

The genus *Heterospilus* Haliday in Britain, with description of a new species and remarks on related taxa (Hymenoptera: Braconidae: Doryctinae)

M.R. Shaw

Shaw, M.R. The genus *Heterospilus* Haliday in Britain, with description of a new species and remarks on related taxa (Hymenoptera: Braconidae: Doryctinae).

Zool. Med. Leiden 71 (5), 31.vii.1997: 33-41, figs 1-7.— ISSN 0024-0672.

M.R. Shaw, National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF (e-mail: mrs@nms.ac.uk).

Key words: Braconidae; Doryctinae; *Heterospilus*; Palaearctic; Britain.

Heterospilus fuscevilis spec. nov. is described from England and Sweden. A key to the macropterous European species with the ovipositor sheath projecting not more than half the length of the metasoma and having subbasal sculpture on the third-fifth tergites is added. *Heterospilus testaceus* Telenga, 1941, is synonymised with *H. cephi* Rohwer, 1925, the synonymy of *H. basifurcatus* Fischer, 1960, with the latter is accepted, and *H. rubicundus* Fischer, 1960, is considered to be a valid species.

Introduction

Morley (1937) recorded *Synodus caesus* (= *Heterospilus caesus* (Nees, 1834); Braconidae: Doryctinae) as “new to Britain: bred by Mr Donisthorpe from beetles” (without giving a location or further detail except for indicating that the specimen did not come from Suffolk). Accordingly, *Heterospilus caesus* (Nees) appeared on subsequent British checklists (Kloet & Hincks, 1945; Fitton et al., 1978). Morley’s has remained the only published record of occurrence of the genus *Heterospilus* in the British Isles. However, a re-examination of the relevant specimen in Morley’s collection in Ipswich Museum showed it to have been misidentified and to belong instead to *Monolexis fus-cicornis* Foerster, 1862, leading Shaw & Huddleston (1991) to delete *Heterospilus* Haliday, 1836, from the list of genera of Braconidae known from Britain.

While this action was correct at the time, during subsequent sorting of catches of insects from Malaise traps operated by Dr J.P. Field at the boundary between wet woodland and lush grassland giving onto reedbed at Chippenham Fen NNR, Cambridgeshire (England) I have come upon 9 ♀♀ + 4 ♂♂ of a species of *Heterospilus* which, according to Papp’s (1984) diagnosis, falls into the subgenus *Heterospilus* s.s. The British female specimens, having the ovipositor only 0.3-0.5 times the length of the metasoma, were clearly not *H. caesus* (a widely recorded species in Europe, and the name chosen by Morley for his erroneous record) as the original description of that species refers to an ovipositor as long as the metasoma and propodeum together. The unsuccessful effort to find an existing valid name for them (with the original simple aim of reinstating *Heterospilus* in the British list) has uncovered some information on the taxonomy and nomenclature of certain Palaearctic *Heterospilus* species that is worth recording.

In Fischer’s (1960) key to Palaearctic species of *Heterospilus* the British specimens come closest to “*H. incompletus* (Ratzeburg)”, and indeed Fischer (personal communication) has kindly confirmed that determination in the sense of his key. The name *Bracon incompletus* Ratzeburg, 1844, has, however, been inconsistently applied and

Fischer's (1960) interpretation is not in accordance with Ratzeburg's description and cannot be upheld. Papp (1984) designated a lectotype (and synonymised it with *Heterospilus tetropis* Fischer, 1966) and subsequently Belokobylskij & Tobias (1986) treated *H. incompletus* as a species of *Dendrosotinus* Telenga, 1941 (subgenus *Caenophanes* Foerster, 1862), a genus they regarded as distinct from *Heterospilus*. Although clearly not taking into account Fischer's (1960) interpretation, Belokobylskij & Tobias (1986) associate *Heterospilus incompletus* auct. with *H. austriacus* (Szépligeti), presumably following Papp's (1984) designation of a lectotype of *Atoreuteus austriacus* Szépligeti, 1906, though they refute his concurrent synonymising of this taxon with *Dendrosoter sicanus* Marshall, 1886, by treating the two as distinct species of *Heterospilus* in their key to the species occurring in the European part of the USSR. (Having examined and compared the types of *A. austriacus* and *D. sicanus* I support the view that they are not conspecific.) In fact all three of the above nominal species lack a depressed band of sculpture on the third tergite, and are arguably incorrectly placed in *Heterospilus*: indeed, it is questionable that many of the 30 or so nominal taxa in the Palaearctic that have recently been placed in *Heterospilus* (Shenefelt & Marsh, 1976; Papp, 1984; Belokobylskij & Tobias, 1986) are really congeneric with the type species, *Rogas (Heterospilus) quaeator* Haliday, 1836. Papp (1984) has proposed a subgeneric name *Ratzsynodus* (with type species *Bracon incompletus* Ratzeburg) for six of these species that lack a sculptured transverse depression on the third metasomal tergite to distinguish them from subgenus *Heterospilus* s.s. However, because the genus-group name *Caenophanes* Foerster, 1862 (type species *Bracon incompletus* Ratzeburg) was already available as a replacement name for *Synodus* Ratzeburg, 1848 (not Gronow, 1763 or Latreille, 1828), which had the same type species (Shenefelt & Marsh, 1976), *Ratzsynodus* Papp, 1984, is an objective junior synonym of *Caenophanes* Foerster, 1862 (Belokobylskij & Tobias, 1986: addendum). As already indicated, subsequently *Caenophanes* has been treated outside the genus *Heterospilus* (Belokobylskij & Tobias, 1986).

Apart from their very much darker colour, the British specimens run in Belokobylskij & Tobias's (1986) key to *Heterospilus* species in the European part of the USSR nearest to *H. testaceus* Telenga, 1941 (with which *H. rubicundus* Fischer, 1960, is synonymised) as they lack the extreme characters of species separated in early couplets, have an ovipositor projecting not longer than half the metasoma, and the third, fourth and fifth metasomal tergites are all banded with distinct sculpture. However, this key is unsatisfactory in several respects. It misinterprets *H. leptosoma* Fischer, 1960, the type of which has a similar distribution of sculpture, and to which the British specimens might run if this allowance is made, and the key also places (with a question mark) *H. cephi* Rohwer, 1925, described from N. America, in synonymy with *H. graeffei* Fischer, 1960 and *H. tauricus* Telenga, 1941, despite the fact that Marsh (1973) had synonymised *H. cephi* with *H. basifurcatus* Fischer, 1960, a species that Fischer described and keyed in the same paper as his description of *H. graeffei*.

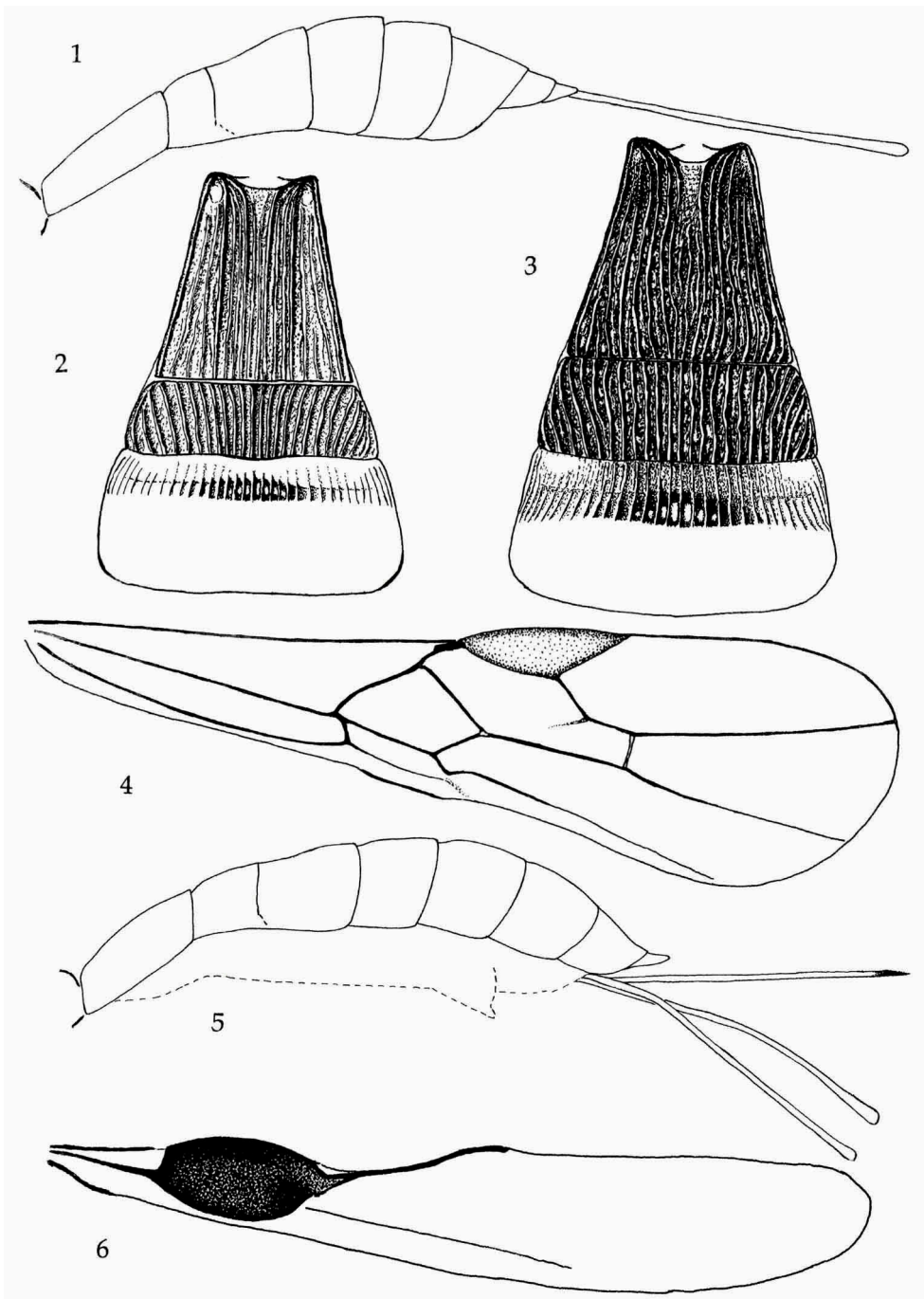
In view of the several confusions outlined above, the fact that so many of the European *Heterospilus* species have been described from single specimens, the probable variability of many species, the uncertain basis for some of the synonymy proposed in the literature and, not least, the fact that the British series included nine clearly conspecific females exhibiting appreciable character variation (e.g. figs 3, 7), it seemed necessary to examine the types of *H. leptosoma* and *H. rubicundus* (as the supposed representative of *H. testaceus* in Europe) in order to establish whether the Brit-

ish specimens were possibly conspecific with either. *H. basifurcatus* is the only further West Palaearctic species with short ovipositor, second metasomal tergite shorter than the third, and with sculpture on the third, fourth and fifth tergites that perhaps should not be instantly ruled out on other grounds, and the holotype of that nominal species has also been examined. In order to clear up further confusion arising from Belokobylskij & Tobias's (1986) key over the identity of *H. basifurcatus*, the holotypes of *H. graeffei* and *H. cephi* were examined as well, as were a further three reared female specimens of *H. cephi* from North America. An unexpected opportunity to examine the lectotype (designated by Belokobylskij and Tobias, 1986) of *H. testaceus* arose subsequently, allowing the proposed synonymy of *H. rubicundus* to be reassessed, and also clearing up the remaining possibility that the British specimens might be referable to that species. The following conclusions were reached (the notation of wing venation follows Shaw & Huddleston, 1991):

Heterospilus basifurcatus appears to be certainly conspecific with *H. cephi*, the type of the former falling within the range of variation of the type plus the other three females determined as the latter in all main respects. This supports the synonymy proposed by Marsh (1973) who concluded that the species had been accidentally introduced to N. America with its host, *Cephus pygmeus* (Linnaeus, 1767) (Hymenoptera: Cephidae), a supposition strengthened by the more recent hypothesis that some at least of the very few graminicolous Cephini hitherto regarded as native to North America are of recent Eurasian origin (Ivie, 1997). The lectotype of *H. testaceus* also appears to be conspecific with this taxon, being similar in all main respects apart from its marginally paler colour (**syn. nov.**).

Heterospilus graeffei is distinct from *H. cephi*, the type having a strong medio-dorsal carina on the anterior 0.3 of the propodeum, bifurcating and diverging posteriorly at over 90° (the carina extending only at most 0.1 times length of propodeum before bifurcating and diverging at about 70° or less in the six specimens of *H. cephi* examined) and the ovipositor projecting beyond the apex of the metasoma 0.6 times as long as the metasoma or 1.15 times as long as the hind tibia (ca 0.3-0.35 times as long as metasoma or ca 0.65-0.7 times as long as hind tibia in *H. cephi*). Whether either *H. graeffei* or *H. cephi* is conspecific with *H. tauricus* has not been investigated.

Heterospilus rubicundus appears to be distinct from the other taxa examined and it should be treated as a valid species (**stat. rev.**), at least until variation in Eurasian material of *H. cephi* can be better assessed. It differs from the British material most obviously in its very much paler colour (yellow) and weaker sculpture (e.g. the sub-basally sculptured third metasomal tergite smooth at extreme base), its smaller eyes (temple 0.8 as long as eye in dorsal view), its broader first and shorter second tergite (first tergite 1.2 times as wide as long, second tergite 3.1 times as wide as long, length of first tergite 2.55 times length of second), and in having a larger second submarginal cell in the forewing (2Rs about 1.4 times 2r-rs and 1.6 times 2rs-m) and its weaker sculpture. It differs from *H. cephi* in the larger size and longer shape of its second submarginal cell, longer temple in relation to the eye, and the presence of a medio-dorsal carina extending for the anterior 0.2 of the propodeum: the extent of variation in these characters is not clear, however, and I have seen specimens from Europe with the second submarginal cell short and a well developed medio-dorsal carina, which might be intermediates.



Figs 1-2, *Heterospilus leptosoma* Fischer, holotype, ♀; figs 3-6, *H. fuscexilis* spec. nov. 3-5, ♀, isotopic paratype, 6: ♂. 1, 5, metasoma, lateral view; 2, 3, metasoma, first to third tergites, dorsal view; 4, right forewing; 6, right hindwing (drawn under 70% alcohol).

Heterospilus leptosoma is in some respects close to the British specimens, having a similar gracile habitus, but it differs most significantly in its much shorter second tergite (3.7 times as wide as long; first and third tergites respectively 2.9 and 1.9 times as long as second), as well as in its substantially paler body colour (light reddish brown except mesosoma behind mesonotum/mesopleuron (except scutellum and propodeum subposteriorly at sides) and most of first tergite (basally, centrally) darker brown; vertex posteriorly and lobes of mesonotum centrally only a little darkened, as also is the mesosternum), in its longer ovipositor (extending beyond apex of metasoma just over 0.6 times as long as metasoma (fig. 1) or just over 1.1 times as long as hind tibia), and the more linear and less uniformly strong sculpture of the first metasomal tergite and the weaker sculpture on the third tergite that does not extend to its anterior margin centrally (fig. 2).

As the British material appears not to belong to any described taxon recorded from West Europe it is described below. Three female specimens from Sweden that were to hand and that fall within the range of morphological variation seen in the British series have been included as paratypes. It is probable that the new species is present among Northwest and Central European specimens in many collections, and it may have been widely misidentified as *H. incompletus*. I have also seen specimens of *Heterospilus* from Bulgaria (RMNH, Leiden) and Austria (NHM, Vienna) that differ in being less darkly coloured and in having the basal tergites more coarsely striate, with less microsculpture overall, and the second tergite on average a little shorter. It seems probable that these belong to a closely related species rather than to the species described here, but more material is needed to properly assess their identity.

Heterospilus fuscexilis spec. nov.
(figs 3-7)

Material.— Holotype ♀ (NMS; = National Museums of Scotland, Edinburgh), England: "Chippenham Fen, Cambs. [= Cambridgeshire], TL650693, Malaise trap: carr at reedbed edge, 18-29.vi.1984 (J. Field) RMSNH 1986.021". Paratypes (11♀♀ + 4♂♂). England: 1♀ + 3♂♂ (1♀ + 2♂♂ [one

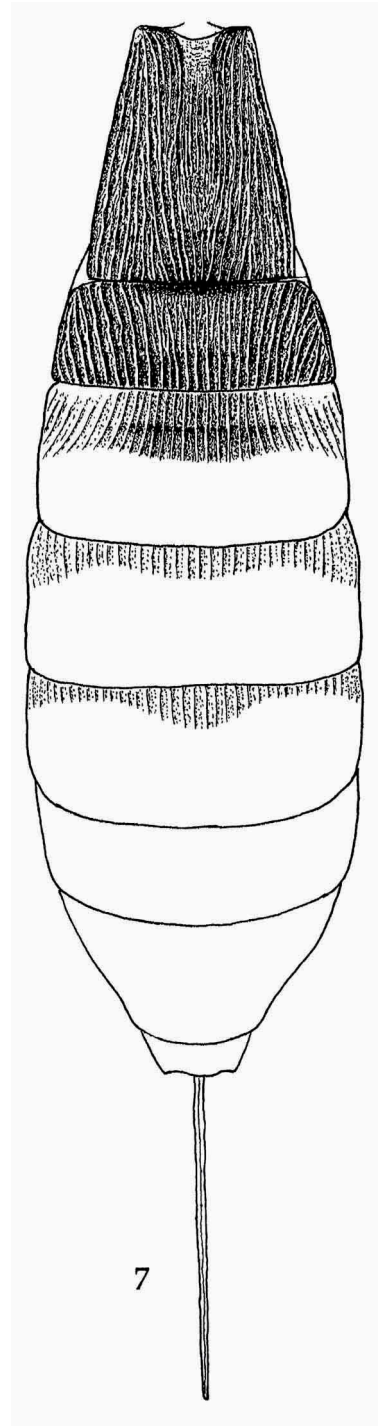


Fig. 7, *Heterospilus fuscexilis* spec. nov., holotype, metasoma, dorsal view.

severely damaged] NMS, 1? BMNH, London), same data as holotype; 7♀ + 1♂, same locality: 2♀ (NMS), same data as holotype except dates 9-21.viii.[19]83, 1♀ (BMNH), uncertain date in 1983, 1♀ (very small, weakly sculptured, head misshapen - and so labelled; NMS), 29.vi-9.vii.[19]84, 1♂ (severely damaged, RMNH, Leiden), 25.vi-6.vii.[19]85; 1♀ (NMS), 1♀ (RMNH, lacking head), 1♀ (NHM, Vienna), 6-20.vii.[19]85. Sweden: 2♀ (1♀ RMNH, 1♀ [metasoma unusually pale - and so labelled] NMS), "Museum Leiden, Sweden, Ang., Ålska, Petnäset, 21.vii.1981, L. Huggert"; 1♀ (RMNH), "Museum Leiden, Sweden, Vb., Umeå, 2.viii.1981, L. Huggert".

Description.— Female. Length of body 1.9-3.4 mm (type 2.9 mm), length of forewing 1.6-2.6 mm (type 2.1 mm). Body light reddish brown, predominantly blackened as follows: tips of mandibles; frons and vertex, except for orbits broadly, sometimes extending downwards along occipital carina onto lower cheek (sometimes face very weakly darkened centrally); mesosoma almost entirely, except for lower half of mesopleuron, and usually a small area in front of the origin of the notaulices and the adjacent part of pronotum (prothorax otherwise rather variable); basal part of metasoma, including the whole of the first tergite and the second more or less, but thereafter more variable but with the basal parts of the third, fourth, fifth and to some extent sixth tergites usually being appreciably darkened (and showing through the apical part of the preceding tergite, resulting in a somewhat banded appearance); ovipositor sheaths; and ovipositor tip. Antennae darkening gradually towards apex; palpi pale yellowish; all legs rather uniformly yellowish brown (the front legs the lightest) but with fifth tarsal segment darkened; tegulae and most of wing venation brownish yellow, pterostigma yellowish.

Head.— Head 1.3-1.4 times as wide as long; temple 0.5-0.6 times length of eye (but in one very small specimen with misshapen head 0.8 times); OOL ca 4 times and POL ca 2 times posterior ocellar diameter; vertex and generally also frons with moderately strong transverse striae (weak to very weak in small specimens); malar space 1.4-1.8 times width of mandible; antenna ca 1.5-1.7 times as long as forewing, with 22-32 segments (type 27), the third ca 4-5 times as long as wide and the preapical one ca 3-3.8 times as long as wide.

Mesosoma.— Mesosoma 2.0-2.2 times as long as high, rather flat, mid lobe of mesonotum only slightly produced anterolaterally and in lateral view curving down evenly through ca 80° to meet the pronotum at ca 60°; notaulices strong, foveolate, connected by an area of coarse rugosity before posterior margin of mesonotum; otherwise sculpture of mesonotum, and of scutellum at least anteriorly, strongly granulate; propodeum with a medio-dorsal longitudinal carina on anterior 0.25-0.35, usually distinct, bifurcating posteriorly and diverging at ca 70-90°, and bordered by areas of weakly rugulose to coriaceous sculpture that is clearly weaker than the more coarsely rugose sculpture posteriorly of its divergence and laterally onto metapleuron (in some specimens, including type, the overall sculpture of anterior part of propodeum is stronger, leaving the dorsal carina and its precise point of bifurcation less well defined), propodeum rather long and anteriorly flat in lateral view; mesopleuron with coarse rugae above, rather weakly granulate and somewhat shiny surrounding the deep but weakly sculptured "sternaulus" (= precoxal sulcus); forewing (fig. 4) rather narrow, 3.4-3.8 times as long as wide with second submarginal cell relatively short for the genus (2Rs 1.0 to 1.25 times 2r-rs); hind femur rather robust, 3.1-3.6 times as long as wide.

Metasoma.— Metasoma (figs 3, 5, 7) fusiform, relatively slender, ca 2.5-3.5 times as long as wide (in part dependent on how the specimen died), first and second tergites entirely coarsely and somewhat irregularly striate/strigose, third tergite striate in basal ca 0.4 centred on a somewhat foveolate transverse depression, fourth and fifth tergites with a somewhat depressed band of more or less striate sculpture towards base (usually at extreme base of visible parts, but if tergites strongly telescoped the sculpture may be most clearly visible at sides, where it becomes more coriaceous), last visible tergite somewhat spatulate and upturned, ovipositor sheath projecting 0.3-0.5 times length of metasoma (0.7-1.1 length of hind tibia). First tergite 0.8-1.1 (type 0.8), second tergite 2.4-3.0 (exceptionally 3.2) (type 2.8), third tergite 1.8-2.5 (type 2.0) times as wide as long; length of first tergite 1.95-2.5 (type 2.45) times length of second tergite; length of third tergite 1.35-1.8 (type 1.6) times length of second tergite.

Male.— Body similar in colour to female but pale and dark areas rather less contrasted. Length of body 2.0-2.3 mm, slenderer and with generally weaker sculpture than female. Temple 0.7-0.8 times length of eye; antenna with 24-28 segments, marginally slenderer than in female, its preapical segment 3.5-4.2 times as long as wide. Mesosoma 2.2-2.3 times as long as high; propodeum shorter and more evenly declivous than in female with its carinae in some cases less distinct. Hindwing with pronounced pterostigma (fig. 6; drawn in 70% alcohol as the pterostigma bows to a variable extent in dry specimens). Metasoma slenderer than in female, sculpture similarly distributed although somewhat weaker; first tergite 0.6-0.85 and second tergite 1.2-1.55 times as wide as long; length of first tergite 1.3-1.55 times length of second tergite; length of third tergite ca 1.1 times length of second tergite.

Notes.— The great range in some of the above characters in the female sex is in part size related: the larger specimens have the most antennal segments and the broadest build, and they are also the darkest. The variation in the series from Chippenham Fen encompasses the other paratypes in each of the characters mentioned except as noted. Although some have the dark colouration less contrasted all specimens are at least moderately dark, and dark colouration is probably a good if not absolutely reliable character for this species.

Key to females of European *Heterospilus* treated in this paper

It seems that, at least for now, only three described European species of fully winged *Heterospilus* that have (in females) the ovipositor projecting not more than half the length of the metasoma, the second tergite clearly shorter than the third, and the third to fifth tergites with clear sub-basal sculpture should be regarded as valid. The main differences between them, but based only on females of the type material examined, is summarised in the following key (in which some supplementary characters are also given for *H. cephi*): it is stressed, however, that species of *Heterospilus* seem to be abnormally variable, and only a thorough and exhaustive revision of the West Palaearctic species would be likely to result in a properly useful key. Because Fischer's (1960) figure of the type of *H. leptosoma* (in which the ovipositor is out of plane, and consequently appears short) shows some resemblance to the species described here as new, *H. leptosoma* (ovipositor 0.6 times the length of the metasoma) is included, and also figured.

1. Medio-dorsal carina at anterior of propodeum virtually or completely absent, extending posteriorly at most 0.1 times length of propodeum before bifurcating as strong carinae diverging at less than or about 70° (ovipositor projecting ca 0.3-0.35 times as long as metasoma, 0.65-0.7 times as long as hind tibia; first tergite 1.2-1.3 times as wide as long; second tergite 3.0-3.1 times as wide as long; first tergite ca 2.1 times as long as second; third tergite 1.3-1.6 times as long as second; temple ca 0.7 times as long as eye) *H. cephi* Rohwer
- Medio-dorsal carina of propodeum extending 0.2-0.4 length of propodeum, bifurcating posteriorly as strong carinae diverging at 70°-90° 2
2. First tergite 1.2 times as wide as long; temple ca 0.8 times as long as eye in dorsal view; second submarginal cell large, 2Rs about 1.4 times as long as 2r-rs (ovipositor projecting 0.45 times as long as metasoma, 0.8 times as long as hind tibia) *H. rubicundus* Fischer
- First tergite usually narrower apically than its length (figs 2, 3, 7), exceptionally 1.1 times as wide as long; temple 0.5-0.6 times length of eye; second submarginal cell usually smaller (but in *H. leptosoma* intermediate), 2Rs seldom as much as 1.25 times as long as 2r-rs 3
3. Second tergite short, 3.7 times as wide as long; sculpture of first two tergites more striate, less infilled with rugosity (fig. 2); ovipositor projecting just over 0.6 times length of metasoma (fig. 1), just over 1.1 times length of hind tibia; body predominantly reddish brown *H. leptosoma* Fischer
- Second tergite longer, 2.4-3.2 times as wide as long; sculpture of first two tergites less regular, more rugulose (figs 3, 7); ovipositor shorter, projecting 0.3-0.5 times length of metasoma (fig. 5), 0.7-1.1 times length of hind tibia; body usually extensively dark *H. fuscexilis* spec. nov.

As far as recognising *H. fuscexilis* in the British fauna is concerned, *Heterospilus* will key satisfactorily to Doryctinae in both Shaw & Huddleston (1991) and van Achterberg (1993). Among British Doryctinae the genus is easily recognised by its forewing venation, in which the vein separating the first submarginal cell from the second submarginal cell (1Rs in Shaw & Huddleston (1991, fig. 8) = 2-SR in van Achterberg (1993, fig. H)) is present distally but virtually effaced basally/basad (fig. 4). In the male sex the hindwing has a conspicuous pterostigma (fig. 6), but this character is lacking in the female (and it occurs also in several other male Doryctinae, e.g. species of *Dendrosoter* and *Hecabolus* in Britain). Taken as a whole the body sculpture of *H. fuscexilis* is unlike that of any other British Braconidae: vertex transversely striate, mesonotum granulate, first and second tergites entirely longitudinally striate/stri-gose with at least the apical parts of the succeeding tergites smooth.

Species of *Heterospilus* are known to be idiobiont ectoparasitoids of concealed larvae, and the overall host range of the genus is very wide, involving especially Coleoptera and stem inhabiting Lepidoptera, but including also symphytan Hymenoptera (Shaw & Huddleston, 1991 and references therein). The relatively short ovipositor and gracile proportions of *H. fuscexilis* may possibly suggest hosts living in shallow concealment, perhaps in galleries under thin bark or in thin stems.

Acknowledgements

I am grateful to Jeremy Field for donating Malaise trap catches to the National Museums of Scotland and to English Nature (at the time part of the Nature Conservancy Council) for permitting the operation of traps at Chippenham Fen NNR, to Kees van Achterberg for helpful advice and comments on a draft of this paper and to Tanya Quicke for translation of Russian literature. I am also indebted to Sergey Belokobylskij, Max Fischer, Jenö Papp and David Smith for lending type specimens in their care, to Howard Mendal for loans from the Morley collection in Ipswich Museum and to Kees van Achterberg and Tom Huddleston for access to the collection at the Nationaal Natuurhistorisch Museum (Leiden) and Natural History Museum (London), respectively. The unknown person who crushed the box containing the type series of *H. fuscexilis*, causing considerable damage before distribution of the paratypes, deserves less positive recognition!

References

- Achterberg, C. van, 1993. Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). Zool. Verh. Leiden 283: 1-189.
- Belokobylskij, S.A. & V.I. Tobias, 1986. Doryctinae. In Medvedev, G. S. (ed.). Opredelitel nasekomykh Evropeiskoi tchasti SSSR 3, Perepontchatokrylye 4. Opr. Faune SSSR 145: 21-72. [In Russian]. (English translation: 1996, Science Publishers, Lebanon, New Hampshire, USA.)
- Fischer, M., 1960. Revision der paläarktischen Arten der Gattung *Heterospilus* Haliday (Hymenoptera, Braconidae).— Polskie Pismo ent. 30: 33-64.
- Fitton, M.G., M.W.R. de V. Graham, Z.R.J. Boucek, N.D.M. Fergusson, T. Huddleston, J. Quinlan & O.W. Richards, 1978. Kloet & Hincks, a check list of British insects (second edition). Handbks Ident. Br. Insects 11 (4): i-x + 1-159.
- Ivie, M.A., 1997. On the geographic origin of the wheat stem sawfly (*Cephus cinctus* Norton, Hymenoptera: Cephidae): a new hypothesis of introduction from northeastern Asia.— Am. Entomologist 43 (in press).
- Kloet, G.S. & W.D. Hincks, 1945. A check list of British insects: i-lix + 1-483.— Stockport.
- Marsh, P.M., 1973. New synonyms and new combinations in North American Doryctinae (Hymenoptera: Braconidae).— J. Wash. Acad. Sci. 63: 69-72.
- Morley, C., 1937. The Hymenoptera of Suffolk (portio tertio et ultimo).— Trans. Suffolk Nat. Soc. 3: 233-248.
- Papp, J., 1984. Contributions to the braconid fauna of Hungary. V. Doryctinae (Hymenoptera: Braconidae).— Folia ent. hung. 45: 173-185.
- Shaw, M.R. & T. Huddleston, 1991. Classification and biology of braconid wasps (Hymenoptera: Braconidae). Handbks Ident. Br. Insects 7 (11): 1-126.
- Shenefelt, R.D. & P.M. Marsh, 1976. Braconidae 9. Doryctinae. Hymenopterorum Catalogus (nova editio) 13: 1263-1424.

Received: 15.i.1997

Accepted: 16.i.1997

Edited: C. van Achterberg