii.2005, em. 20–22.vii.2005 (C. Hart). Nixon (1972) indicated that the host was unknown, but Papp (1988) includes *S. bipunctidactyla* (although in his less accredited category) among a short but suspiciously diverse list of recorded supposed hosts.

Dolichogenidea glaber (Papp, 1978)

New to Britain. 1 ♀, England, Hampshire, Portsmouth (V.C. 11), reared from the pterophorid *Platyptilia ochrodactyla* ([Denis & Schiffermüller]) on *Tanacetum*, coll. 28.v.1995, em. vi.1995 (J. R. Langmaid); 1 ♀, Scotland, Aberdeenshire, Bridge of Aboyne (V.C. 92), 16.vii.1977 (P. J. Chandler). This species is very close to the otherwise highly distinctive and better-known *Dolichogenidea longipalpis* (Reinhard), and consequently is easy to overlook.

Dolichogenidea halidayi (Marshall, 1885)

All 20 of the specimens in NMS, from five sites, were reared as solitary parasitoids from dry stems of the grass *Dactylis glomerata* that larvae of the glyphipterigid *Glyphipterix simpliciella* (Stephens) had entered for pupation the previous year (F. D. Bennett, K. P. Bland, M. R. Shaw). This, rather than any of the species listed by Papp (1988), would appear to be its regular host.

Dolichogenidea immissa (Papp, 1977)

Papp (1988) was unable to give a host record for this species. In NMS there is 1 ♀ (with its cocoon) from Switzerland, TL/96, Muttenz, reared from the gracillariid *Caloptilia rufipennella* (Hübner) on *Acer*, cocoon in cone coll. and em. vi.1976 (S. E. Whitebread).

Dolichogenidea longipalpis (Reinhard, 1880)

Numerous specimens were swept by R. L. E. Ford in England from *Achillea millefolium* in July (Nixon, 1965), and about 50 of these are in BMNH. Although Papp (1988) gives only a species of psychid (under two names) as host, a reared English male in NMS from ?*Thiodia citrana* (Hübner) (Tortricidae, Olethreutinae) on *A. millefolium*, coll.30.v.1998, em. 28.vi.1998 (R. J. Heckford) and a pair in BMNH each from 'larva in stem of yarrow' (*O. W. Richards*) confirm that the plant is involved in the parasitoid's host relations. Although *D. longipalpis* has long been regarded as one of the most distinctive of all Microgastrinae, it has a close relative in *D. glaber* (Papp) (see above), with which it is easily confused.

Dolichogenidea ononidis (Marshall, 1889)

This species was treated neither by Nixon, although the British type is in BMNH, nor by Papp. Marshall's (1889) original description gives the gracillariid *Parectopa ononidis* (Zeller) as host, and there are five English specimens (three localities) in NMS reared solitarily from this host mining *Trifolium pratense* (R. J. Heckford, E. C. Pelham-Clinton, A. N. B. Simpson), all emerging in the year of collection. In addition there are four specimens from a single French locality (Dordogne) reared from a gracillariid *Phyllonorycter* sp. mining *T. pratense* (R. R. Askew). This species will run to [*D.*] *seriphia* (Nixon, 1972) in Nixon's (1972) key, a species described from two females collected in the Italian Alps (not Germany, *pace* Nixon) at moderate altitude. Nixon's description of [*D.*] *seriphia* is extremely brief, and I have not seen authentic specimens, but I suspect *D. ononidis* might prove to be conspecific. In addition to the characters by which it keys to [*D.*] *seriphia*, *D. ononidis* can be recognised by its relatively small size (2.0 mm); slender antenna fully as long as the body and with preapical segment 1.5–1.8 times as long as wide; mesoscutum with weakly rippled satiny sculpture; metacarp about 3 times as long as its distance from the apex of the radial cell; vannal lobe nearly straight, with an almost unnoticeable hair fringe present; hind spurs equal, falling well short of the middle of the basitarsus; first tergite parallel-sided, its apical turned-over part with a few vague punctures but otherwise practically unsculptured, strongly matt; basal field of second tergite similarly sculptured, rectangular, about 2.4 times as long as wide, 0.7 times as long as the remainder of tergites 2+3; ovipositor sheath about 0.6 times as long as hind tibia. Pterostigma evenly brown, hind femur blackish, hind tibia dull orange-brown becoming obscurely infuscate over apical half.

Dolichogenidea petrovae (Walley, 1937) (= *dioryctriae* (Wilkinson) = *murinanae* (Čapek & Zwolfer))

New to Britain. 1 ♀, England, Surrey, Hankley (V.C 17), 22.v.1976 (R. R. Askew).

Dolichogenidea punctiger (Wesmael)

One male specimen in NMS was reared on 25.iii.2007 (indoors) from its rather frail cocoon within the case of an incurvariid or adelid, probably *Nematopogon* sp., collected on 3.ii.2007 (R. J. Heckford). This host is unrelated to those listed by Papp (1988), all of which should perhaps be regarded with suspicion.

Dolichogenidea soikai (Nixon, 1972)

New to Britain. 1 ♀, England, Norfolk, Morston Salt Marsh (V.C. 28), 13.viii.1980 (M. R. Shaw). The above specimen agrees closely with the Italian type in BMNH.

ILLIDOPS Mason***Illidops cloelia*** (Nixon, 1965)

No host of this probably montane species has been recorded. A clue is provided by one female reared from an unidentified microlepidopteran feeding in a spun shoot of *Lotus* (probably *L. corniculatus*), Italy, S. Tyrol, Burgeis (1200 m), coll. 6–11.vii.2004, em. 27.iv.2005 (M. R. Shaw).

Illidops naso (Marshall, 1885)

Despite its many synonyms, *I. naso* appears to have been formally recorded from Britain only once, in Marshall's (1885) original description. In NMS there are four females, collected in Malaise traps in Norfolk (V.C. 28) and Cambridgeshire (V.C. 29) in vi and viii (all J. Field). See also remarks under *Apanteles lenae*.

PHOLETESOR Mason

Owing to heavy sampling of Gracillariidae in particular, with considerable material also from Elachistidae, there is in NMS a large quantity of reared material of *Pholetesor* (all of which are solitary parasitoids). It is hoped that this has helped to elucidate the taxonomy and host relations of some members of this rather difficult genus, though several problems and uncertainties remain that might best be approached through molecular genetics. In several species there appears to be large variation in the shape of the basal tergites of the metasoma, which to some extent is related to both season and size.

Pholetesor bicolor (Nees, 1834)

Papp (1983) synonymised *Apanteles pedias* Nixon, 1973, under *Microgaster bicolor* Nees, 1834, following an examination of type material, and raised [*Pholetesor*] *bicolor* from the synonymy of [*Pholetesor*] *circumscriptus* (Nees). This is accepted here. Nixon had recognised his [*Ph.*] *pedias* as a species distinct from *Ph. circumscriptus* partly on the basis of the shorter metacarp in *Ph. pedias*, but van Achterberg (1997) discredited this difference on the grounds that he had seen specimens representing both conditions in a single series reared from the pest gracillariid *Phyllonorycter blancardella* (Fabricius) mining *Malus*. However, both *Ph. bicolor* and *Ph. circumscriptus* do regularly parasitise this leaf-miner (material in NMS and BMNH, showing a usually clear distinction) and it seems probable that van Achterberg had before him specimens of both species. His suggestion (1997: 37–38), made despite his noting (as a pers. comm.) much of the information given below, that *Ph. circumscriptus* might again be given the wide interpretation followed by Wilkinson (1938) to include *Ph. bicolor*, has not been generally accepted, and *Ph. bicolor* and *Ph. circumscriptus* are still usually accorded separate status (e.g. in *Fauna Europaea*, as *Apanteles*).

Although there may be several cryptic species lurking in the current concept of *Ph. circumscriptus* (see below), as parasitoids of *Phyllonorycter* species *Ph. bicolor* (= *pedias*) and *Ph. circumscriptus* are very different biologically, beyond the morphological characters given by Nixon (1973) which include the shorter antennae and hind tibial spurs of *Ph. bicolor* as well as its shorter metacarp (the length of the metacarp in *Ph. circumscriptus*, which may be a species-aggregate, is admittedly rather variable). Both are plurivoltine but, while *Ph. bicolor* invariably overwinters in its deep orange/brown cocoon (yellow in the summer generations), *Ph. circumscriptus* does so as an immature larva and for this depends on host species that are in their larval stage through the winter. It is especially abundant from some of the relatively few *Phyllonorycter* species that mine in winter (e.g. *Phyllo. messaniella* (Zeller), *Phyllo. leucographella* (Zeller), *Phyllo. scopariella* (Zeller), *Phyllo. trifasciella* (Haworth) [though in the latter case the host's overwintering mode is less clear]), and also on species that delay pupation until spring without actually feeding through the winter (e.g. *Phyllo. lantanella* (Schrank), *Phyllo. cerasicolella* (Herrich-Schäffer)). The cocoon of all generations of *Ph. circumscriptus* is pure white and it seems that the adult invariably emerges in the year of its formation. While most populations of *Ph. circumscriptus* are thelytokous (see below), *Ph. bicolor* is sexual (though this has not been confirmed for British populations). In BMNH there are no British specimens, but there are series including several males from *Phyllo. comparella* (Duponchel) mining *Populus alba* (Switzerland and Serbia) and *Phyllo. blancardella* mining *Malus* (Hungary), and in NMS there are 4 ♀, 7 ♂ from *Phyllo. strigulatella* (Lienig & Zeller) mining *Alnus incana* in Switzerland (S. E. Whitebread). *Pholetesor bicolor* is a rather rare, southern species in Britain, where it has been reared from *Phyllonorycter* species mining *Carpinus*, *Corylus*, *Alnus*, *Populus* and proportionally much less often *Quercus* and *Fagus* (the 18 sexable British specimens in NMS from the foregoing are all females). In contrast *Ph. circumscriptus* is rather common and parasitises most *Phyllonorycter* species (see below), except that it is completely replaced by *Ph. nanus* (Reinhard) on *Salix* and *Betula*.

Pholetesor circumscriptus (Nees, 1834)

At least in Britain, on the face of it this is a common and widespread thelytokous species. The large amount of reared material in NMS shows that, except for being replaced by *Ph. nanus* (Reinhard) (see below) on *Salix* and *Betula*, it commonly parasitises a wide range of gracillariids in the genera *Phyllonorycter* (on *Acer*, *Alnus*, *Celtis* [France, M. R. Shaw], *Corylus*, *Crataegus*, *Fagus*, *Leycestria*, *Lonicera*, *Malus*, *Prunus*, *Pyracantha*, *Quercus*, *Sarothamnus*, *Symphoricarpos*, *Ulmus*, *Vaccinium*, *Viburnum* and *Vicia*), *Parornix* (on *Corylus*, *Crataegus* and *Prunus*), *Acrocercops* (on *Quercus*) and *Dialectica* (on *Echium* [Spain, R. J. Heckford]), as well as Tischeriidae (*Emmetia* on *Rubus*) and tentatively determined specimens from Choreutidae (*Millieria* on *Aristolochia* [France, M. R. Shaw]) (single rearings are not included in the above). There is, however, wide morphological variation: in the length of the metacarp (but only in the smallest individuals does it approach the shortness of *Ph. bicolor*); in the sculpture and shape of the triangular basal field (generally more rugulose in the overwintering generation, potentially causing confusion with *Ph. 'exiguus'* sensu (Nixon) [see below under *Ph. laetus*] and sometimes approaching the breadth seen in the sexual species *Ph. arisba* (Nixon)); in the degree of apical

narrowing of the first metasomal tergite; and in the colour of the basal tergites, which range from black to reddish with some degree of at least partial host-fidelity. It seems probable that quite wide genetic divergence is present in this essentially uniparental aggregate, with the strong possibility that some lineages have specialised on just a part of the overall host range. Some of the more robust specimens reared (usually as singletons) from species within the above host range may be *Ph. arisba* or *Ph. laetus*, as is also sometimes indicated by the presence of males, though whether or not *Ph. arisba* really parasitises gracillariids needs further assessment. Mention should be made of several series (in both NMS and BMNH, but from the same English site: Surrey, Addington) from *Phyllonorycter scabiosella* (Douglas) mining *Scabiosa*, in which a substantial proportion of males are consistently present. Whether or not this population represents *Ph. arisba* would be worth investigation through DNA, as they do not seem to be the 'exiguus' sensu (Nixon) form of *Ph. laetus* (Marshall) (see below), but until then they serve best to emphasise that the taxonomy and host associations of this presumed aggregate of '*Ph. circumscriptus*' need further exploration.

An experiment (M. R. Shaw, unpublished) in which two virgin females of *Ph. circumscriptus* reared from *Phyllonorycter maestingella* (Müller) were sleeved on *Quercus robur* with adults of *Phyllonorycter quercifoliella* (Zeller) resulted in 73 female parasitoids with no males, demonstrating that *Ph. circumscriptus* is thelytokous in Britain. Although it might be argued that other strains may differ, this result is fully in line with rearing experiences from the full range of its wild collected hosts, from which male specimens are very rarely reared (with the notable exception of *Phyllo. scabiosella* mentioned above).

See further comments under *Ph. bicolor*, *Ph. laetus*, *Ph. namus* and *Ph. phaetusa*.

Pholetesor laetus (Marshall, 1885) (= *exiguus* sensu (Nixon), nec (Haliday))

Van Achterberg (1997) designated a lectotype for *Microgaster exiguus* Haliday, 1834, although Wilkinson (1938) had previously concluded that the type was lost. The specimen designated by van Achterberg is a female that appears to be conspecific with *Ph. circumscriptus* (Nees) (not [*Ph.*] *bicolor*, with which van Achterberg synonymised it) and, as he points out, this is not in accordance with the application of the name [*Ph.*] *exiguus* by Nixon (1973) and subsequently Papp (1983). Van Achterberg suggested that the Nearctic species [*Pholetesor*] *salalicus* (Mason) would include also *Ph. exiguus* sensu (Nixon) nec (Haliday), but this is not accepted here on the grounds that the female paratype of *Ph. salalicus* in BMNH (examined) shows significant differences, including its shorter metacarp, its third tergite having weakly striate sculpture over its basal half, and its higher ocellar triangle. This leaves *Ph. exiguus* sensu (Nixon) nec (Haliday) without an obvious formal name.

In an experiment (M. R. Shaw, unpublished) three mated females of *Ph. 'exiguus'* sensu (Nixon) reared in Scotland from *Phyllonorycter junoniella* (Zeller) mining *Vaccinium vitis-idaea*, of which it is a very abundant parasitoid, were sleeved on *Quercus robur* with adult moths of *Caloptilia alchimiella* (Scopoli). This resulted in a series (41 ♀, 32 ♂) of progeny that are different, in many cases markedly, from their parents in having a more transverse and often less sharply triangular basal field, and are clearly conspecific with those reared from *C. alchimiella* on *Quercus* and *Caloptilia elongella* (Linnaeus) on *Alnus glutinosa* at various sites in Scotland. In turn, the latter are closely similar to specimens reared from these hosts, and also from *Caloptilia rufipennella* (Hübner) on *Acer pseudoplatanus* and *Caloptilia semifascia* (Haworth) on *Acer campestre*, in southern England, although the southern specimens are lighter in colour (the hind coxa, in particular, being largely yellow, while it is only apically so in northern specimens). Overall, there is size-related variation in that the larger specimens (including those from *C. semifascia*, from which *Ph. laetus* (Marshall) was described) have the second metasomal tergite more strongly sculptured outside the grooved and in any case wider basal field, making the grooves less pronounced and the sculptured area more transverse and markedly less triangular. The variation seen in the material in NMS forms a continuum, however, and (influenced particularly by the substantial change in appearance seen in the above experiment) I have become convinced that the extremes of northern specimens conforming to *Ph. exiguus* sensu (Nixon) commonly reared from *Phyllonorycter junoniella* (and rather regularly other *Phyllonorycter* species) on the one hand, and the larger and paler southern specimens from *Caloptilia* conforming to *Ph. laetus* on the other hand, are conspecific. This conclusion is, however, best regarded as tentative, and might appropriately be tested by molecular data: in

the meantime it would be unambiguous to refer to the species so commonly reared from *Phyllo. junoniella* as *Ph. exiguus* sensu (Nixon) nec (Haliday). The overall spectrum of British hosts (all Gracillariidae) of this sexual and presumed single species (though the possibility of an aggregate exists) represented in NMS includes species of *Phyllonorycter* (on *Betula*, *Alnus*, *Quercus*, *Fagus*, *Symphoricarpos* and *Vaccinium*), *Parornix* (on *Betula* and *Sorbus*), *Callisto* (on *Salix* [K. P. Bland]) and *Caloptilia* (on *Quercus*, *Betula*, *Alnus* and *Acer*) (single rearings omitted). There are also two series of rather small and dark specimens of both sexes from a single site in France (Gard) from the gracillariids *Caloptilia* on *Humulus* and *Dialectica* on *Rumex* (both M. R. Shaw) that are clearly conspecific and probably also represent *Ph. laetus*.

Nixon (1973) remarks that [*Ph.*] *arisba* (Nixon), which he described from specimens reared from the elachistid *Stephensia brunnichiella* (Linnaeus), is close to [*Ph.*] *laetus*. As mentioned here under *Ph. circumscriptus*, I have found it difficult to be sure that some specimens reared from *Phyllonorycter* are not *Ph. arisba*, and the status of that species in relation to *Ph. laetus* and perhaps even *Ph. phaetusa* (on the face of it differing from *Ph. arisba* by having a much less transverse basal field, but also a parasitoid of Elachistidae) needs further investigation.

Pholetesor moldavicus (Tobias, 1975)

New to Britain. About 30 specimens (both sexes) of this distinctive species were fogged from *Quercus* canopy, England, Surrey, Richmond Park (V.C. 17), 18.viii.1983 (N. E. Stork). Also in NMS: 1 ♀, England, London, Hampstead Heath (V.C. 21) ex *Bucculatrix* sp. on *Quercus*, coll. ix.1989, em. 1990 (R. A. Softly); 1 ♀, England, Hampshire, Hayling Island (V.C. 11) ex *Bucculatrix* cocoon on *Pyrus* (near *Quercus*), coll. 22.vii.1981, em. viii.1981 (J. R. Langmaid); 1 ♂, England, Berkshire, Lower Earley (V.C. 22) ex *Bucculatrix ulmella* Zeller on *Quercus*, coll. 30.ix.1995, em. 1996 (I. Sims). A further specimen from the latter host collected on *Quercus* in viii in France (Dordogne) emerged in the year of collection (M. R. Shaw). Although, as usual for *Bucculatrix*, some cocoons were collected away from the foodplant, there is little doubt that in all the above cases the host was *B. ulmella*. However, there is also 1 ♀, England, Berkshire, Jealott's Hill (V.C. 22) ex *B. thoracella* (Thunberg) collected on *Tilia* 13.ix.2010, em. 2011 (I. Sims), which suggests a wider host range.

Pholetesor nanus (Reinhard, 1880)

All reared material in NMS (over 100 specimens, but the material retained is only a part of more extensive rearings from the same hosts) of this common and distinctive species is from gracillariids, of which it regularly parasitises various *Phyllonorycter* species on *Alnus*, *Betula* and *Salix* in Britain (and *Robinia* in Switzerland) and *Parornix* species on *Betula* (single rearings are not included). The very few additional rearings from *Quercus* in which the host could be identified have been from *Phyllonorycter heegeriella* (Zeller).

An experiment (M. R. Shaw, unpublished) in which a virgin female of *Ph. nanus* reared from *Phyllo. ulmifoliella* (Hübner) was sleeved on *Betula pendula* together with adults of *Phyllo. ulmifoliella* resulted in 33 females of the parasitoid and no males, demonstrating that *Ph. nanus* is thelytokous (in line with rearing evidence from wild hosts). Except on *Alnus*, there is essentially no overlap in host range between this species and *Ph. circumscriptus* as parasitoids of Gracillariidae, but experiments to explore whether this is the result of searching orientation or incompatibility have not been undertaken (cf. Shaw & Askew, 1999).

Pholetesor phaetusa (Nixon, 1973)

Nixon (1973) described this species from specimens of both sexes reared from the elachistid *Elachista poae* Stainton, also citing specimens from *E. albifrontella* (Hübner) that he excluded from the type series. It is significant that *E. poae* is one of the largest European *Elachista* species (cf. Bland, 1996), and the type series of *Ph. phaetusa* comprises large specimens having well-developed (i.e. large, with somewhat bowed lateral sides) basal fields on the second metasomal tergite. There are no *Pholetesor* specimens other than the distinctive *Ph. viminetorum* in BMNH reared from *Elachista* species larger than *E. poae*, but Nixon had included in his concept of [*Ph.*] *circumscriptus* several series reared from elachistids that include males and share the matt and rather greasy-looking sculptural characters of the basal field with *Ph. phaetusa*, although in these specimens the basal field is generally a little smaller and more triangular than in the type series (but still as long as or longer than wide, shaped much as in the forms of *Ph. circumscriptus* with the longest basal field). I am confident that these specimens, in BMNH totalling 19 ♀, 5

♂, from *E. apicipunctella* Stainton, *E. gangabella* Zeller, *E. gleichenella* (Fabricius), *E. humilis* Zeller, *E. megerlella* (Hübner) and *E. rufocinerea* (Haworth), are better regarded as *Ph. phaetusa* rather than as *Ph. circumscriptus*, even allowing for the possibility that *Ph. phaetusa* as recognised here might still represent an aggregate. There are also series in NMS, totalling 35 ♀, 28 ♂, from *E. albifrontella* (Hübner), *E. bisulcella* (Duponchel), *E. gangabella*, *E. gleichenella*, *E. humilis*, *E. megerlella*, *E. poae*, *E. regificella* Sircom, '*Elachista*' sp. and *Biselachista trapeziella* (Stainton), that clearly belong here. In BMNH there is just one additional series from *Elachista* standing over *Ph. circumscriptus*, of 7 ♀, 10 ♂ reared from *E. megerlella* at Warton Crag (Lancashire), that does not quite fit this pattern, these specimens having basal tergites as shiny as is usual for *Ph. circumscriptus*. However, they are more likely to belong to *Ph. phaetusa* than to *Ph. circumscriptus*: quite apart from the presence of males, in detailed comparison with an all-female series in BMNH of 24 specimens of *Ph. circumscriptus* reared from the gracillariid *Phyllonorycter nigrescentella* (Logan) at Stogumber (Somerset), females of the series from *E. megerlella* consistently have a less transverse head that is less narrowed behind the eyes, the basal field longer, the mesosoma a little more elongate, and the hind tibial spurs probably longer (not visible in some specimens). Additionally, in NMS there are several specimens (of both sexes) reared from the tineid *Psychoides verhuella* Bruand feeding on *Asplenium* and *Phyllitis* (K. P. Bland, E. C. Pelham-Clinton, A. N. B. Simpson, S. E. Whitebread), which might belong to *Ph. phaetusa*, but molecular studies on the whole complex would be desirable.

Pholetesor viminetorum (Wesmael, 1837).

All reared specimens (35 ♀, 37 ♂) of this rather common and distinctive species in NMS are from the following elachistids: *Elachista adscitella* Stainton, *E. albifrontella* (Hübner), *E. bifasciella* Treitschke, *E. bisulcella* (Duponchel), *E. gleichenella* (Fabricius), *E. humilis* Zeller, *E. regificella* Sircom, *E. subnigrella* Douglas, *Biselachista trapeziella* (Stainton), *Cosmiotes freyerella* (Hübner), *C. stablrella* (Stainton) and undetermined '*Elachista*' sp. Six of these are among the ten hosts given by Nixon (1973), the others being *Elachista apicipunctella* Stainton, *E. megerlella* (Hübner), *E. monosemiella* Rössler and *E. triatomea* (Haworth). Although there are large overlaps in the host range recorded here for *Ph. viminetorum* with that given for *Ph. phaetusa*, it is likely that the apparent closeness is an illusion that to a large extent reflects collecting bias and/or the ease with which host mines of particular species can be identified.

The cocoon of *Ph. viminetorum* is atypical for *Pholetesor* species, being rather woolly and stuck down along one side within the host's mine, rather than being satiny and slung hammock-like. Nixon (1973) remarks on the marginal position this species has in his '*Apanteles circumscriptus*-group' (i.e. *Pholetesor*) regarding adult morphology.

COTESIINI

COTESIA Cameron

There is much reared material of this large genus in NMS, some of which represents undescribed species that will be dealt with elsewhere following current DNA studies. See also Shaw (2007; 2009).

Cotesia numen (Nixon, 1974)

Nixon (1974) records [*C.*] *numen* as a parasitoid of several species of the geometrid genus *Eupithecia* with larvae feeding on field-layer plants. In addition to rearings from *Eupithecia* hosts elsewhere, I have reared a long series at a range of coastal sites in England and Scotland from both *Eupithecia venosata* (Fabricius) and the noctuid *Hadena confusa* (Hufnagel) feeding together on *Silene maritima* flowers and seeds, with several precisely confirmed rearings from each host species. This expansion of host range to include a *Hadena* species feeding alongside a presumably more normal *Eupithecia* host is a good example of the importance of niche in the expansion of host range even in koinobionts (cf. Shaw, 2003).

Cotesia subordinaria (Tobias, 1976)

New to Britain. 3 ♀, England, Gloucestershire, Eastleach Martin (V.C. 33) reared solitarily from the noctuid *Rivula sericealis* (Scopoli), coll. 23.v.2007, em. vi.2007; and coll. 21.v.2009, em. 22 and 25.vi.2009 (*M. R. Shaw*). A long series of males was reared in cultured *R. sericealis* during 2009 from the latter, some gregariously (Shaw, in press.). There is also 1 ♂ from

Sussex, Shoreham, coll. and em. v.1995 from an undetermined host on *Brachypodium sylvaticum* (I. D. Ferguson). Fortunately the latter was accompanied by the host remains, which I can now recognise as clearly belonging to *R. sericealis* (presumably post-diapause), to which this species seems likely to be completely specialised. Only the female sex has the characteristically pale hind coxa.

DEUTERIXYS Mason

Deuterixys plugarui (Tobias, 1975)

New to Britain. 1 ♀, England, Kent, Ellenden Wood (V.C. 15) ex *Bucculatrix ?ulmella* Zeller, cocoon coll. on *Sarothamnus* 19.viii.1976 (P. J. Johnson). In NMS there are three further specimens from more certainly identified *B. ulmella* from France (M. R. Shaw) and Switzerland (S. E. Whitebread), emerging in the year of collection. The significance of the plant species on which *Bucculatrix* cocoons are collected is low, as the larvae often disperse widely from their foodplant prior to cocoon formation.

DIOLCOGASTER Ashmead

Diolcogaster abdominalis (Nees, 1834)

There are two reared female specimens in NMS, solitarily from the satyrines *Coenonympha tullia* (Müller) in England, Cumbria (V.C. 69) (*T. Melling*) and *Coenonympha oedippus* (Fabricius) in France (Gironde) (*K. Dierks*). In both cases the host was collected in April and the adult parasitoid emerged the same year; a further cocoon from *C. tullia* (from the same site) failed to hatch. The rather stout cocoon is brownish pink. There are also two males in the collection, one (France) being much bigger than the other specimens present, perhaps suggesting a larger host. Yu, van Achterberg & Horstmann (2005) list only the vanessine *Vanessa atalanta* (Linnaeus) as host, but it is clearly not a regular parasitoid of this very commonly reared butterfly.

Diolcogaster hinzi (Nixon, 1965)

New to Britain. In NMS there are five specimens collected on separate occasions in England: Cheshire (V.C. 58), Lancashire (V.C. 60) and Westmoreland (V.C. 69), and Scotland: Angus (V.C. 90) and Easter Ross (V.C. 106). Four are reared, from the arboreal geometrids *Cabera exanthemata* (Scopoli) (2) (M. R. Shaw), *Cabera pusaria* (Linnaeus) (1) (M. R. Shaw) and *Biston betularia* (Linnaeus) (1, with distinctive host remains present) (*W. A. Watson & J. Whiteside*). In each case the single rather large, pure white parasitoid cocoon was formed in August or September, and the adult parasitoid emerged in June or July the following year. In one closely observed instance a well-grown *C. exanthemata* larva spun a frail retreat, within which the parasitoid larva erupted and formed its cocoon, after which the host larva left the retreat and subsequently died after a few days of wandering around (see also notes under *Microplitis tristis*). Nixon (1965) described this species from German specimens, one of which was reared from *C. pusaria*.

Diolcogaster procris (Fischer, 1964)

Nothing seems to be known of this species since its description from a gregarious brood reared from the zygaenid *Jordanita notata* (Zeller) in Austria (Fischer, 1964). In NMS is a brood of 17 (8 ♀, 4 ♂ emerged) reared from *Jordanita* sp. mining *Centaurea ?nigra*, France, Lot-et-Garonne, Bernac, coll. 14.v.1996, cocoons formed in host cocoon, em. 29.vii.1996 (*K. P. Bland*). The rather frail cocoons are white. It is most likely that the host was again *J. notata*.

GLYPTAPANTELES Ashmead

Glyptapanteles aliphera (Nixon, 1973)

According to Papp (1990), no host is known for this species. A male was reared as a solitary parasitoid of an unidentified geometrid larva collected on 2.v.1998 in leaf litter, Scotland, Roxburghshire, Threepwood Moss (V.C. 80), emerging from its pure white cocoon on 16.v.1998 (*K. P. Bland*).

Glyptapanteles antinoe (Nixon, 1973)

The recorded distribution of this distinctive species is Austria, Germany, Hungary and Turkey (Yu, van Achterberg & Horstmann, 2005). To this may be added a brood of 6 ♀, 3 ♂, Sweden, Småland, Bäckebo, Millemåla reared from an unidentified arctiid, coll. vii.1998, em. vii/viii.1998 (C. U. Eliasson). The rather large cocoons are white, fluffy, and only loosely connected to one another. The Austrian type series was also reared gregariously from an unidentified arctiid (Nixon, 1973).

Glyptapanteles fausta (Nixon, 1973)

Papp (1983) synonymised the nominal species *Apanteles fausta* Nixon, 1973, under *Apanteles eugeni* Papp, 1972, but later (Papp, 1988) rescinded his action. Unfortunately Papp (1972) had chosen a non-reared specimen as holotype, but a paratype of *G. eugeni* reared from the choreutid *Anthophila fabriciana* (Linnaeus) is in BMNH (examined) and appears to be conspecific with *G. fausta* (described from this host; type examined). It seems probable that Papp's (1983) synonymy was justified but, as this requires further investigation (i.e. of the holotype of *G. eugeni*), the name *G. fausta* is retained for now. Nixon (1973) had speculated that *G. fausta* might be the summer generation of *G. lateralis* (Haliday), which has the same host, but I have conducted experimental rearings (M. R. Shaw, unpublished) that demonstrate beyond doubt that the two species are distinct. Both species are solitary, plurivoltine, and overwinter as an early instar larva within the overwintering larva of the host. Additionally, *G. fausta* was found to be thelytokous while *G. lateralis* is sexual.

Glyptapanteles porthetriae (Muesebeck, 1928)

Partly to explain the absence of confirmed late summer hosts of this widespread and often abundant parasitoid of the pest lymantriid *Lymantria dispar* (Linnaeus) in Europe, Shaw & Skelton (2008) suggested that this solitary species (*pace* Nixon, 1973) may be a partly univoltine specialist parasitoid, ovipositing into *L. dispar* eggs containing the developed but unhatched first instar host larvae that then overwinter *in situ*. The weak point in the hypothesis was that the adult females of *G. porthetriae*, which would normally emerge in June if from *L. dispar*, would need to survive in the field for several weeks, until *L. dispar* eggs had been laid and the embryos within had developed to become unhatched first instar larvae in late summer. However, it is now clear that there is after all a mid/late summer generation of *G. porthetriae* on noctuid hosts that bridges this gap, as on separate occasions three specimens have been reared from noctuid hosts in southern France; one each from *Calophasia lunula* (Hufnagel), *Shargacucullia lanceolata* (Villers) and *Craniophora ligustri* ([Denis & Shiffermüller]) (all M. R. Shaw). The adults emerged from early July to early August in the year of cocoon formation and, although the supposition of host-specificity and univoltinism was wrong, these rearings in fact strengthen the hypothesis (Shaw & Skelton, 2008) that oviposition into eggs of *L. dispar* containing pre-diapause pharate first instar larvae occurs in late summer. If correct, this would explain how the parasitoid gets through the winter in Europe and (presuming it is less pre-adapted to summer hosts occurring in North America) also its failure as a biocontrol agent against invasive *L. dispar* in the Nearctic.

Glyptapanteles salepus (Papp, 1983)

New to Britain. 1 ♀, England, North Yorkshire, RAF Fylingdales, SE880970 (V.C. 62), water trap in *Calluna* moor/bog, vii–ix.1996 (per G. J. King – collected during a survey to evaluate biodiversity in the radar hazard area).

PROTAPANTELES Ashmead***Protapanteles hirtariae*** (Kotenko & Tobias, 1986)

New to Britain. Rather regularly reared, usually in broods of about 6–12, from the geometrid *Lycia zonaria* ([Denis & Schiffermüller]) in its machair habitats on the Scottish V.C.s 103 and 110 west coast islands of Mull (*D. A. Barbour, P. Wormell*), Coll (*K. P. Bland*), South Uist (*G. R. Else*) and Lewis (*R. Wolton*). The characteristic, and for the genus very unusual, reddish ribbed cocoons are initially borne on the back of the still-living host, but tend to drop off to overwinter singly or in small groups. Kotenko & Tobias (1986) mention these striking cocoons in describing the species from the Volgograd region, Russia, as a parasitoid of *Lycia hirtaria*

(Clerck). The Scottish material matches the original description of what is a rather distinctive species closely; the spine on the apical segment of the front tarsus being apparently rather weaker than suggested and the associated emargination slighter in the Scottish specimens is likely to be of no significance. At least in Scotland, the two known hosts occupy very different habitats and it would be interesting to know if the parasitoid uses either of the two inland *Lycia* species, *L. hirtaria* and *L. lapponaria* (Boisduval), in Britain.

VENANIDES Mason

***Venanides* sp.**

Though widely distributed, *Venanides* is known from few species (Mason, 1981). Two specimens are in NMS, both reared from gelechiid hosts collected in Teneriffe (J. L. Gregory): 1 ♀ ex *Brachmia convolvuli* Walsingham on *Calystegia*, coll. xi.1989, em. 16.xii.1989; and 1 ♂ ex *Teleiopsis lunariella* (Walsingham) coll. xi.1989, em. 1990. Both rearings appear to be solitary, which may be unusual for *Venanides* (Mason, 1981). It is unclear whether the two specimens are conspecific, but neither appears to belong to any species treated by Nixon (1965) in his '*Apanteles congoensis*-group'.

MICROGASTRINI

HYGROPLITIS Thomson

***Hygroplitis rugulosus* (Nees, 1834)**

1 ♂, Wales, Pembrokeshire, Gors Fawr, SN133295 (V.C. 45), 6–20.vii.1987 (*P. Holmes/NCC*). Nixon (1968) emphasises the red apex of the metasoma of females, but this is not the case in males. Morley (1936: 210; see also 1906: 104) records (as *Microgaster*) 'a good many' British specimens of this very seldom-collected species reared [solitarily] from the nymphuline pyralid *Elophila nymphaeata* (Linnaeus) by A. Sich at Richmond, Surrey. In the C. Morley collection (Ipswich Museum) there is just 1 ♂ (lacking the head) from this series, em. 3.x.1905, which I have examined and believe to have been correctly determined.

ICONELLA Mason

***Iconella aeolus* (Nixon, 1965)**

New to Britain. 1 ♂, England, Shropshire, Whixall Moss (V.C. 40) reared from the pyralid *Metriostola betulae* (Goeze), coll. 30.v.1987, em. 19.vi.1987 (*E. C. Pelham-Clinton*). This is the host from which Nixon (1965) originally described it (from Germany).

MICROGASTER Latreille

The taxonomy of western European species in this genus remains difficult, with much unresolved. Although I hope to have cleared up some uncertainties, in NMS several series remain, unfortunately mostly of non-reared specimens, which seem to represent definable species but for which names could not be found. Two such species are described here, but otherwise they are not further dealt with.

***Microgaster acilia* Nixon, 1968 sp. rev.**

Van Achterberg (1997) placed *Microgaster grandis* Thomson, 1895, in synonymy under *Microgaster meridiana* Haliday, 1834. Subsequently Papp (1999) placed *M. acilia* Nixon, 1968, in synonymy with *Microgaster meridiana*, without commenting on van Achterberg's (1997) view. However, the two nominal species *M. grandis* (sensu Nixon (1968), which is here presumed to be reliable) and *M. acilia* are certainly distinct (cf. Nixon, 1968), and therefore these two published opinions are incompatible. Having examined the holotype of *M. acilia* and the lectotype of *M. meridiana*, I can support van Achterberg's (1997) view, rather than that of Papp (1999). Thus, *M. acilia* should be regarded as a valid species, and *M. grandis* as a synonym of *M. meridiana*.

Papp (1976), in his couplet to separate *M. grandis* from *M. acilia*, cites as differences the usually dark hind femur of *M. grandis* (always largely red in *M. acilia*) and the smaller ocelli of *M. acilia*. The lectotype of *M. meridiana* has ocelli that are smaller than usual for specimens

corresponding to Nixon's concept of *M. grandis*, and also has the hind femur predominantly red. However, Nixon (1968) states that this varies from black to red in *M. grandis*, and indeed the eight females of *M. meridiana* in NMS split equally in having it largely red and largely black, both forms being represented in specimens reared from *Aphelia* spp. (Tortricidae), which is clearly a regular association. These character states of the lectotype of *M. meridiana* might explain Papp's (1999) conclusion, especially as it also has rather weak sculpture on the frons and vertex. However, it has large and discrete punctures on the mesoscutum anteriorly, and at the anterior edge of the mesopleuron, and also has the longest setae on the face and eyes rather more than half the width of the third antennal segment – exactly as in specimens determined by Nixon as *M. grandis*, and differing in these respects markedly from *M. acilia* (of which I have seen the type). It is also larger than any specimen of *M. acilia* I have seen, but corresponds in size to *M. grandis* sensu Nixon.

***Microgaster arctostaphylica* sp. nov.** (Figs 1–8)

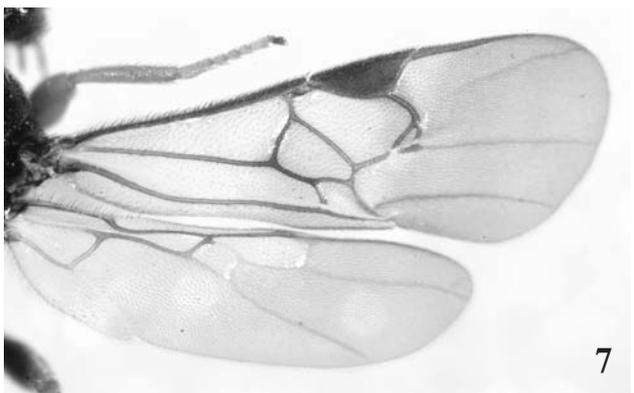
See also remarks under *Microgaster messoria*. The new species will run in Nixon's (1968) and Papp's (1976) keys to *M. tibialis* (now *M. messoria*), from which it differs most obviously in its larger size (usually *ca* 4.5 mm as against 3.0 mm), its broader front femur (2.6–3.0 as against 3.3 times as wide as long), its more transverse second metasomal tergite (3.8 as against 2.8 times as long as wide), and the orange-brown apex of the middle femur (virtually black in *M. messoria*). Papp (1961) implies that *M. dudichi* Papp is close to *M. messoria*, but the further details given for his species (Papp, 1976: 113) indicate several clear differences from *M. arctostaphylica* sp. nov., including that *M. dudichi* has the second [sic] tergite almost smooth, the hypopygium less creased, the face less transverse, only two spines on the hind claw, and a shorter pterostigma. Even if the second tergite was a lapsus for the third tergite, as seems possible, the other differences remain significant. The new species is also quite close to *M. australis* (= *deprimator* auctt), but among other differences that species has the hind femur red and the hind tarsus strongly infusate.

Holotype ♀, [Scotland]: 'Inverpolly NNR, W. Ross, *Olethreutes arbutella*, *Arctostaphylos* [coll.] 4.1981 M. R. Young' (in NMS, Edinburgh).

Paratypes (10 ♀, 9 ♂), all Scotland: 3 ♀, 3 ♂, same data as holotype; 3 ♀, 4 ♂, Skye, Raasay, ex *Olethreutes arbutella* (Linnaeus) (Tortricidae), *Arctostaphylos uva-ursi*, coll. 20.iv.2010, em. dates between 22.v and 15.vi.2011 (*S. D. Beavan*, *R. J. Heckford*); 1 ♀, 1 ♂, S. Aberdeenshire, The Craig, ex ?*Olethreutes mygindiana* ([Denis & Schiffermüller]), *Arctostaphylos uva-ursi*, coll. 15.v.2002, em. 31.v.2002 and by vii.2002 (*R. J. Heckford*); 1 ♀, Inverness-shire, Aviemore, ex *O. mygindiana*, *A. uva-ursi*, coll. 18.iv.1970, em. 1970 (*J. M. Chalmers-Hunt*); 1 ♂, Perthshire, S. of Drum Croy, ex *O. mygindiana*, *A. uva-ursi*, coll. 7.iv.1994, em. 13–24.v.1994 (*K. P. Bland*); 1 ♀, Inverness-shire, Tulloch Moor, ex *Epinotia nemorivaga* (Tengström) (Tortricidae), *A. uva-ursi*, coll. 4.v.2002, em. 2.vi.2002 (*R. J. Heckford*); 1 ♀, Inverness-shire, Aviemore, labelled as ex *Coleophora arctostaphyli* Meder (Coleophoridae) [the lack of cocoon or host remains, and the full size of this specimen, suggest that the true host might have been overlooked among foodplant], 21.v.1974 (*I. A. Watkinson*). Paratypes deposited in NMS and 1 ♀, 1 ♂ with same data as holotype in BMNH, London.

Description

Female. Body length 4.5 mm in most specimens. Head in dorsal view (Fig. 1) 2.0 times as wide as long, temple as long as eye, scarcely broadening immediately behind eye then roundly narrowing posteriorly; POL 2.1 times and OOL 2.1 times diameter of posterior ocellus; distance between anterior and a posterior ocellus about the same as ocellar diameter; face (Fig. 2) often transversely rugulose-striate over most of its surface with the punctate element prominent only in lower part centrally and on rugose-punctate clypeus (in some specimens the rugosity of face and clypeus is less extreme and the punctate element clearer), 1.5 times as wide as high (excluding clypeus), eyes parallel or only slightly converging from below antennal sockets to level of upper margin of clypeus; malar space 0.7 times basal width of mandible; frons strongly concentrically striate; vertex with feeble sculpture, somewhat shiny; antenna (Fig. 3) not markedly bristly, moderately stout, about as long as body, third segment about 2.7 and penultimate segment 1.0–1.2 times as long as wide. Mesosoma 1.5 times as long as high; mesoscutum (Fig. 4) anteriorly sharply punctate, weakly coriaceous between punctures so appearing dull, becoming strongly shiny centrally and posteriorly with the strong punctures at least weakly present practically up to scutellar fovea; scutellum largely smooth and shiny, with



punctures well indicated only at sides; propodeum strongly rugose with median keel distinct; mesopleuron strongly shining with large rather sharp punctures anteriorly and subventrally, progressively becoming confluent and hence rugose-punctate towards anterior edge. Front femur stout, 2.6–3.0 times as long as wide. Hind leg (Fig. 5) with coxa dorsally weakly rugulose-striate, laterally shining with weak scattered punctures, and ventrally strongly rugose-punctate; hind femur 2.9–3.2 times as long as wide, rather shiny, its outer aspect rugose-punctate; hind tibia 5.3 times as long as wide, inner spur longer than outer and reaching to about three quarters the length of the basitarsus; claw (Fig. 6) large with a pecten of three stout spines. Fore wing (Fig. 7) with pterostigma 2.8 times as long as wide; metacarp becoming indistinct distally, 1.1–1.2 times as long as its distance from the apex of the radial cell; first abscissa of the radius (r) [2r-rs] rather evenly curved, issuing somewhat obliquely from distal 0.7 of pterostigma, as long as width of pterostigma; areolet (2nd submarginal cell) tending to appear subtriangular and narrow; costad abscissa of basalis (1-SR) about a third as long as mediad abscissa (1-M); first abscissa of discoideus (1-CU1) substantially longer than second (2-CU1). Hind wing (Fig. 7) with nervellus (cu-a) [cua+Cu] not strongly incurved, somewhat sinuate. Metasoma (Fig. 8) with first tergite strongly widening posteriorly, 1.7 times as wide as long, rugose (longitudinally so at sides posteriorly); second tergite 3.8 times as wide as long, equally rugose; third tergite as long as second, practically entirely smooth, shiny; hypopygium (Fig. 5) 0.7 times as long as hind tibia, with strong lateral creases (so appearing apically somewhat produced), not reaching apex of metasoma; hairy part of ovipositor sheath (Fig. 5) 0.5 times as long as hind tibia; ovipositor rather slender, weakly downcurved.

Colour: black. Mandible apically and palpi, brown. Front leg beyond about basal third of femur, mid leg beyond about basal three-quarters of femur (variable), hind leg beyond femur, orange brown (hind tibia apically and tarsus usually weakly infuscate). Apex of hind trochantellus and extreme base of hind femur often slightly reddish, and sometimes hind femur, particularly along inner aspect subventrally, deep reddish brown.

Male. Like female except for sexual differences. Second tergite about 3.0 times as long as wide and slightly longer than third. Punctuation of mesoscutum sometimes less intense and then not traceable posteriorly to the scutellar fovea.

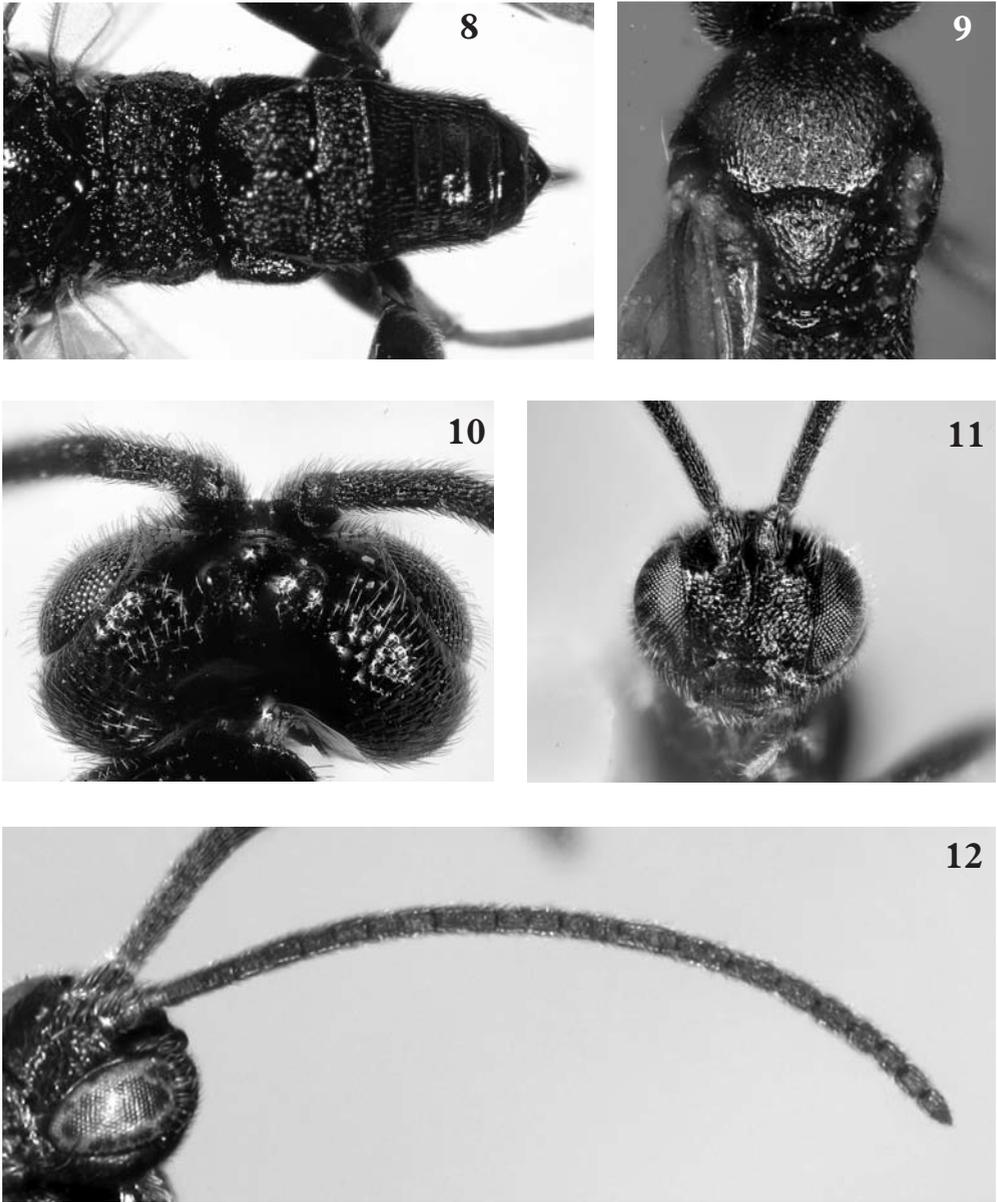
Variation. There is little size variation, although one small female (from *O. mygindiana*) is only 3.4 mm long. The intensity of sculpture (e.g. the extent to which punctures emerge from the transverse rugosity of the face) is also variable. One female (W. Ross) and one male (Perthshire) have the hind femur extensively (more or less centrally, and particularly on inner face) reddish; and one male (Skye) has the mid femur virtually entirely black (as in *M. messoria*).

All specimens known so far have been reared from microlepidopterous larvae, perhaps in all cases Tortricidae, feeding on *Arctostaphylos uva-ursi* in Scotland. The specific epithet is derived from their foodplant.

Microgaster ductilis Nixon, 1968

New to Britain (though there is a possibility of an aggregate being involved in my concept of *M. ductilis*). 2 ♀, 4 ♂, England, Hampshire, Emmer Bog (V.C. 11) solitarily from the tortricid *Endothenia nigricostana* (Haworth) in *Stachys sylvatica* stems, coll. 4.v.1987, em. v.1987 and coll. 17.iii.1990, em. iv.1990 (♂. *R. Langmaid*); 3 ♀, England, Devon, Dartington (V.C. 3) from the same host and plant, coll. 4.xi.2010, em. iii.2011 (*S. D. Beavan*). Also non-reared series from Cambridgeshire (Chippenham Fen, V.C. 29, ♀. *Field*) and Oxfordshire (Barrow Farm Fen, V.C. 22, *K. Porter/NCC*), collected in vi–vii(viii). The host of this supposedly distinctive species, with its long hypopygium and bristly antenna, was previously unknown. The material detailed above, while being very obviously conspecific, is rather variable in several respects, especially the length of the penultimate antennal segment and the shape of the discoidal cell. Otherwise the specimens agree closely with the holotype (in FMNH, Helsinki; examined) in most respects, except in having larger ocelli and a somewhat more bowed head

Figs 1–7. *Microgaster arctostaphylica* sp. nov. Female. 1, head in dorsal view; 2, head in facial view; 3, antenna; 4, mesoscutum and scutellum; 5, hind leg and metasoma in lateral view; 6, hind claw; 7 wings.



Figs 8–12. *Microgaster* species. Females, except fig. 9, male. 8, *M. arctostaphylica* sp. nov., propodeum and metasoma in dorsal view. 9, *M. fischeri* Papp, mesoscutum and scutellum. 10–12, *M. raschkiellae* sp. nov. 10, head in dorsal view; 11, head in facial view; 12, antenna.

(i.e. more constricted behind the eyes and with the vertex more excavate), and (in most specimens) the costad abscissa of the basalis markedly shorter (unfortunately none of the 3 paratypes detailed by Nixon (1968) was located so variation in these characters could not be assessed in the type series). Nixon (1968) also draws attention to the long basal (hairless) part of the ovipositor sheath, which is indeed clearly visible in the type of *M. ductilis* though less so

in the females in NMS: however, it is probably a real correlate of the extended hypopygium, and its visibility or otherwise may be simply a matter of how the insect died (or rather, dried).

In NMS there is also a non-reared series of 4 ♀ from Scotland, Inverness-shire, Creag Megaidh (V.C. 97) collected at 290, 445 and 885 m, 17.vi–10.vii.1983 (*D. Horsfield*) with a head shape and ocelli more like the holotype, and also a long costad abscissa of the basalis, but with a markedly less bristly antenna and much redder legs. Despite the similarly large hypopygium, and their being a good match for *M. ductilis* in some respects, I do not think that these rather smaller and less slender specimens are conspecific with the specimens reared from *E. nigricostana* that I believe are *M. ductilis*. However, the situation is disappointingly unclear.

***Microgaster* sp. near *erro* Nixon, 1968**

Nixon (1968) described *M. erro* from Finland, mentioning also three females from Switzerland that differed sufficiently to be excluded from the type series. Having examined both the type (in FMNH, Helsinki) and the Swiss specimens (in BMNH) I believe that the latter, which (among other differences) are substantially less coarsely sculptured than the type, belong to a different species (perhaps undescribed). In NMS is a single British female apparently conspecific with the Swiss specimens: England, Oxfordshire, Wychwood Forest, SP343171 (V.C. 23), 4–23.v.1990 (*K. Porter/NCC*).

***Microgaster fischeri* Papp, 1960 (Fig. 9)**

On the basis of having seen two male paratypes of *M. fischeri* (which was described from the male sex only) deposited in the Naturhistorisches Museum (Wien), Nixon (1968) determined two females and one male from England (in BMNH) as that species, stating that they agreed with the paratypes in size, colour and sculpture (rather surprisingly in the latter case, as they do not). From 1978 onwards I have determined a *Microgaster* species reared in numbers, and at many British localities, from the leaf-mining momphid *Mompha raschkiella* (Zeller) as *M. fischeri*, after comparing them with the above English specimens determined by Nixon. However, it became evident that these British specimens do not run smoothly to *M. fischeri* in Papp's (1976) key, largely because *M. fischeri* is stated therein to have the mesoscutum rugulose posteriorly as well as anteriorly, while in the British material it is clearly largely smooth and shiny posteriorly. At the time that Papp (1960) described *M. fischeri*, the female was unknown. Nixon (1968) then gave characters of the supposed (but misidentified) female, which Papp (1976) incorporated into his concept of *M. fischeri* in his keywork. Thus some of the characters of the true *M. fischeri* female (e.g. ovipositor, hypopygium, antenna) remain obscure, and it is possible that it might not be readily identifiable from Papp's (1976) key.

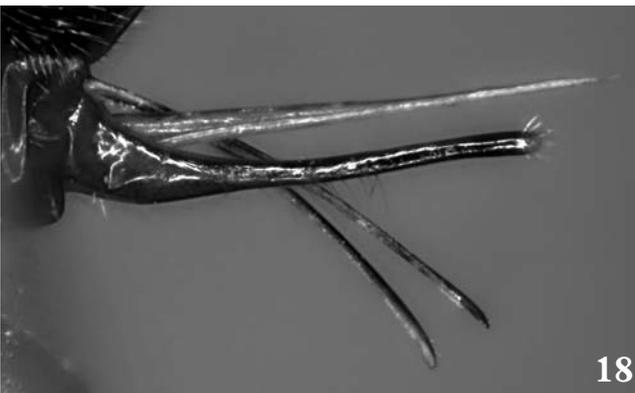
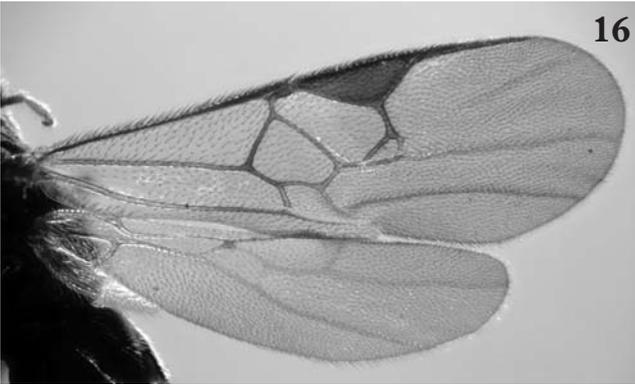
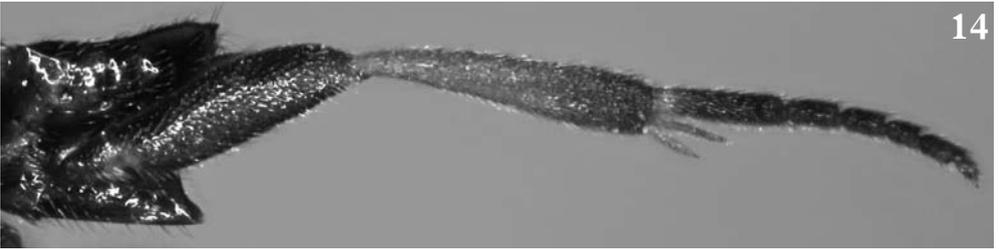
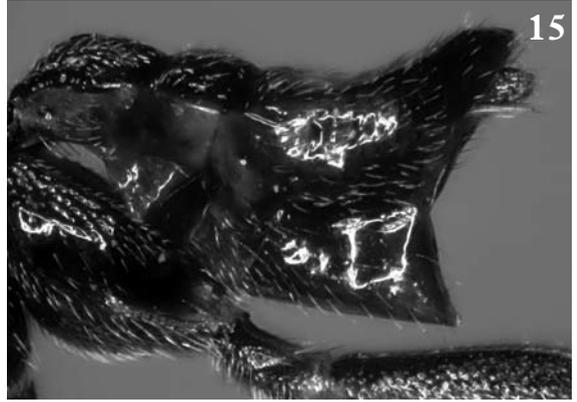
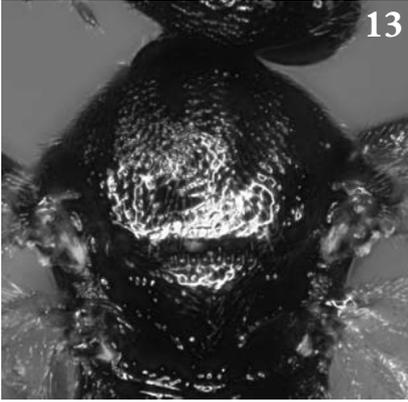
I have been able to examine all the material available to Nixon (including the two male paratypes of *M. fischeri* from NHM, Wien), and it is evident that the British material belongs to a different species. On this basis *Microgaster fischeri* Papp, 1960, should be deleted from the British list (although, through an oversight, it was not in fact included in Fitton *et al.*, 1978), and the species misidentified as that is described below as *Microgaster raschkiellae* sp. nov.

***Microgaster fusca* Papp, 1959 (= *phryne* Nixon, 1968)**

1 ♀, France, Dordogne, St Alvére, 1–17.ix.2001 (*R. R. Askew*). Previous European records (cf. *Fauna Europaea*) are from Hungary and south-eastwards.

***Microgaster globata* (Linnaeus, 1758) and *Microgaster laeviscuta* Thomson, 1895**

Papp (1976) synonymised *Microgaster laeviscuta* Thomson, 1895 under *Ichneumon globatus* Linnaeus, 1758. A rather varied assortment of specimens in NMS run to *M. globata* in Papp's (1976) key, including a long series reared solitarily from the pyralid *Acrobasis consociella* (Hübner) (*M. T. Jennings*, *M. R. Shaw*) collected at several sites, and others from mostly incompletely determined hosts, especially tortricids. Among the latter are series that belong to an apparently different species from that parasitizing *A. consociella*, among other things having smaller ocelli, which correspond to Nixon's (1968) concept of *M. laeviscuta*. There is clearly much to sort out in this aggregate, but it seems unfortunate that Papp (1976) applied the name *M. globata* so widely. Without examining Thomson's type it can be no more than an informal suggestion that Nixon's rather clear concept of *M. laeviscuta* should be entertained as a species separate from *M. globata* sensu Papp; an action that would probably improve specimen identification within the aggregate.



Whether or not the name *globata* should be used for any solitary species of Microgastrinae is another debatable issue: conflicting views are advanced by Nixon (1968: 33–34) and Papp (1976: 114–115).

***Microgaster laeviscuta* Thomson, 1895**

See remarks under *M. globata*.

***Microgaster meridiana* Haliday, 1834**

See remarks under *M. acilia*.

***Microgaster messoria* Haliday, 1834**

Yu, van Achterberg & Horstmann (2005) list *Microgaster tibialis* Nees, 1834 [homonym], *Microgaster ambigua* Ruthe, 1860, *Microgaster maculata* Ruthe, 1860, *Microgaster vulgaris* Ruthe, 1860, and *Microgaster pluto* Morley, 1936, as synonyms of *M. messoria*. (The types of the last four are in BMNH. All three of the Ruthe nominal species were originally described as vars of *M. tibialis* Nees, the type of which is lost.) Because I am describing a species very close to *M. messoria* (as *M. arctostaphylica* sp. nov., see above), I have needed to examine the types of all the foregoing (including the lectotype of *M. messoria*, in NMI, Dublin). From this it is clear that *Microgaster tibialis* var. *vulgaris* Ruthe and *Microgaster pluto* Morley are conspecific with *M. messoria*, which is represented by more than 50 specimens in NMS reared from the gracillariid *Aspilapteryx tringipennella* (Zeller) mining *Plantago lanceolata* from five sites in S. England (*H. C. f. Godfray, K. Saul, M. R. Shaw*) and one in Scotland (*K. P. Bland*). It is clear, however, that neither the type of *Microgaster tibialis* var. *maculata* Ruthe nor that of *Microgaster tibialis* var. *ambigua* Ruthe is conspecific with *M. messoria* (among other things, both have rather weak sculpture and the hind femur to a large extent red). Although their precise identity is not pursued here, they are likely to be conspecific with species known under later names. Fortunately, if this is ever judged to be the case, both names are long neglected and as such could be suppressed under Article 23.9.2 of the ICZN Code if found to threaten a better established subsequent name.

***Microgaster novicia* Marshall, 1885**

1 ♀, Scotland, Argyll, Glencoe visitor centre, NN 112 575 (V.C. 98), reared from the yponomeutid *Swammerdamia caesiella* (Hübner) on *Betula*, coll.7.ix.2010, em. 30.iii.2011 (*S. D. Beavan*) (compared with type); 1 ♂, England, Lancashire, Chat Moss (V.C. 59) ex *S. caesiella* on *Betula*, coll. 16.ix.1977, coc. ix.1977, em. 1978 (*M. R. Shaw*). Nixon (1968) synonymised *M. swammerdamiae* Muesebeck, 1922, described as a parasitoid of *Swammerdamia castanea* Busk in North America, under *M. novicia*, but was unable to give a British or European host. The above British rearings from a host congeneric with that recorded in North America support the synonymy. However, material running to this species in Nixon's (1968) and Papp's (1976) keys may be an aggregate. In NMS are also English series of 1 ♀, 1 ♂; 1 ♂; 1 ♂ reared solitarily at separate sites from the gelechiid *Caryocolum blandella* (Douglas) (all ♀. *R. Langmaid*) and, at yet another site, 1 ♀, 2 ♂ from ?*Caryocolum* sp. (*E. C. Pelham-Clinton*), in all cases from *Stellaria holostea* shoots with emergence in the year of collection, and in these the females have a longer ovipositor than the type. It may be relevant that Papp (1976) and Nixon (1968) differ on this character, such that these series conform to Papp's concept. They presumably represent an undescribed species. There are additional female specimens from England (*C. W. Plant*) and Sweden (*I. Svernnson*) reared from the gelechiid *Scrobipalpa acuminatella* (Sircom), with emergence the year following collection, which might also belong to it.

***Microgaster parvistriga* Thomson, 1895**

Nixon (1968) mentions a series in BMNH reared from *Betula* catkins. Series in NMS from the tortricid *Epinotia immundana* (Fischer von Röslerstamm) (6, on 5 occasions) (*K. P. Bland, f. L.*

Figs 13–18. Microgastrinae. Females. 13–17 *Microgaster raschkiellae* sp. nov. 13, mesoscutum and scutellum; 14, hind leg (excluding coxa); 15, hind coxa and metasoma in lateral view; 16, wings; 17, propodeum and metasoma in dorsal view. 18, *Microplitis impressus* (Wesmael), hypopygium, ovipositor and sheaths in lateral view.

Gregory, M. R. Shaw, A. N. B. Simpson) and from the yponomeutids *Argyresthia goedartella* (Linnaeus) (1) (*J. R. Langnoid*) and *Argyresthia* sp. cocooned in *Betula* bark (1) (*K. P. Bland*) suggest that this species, with its distinctively bent ovipositor, is a regular parasitoid of hosts that start their lives in the catkins and buds of Betulaceae (both *Alnus* and *Betula*).

***Microgaster polita* Marshall, 1885**

Nixon (1968) did not give a host. In NMS are 2 ♀ reared from an unidentified host feeding in *Sorbus aucuparia* berries, Scotland, Rum (V.C. 104), coll. x.1965, em. vi.1966 (*P. Wormell*). Marshall (1889) gives a rearing record from the yponomeutid *Argyresthia conjugella* Zeller, and it is most probable that the Rum specimens were also from that.

***Microgaster procera* Ruthe, 1860**

Nixon (1968) gave no host. As far as the British Isles are concerned, he recorded only 1 ♂ specimen, from Ireland (with abnormal coloration, thought by him possibly to be an artefact). In NMS are 2 ♀, 1 ♂ from separate sites in S. England and with typical coloration. The two females are labelled as reared: from the arctiid *Tyria jacobaeae* (Linnaeus) coll. 1971, em. 14.vi.1972 (*D. A. Sheppard*); and from communal cocoons of the pyralid *Eurrhynpara hortulana* (Linnaeus) found under loose *Acer pseudoplatanus* bark 19.i.1994, em. 2.v.1994 (*D. Hackett*). The latter rearing is given the better credence by the detail available as well as recovery of the parasitoid's rather large, whitish, elongate cocoon, but unfortunately host remains are not present in either case.

***Microgaster raschkiellae* sp. nov.** (Figs 10–17)

See also remarks under *M. fischeri*. The new species will run in Nixon's (1968) key to *M. fischeri*, for which Nixon had mistaken it. In Papp's (1976) key it is accommodated within the incorrectly perceived variation of *M. fischeri*. It differs most obviously from the two male paratypes of *M. fischeri* examined in having the eyes much less convergent below (in fact, hardly at all convergent in the new species), the posterior third of the mesoscutum smooth and very shiny (rugulose and more or less matt in *M. fischeri*, Fig. 9), the scutellum less sculptured and shinier, the sculpture of the third tergite limited to at most the basal third (it extends over the basal two-thirds in *M. fischeri*), and the less coarsely rugose propodeum, on which a median longitudinal keel is more evident than in *M. fischeri*. It should be noted, however, that I have not seen the female of *M. fischeri*.

Holotype ♀, [Wales]: 'Little Haven, Pembs. Mompha raschkiella, Ch. angustifolium HLC 6.8.[19]77, PLE ex prepupa, PIE 19.6.78 M. R. Shaw' (in NMS, Edinburgh).

Paratypes (82 ♀, 58 ♂). 77 ♀, 52 ♂ reared singly from *Mompha raschkiella* (Zeller) (Mompidae) mining *Chamaenerion angustifolium* collected on various dates in vi and vii in 1976–1979, 1981 and 2008 at **Wales**: Pembrokeshire, Little Haven; **England**: Cheshire, Lindow Common and Cotterill Clough; Manchester, East Disbury; Buckinghamshire, West Wycombe; Oxfordshire, Bruern; Gloucestershire, Eastleach; **Scotland**: Edinburgh, Blackford Hill; Selkirkshire, Ettrick Marsh; Kirkcudbrightshire, Laurieston. Emergence from the host cocoon was in vi of the following year in all cases except for 4 ♀, 2 ♂ which emerged in viii of the year of collection (all the foregoing *M. R. Shaw*; deposited in NMS; BMNH, London; NMI, Dublin; FMNH, Helsinki; RMNH, Leiden; HNHM, Budapest; NHM, Wien; ZI, St Petersburg). Also included as paratypes 4 ♀, 4 ♂ reared from the above host on various dates, **England**: Devon, Chudleigh Knighton Heath (*R. J. Heckford*); Kent, Dartford (*P. A. Sokoloff*); Middlesex, Scratch Wood (*E. S. Bradford*); **Scotland**: Edinburgh (*E. C. Pelham-Clinton*); Ayrshire, Roseberry (*K. P. Bland*); Aberdeenshire, Wartle Moss (*M. R. Young*) (all in NMS), and the 2 ♀, 1 ♂ non-reared specimens from the three separate localities in **England**: Buckinghamshire detailed by Nixon (1968) under the name *M. fischeri* (in BMNH).

Description

Female. Body length 2.3 mm. Head in dorsal view (Fig. 10) 1.8 times as wide as long, temple as long as eye and broadening shortly immediately behind eye then roundly narrowing posteriorly; POL 2 times and OOL 2.7 times diameter of posterior ocellus; distance between anterior and a posterior ocellus 0.8 times ocellar diameter; face (Fig. 11) transversely and coarsely rugulose, scarcely punctate, 1.4 times as wide as high (excluding clypeus), eyes not converging below level of antennal sockets; clypeus rugulose with punctures somewhat better defined than on face; malar space 0.5 times length of base of mandible; frons somewhat shiny, weakly concentrically striate; vertex feebly rugulose-punctate, weakly shiny; antenna (Fig. 12,

see also Figs 10, 11) bristly, moderately slender, as long as body, third segment 3.2 times and penultimate segment 1.3 times as long as wide. Mesosoma 1.5 times as long as high; mesoscutum (Fig. 13) anteriorly dull, more or less rugulose-punctate, posteriorly becoming smooth, strongly shiny in posterior third; scutellum shiny with moderately large soft punctures; propodeum rugulose with median keel clear on most specimens; mesopleuron strongly shiny, smooth but developing vague large punctures anteriorly and subventrally. Front femur 4.3 times as long as wide. Hind leg (Figs 14, 15) with coxa laterally smooth and shiny, dorsally weakly rugulose-punctate, ventrally somewhat more strongly so; hind femur 3.5 times as long as wide, rather shiny, outer side weakly rugulose-punctate; hind tibia strongly and evenly widening to apex, 4.6 times as long as wide, spurs strong, the inner longer than the outer and easily reaching the middle of the basitarsus; claw simple, short and inconspicuous. Fore wing (Fig. 16) with pterostigma 2.5 times as long as wide; metacarp fully twice as long as its distance from the apex of the radial cell; first abscissa of the radius (r) [2r-rs] almost straight, issuing from distal 0.6 of pterostigma, scarcely obliquely, 0.7–0.8 as long as width of pterostigma; areolet (2nd submarginal cell) moderately large; costad abscissa of basalis (1-SR) nearly a third as long as mediad abscissa (1-M); first abscissa of discoideus (1-CU1) only a little shorter than second (2-CU1). Hind wing (Fig. 16) with nervellus (cu-a) [cua+Cu] evenly and moderately incurved. Metasoma (Fig. 17) with first tergite strongly widening posteriorly, 1.4 times as wide as long, longitudinally rugose; second tergite 3.2 times as wide as long, similarly but somewhat less strongly sculptured; third tergite usually 1.2 times as long as second, largely smooth, often completely so but sometimes with weak sculpture extending over as much as basal third; hypopygium (Fig. 15) strongly sclerotised, creased along midline but usually without lateral creases in death (so appearing only slightly produced), 0.5 times as long as hind tibia, its apex angled at about 60°, not reaching apex of metasoma; ovipositor sheath very short, its hairy part between a quarter and a third as long as hind tibia, scarcely surpassing apex of metasoma; ovipositor very weakly downcurved.

Colour: black. Mandible, palpi (apically yellowish), trochanters and trochantelli brown. Front leg with femur brown basally and dorsally, more distal parts yellowish. Middle femur deep brown, paler apically, tibia and tarsi yellowish brown. Hind femur entirely black, to deep brown with central area paler, tibia yellowish brown becoming infuscate in apical two-fifths, tarsus weakly darkened. Wings distinctly and evenly darkened; pterostigma, venation and setae rather uniformly light brown or grey-brown.

Male. Like female except for sexual differences. Mesoscutum posteriorly equally shiny. Second tergite about 2.9 times as wide as long and about 1.0 times as long as third tergite.

Variation. The material is very uniform in size. The hind femur varies from entirely black to brown with dorsal and ventral infuscation. The sculpture of the third tergite varies from none to weak confused rugulosity over about basal third. The general intensity of sculpture (e.g. on head) is also rather variable. The penultimate antennal segment in females varies from 1.2 to 1.5 times as long as wide. The third tergite in females varies from 1.0 to 1.3 times as long as second. The metacarp can be as much as 3 times as long as its distance from apex of radial cell.

This species is the commonest parasitoid of *Mompha raschkiella* (from which its specific epithet is derived) in most British localities but it has not to my knowledge been reared from any other *Mompha* species, suggesting that it is probably monophagous.

PAROPLITIS Mason

Paroplitis wesmaeli (Ruthe)

Although there are rearing records in the literature (cf. Yu, van Achterberg & Horstmann, 2005), the true hosts of this species have remained unclear. In NMS are ten gregarious broods reared from scopariine pyralids feeding in mosses: *Scoparia bistrigalis* Knaggs (2), *Scoparia ambigualis* (Treitschke) (1) and ?*Eudonia truncicolella* (Stainton) (1) (all *R. J. Heckford*) and *Dipleurina lacustrata* (Panzer) (6, from one large sample) (*M. R. Shaw*). In each case the host was collected in the spring and the adult parasitoids emerged later in the summer. Brood sizes are around 8–16, and the small white cocoons are often adpressed in a more or less honeycombed and cylindrical single layer.

MICROPLITINI

MICROPLITIS Foerster

Taxonomic knowledge of European *Microplitis* remains far from complete. There are several series of what appear to be well-characterised species in NMS for which I have been unable to find names. This is not further pursued here.

Microplitis decens Tobias, 1964

Papp (1984b) recorded this species from England, though it is unclear on what basis. It is a species close to the *M. mediator*/*M. tuberculifer* complex (see below), characterised essentially by its extremely narrow first tergite. In NMS there are two British specimens with equivalently narrow first tergites, but in other respects they do not agree with a specimen of *M. decens* from The Netherlands determined by Papp that I have examined, and they seem to be only extreme forms of the widespread *M. mediator*/*M. tuberculifer* taxon or taxa referred to below. Until the basis for *M. decens* being on the British list can be established, its place is best regarded as questionable.

Microplitis heterocera (Ruthe, 1860)

1 ♀, Spain, Madrid, El Goloso, ex *Dryobotodes roboris* (Boisduval) (Noctuidae) on *Quercus ilex*, coll. 15.v.2006, em. 27.v.2006 (*G. E. King*). There is also a non-reared specimen from Italy, Toscana, Iesa, 19–31.vii.1987 (*M. R. Shaw*). Nixon (1970) gives a record of the *Quercus*-feeding noctuid *Dicycla oo* (Linnaeus) as host.

Microplitis impressus (Wesmael, 1837) (= *sispes* Nixon, 1970) (Fig. 18)

New to Britain. 1 ♀, England, Surrey, Richmond Park (V.C. 11), fogged from *Quercus robur* canopy, 26.iv.1984 (*N. E. Stork*); 1 ♂, England, Berkshire, Burghfield Common (V.C. 22), ex *Orthosia incerta* (Hufnagel) (Noctuidae) on *Salix*, vi.1979, coc. vi.1979, em. v.1980 (*B. T. Parsons* & *M. R. Shaw*); 1 ♂, England, Hampshire, Silchester Common (V.C. 12), ex ?*Orthosia munda* ([Denis & Schiffermüller]) on *Quercus* trunk, 30.v.1985, coc.10.vi.1985 (*B. T. Parsons*); 1 ♂, England, Lancashire, Gait Barrows (V.C. 60), ex *Orthosia cruda* ([Denis & Schiffermüller]) on *Prunus spinosa*, 4.vi.1994, coc. 25.vi.1994 (*M. R. Shaw*). The last two specimens died as adults in their cocoons, from which they were extracted the following year. Nixon (1970) described *M. sispes* from three specimens reared on different occasions from *Orthosia cerasi* (Fabricius) in central Europe, and it is evident that *M. impressus* is a widespread and strictly univoltine parasitoid of a range of arboreal *Orthosia* species. It has the reputation of being extremely rare, but this is probably an illusion: like many other univoltine species that fly in early spring it is seldom collected, and its ten months of diapause in the cocoon, including the hottest part of the year, makes it difficult to rear.

Both Nixon (1970) and Papp (1984b) overlooked the very slender distal part of the hypopygium (Fig. 18) which does, in fact, extend to the apex of the ovipositor sheaths and therefore conforms to Mason's (1981) diagnosis of the genus. On close examination, the structure of the hypopygium of both the holotype and the paratype of *M. sispes* in BMNH is clear, though not obvious as the ovipositor sheaths (for which it had been mistaken) are fully concealed by it.

Microplitis malimbus (Papp, 1984)

Papp (1984b) synonymised *Microplitis trochanterata* Thomson, 1895, under *Microgaster tuberculifer* Wesmael, 1837, after an examination of the male lectotype, saying that *M. trochanterata* 'was erroneously considered as a valid species name (Nixon, 1970)' (although, interestingly, Nixon (1970: 19) records that he too had seen the type). However, nowhere does Papp give the identity of the species treated by Nixon as *M. trochanterata*.

I have seen the material (in BMNH) listed by Nixon as *M. trochanterata* and believe the 3 ♀ from Sweden correspond to *M. malimbus* (Papp), of which I have seen a female paratype from The Netherlands. But the males from England and Sweden listed by Nixon have a less wide discoidal cell, and I think most, at least, may belong to other species. Nixon saw no British female that he determined as *M. trochanterata*, but in NMS are altogether 10 ♀ from four English localities (Norfolk, Cambridgeshire, Hampshire and Wiltshire) that agree very closely with the paratype of *M. malimbus*, and it is on the basis of these specimens that *M. malimbus* can be regarded as British.

Microplitis mediator (Haliday, 1834) and ***Microplitis tuberculifer*** (Wesmael, 1837)

Nixon (1970) was unsure of the separation of these two nominal species, both of which he recorded from noctuid hosts, placing high reliance for the existence of two species on the long fringe of hairs on the underside of the front tarsus supposedly present in males of *M. tuberculifer* but absent in males of *M. mediator*. I believe that he greatly exaggerated this character, which seems to vary rather continuously in all the males of the aggregate that I have seen reared from noctuids (always solitarily), of which there are about 50 in NMS, though in none is it as pronounced as was figured by Nixon (1970: fig. 18). It should be noted that none of the specimens of *M. tuberculifer* listed by Nixon (1970) as reared from noctuids that I have seen in BMNH was male. Papp (1984b: 108) makes no use of the hair fringe character, but also had difficulty in separating the two, choosing this as the only place in his long key to a notoriously difficult genus to remark that 'the next two species ... are very difficult to distinguish.'

In NMS there are several separate series reared from the same host at single sites, and the characters given by either Nixon (1970) or Papp (1984b) usually tend to split these series into two species. My suspicion is that either only one, albeit extremely variable, species in this complex parasitises noctuids, or perhaps more likely that there is associated with noctuids an aggregate that does not separate according to morphological characters so far discovered. Rearing data in NMS suggest that it is plurivoltine, capable of overwintering both in low-feeding hosts such as *Xestia* spp. but also in its cocoon, the adults emerging in time to take advantage of the abundant noctuids such as *Orthosia* spp. feeding on the 'spring flush' vegetation of trees and bushes, then for subsequent summer generations largely reverting to noctuids on low plants. This view is reinforced by the presence of several reared series in NMS of an evidently univoltine solitary parasitoid of a range of small to medium-sized geometrid hosts; in particular, many *Eupithecia* species (*M. R. Britton*, *T. H. Ford*, *G. M. Hagggett*, *R. P. Knill-Jones*, *M. R. Shaw*, *M. Townsend*), but there is also a series from *Electrophaes corylata* (Thunberg) (*M. R. Shaw*) and singletons from some others, whose cocoons invariably overwinter. In total there are 42 reared specimens and the 19 males all have a substantial hair fringe beneath the front tarsus. In the keys of Nixon (1970) and Papp (1984b) these run to *M. mediator* or *M. tuberculifer* but, in contrast to specimens reared from noctuids, they are very uniform and have a slightly shorter preapical antennal segment, a brown pterostigma that is only faintly lighter at its proximal corner, tergites 2 and 3 never reddish, and less heavy sculpture. The hind tibia tends to be paler and, despite the dark pterostigma and the variable shape of the first tergite, probably most specimens would run better to *M. tuberculifer* than to *M. mediator* in the above keys (the males certainly do, on account of the front tarsal hair fringe). However, removing these specimens has not enabled more precise characters to be expressed for the specimens reared from noctuids, and further research is needed to decide whether the undoubtedly different species that parasitises geometrids is the true *M. tuberculifer*, or indeed to test the hypothesis that *M. mediator* auctt. and *M. tuberculifer* auctt. (at least in respect to noctuid hosts) together refer to either an aggregate or to a single, highly variable, plurivoltine species that parasitises only noctuids.

Microplitis scrophulariae Szépligeti, 1898

If this really is a distinct species within the *M. viduus* (Ruthe)/*M. flavipalpis* (Brullé) complex, as it is currently treated (cf. *Fauna Europaea*), it is appropriate to add it to the British list. In NMS there are 12 ♀, 6 ♂ that I am sure are conspecific and most of which run satisfactorily to *M. scrophulariae* in Papp's (1984b) key, reared solitarily from the cuculline noctuids *Shargacucullia lanceolata* (Villers) (7: France, *M. R. Shaw*), *S. verbasci* (Linnaeus) (5: Greece, *T. H. Ford* and Turkey, *W. G. Tremewan*), *S. blattariae* (Esper) (1: France, *M. R. Shaw*), *Cucullia absinthii* (Linnaeus) (2: England, *M. Townsend* and Sweden, *C. U. Eliasson*), *C. chamomillae* ([Denis & Schiffermüller]) (2: England, *G. M. Hagggett/R. Leverton*) and *C. achilliae* Guenée (1: Spain, *G. E. King*). The cocoon is green when emergence is in the year of formation, or slightly ribbed and light brown if destined to overwinter. Overall the colour of the hind femur varies from predominantly red, more or less flushed blackish dorsally, ventrally and at the apices, to (almost) completely black, often with large variation between specimens with the same rearing data. In the British specimens seen the hind femur is usually almost entirely black.

Although I have listed them as *M. scrophulariae*, the above specimens come very close to equally variable specimens reared from noctuid larvae, including (on the European mainland) *Calophasia lunula* (Hufnagel) (*M. R. Shaw*) and *Hecatera dysodea* ([Denis & Schiffermüller]) (*M. R. Shaw*), similarly feeding on prominent field layer plants, that I have identified as *M. viduus* (Ruthe), and I am not completely confident that two species are involved.

Microplitis serotina (Papp, 1984)

Papp (1984*b*) gave no host for this species, which he described from southern France (Toulon). In NMS are several gregarious broods reared from noctuids in Spain, but only two broods are from identified hosts: *Noctua pronuba* Linnaeus and *Trigonophora* sp. (both *G. E. King*). The cocoons are light brownish, spun in concealment, and emergence followed their formation quite soon in all broods seen.

Microplitis spinolae (Nees, 1834)

Nixon (1970) was unable to give a host. In NMS are 5 ♀, 3 ♂ reared solitarily from *Autographa gamma* (Linnaeus) in France (2 sites, *M. R. Shaw*) and England (*J. L. Gregory*). All emerged from their light bluish cocoons in the year of formation.

Microplitis strenuus Reinhard, 1860

There is a series in NMS reared solitarily from both the notodontid *Diloba caeruleocephala* (Linnaeus) (5 ♀, 1 ♂) and the noctuid *Allophyes oxyacanthae* (Linnaeus) (4 ♀, 4 ♂) (both *M. R. Shaw*) feeding on *Prunus spinosa* at the same site in England (Oxfordshire, Otmoor). All emerged in the year of cocoon formation. Numerous other caterpillars of various families were collected concurrently and reared for parasitoids, but no further specimens of *M. strenuus* resulted. This is an interesting 'discontinuous' host range (cf. Shaw, 2003) – see also remarks under *Cotesia numen*.

Microplitis tristis (Nees)

This is a well-known gregarious parasitoid of various *Hadena* (Noctuidae) species, which, like other *Microplitis* species, leaves the host alive and mobile for some time after the parasitoids have erupted and formed cocoons. In the course of rearing many broods from large collections of *Hadena confusa* (Hufnagel) I noticed that in most cases the parasitoid larvae erupted from the host after it had constructed a subterranean pupation retreat, and that a few hours later the still-mobile host left the retreat (and the parasitoid cocoons within it), to die elsewhere. This interesting behaviour can have no possible benefit to the already stricken host, and is presumed to be induced by the parasitoid, to which it would have adaptive advantage in isolating the cocoons from a putrefying host carcass.

Microplitis tuberculifer (Wesmael, 1837)

See remarks under *Microplitis mediator*.

Microplitis xanthopus (Ruthe, 1860)

Nixon (1970) could give no host. In NMS are 2 ♀, 1 ♂ reared solitarily on separate occasions (two sites in Scotland and one in Wales) from *Xylena vetusta* (Hübner) (*K. P. Bland*, *M. R. Shaw*). In each case emergence was in the year of formation of the light brown, rather elongate and feebly ribbed cocoon.

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