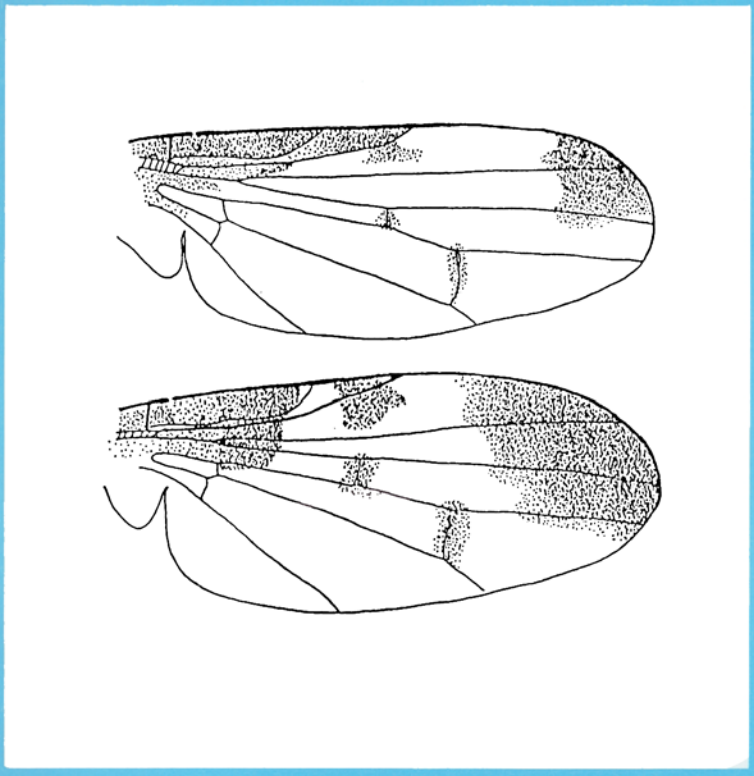
Dipterists Digest



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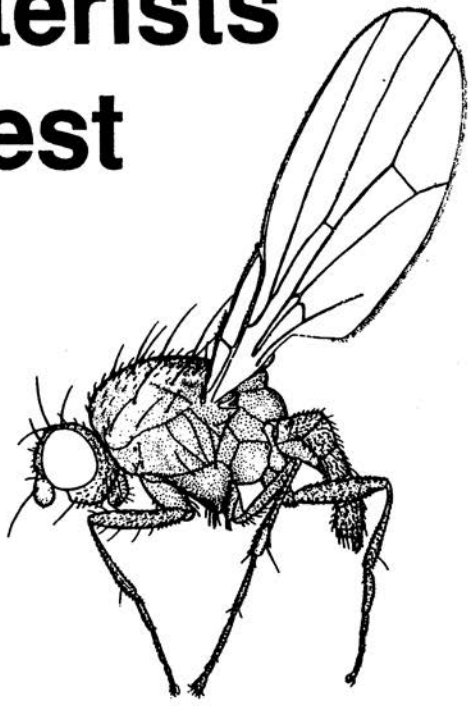

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Dipterists Digest is the journal of the **Dipterists Forum**. It is intended for amateur, semi-professional and professional field dipterists with interests in British and NW European flies. All notes and papers submitted to **Dipterists Digest** are refereed. The scope of **Dipterists Digest** is:

- the behaviour, ecology and natural history of flies;
- new and improved techniques (e.g. collecting, rearing etc.);
- the conservation of flies;
- provisional and interim reports from the Diptera Recording Schemes, including maps;
- records and assessments of rare or scarce species including those new to regions, countries etc.;
- local faunal accounts and field meeting results, especially if accompanied with good ecological or natural history interpretation;
- descriptions of species new to science;
- notes on identification including deletions or amendments to standard key works and checklists.

Articles may be of any length up to 3,000 words and must not have been accepted for publication elsewhere. Items exceeding this length may be serialised or printed in full, depending on competition for space. Articles should be written in clear and concise English. They should preferably be typed double spaced on one side of A4 paper and **wherever possible also supplied on 3.5" computer disc.** Material submitted on disc should be in ASCII, Word or Word Perfect formats and accompanied by hard copy.

Style and format should follow articles published in the most recent issue. References to journals should give the title of the journal in full. Scientific names should be underlined or preferably italicised. **If an article is supplied on disc, scientific names should always be italicised.** Authors of scientific names should be given in full (with parentheses if applicable) and nomenclature should follow the most recent check list, unless reflecting subsequent changes. Tables should be on separate sheets. Figures should be drawn in clear black ink, about twice their printed size and lettered clearly. Descriptions of new species should include a statement of the museum or institution in which type material is being deposited.

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Dipterists Digest 1998 **5**, 55-67

Key to the genus *Herina* (Diptera, Ulidiidae) in Britain

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The Ulidiidae are a small family of acalypterate Diptera represented by about 200 species in the Palaearctic region, of which almost 100 occur in Europe (Soós 1984; Zaitzev 1984; subsequent papers). These species have long been considered by European authors to lie in two families, the Otitidae and Ulidiidae, as listed by the Palaearctic Catalogue, although in Britain they have tended to be combined into a single family, the Otitidae (e.g. Cogan 1976). Phylogenetic studies by Kameneva and Korneyev (1993) indicate, however, that the Otitidae and Ulidiidae are not separable monophyletic groupings and are more suitably combined in a single family which, under the rules of priority, should be called the Ulidiidae.

The biology of the family is generally very poorly known, with species occurring in a wide range of habitats although particularly frequent in coastal and freshwater wetlands, grassland habitats (especially calcareous grasslands and sand dunes) and woodland rides and edges. Known larval associations in the Ulidiidae suggest development in plant tissues, including in roots and under tree bark, in rotting or decayed vegetable matter, or in sub-aquatic, organic situations (e.g. Smith 1989; Ferrar 1987), whilst the larvae of some Ulidiidae may be predatory (e.g. Séguy 1934). Kameneva (1996) referred to data suggesting that most, if not all, of the tribe Otitini (which contains *Herina*) have larvae associated with living or rotting plant roots and stems.

The Ulidiidae are a heterogeneous family although its members can normally be recognised by the combination of characters given by Clements (1990). *Herina* is a distinctive genus of small to medium-sized, dark species, about 3.5-5.5mm long, with patterned wings. The head is variably yellowish, reddish or darkened, whilst the body is either shining black or black dusted with grey. The legs are usually either wholly black or have only the tarsi pale (except in the non-British *scutellaris* Robineau-Desvoidy, which also has the scutellum pale - see Key).

Amongst British Ulidiidae *Herina* is characterised by the following combination of features: small (or no) extension to the anal cell *cup*; wing typically darkened along costal margin, at least in the basal third and with an apical or preapical blotch (other wing markings may also be present - see Figs 1-10); vein R_1 with small black bristles dorsally; gena narrow, typically less than one third vertical depth of eye; face with conspicuous grooves or hollows behind the antennae and a more or less prominent carina; third antennal segment varying in length from about 1.5 to 4 times the maximum breadth, always longer than the two basal segments combined and often pointed apically, but never obviously sickle-shaped; pleura with fine proepisternal (= propleural) setae, a strong seta immediately above front coxa and a strong posterior katepisternal (= sternopleural) seta; thorax dorsally with one pair of prescutellar acrostichal setae and two pairs of dorsocentral setae in the posterior third.

The only other species in the British fauna which broadly shares these characteristics is *Ceroxys urticae* (Linnaeus), but this is typically larger (6mm or more in length), has an obvious extension to cell *cup* and a distinctive pattern of four separate wing bands (see Clements 1990).

The genus *Herina* Robineau-Desvoidy comprises some 15 species in Europe. These were first treated in detail by Hennig (1939), who provided illustrations of the male genitalia of most of the then-known species. Subsequent taxonomic works by Soós (1982; 1983; 1984) and Rivosecchi (1992) have served to further characterise the European species and to designate

relevant type material. The latter author has also described a new species. It is likely that numerous species still await discovery and description in the Palaearctic fauna.

In Britain, *Herina* species are most often encountered in marshland or calcareous grassland situations and in coastal wetlands (Clements 1997). None of the larvae of the British species appears to have been described and the larval habits are generally unknown. Alan Stubbs (*pers. comm.*) has, however, suggested a general association of larvae with sedge species (Cyperaceae).

Six species of *Herina* are presently recognised in Britain. *Herina lacustris* (Meigen) was recorded in Britain by Verrall (1901) and other workers, but this evidently referred to misidentified material of *Myennis octopunctata* (Coquebert) (see Blair 1948), an error which was overlooked in the compilation of the 1976 checklist. Recent work by Clements and Merz (1997) has shown that the species long referred to as *Herina lugubris* (Meigen) in Britain is in fact *H. longistylata* Rivosecchi. True *lugubris* has yet to be recorded but may well also be present, since the two species evidently fly together on the continent. There are also a number of other species which occur on the near continent and which may also be present in Britain.

The British species were provisionally treated by Clements (1990) in a key which relied primarily on the patterns of wing markings. The wing markings are often distinctive of the species, but are nevertheless prone to some variation and in some cases (e.g. *lugubris* and *longistylata*) they are not diagnostic. Reliable determination of the species generally requires examination of the male genitalia; recent work (Merz 1996; Clements and Merz 1997) has shown that similarly reliable identification characters are present in the ovipositors of females.

The remainder of this paper comprises a key to the known and some possible British species, giving illustrations of the diagnostic features of the genitalia in both sexes in all cases except *scutellaris* Robineau-Desvoidy and *lacustris* (Meigen), material of which was not available to us.

Materials and methods

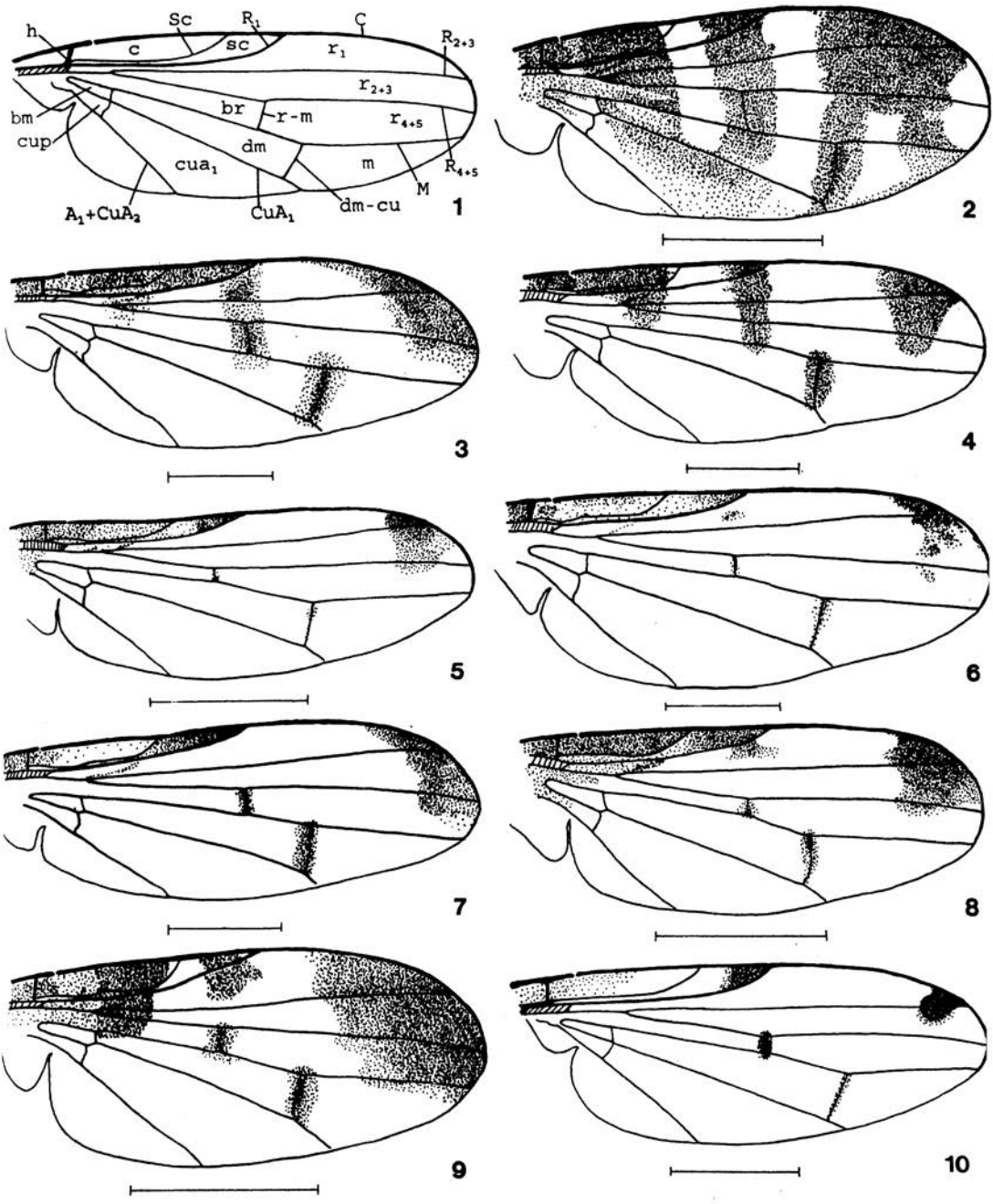
This review has been based primarily on the examination of approximately 100 British specimens held in DKC's collection and on various material on loan from the sources listed in the Acknowledgements. The very extensive material seen by Merz (1996) in reviewing the Swiss fauna has also contributed to our investigations.

We have not attempted a comprehensive review of collections held in British institutions, although investigations of these are proceeding on an *ad hoc* basis and will be reported in the future where relevant. A recording scheme for the Ulidiidae has recently been set up by the UK Dipterists Forum (details obtainable from DKC) in order to collate distributional and ecological information, but at present it is not possible to provide anything more than provisional guidance on the distribution of species in Britain.

The male genitalia of *Herina* should routinely be reflexed in freshly collected material and the ovipositors of females carefully extruded. In dry material the terminalia usually require removal and maceration in 10% potassium hydroxide prior to examination. White (1988) described suitable methods in detail.

Terminology of venation follows White (1988).

Figs 1-10. *Herina* wing patterns: (1) generalised wing showing vein terminology (after White 1988) and vein condition of *lacustris* (after Hennig 1939); (2) *frondescentiae*; (3) *germinationis*; (4) *longistylata* (*lugubris* is indistinguishable); (5) *oscillans*; (6) *palustris*; (7) *paludum*; (8) *parva*; (9) *pseudoluctuosa*; (10) *scutellaris* (after Hennig 1939). Scale bars = approx. 1.0mm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Key to the known British species and some possible additions
Known British species are shown in bold type.

1 Wing pattern unmistakable (Fig. 2), with two broad dark bands crossing the basal half of the wing and uniting below vein CuA_1 and two somewhat narrower bands crossing the apical half and uniting above vein R_{4+5}. Male genitalia as in Figs 24-25, ovipositor of female as in Figs 42-43. **frondescentiae**

- Wing pattern not as above. 2

2 Whole scutellum dark; femora and/or tibiae at least partially dark (femora and tibiae usually extensively dark, tarsi may be dark or pale). 3

- Legs and at least the hind margin of the scutellum yellowish-red. Face and frons reddish. Wing hyaline with smallish dark spots (Fig. 10). *scutellaris*

3 Vein M between r-m and dm-cu distinctly longer than dm-cu (Figs 2-10). Small or large species, body length ranging from about 3.5-5.5mm or more. 4

- Vein M between r-m and dm-cu about the same length as or shorter than dm-cu (Fig. 1). Small species, body length about 3.5mm. *lacustris*

4 Wing with crossband in middle part reaching from costa right across r-m (Figs 3-4). Face and frons never wholly blackish. Typically larger species with body length of 5.0-5.5 mm or more. 5

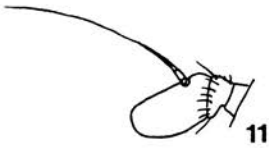
- Wing with no infuscation on r-m, or any infuscation on r-m isolated from that on the costa. Face and frons may be wholly dark. Typically smaller species, not exceeding 5.0mm in length. 7

5 Apical wing spot running around the wing margin at tip. Basal wing band usually poorly developed; costa infuscated strongly from base to R_1 (Fig. 3). Abdomen uniformly weakly dusted, without prominent grey-dusted anterior edge on tergite 3. Legs sometimes completely black. Facial carina moderately broad (Fig. 22). Male genitalia as in Figs 26-27; ovipositor of female as in Figs 44-45. **germinationis**

- Apical wing spot not running around wing margin at tip. Basal wing band usually well developed, sometimes extending to vein M or beyond; cell sc at least partially hyaline (Fig. 4). Third tergite of abdomen often with prominent grey-dusted anterior edge. Legs always with at least tarsi pale. Facial carina typically narrow (Fig. 23). 6

Figs 11-20. Typical antennae of *Herina*: (11) *frondescentiae*; (12) *germinationis*; (13) *longistylata*; (14) *lugubris*; (15) *oscillans*; (16) *palustris*; (17) *paludum*; (18) *scutellaris* (after Hennig 1939); (19) *pseudoluctuosa*; (20) *parva*.

Figs 21-23. Head profiles: (21) *paludum*, showing distinctive wide facial carina; (22) *germinationis*, showing typical carina profile for most of the genus; (23) *lugubris* or *longistylata*, with markedly narrow carina.



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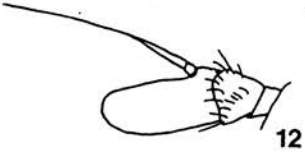

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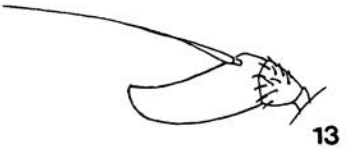

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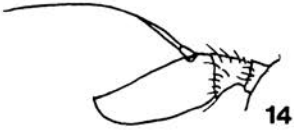

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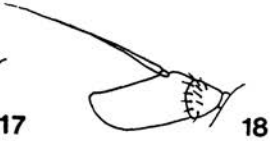

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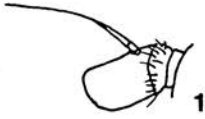

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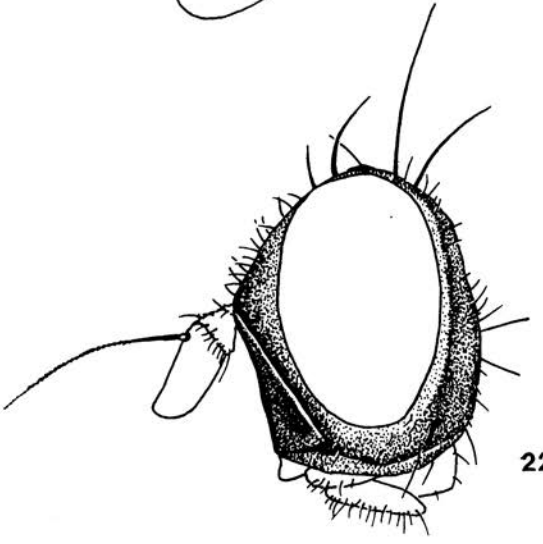

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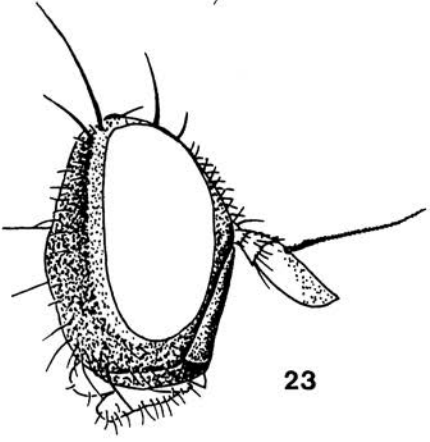

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6 Surstylus of male genitalia rounded and rather elongate in rear view, bearing an elongated projection on the inner-ventral edge with two similar-sized spines at base; surstylus broad and jaw-bone shaped in side view (Figs 28-29). Ovipositor of female with long, slim aculeus tapering gradually to tip and at least 4.5 times its maximum width; ventral sheathing sclerites narrow, elongated and tapering (Fig. 46). **longistylata**

- Surstylus of male broader and clearly bifurcated in rear view, the lobes each bearing a spine, one of which is much larger than the other; surstylus narrow and curved in side view (Figs 30-31). Female aculeus short, thickly cylindrical and narrowing abruptly at tip; about 3.0-3.5 times maximum width; ventral sheathing sclerites broad and blunt (Figs 47-48). *lugubris*

7 Face usually wholly shining black; if not (occasional pale examples of *oscillans*), r-m not or hardly infuscated (Fig. 5) and/or length of third antennal segment at least 2.5 times basal width in side view (Figs 15-17). 8

- Face at least pale on mouth-edge, never wholly shining black and r-m may be strongly infuscated (Figs 8-9). Length of third antennal segment no more than twice the basal width in side view (Figs 19-20). *pseudoluctuosa* and *parva*

8 Frons extensively darkened; facial carina very broad in side view (Fig. 21); length of third antennal segment 3.5-4 times basal width in side view (Fig. 17); r-m usually distinctly infuscated (Fig. 7). Male surstylus with distinctive pilose dorsal edge (Figs 34-35); ovipositor of female (Figs 52-53). **paludum**

- Frons extensively pale; facial carina narrower (cf. Fig. 22); length of third antennal segment variable, but usually less than 3 times basal width in side view; r-m usually weakly infuscated. 9

9 Length of third antennal segment normally 3 times basal width in side view and with a rounded tip (Fig. 16). Larger species, typically 3.0-4.1mm long. Surstylus of male distinctively long and curved (Figs 36-37); female aculeus distally with hooped and weakly-sclerotized tube behind tip (Figs 49-50). **palustris**

- Length of third antennal segment normally about 2.5 times basal width or less, usually with a pointed apex (Fig. 15). Smaller species, typically 2.7-3.5mm long. Surstylus of male short (Figs 32-33); female aculeus without hooped, weakly-sclerotized tube behind tip (Fig. 51). **oscillans**

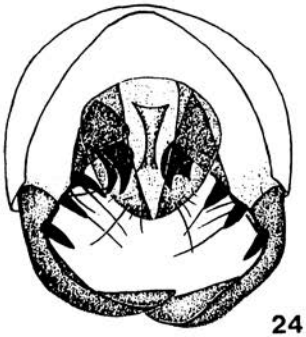
Notes on the British species

Biological information for these species is based primarily on British records.

Herina frondescentiae (Linnaeus, 1758)

Figs 2, 11, 24-25, 42-43

Figs 24-35. *Herina*: male genitalia, in dorsal and lateral view: (24-25) *frondescentiae*; (26-27) *germinationis*; (28-29) *longistylata*; (30-31) *lugubris*; (32-33) *oscillans*; (34-35) *paludum*.



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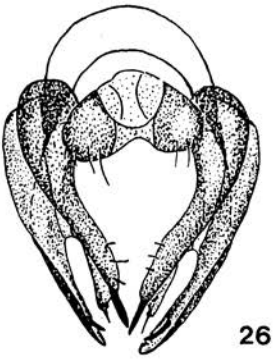

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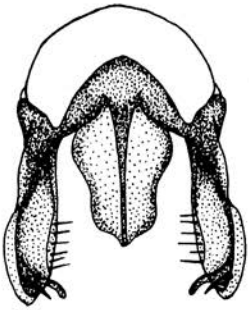

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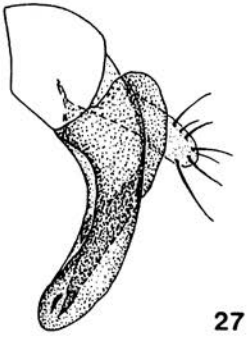

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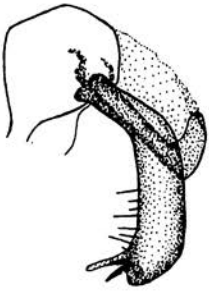

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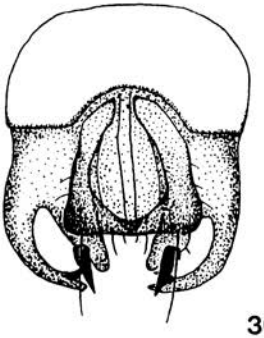

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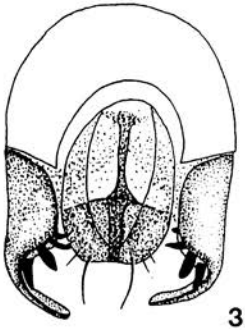

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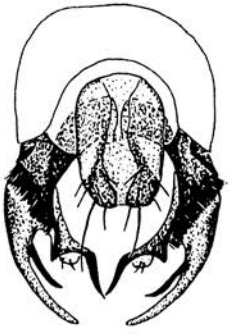

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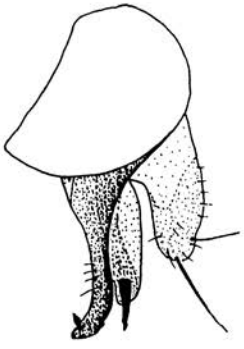

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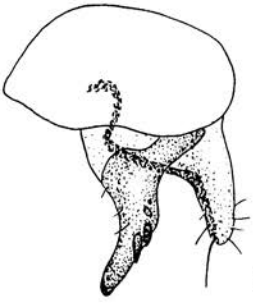

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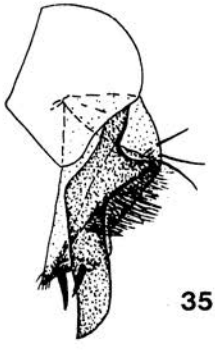

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Diagnosis: the wing pattern in this species is unmistakable. Body length 3-4mm, wing length 2.8-3.5mm.

Biology: typically in lowland wetlands, especially rushy pastures and flushes, but also wooded streams, dune slacks and saltmarshes. In Switzerland it also occurs rarely in nutrient-poor dry grasslands. Moderately common and widespread in Britain.

Herina germinationis (Rossi, 1790)
Figs 3, 12, 22, 26-27, 44-45

Diagnosis: usually a large species (body length typically 5.0-5.5mm or more) with well-marked wings. The apical wing spot runs around the tip of the wing, usually to below the tip of R_{1+2}, and the costal and subcostal cells (c and sc) are usually continuously infuscated as far as the tip of R_1, where the infuscation becomes continuous with the discal cross-band. Sub-basal wing band usually poorly-developed. Face and frons reddish. Legs often completely black, or otherwise with just the tarsi pale. Wing length 3.5-4.8mm.

Biology: typically dry calcareous grasslands, including coastal cliff situations. Often swept from medium-tall swards. In Switzerland recorded almost exclusively from woodland clearings and undergrowth. An uncommon species with an apparently southerly distribution in Britain.

Herina longistylata Rivosecchi, 1992
Figs 4, 13, 23, 28-29, 46

Diagnosis: usually a large species (body length typically 5.0-5.5mm or more) with well-marked wings. The apical wing spot does not run around the tip of the wing and the infuscation along the costa is usually broken in cell sc between the tips of veins Sc and R_1. Sub-basal cross-band usually well-developed, extending to vein M or beyond. Face and frons reddish, facial carina typically narrow (cf. *lugubris*, Fig. 23). Legs usually dark but with contrastingly pale tarsi. Wing length 3.5-4.8mm.

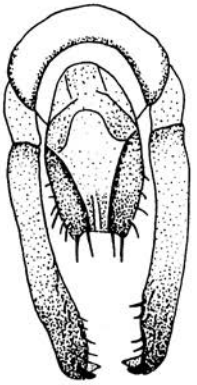
Note that examination of the genitalia is necessary in order to separate this species from the closely similar *H. lugubris*, which may also be present in the British Isles.

Biology: primarily in dry calcareous grasslands, including coastal cliff situations, but also found in base-rich, neutral and acidic wetland situations such as wooded streamside vegetation, seepages, claypits and damp scrub. Moderately frequent and widely distributed in Britain.

Herina oscillans (Meigen, 1826)
Figs 5, 15, 32-33, 51

Figs 36-41. *Herina*: male genitalia: (36-37) *palustris*, in dorsal and lateral view; (38) *palustris*, surstylus tip; (39) *parva*, in lateral view - compare with *oscillans*; (40-41) *pseudoluctuosa*, in dorsal and lateral view.

Figs 42-48. Aculei of females: (42-43) *frondescentiae*, dorsal view and ventral view of tip; (44-45) *germinationis*, dorsal and ventral views; (46) *longistylata*, ventral view; (47-48) *lugubris*, dorsal and ventral views.



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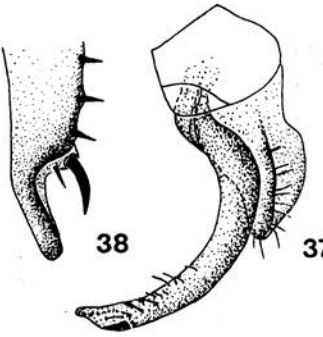

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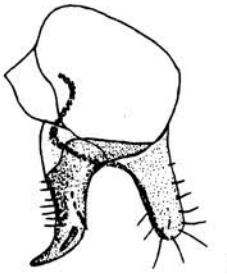

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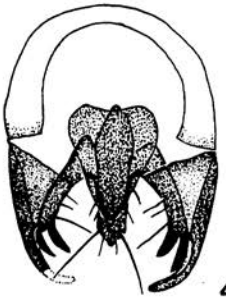

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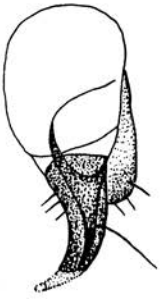

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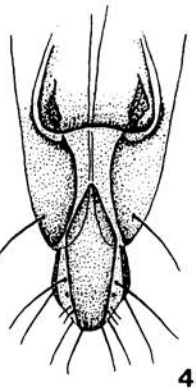

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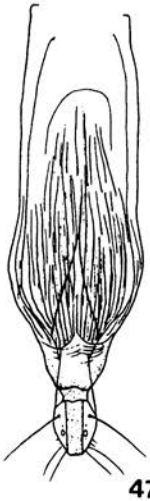

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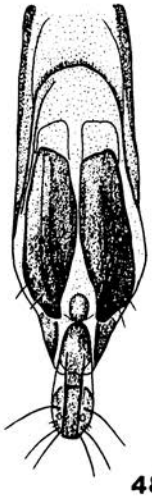

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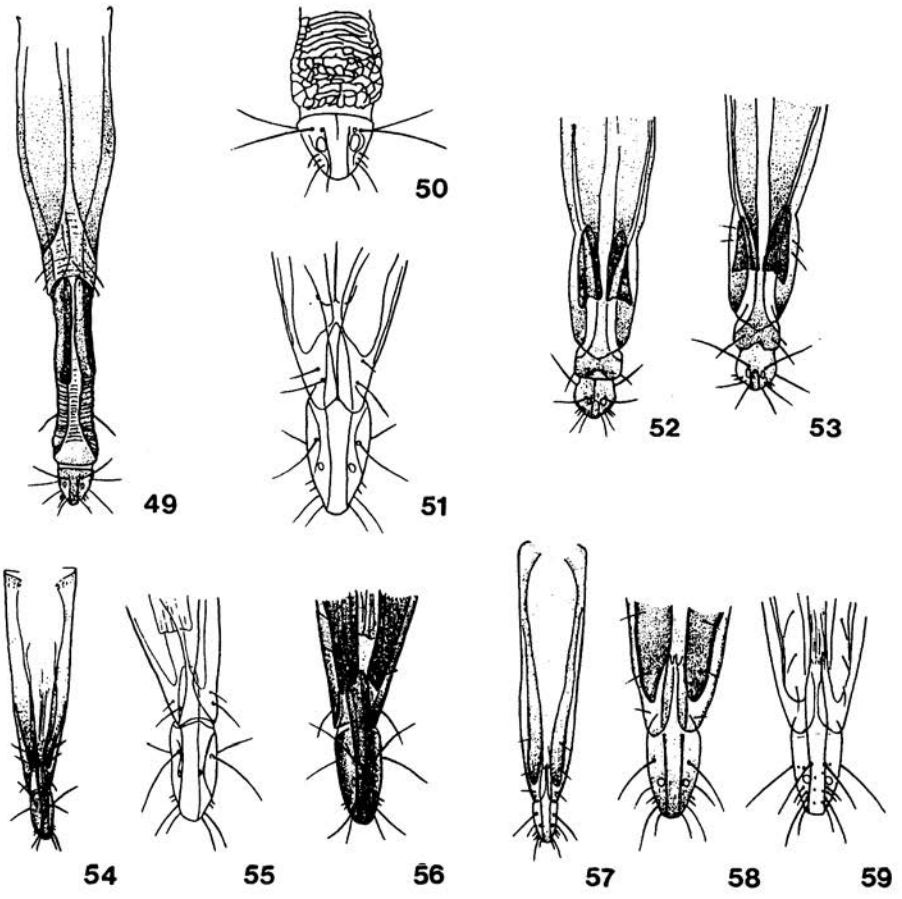

Figs 49-59. *Herina*; aculei of females: (49-50) *palustris*, dorsal view and ventral view of tip; (51) *oscillans*, ventral view of tip; (52-53) *paludum*, dorsal and ventral views of tip; (54-56) *parva*, ventral view, dorsal and ventral views of tip; (57-59) *pseudoluctuosa*, ventral view, dorsal and ventral views of tip.

Diagnosis: a small species with body length usually less than 3.5mm. Wing rather slender, the length usually 2.8-3.0 times the maximum width. Wing usually infuscated along costa and at tip, but without discal or preapical cross-bands, although cross-veins r-m and dm-cu may be slightly infuscated, the former usually weakly so. Apical wing spot does not run around the wing tip. Face and frons usually darkened, but with the frontal stripe reddish. Third antennal segment usually rounded at tip and with a length about 2.5 times the width, sometimes slightly less. Wing length 2.7-3.5mm.

Requires careful comparison with *H. palustris* and also with the non-British *parva* (see below).

Biology: usually in calcareous seepages, including marshy lakesides, valley fens and coastal cliff seepages. An uncommon species, seemingly with a northern and western distribution in Britain.

Herina paludum (Fallén, 1820)
Figs 7, 17, 21, 34-35, 52-53

Diagnosis: a medium-small, dark species with body length usually around 5.0mm. Wing usually only very lightly infuscated along costa and without discal or preapical cross-bands, although cross-veins r-m and dm-cu may be slightly infuscated, the former usually distinctly so. Apical wing spot runs around the wing tip, usually to below the tip of R_{4+5}. Face and frons, including the frontal stripe, characteristically blackish; facial carina very broad in side view (Fig. 21). Third antennal segment characteristically elongate; length 3.5 to 4.0 times width and rounded at tip. Wing length 3.0-4.2mm.

Biology: available British records are from dry, short calcareous grasslands. Decidedly scarce.

Herina palustris (Meigen, 1826)
Figs 6, 16, 36-38, 49-50

Diagnosis: a small species, superficially similar to *H. oscillans*. However, *palustris* is usually slightly larger (body length usually greater than 3.5mm and may be up to 5.0mm) and the wing is broader, its length usually no more than about 2.7 times the maximum width. The third antennal segment is usually slightly pointed at the tip and the length is usually at least 3 times the basal width. The long, curved male surstyli are diagnostic. Face and frons dark, but with frontal stripe reddish. Apical wing blotch does not run around the wing tip. Wing length 3.0-4.1mm.

Biology: in Britain usually found in coastal and freshwater wetlands (the latter as in Switzerland), often amongst short vegetation at the wet/dry transition. Kameneva (1996) referred to a possible larval association with *Schoenus* spp (Cyperaceae). A scarce species.

Notes on possible additions

Biological information for these non-British species is based primarily on Hennig (1939) and Merz (1996).

Herina lacustris (Meigen, 1826)
Fig. 1 (diagrammatic only)

Identification: a dubious species known only from the type specimen, which we have not seen but which may represent a teneral individual. The species apparently shares with the southern European species *H. approximata* Villeneuve the character of vein M between r-m and dm-cu about as long or shorter than dm-cu. The type was described and illustrated by Hennig (1939).

This species was erroneously recorded from Britain in the past by previous authors, but is otherwise seemingly known only from the type locality in Germany.

Biology: unknown.

Herina lugubris (Meigen, 1826)
Figs 4, 14, 23, 30-31, 47-48

Identification: very similar to *longistylata* and distinguishable only with reference to the terminalia, which are distinctive.

Biology: data from Switzerland indicate that this species occurs in dry calcareous grassland, but it may also occur in other habitats. Recorded with certainty from Spain, France, Switzerland, Italy, Greece, the former Yugoslavia and Cyprus; it is probably widespread in Europe.

Herina parva (Loew, 1864)
Figs 8, 20, 39, 54-56

Identification: very similar to *oscillans*. Main differences include: face reddish, not black (not always obvious); third antennal segment shorter, about twice as long as broad and more broadly rounded at tip; wing more strongly infuscated in and beneath costal cells and more extensively at the tip, with the apical wing spot tending to run around the tip as far as R_{4+5}. Crossvein r-m usually distinctly infuscated. Body length 3-4mm.

Biology: an upland species almost entirely confined to montane and alpine grassland habitats, typically over 1000m above sea level. Widespread in central Europe.

Herina pseudoluctuosa Hennig, 1939
Figs 9, 19, 40-41, 57-59

Identification: a small species, distinguished by the very large apical spot on the wing. Face and frons reddish, occiput uniformly silvery dusted. Third antennal segment very short and dumpy, its length usually less than twice the basal width. Scutum and abdomen both black and lightly dusted, the scutum more strongly so. Femora almost completely yellowish, tibiae yellowish at base and apex. Infuscation on both crossveins distinct and isolated. Body length 2.6-3.2mm.

Biology: a rare species, in Switzerland confined to montane areas over 1000m above sea level. Known only from a few localities in central Europe.

Herina scutellaris Robineau-Desvoidy, 1830
Figs 10, 18

Identification: material was not available to us for study, but the entirely pale legs and at least partially pale scutellum are diagnostic, as is the wing pattern. This medium-small species was well illustrated by Rivosecchi (1994) who gave details of the male genitalia, although these are somewhat at odds with the illustration given by Hennig (1939). Body length 4.0-4.5mm.

Biology: probably also chiefly a montane species, widespread in southern Europe.

Acknowledgements

We thank the National Museum of Wales in Cardiff for the loan of material. Material has also been loaned or given to DKC by J.H. Cole and Mrs M.J. Morgan. We also express our sincere gratitude to the editor of *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, G. Bächli, for his kind permission to use many of the figures which originally appeared in Merz

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Dipterists Digest 1998 **5**, 68-69

Observations on *Ctenophora pectinicornis* (Linnaeus) (Tipulidae) at Stanmore Common, Middlesex

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On 6 June 1998, while I was recording Diptera and other insects at Stanmore Common LNR, Harrow, accompanied by the site warden, Simon Braidman, we observed two females of *Ctenophora pectinicornis* (Linnaeus) investigating the trunk of a beech tree (*Fagus sylvatica*).

The tree, situated on the east margin of the Common in TQ 1694, was mature and in a semi-open situation, somewhat sheltered but not closely abutted by other trees. Although much of the crown was alive and in full leaf, there were two large and barkless dead branches arising from the main trunk below the crown. In addition, a major branch arising close to the primary fork in the tree had, at some stage, broken off close to its base, leaving the broken end exposed. The bark of the main trunk, from 2-3m above ground-level, at least as far up as the primary fork, was marked with fine vertical fissures, typically between 10 and 20 cm in length. These, by and large, followed the slow clockwise spiral of the tree's grain, but occurred predominantly on the southern aspect of the trunk. Although some of these fissures, particularly the longer ones, had opened sufficiently for the underlying trunk to be narrowly visible through them, in most cases they were in an earlier stage of development. The bark immediately adjacent to the fissures was slightly raised or swollen (the location of the fissures could normally be seen edge-on), but appeared to be firmly attached to the tree, and gave only marginally when pressed firmly. A slight degree of seepage had occurred at some of these fissures, which were narrowly stained black.

I initially observed one female flying very close to the trunk of the tree at a height of approximately 3m at 4.00 p.m. and a second female was seen on the same trunk about a minute later. Both flies 'quartered' the main trunk of the tree, flying with their legs intermittently contacting the bark. Most of the flies' time was spent on the southern ('fissured') aspect of the trunk, which was in shadow at that time of the day, although the sunlit side of the trunk was occasionally visited by the flies. Although they sometimes travelled down the trunk, the net direction of movement of both flies was upwards and their systematic and detailed inspection of the tree, which was first observed in the lower half of the main trunk, progressed in an upwards direction.

The flies settled regularly on the fine vertical fissures in the bark and investigated some of them at length. In the latter cases, a fly would settle on the trunk, straddling a fissure and facing upwards. It would then push its head into the fissure, and raise its body, sometimes until the abdomen was directed outwards at nearly a right-angle to the trunk. The fly would then move its body up-and-down and from side-to-side. All or most of the tarsi were gripping the tree-trunk and it appeared that the flies were using this leverage, along with the reciprocal body movements, to force their heads as far as possible into the narrow fissures. The flies' systematic and thorough inspection of the narrow fissures in the bark progressed steadily upwards, continuing beyond the primary fork, until the flies were lost from view. No oviposition was seen. The flies paid no apparent attention to the dead side-branches, or to the broken base left by the large fallen branch.

Some Tipulidae ovipositing in semi-liquid substrates, such as mud, probe the material with their ovipositor prior to depositing ova, presumably in order to gauge the suitability of the medium for larval development. It is therefore of interest that, in the instances described here, *C.*

pectinicornis was apparently gauging the suitability of the substrate employing sensory apparatus on the head. The ovipositor is rather short in this species, suggesting that shallow (e.g. subcortical) oviposition takes place. A related species, *Tanyptera atrata* (Linnaeus) which has a long ovipositor, has been observed to insert its abdomen deep into a crevice in a birch trunk (P. J Chandler, *pers. comm.*) but structure/function relationships in this respect require further investigation.

I first recorded *C. pectinicornis* at Stanmore Common on 30.v.1998, when one female was observed flying very close to the ground in damp and shady secondary woodland with a well-developed under-storey, in TQ 1693. Another female (in poor condition) was recorded under similar circumstances on 20.vi.1998. I also recorded *Tipula flavolineata* Meigen at Stanmore Common on 30.v. and 6.vi.1998; this is another cranefly associated with decaying timber, particularly beech and birch (Stubbs, A. E. 1992. *Provisional atlas of the long-palped craneflies (Diptera: Tipulinae) of Britain and Ireland.* Biological Records Centre, Huntingdon).

Following a major gorse fire at Stanmore Common in 1910, there was extensive colonisation by silver birch (*Betula pendula*). Trees of that generation are now ending their natural life and, as a result, large dying and decaying birch trees are currently a very abundant resource at the site. On the other hand, beech trees displaying symptoms of decay conforming to those described in this article, are decidedly scarce and largely confined to a strip on the east margin of the Common. In view of the two records of *C. pectinicornis*, taken in a different habitat and at some distance from most of the mature beeches, the question arises as to whether the fly might also be breeding in silver birch at the site.

***Achalcus thalhammeri* Lichtwardt (Diptera, Dolichopodidae), in Cambridgeshire** - Whilst collecting in compartment 2 at Wicken Fen, Cambridgeshire on 22 March 1998, I captured a dark male *Achalcus* which I expected would be *Achalcus cinereus* (Haliday in Walker). However, by using the keys provided by Pollet (1996. *Systematic Entomology* **21,** 353-386) and examining the genitalia, it was easily determined as *A. thalhammeri* Lichtwardt, the longer cerci with curved apical bristles clearly separating it from *A. cinereus*. On returning to the site a week later I found numerous dark *Achalcus*, all of which on subsequent examination proved to be *A. cinereus*.

A. thalhammeri has been recorded only once before in Britain from water traps set in a reedbed at Stubb Mill, Hickling, Norfolk, 3 males, 2 females, 1-31 October 1988, B.R. Laurence (!995. *Entomologist's monthly Magazine* **131,** 95-105). This record was repeated by Pollet (1996), who provided additional ones from Germany and Hungary. However, *A. thalhammeri* has also been obtained from water traps set in reedbeds at Hornsea Mere, Yorkshire in August 1996 (R. Crossley, *pers. comm.*) and is likely to be more widespread than the few records suggest. Like some other *Achalcus* it has quite a long season with adults found from March to June and August to October; indeed the early and late dates suggest that it may well pass the winter in this stage like *A. cinereus*.

The area of Wicken Fen where *A. thalhammeri* was found is mixed fen cut on an annual basis, with adjacent areas of sallow carr and *Cladium mariscus*. It contains the remnants of old peat diggings and has been the source of other rare Diptera, such as *Ochthera manicata* (Fabricius) and *Conisternum tinctinerve* (Becker), also known from the Norfolk Broads but previously unrecorded from the Cambridgeshire Fens.

I wish to thank Roy Crossley for allowing me to publish his record of *A. thalhammeri* and the National Trust for permission to collect at Wicken Fen - **IVAN PERRY,** 27 Mill Road, Lode, Cambridge CB5 9EN

Dipterists Digest 1998 **5**, 70-74

The larvae of *Aphrosylus celtiber* Haliday (Diptera, Dolichopodidae) as predators of the littoral barnacle *Chthamalus montagui* Southward (Cirripedia, Chthamalidae)

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Introduction

Aphrosylus celtiber Haliday is a common intertidal fly on the marine shores of Western Europe, especially over barnacle-covered rocks. Its natural history, particularly in the immature stages, has not been fully determined although the association of the adult fly and presumed larva with sessile, or acorn, barnacles has led to the belief that at least some larvae prey on the latter. *Aphrosylus* larvae concluded to be *celtiber* were found by Roubaud (1903) in colonies of the barnacle *Semibalanus balanoides* (Linnaeus) (formerly *Balanus balanoides)* and he considered the relationship to be parasitic. Hinton (1967) collected larvae which he assumed to be *A. celtiber* in large numbers from barnacle-covered rock and regarded them as omnivorous carnivores without considering the larvae as possible predators of barnacles.

In neither of these records was the identity of the larvae confirmed as belonging to *A. celtiber*. The sibling species *A. raptor* Haliday occupies the same intertidal habitat, with probably a similar life cycle to *celtiber*, but the larvae have not been described. Also Roubaud did not provide evidence either from his field or laboratory observations that the *Aphrosylus* larvae were actually feeding on the soft parts of the barnacles they had penetrated. During the course of a study of an isolated population of *A. celtiber* inhabiting the outside of an intertidal concrete conduit on the shore of Mount's Bay, near Marazion, Cornwall, evidence was obtained that the late larval instars of this *Aphrosylus* species are predators of the sessile barnacle *Chthamalus montagui* Southward and regularly feed on the soft parts of this barnacle.

The Study Area

The population of *Aphrosylus celtiber* studied is part of a complex marine invertebrate and plant community on the surface of a large concrete conduit situated on the beach between Marazion and Long Rock (SW 505312). This level conduit protrudes from a sand and gravel beach in the midlittoral section below the mean high tide level and discharges freshwater from Marazion Marsh onto the shore. It is 20-25m long depending on changes in the beach profile, 1.5m in width and a maximum height of 1.5m at the distal seaward end. Although roughly rectangular in cross section the top is curved with a 0.25m flat shelf along its whole length. The conduit emerges from the beach about 50m from a bare cemented stone sea-wall and the nearest rocky shore is 1km to the south-east at Marazion, whilst off shore reefs are exposed at low water 1km to the south-west. The study area is covered by all high tides including the lowest high water neaps and is submerged for 5-6 hours at each high tide depending on the height of the tide and the prevailing sea conditions. The maximum depth of the tide above the conduit is about 4m at high water springs.

The invertebrate and plant community of the conduit falls into three integrating sections. The seaward end of the conduit including the terminal block is dominated by the common mussel *Mytilus edulis* which covers the sides in compact clusters with encroachment along the edges of the flat top. Sessile barnacles, largely *Chthamalus montagui* and the common limpet

Patella vulgata occupy the remaining surfaces in competition with the mussels. This distal section of about 6m merges into a section of about the same length, predominantly occupied by a dense covering of barnacles, also mainly *Chthamalus montagui*, which extend down the sides to beach level. The remaining section of about 5m is covered with green algae of the genus *Enteromorpha*, with an occasional strand of a *Fucus* species, whilst the remainder of the proximal end of the conduit is bare due to erosion by the mobile substrate of the beach. In both the mussel and barnacle populations there is a high density of individuals, with overcrowding causing interspecific and intraspecific competition for space especially on the sides of the conduit. This crowding in the case of *C. montagui* has resulted in a preponderance of tall cylindrical shell forms with a narrow basis attached to the substrate, instead of the characteristic squat pyramidal shape of an acorn barnacle.

Adult *Aphrosylus celtiber* were found in the study area from early May to mid or late October. The maximum count was about 100 in mid June and about 200 in late September. At low water they occupy mainly the distal sections of the conduit searching the surfaces of the barnacles and mussels. As the flood tide advances the flies retreat to the proximal sections and finally onto the beach remaining just beyond the waves as the tide moves up the beach. On the ebb tide the conduit is rapidly reoccupied as it becomes exposed. The *Aphrosylus* were sampled over a five-year period and no other species was identified. The closely related *A. raptor* has not been recorded in Mount's Bay but the smaller *A. ferox* Haliday is frequent on barnacle-covered rocks. The larvae of *Aphrosylus* were occasionally seen crawling across the surface of the substrate but were usually concealed between barnacles or within the debris found in clusters of mussels. Pupal cocoons can be detected in the field within empty barnacle shells (or tests) with aid of a lens, although most were found during the sorting of samples in the laboratory.

Materials and Methods

Two approaches were used to demonstrate that the larvae of *A. celtiber* prey on *C. montagui* with which they were closely associated in the study area: firstly an attempt to find larvae inside barnacles and to determine the mode of entry; secondly to identify food material in the alimentary canal of the larvae. Between December and April samples of barnacles were removed as the flood tide reached the conduit. With a wide blade squares about 5x5cm comprising about 100 mainly tall cylindrical forms were lifted from the surface and examined in the laboratory with a stereo-microscope. *Aphrosylus* larvae ranging in length from 2-8mm were found in most samples, but for this investigation only mature larvae estimated to be at a late or final instar stage were used. Larvae found in the peripheral damaged barnacles were removed, but those remaining *in situ* in the spaces between adjacent barnacles were first stimulated to vacate the cavities by touching the peripheral lobes of the terminal segment. These were collected separately and the cavity identified with a 2mm flexible marker. The barnacle samples were subsequently fixed in 10 per cent. "formal sea water" (i.e. 10 parts of 40 per cent. formaldehyde solution to 90 parts of sea water) for several days prior to further examination and dissection.

The collected larvae were treated by one or more of the following methods: (1) kept in sealed glass rearing chambers with either live barnacles or *Enteromorpha* with empty shells or tests and irrigated daily with sea water; (2) fixed in 70 per cent. alcohol and stored for morphological studies; (3) fixed in either 10 per cent. "formal sea water" or a variant of Bouin's picric acid fixative, followed by paraffin embedding to prepare sections of the alimentary canal for histological studies. In addition, intact barnacles from each sample were preserved in formal sea water for confirmation of identification; the soft parts from dissected individuals were fixed and sections prepared as for the *Aphrosylus* larvae.

Results

Species recognition. All the adult *Aphrosylus* monitored on the conduit were identified as *A. celtiber* using the key by Assis-Fonseca (1978). The shape of the second tarsomere of the fore tarsus and the presence of anterodorsal bristles at the base of the hind femur were the main characters used to differentiate this species from the similar *A. raptor*. Two male flies were reared from late instar larvae, one of which had pupated in an empty test, the other in *Enteromorpha* and debris at the bottom of the rearing chamber. Both emergent flies were identified as *A. celtiber*.

The barnacles in the samples and in the adjacent areas removed for examination were classified as *Chthamalus montagui* Southward based on external shell characters of individuals with a clear shell structure. This chthamaloid was differentiated from the similar *C. stellatus* (Poli) by the morphology and peripheral colour pattern of the operculum (Southward 1976).

Predation of barnacles. The cavities between adjacent barnacles, which had been occupied by larvae in the samples examined and tagged with flexible markers, were explored by removing the separate lateral shell plates to expose the route of the marker. Although cylindrical shells have thin fragile plates it proved possible to trace the cavity vacated by a specific larva to the basis of a barnacle in a limited number of instances without artifactual damage. Further removal of plates from these "target" barnacles frequently revealed damage to the mantle and soft tissues within the lower region of the mantle cavity. The difficulty in removing the shell without accidentally tearing the attached mantle covering was considerable. However, for two specimens in which most of the internal organs and mantle of the prey barnacle were found to be missing, the covering plates were removed with minimal damage to reveal a cavity above the bases containing only tissue remnants. Although in both cases there were several fissures connecting with the mantle cavity of the target barnacle at the junction of the basis and the final plate removed, it was not possible to identify the precise point of entry by the larva. The remainder of the partially consumed barnacles appeared intact apically with the cirral structure, mantle tissue and opercular plates undisturbed. Externally, the closed operculum was undamaged and there was no evidence of artificial fissures at the crown of the surrounding lateral plates.

Identification of food material in the alimentary canal of larvae. In the larvae removed from the marked cavities between barnacles, the alimentary canal from the oesophagus to the rectum was packed with a dense brownish-black material visible through the translucent cuticle with the unaided eye. Examination of cleared whole mounts revealed microscopically that the material was contained within multiple cylindrical pellets from the anterior midgut to the rectum. Histological examination showed that the food pellets, encircled by a peritrophic membrane, were filled with solid fragments up to 200microns in diameter and amorphous debris interspersed with dense masses of a fine granular pigment. This appeared brown when thinly dispersed but black in the thicker accumulations. A series of histochemical and solubility procedures on sections prepared from the anterior midgut indicated that this exogenous pigment was a form of melanin. The protocols used to identify the pigment in fixed tissue were those advocated by Pearse (1961) and Bancroft and Cook (1994). Many of the more solid, partially digested, fragments in the midgut food pellets gave the colour reaction of muscle with standard staining methods, but cellular details were absent.

In dissected barnacles, the mantle lining the inner surface of the shell and compartments containing the organs was heavily pigmented and appeared black *in situ*. Microscopically this was due to a dark brown to black pigment contained in flat cells, or melanophores, forming the inner mantle epithelium. Morphologically this endogenous pigment was similar to the pigment found in the alimentary canal of the *Aphrosylus* larvae. Parallel histochemical and solubility

tests confirmed that the pigment was a melanin, with identical results to the melanin found in the food pellets of the larvae. The dark brown pigment in the epidermis of the sessile barnacle *Balanus eburneus* Darwin was identified by Koulish and Klepal (1981) as a melanin but further solubility and electron microscope studies indicated that the pigment ommochrome could not be excluded (Barden and Koulish 1983).

Discussion

The finding of *Aphrosylus* larvae close to the bases of partially consumed *C. montagui* and the presence in the alimentary canal of the larvae of large amounts of the pigment melanin, which was also found in quantity in the pigmented mantle epithelium of the barnacle, provides further evidence that the larvae of *A. celtiber* are predators of sessile barnacles in certain situations. One of the factors influencing the availability of barnacles as a food source to *Aphrosylus* larvae in the study area was the prevalence of cylindrical forms of *C. montagui* due to crowding, creating long cavities between touching shells. These refuges provide access to the bases of the barnacle, concealment from predators, protection from drying out at low water and from wave action at high tide. Also a bubble of air is retained in the cavity in contact with the posterior spiracles of the larva when the barnacles are covered in sea water, enabling the larvae to survive the period of submergence at high water (personal observation). Unlike some higher balanoid species in which the bases are calcified and interlocked with the lateral shell plates, the bases of chthamaloid barnacles attached to the substrate are membranous and are vulnerable to biotic pressures, particularly in the tall cylindrical forms with narrow bases. Stubbings (1975) reported that in the intertidal barnacle *Semibalanus balanoides* crowded individuals can be lifted from the substrate by the pressure of surrounding shells to expose their bases. It seems likely that the larvae gain access to the mantle cavity of a barnacle either through the membranous basis or the overlapping sutures at the junction of the lateral plates and the basis. No larvae were found inside the mantle cavity of dissected barnacles since on disturbance they almost certainly always withdraw completely to an external refuge. As well as seeking alternative refuges between barnacles, larvae disturbed during examination of samples frequently entered damaged live barnacles through the broken crown of the shell, burrowing through the soft tissues to the bases. The two barnacles identified as being subjected to predatory attacks from late instar larvae of *A. celtiber* were grossly damaged in the basal region of the soft tissues and would not have survived. There is no evidence that partially consumed barnacles are utilised for pupation by late instar larvae. The empty tests usually selected for pupation are shorter and wider so as to accommodate the cocoon and pupa, with the respiratory horns projecting through a membrane secreted across the crown in place of the missing opercular plates.

The only other confirmed dipteran predator of intertidal barnacles is the dryomyzid *Oedoparena glauca* (Coquillett), common along the west coast of North America, which preys on the sessile barnacle *Balanus glandula* Darwin (Burger *et al.* 1980). Eggs are deposited on or near the operculum and the first instar larvae enter the barnacle through the opercular valve. These and second instars appear to remain within the barnacle, but third instar larvae seeking fresh prey were observed attacking barnacles by attaching mouth hooks to the operculum before entering when the valve opened on immersion by sea water. Although the point of entry was at the apex of the barnacle the basal portion of the soft tissues was consumed first. This is in contrast to the method of attack by the larva of *A. celtiber* which enters the mantle cavity of *C. montagui* at the basis to consume the organs, also from the basal portion upwards. It is of interest to note that the larvae of *O. glauca* rejected living barnacles during prepupation searches and always selected empty tests for pupation.

Acknowledgements

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Hertfordshire hoverflies (Diptera, Syrphidae): a request for further records and information - For the last decade we have been collating the published and unpublished hoverfly records for the county with the intention of producing an updated account of the status and distribution of the county's fauna (covering up to, and including, the 1999 season). We would therefore like to hear from anyone who has records (however old) for the county or is willing to undertake fieldwork in 1999. Records and/or specimens should be sent to Malcolm C. Aldridge, Clunie Cottage, Ayot St Lawrence, Welwyn, Herts., AL6 9BX. Preliminary coverage and distribution maps (based on a 5x5km grid) are available, for those interested in recording in Hertfordshire, from the following address (please enclose an A4 S.A.E.) - **IAN R. WYNNE**, 151 Riverside Road, St Albans, Herts., AL1 1RZ

Dipterists Digest 1998 **5**, 75-76

Male territorial behaviour and the habitat of the horsefly *Haematopota grandis* Meigen (Diptera, Tabanidae) in Suffolk

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Very little is known of the larval location of any of our "clegs", the mobility of adults often obscuring evaluation of exact habitat requirements. Our coastal species, which are generally regarded as rare, are assumed to require a degree of brackish conditions, but that still leaves a range of options to be considered. Also, observations on male behaviour are largely lacking for the rarer species. By good fortune some observations were made on *Haematopota grandis* Meigen, providing a small step towards filling gaps in knowledge of this species.

My only experience of *H. grandis* has been in Suffolk. On 8 August 1986 at Walberswick NNR, females flew commonly about me in a small area of rough heath grassland in a sheltered spot some 300m from the nearest marshes. A female was seen on these marshes on 30 July 1986 and another on 30 July 1998, but this tells one little. Apart from terrestrial habitat, Walberswick NNR has freshwater and mildly brackish fen and reedbeds and some most extraordinary saltmarsh where sea water percolates through the shingle beach. The larvae could thus be situated in one or more of a variety of habitats.

On 27 July 1998 a visit to Iken Cliff on the south side of the Alde estuary near Snape revealed that there was some rather interesting saltmarsh. In one small area (TM 401563) there was a very strong population of the cranefly *Dicranomyia sera* (Walker), a local species that is normally found among the rush *Juncus gerardii*, together with *Erioptera stictica* (Meigen) which is ubiquitous on saltmarsh. In the hope of finding larvae of these craneflies, it was decided to take some sediment samples for sieving in water.

On delving into the vegetation at the chosen spot, a male *Haematopota* was immediately found crawling along. It was obviously very newly emerged, weakly coloured, the wings full sized but floppy and the abdomen soft and very inflated. Here at last was my first encounter with the male of *H. grandis*, the only species with the first antennal segment entirely dusted. The pupal exuvium could not be located: it was probably still buried in the sediment or more likely the fly had walked from beyond the area it was practical to search in detail. The situation was rather unusual. On the upper saltmarsh was a reed bed (*Phragmites australis*). On the landward side of this was a depression, which was the upper part of a creek, with bare mud and saltmarsh. This resembled a glade since the landward margin in part had a line of oaks (*Quercus* species) with a shaded ditch and some reed. In the "glade" the craneflies and *H. grandis* were in a plant community with *Atriplex prostrata* (= *hastata* of authors) (not typical of saltmarsh), *Triglochin maritima*, *Glaux maritima* and *Salicornia* species as well as some stunted *Phragmites australis*. My observations were in mid-morning, but later in the day it was found that the tide had covered this area to a depth of at least 30cm.

On sieving the sediment sample, *Dicranomyia* larvae eluded me as usual (yet another fly that exists only by spontaneous creation!). Nor were any early stages of *Haematopota* found. Since most horsefly larvae are predatory, it seems probable that cranefly larvae could be their prey. In this instance, saltmarsh is clearly the larval habitat, which can be interpreted from the flora as a high zone that receives regular tidal flooding. The vegetation and *D. sera* are what one may expect on a fully saline coast. However, Iken Cliff is within an estuary and lies over 6km from the sea, or more significantly some 23km from the end of Orford Beach where the River Alde becomes the River Ore before reaching the sea. Thus one might expect brackish

conditions, though the River Alde is quite small and may provide relatively little dilution in summer.

The following day, 28 July, an excursion was made along a footpath leading to the eastern side of the Butley River estuary, a limb of the River Ore (= lower River Alde), at Chillesford, about 4km from Iken Cliff. The freshwater inflow into Butley River estuary is minor, amounting to a small stream and some minor drainage. Thus, like Iken Cliff, the saltmarsh is strongly brackish. The weather was dull, cold and windy but on the way back, about 1pm BST, there was sunshine for a while. About 500m inland from the estuary, on reaching a T-junction of tracks (TM 393520), I became aware that about six male clegs were hovering about 1m above bare sand in the style of territorial hoverflies; one was captured and proved to be *H. grandis*. This junction area was somewhat sheltered by bushes and was the only patch offering the characteristics concerned. The location had the feel of an ideal place for aculeate Hymenoptera, since there was such a broad patch of bare sand in the sun, sheltered and at the junction of flight lines. This shows that *H. grandis* males can assemble some distance from their potential larval habitat, at least under windy conditions, presumably for the purpose of mating.

Diglochis sylvicola (Walker) (Hymenoptera, Pteromalidae) reared from the pupa of *Tabanus cordiger* Meigen (Diptera, Tabanidae)

On 10 June 1997 a party of five participants of the Abergavenny Field Meeting visited a site on the River Usk where the map showed ox-bows at Llanvihangel Gobion, Gwent (SO 343089). The vegetation was still wet from overnight rain so, on finding a patch of river shingle, we decided to search for larvae and pupae.

Quite soon we were finding tabanid pupae about 3-6cm below the surface, among coarse gravel with a grit matrix on a shoal projecting from the land. One of the pupae was already broken open when it was passed to me; the head portion was missing to expose tightly packed pupae of a tiny hymenopteran parasitoid. Some of these pupae were already dark, indicative of imminent emergence. A few days later, the first adult parasitoids emerged and continued to do so over at least two weeks (and had finished by the end of the third week after a gap in regular observation), about 20 individuals in all.

A sample of the parasitoids was given to Dr M.R. Shaw who in turn passed some of them to Dr R.R. Askew for identification. The latter reported that the six specimens received by him were female *Diglochis sylvicola* (Walker). Apparently there is no previous rearing record in Britain though it is not uncommon in sweep net samples, usually in marshy places, and it has been found most frequently in Scotland. On the continent it has been reported to be a parasitoid of tabanid pupae by Boucek and Rasplus (1991, *Illustrated key to West-Palaearctic genera of Pteromalidae (Hymenoptera: Chalcidoidea)*. 140pp. (p.64). Institute National de la Recherche Agronomique) who annotate their key with the comment "common, in tabanid pupae in damp ground and in forests".

About 10 tabanid pupae and one larva were found, all belonging to *Tabanus cordiger* Meigen. One adult was bred out and this is the only *Tabanus* that is normally considered to belong to this habitat. The larvae must be able to withstand submergence and indeed may be semi-aquatic. The pupae were concentrated at the highest part of the shingle shoal, as may be expected for pupation, well above the river level at the time (though floods the next week probably over-topped the shoal). Locally there was a very thin sand veneer at the highest level, containing therevid larvae.

I thank Dr Mark Shaw and Dr Dick Askew for their help - **ALAN STUBBS,** 181 Broadway, Peterborough, PE1 4DS.

Dipterists Digest 1998, 77-79

The occurrence of the soldierfly *Oxycera leonina* (Panzer) (Diptera, Stratiomyidae) in Norfolk and Suffolk

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Oxycera leonina (Panzer) was a reputed British species which was removed from the British list by Verrall (1909) in the absence of substantiated specimens or records. It is newly confirmed to be a native species; the records discussed here have also been cited in *British Wildlife* (Stubbs 1997, 1998).

This soldierfly is distinctive in the field. It is a robust species of the build of *O. rara* (Scopoli), but the abdomen lacks side spots, being black with a yellow median spot at the base (usually) and another at the apex of the abdomen. On the continent the species is widespread (Rozkosný 1982) so this was an expected addition to our fauna.

My initial discovery of *O. leonina* was at East Walton Common (private access; TF 7316), West Norfolk, on 6 July 1989. This locality is one of the classic sites for pingo pools, tundra landscape features whose significance has only been appreciated in recent years, but the *O. leonina* was in a rather different habitat. A female was swept from alder (*Alnus glutinosa*) foliage beside a stream about 15m downstream of a spring head arising from Chalk groundwater (just outside the Common boundary). Here the banks are entirely natural in profile, with very gently sloping sides, at this point offering a gradient from water covering bare sediment, to emergent plants, to saturated fen, to wet alder carr with seepages and into drier woodland, all within the space of 5m.

Three other dipterists have successfully observed *O. leonina* at this site. On 11 June 1993 Drs Liz and Mike Howe went to look for the species at the close of the Norfolk summer field meeting of Dipterists Forum. They found one specimen lower down the stream. A visit by Ivan Perry on 14 July 1997 seems to have hit an ideal day, for he found it widely on the Common. Several females and a male were swept from sun-lit oak foliage on bushes and young trees growing on the dry sandy ground between the pingo pools and depression fens.

Whilst on holiday in East Suffolk in July 1998, my host enthused about a meadow full of wild flowers near Snape and offered to contact the owners for access. The site was an exceptionally fine small area of fen meadow and proved to be an SSSI called Gromford Meadow (TM 38558), which in the view of the owners was the last in the district of a formerly widespread type of meadow. Fortunately my arrival was just days before these meadows were to be cut for conservation management of the flora. Thus on 27 July I spent a happy hour or so recording such local species as the hoverfly *Sphaerophoria menthastri* (Linnaeus) and the tachinid *Phasia obesa* (Fabricius); *Helophilus trivittatus* (Fabricius) was quite plentiful. Almost at my final point before leaving the site I swept some alder foliage beside the boundary ditch and much to my surprise the net contained a female *O. leonina*.

This Gromford record is baffling. Other alder had been swept in standard procedure looking for soldierflies, though no other *Oxycera* had been found on a day with little sun and during a period of rather indifferent cool weather. There was a bigger area of alders, inaccessible because of deep ditches and outside the property. There were only two habitat features in common with East Walton. Firstly, the boundary ditch was about the junction between moist peaty meadow/carr soils and dry sandy soils. Secondly, there was a small river along one boundary, mainly with alders and indeed flowing out of alder woodland, although the sides were deeply entrenched and very different from the East Walton stream head. The owners informed

me that there had been a lot of water abstraction from hydrologically related ditches and from the river, but at least the difficulties were now recognised.

Two days later, 29 July, I visited a small strip of woodland along a footpath leading to a small river, a very ordinary site which seemed likely to only yield very common flies. This was located near Farnham, on the footpath to the River Alde just north of Benhall Place (TM 343614), about 4.5km from the Gromford site (same river catchment, the Gromford stream feeding into the Alde floodplain at Gromford). Beyond hazel (*Corylus avellana*) with nettle (*Urtica dioica*) on very dry sandy soil was a glade with meadowsweet (*Filipendula ulmaria*), indicative of a former wetter patch now drained. Further on, some very dry sandy woodland lay beside an entrenched sluggish river. A few glimmers of sun brought hoverflies to hogweed (*Heracleum sphondylium*) but it was mainly dull. When about to leave, I swept some hazel foliage at the scrub edge overhanging the path and to my amazement found yet another female *O. leonina*. This was the only one seen despite much sweeping of foliage. Again, there is the question why should *O. leonina* occur here? This site is very unremarkable. The only features in common with the other sites could be the transition from dry woodland sandy soil to at least seasonally moist more peaty soil in the meadowsweet glade. Alternatively, one is looking to the wooded margin of a river whose banks were largely too precipitous to investigate.

There is a further twist to the tale. In 1991 I examined the Diptera collections in Leicester Museum. Among unnamed material there was a female of *O. leonina* labelled "Bristol, May 1933". This was collected by P. A. H. Muschamp, the collector of specimens of the bee-fly *Anthrax anthrax* (Schrank) labelled as being taken in Leicestershire. The latter are now dismissed as so improbable that it is assumed that he must have got his labelling wrong, since he also collected on the continent. Furthermore, Bristol is a well collected area, including past attention from Audcent, Cowley and Assis-Fonseca among others, plus various dipterists in recent years, yet *O. leonina* was not taken by them. We now know that *O. leonina* definitely occurs in Britain and though its occurrence in Leicestershire or Bristol may even be possible, the 1933 record remains doubtful.

The true status of *O. leonina* in Britain remains enigmatic. That it should be discovered at a previously largely unworked pingo site with chalk springs and very unusual high quality habitats, is what one might expect for a species new to Britain in a popular group of flies. However, the Gromford record is from a historically widespread habitat and the Farnham one from undistinguished habitat. Of course one could postulate that the single specimens from Suffolk sites were strays from other more special situations in the Alde catchment, but this seems unlikely and there are no pingos or exceptional quality stream heads nearby. I spent a fortnight in Suffolk, mostly in the Sandlings area and certainly tried hard for this species for the week following its discovery, yet it was not found even on sites of very much better habitat quality than the Farnham one. There is also the mystery that intensive widespread recording during the June 1993 field meeting, by a large party for a week, did not find it anywhere except at the known East Walton site. Of course there is a strong element of luck with regard to being beside the right bush at the right time on the right day, but Ivan Perry has shown that it is not a difficult species to find on a favourable occasion. If *O. leonina* is not confined to specialised high quality habitat, there seems no reason why it should not be widespread, at least in East Anglia, yet it is proving very elusive.

Perhaps crucial to further understanding of this species is resolution of the larval ecology. In his key to larvae, Rozkosný (1982) classified this species as terrestrial and noted the absence of terminal float hairs that characterise the aquatic adaptation of all other members of the European fauna. A larva was reported in wet soil among the remains of vegetation in a lowland forest. Adults were seen on leaves by streams, in a forest glade and also in wet meadows around ponds and pools, which may give some lead as to where to expect larvae. "Woodland soil" is a vague ecological definition, especially when considering sites with conditions ranging from very

wet to very dry soils. Presumably the larva needs seasonally very moist conditions, since it would be hard pressed on the very well drained sandy soils with little leaf litter that characterise the drier ground on the British sites. Possibly the larvae are at the moister margins of water bodies where they can move as the seasonal water level moves. Two searches for larvae in the vicinity of the original record at East Walton met with no success.

At present one can only speculate that such a species might be found more widely. Could past generations of naturalists have overlooked it, noting that in recent years development of the technique of sweeping tree foliage has proved various other soldierflies to be more widespread than earlier realised. It is also possible that *O. leonina* has been increasing in numbers and/or range in Britain, resulting in these new records.

Acknowledgements

I wish to thank Drs Mike and Liz Howe and Ivan Perry for inclusion of their observations.

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Sciapus basilicus Meuffels and Grootaert (Diptera, Dolichopodidae) new to Britain

- Confusion over the identity of *Sciapus contristans* (Wiedemann) and its related species in Western Europe was resolved by the detailed analysis of this group by Meuffels and Grootaert (1990. *Bulletin de l'Institut royal des Sciences naturelles de Belgique* **60,** 161-178) who characterised four species, of which two were not then known from Britain. In 1995, Roy Crossley and I found one of these, *Sciapus maritimus* Becker, at Turnberry on the Ayrshire coast of Scotland (Crossley, R. 1998. *British Journal of Entomology and Natural History* **10,** 192). Then in 1997 I found the remaining species, *Sciapus basilicus* Meuffels and Grootaert, in Wales, also on a Dipterists Forum summer field meeting and it was exhibited at the 1997 meeting of *Dipterists Forum* (Cole, J.H. 1997. *Dipterists Digest (Second Series)* **5,** 24-25). Neither species has yet been reported from England.

S. basilicus closely resembles *S. zonatulus* (Zetterstedt), which appears to be the most widespread species of the group in Britain, although by no means common. The two may be separated in both sexes using the key and figures in Meuffels and Grootaert (1990). A single male of *S. basilicus* was identified from material swept on 8 June 1997 from partially vegetated and stabilised exposed sediment banks on the River Usk at Llanwenarth, Gwent (SO 273146). Meuffels and Grootaert (1990) noted that the preferred biotope of *S. basilicus* is not known; the type series partly originates from sand dunes in The Netherlands, but habitats for inland records from Europe are not given - **JONATHAN COLE,** 2 Lenton Close, Brampton, Huntingdon, Cambridgeshire, PE18 8TR

Dipterists Digest 1998 **5**, 80-82

Observations on the oviposition and courtship of the bee-fly *Villa modesta* (Meigen) (Diptera, Bombyliidae) in East Suffolk

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Information on the behaviour of the British species of *Villa* is sparse, even for *V. modesta* (Meigen) which is widespread on coastal dunes. There would appear to be no recorded observations of oviposition or courtship; even information on flower visiting or other ecological requirements is very hard to come by. A visit to the Suffolk coast gave me an unexpected opportunity to make the following observations in early August 1998.

North Warren, an RSPB reserve, was visited on 1 August with permission to collect. At about 12am BST whilst walking along the boardwalk on the west side of The Fens (TM 455595), a female *V. modesta* was found on a particularly low flower of *Angelica sylvestris*. Not only was I pleased to note this flower association, it was a great surprise to see *Villa* here at all. The location was 1.7km inland from a coast with a shingle beach. Later that day the shingle between Aldeburgh and Thorpeness looked rather unsuitable, including successively older and more vegetated shingle ridges. On the landward side there was locally some blown sand with marram grass (*Ammophila arenaria*) so it is just possible that *Villa* could breed here. Strong wind made sweeping and observation very unproductive. In similarly poor windy weather I had already failed to detect *Villa* on the much more promising shingle with poor dunes to the north at Minsmere.

The story turns to Sizewell Beach, lying between Thorpeness and Minsmere and thus part of the discontinuous shingle and incipient dune extending many miles along this coast. The observations below were made about 3.5km from the North Warren sighting.

On 3 August early morning was cold but sunny. On arrival at Sizewell Beach about 10.30am the temperature had risen but a strong cool wind left conditions still marginal for heat-loving dune insects. Searching poor dunes behind the shingle beach soon revealed *Villa* on bare sand among marram. About 10.45am a small area was found to be the scene of oviposition behaviour. There was only slight shelter from the wind at the edge of a shallow bank, with scattered small tussocks of *Holcus lanatus* grass and *Carex arenaria* sedge, locally with some moss; overall there was about 50 per cent. bare sand. The *Villa* flew very low, only 1-2cm above the sand whilst fighting the wind. They manoeuvred in the lee of tussocks, and with a shallow bobbing of the abdomen whilst hovering, seemed to be flicking eggs into the base of the tussocks. In three observations, one target was a *Holcus* tussock on bare sand, one a shoot of *Carex* on bare sand and the last, *Carex* with a veneer of moss over the sand, Just when things were getting really interesting, the edge of a bank of cloud obscured the sun and that was the end of *Villa* activity for the day.

A return visit was made to Sizewell Beach on 5 August when there was at last a good weather forecast. Arrival was at 2pm, getting on towards maximum heat for the day. Needless to say, though it was getting very hot inland, the strong cool wind had little abated. At first no *Villa* were seen. By now I had got to know the site and seemed to be looking in all the right places. Perhaps it was siesta time for *Villa*. Whilst searching for other insects on the shingle, at about 2.45pm, my wife Jane called me over to a bare patch of trampled sand where she had just seen two *Villa* apparently filling their dust baskets (a cavity under the abdomen of female bee-flies that they fill with dust or sand, with which the eggs are coated). Could this mean that oviposition was about to occur again? Return to the earlier oviposition location gave a negative

result. However, the sun had moved round so perhaps it was not so favourable. Wider search was equally disappointing, until the most sheltered sun-facing bank was investigated on the basis that this might offer hope. This spot was reached at 3pm and suddenly several *Villa* were active. There was an area about 12x12m of mainly bare sand in a clearing within stunted bracken (*Pteridium aquilinum*), with scattered more isolated bracken fronds and tussocks of *Holcus* and a low semi-prostrate small vernal grass that was scorched dry. Patrolling males were dashing around in an erratic flight 10-30cm above ground, as if checking possible places that females might be resting on vegetation or on bare sand. Occasionally they would intercept other flying insects by instantly darting with tremendous acceleration. The males would sometimes rest on bare sand, always alert to immediately intercept any flying insect within about 30cm.

Within minutes several females were seen, identifiable by the lack of frenetic patrolling behaviour and much drabber brown colour; the males had much brighter erect brown hairs on the abdomen. The females either sat on the prostrate dead grass tussocks, where they were particularly well camouflaged, or on bare sand, or a few centimetres up on vegetation. Everything was happening with great rapidity and three instances of courtship were noticed almost simultaneously. Males approached females sitting low on vegetation and, whilst hovering about 5cm directly behind, performed quick hover-bobbing of an amplitude of about 1cm for about 7-10 seconds before making sudden grappling contact with the female. In one instance the female twice flew forward a few centimetres, causing the male to follow with a repeat bobbing routine. In another case the bobbing led to the female rising to be instantly intercepted by the male flying up, flipping upside-down beneath the female in a grapple head-to-head, before the pair settled tail-to-tail. The latter pairing configuration occurred in all three instances, but within a minute the pairs vanished, this always taking place while not being directly observed.

Just as suddenly as this courtship activity started, it ceased. For a few more minutes an occasional patrolling male was seen and an occasional sitting female. One female made a very half hearted attempt to go through the motions of flicking eggs into the middle of a *Holcus* tussock. Search was made of other likely activity areas but there was no sign of *Villa* and very rarely any sighting at the best patch, so observation finished at 3.45 pm.

The above experience suggests that there is partitioning of activity patterns during the day, including resting periods, as indeed has been demonstrated with some robberflies and other insects (Lavinge and Holland 1963). There is also the strong awareness of chance of being in the right place at the right time and confirmation that it is very easy to overlook the presence of *V. modesta*. There remains a need for more extended observations.

The ecological niche of *Villa modesta* is only a little clearer from these observations, since the site lacks an ideal dune zonation. This and previous personal experience suggests that it is semi-fixed dunes that are preferred, in other words not the very mobile marram dunes nor the well vegetated fixed dunes, but something in between with plenty of bare sand. *Holcus* may seem a very atypical plant but then the site is atypical. As photographs in the visitor centre at the Sizewell nuclear power station reveal, much of Sizewell Beach was a bulldozed mess during its construction, followed by deliberate and apparently successful measures to recreate the original environment (which is more practical with this ecosystem than most). However, the very fact that *Villa* has survived such a trauma indicates that it must also be present more widely on this length of coast. It is also just possible that it may be able to breed inland on the very soft sands, for which there is increased opportunity now that RSPB has acquired nearby agricultural land that it is restoring to heath very like The Breck (where there are historic records of *V. modesta*). Seemingly the only available nectar source of any potential significance for the bee-fly at Sizewell Beach was ragwort (*Senecio* species).

There was one further observation of potential interest. A female *Villa* on taking off was pursued by the wasp *Philanthus triangulum* Fabricius (Hymenoptera, Sphecidae), the bee-wolf. It's normal prey is hive bees (*Apis mellifera* Linnaeus) so it must have been fooled by the bee-fly

mimicry. Unfortunately the hot pursuit went behind me quicker than I could turn, so the end result is unknown. The bee-fly acceleration and performance should have left the *Philanthus* somewhat perplexed. This was the only such wasp seen in the immediate area of observations, though occasional individuals were seen elsewhere on several sites on this coast.

Villa modesta is known to be a parasite of noctuid moth caterpillars (Merle 1964), though host relationships have not been ascertained in Britain. The above observations may give some lead towards potential hosts.

As a footnote, Mike Edwards subsequently informed me that he had seen oviposition behaviour at the back of Crymlyn Beach, Glamorgan. In similar fashion small grass tussocks on bare sand were targetted, including marram grass. He also noted that females settled to replenish their dust baskets after every few oviposition actions.

Acknowledgements

I thank Mike Edwards for allowing me to mention his observations.

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***Ernestia puparum* (Fabricius) (Diptera, Tachinidae) in Berkshire** - On 9.iii.1998 I visited Simons Wood in Crowthorne, Berkshire (SU 8163) to look for early spring aculeate Hymenoptera. Simons Wood is an area of mixed conifer/broadleaved woodland; some sections of the conifer plantations have been clear felled and are now reverting back to *Calluna* heath. Whilst investigating one of these open areas, I caught a single specimen of a large black tachinid with orange abdominal markings. On later examination this proved to be a female of the RDB 2 species *Ernestia puparum* (Fabricius). R. Belshaw (1993. *Handbooks for the Identification of British Insects*, **10**(4a(i)), 169 pp.) gave the distribution as Southern England (Hampshire, Berkshire, Surrey and Hertfordshire) and Midlands (Nottinghamshire and Lincolnshire), with the localities indicating a preference for broadleaved woodland. Belshaw gave the flight period as late March to April so this is an early record, but in Europe a wider range is recorded from early March to early May (Tschorsnig, H.-P. and Herting. B. 1994. *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)* **506,** 170 pp.). The flight period is significantly earlier than other *Ernestia* species (which fly in May and June) and most other Tachinidae (only six other species have been recorded as early as March in Britain according to Belshaw) but may be linked with the life cycle of its host. However, the host of this species remains unknown; other *Ernestia* species are parasitoids of larvae of moths of the families Noctuidae and Thyatiridae - **MATTHEW N. SMITH,** 24 Allnatt Avenue, Winnersh, Berks, RG41 5AU

Dipterists Digest 1998 **5**, 83-88

Notes on Scatopsidae (Diptera), including *Pharsoreichertella simplicinervis* (Duda, 1928) new to Britain

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The distribution of the Scatopsidae in the British Isles was summarised on a county basis in the Handbook by Freeman (1985) but remains very poorly known, little having been published since. Information on the Irish fauna was provided by D'Arcy-Burt and Chandler (1987), who recorded 18 species from Ireland. Only two species have since been added to the Irish list, *Ectaetia platyscelis* (Loew) by Speight (1988) and *Thripomorpha coxendix* (Verrall) by Blackith *et al.* (1991), who cited rearing records for this and other species. Laurence and James (1996) showed that *Colobostema infumatum* (Haliday) was a good species and this replaces *C. nigripenne* (Meigen) on the Irish list, since this had been based only on Haliday's types of *infumatum*.

The Scottish fauna is also poorly known, only 14 species being cited by Freeman (1985); one other species *Reichertella pulicaria* (Loew) was recorded from Scotland in earlier literature (e.g. Verrall 1873). Two recent additions to the British list have, however, been from Scotland, i.e. *Apiloscatopse subgracilis* Haenni and Greve (Haenni and Greve 1995) and *Ectaetia christii* Rotheray and Horsfield (Rotheray and Horsfield 1997). Only one other species has been added to the British list since Freeman's Handbook, *Neorhegmoclemina catharinae* Haenni (Peacey and Ismay 1998) from Buckinghamshire, raising the total fauna from 37 to 41 species. Several recent nomenclatural changes were accepted in the revised checklist (Chandler 1998), where *Anapausis rectinervis* Duda was also included as a new addition based on English specimens.

Curation of the Scatopsidae in the National Museums of Scotland (NMS) collection disclosed a number of additions to the Scottish list as well as unpublished rearing records from the E.B. Basden collection. Simultaneous examination of material in my own collection (PJC) led to discovery of some previously unrecognised species including *Pharsoreichertella simplicinervis* (Duda), a genus and species new to the British list, which is added here and *A. rectinervis* mentioned above. *Anapausis* is being dealt with separately as it was found that *A. soluta* (Loew) of previous authors comprises three species in Britain.

Species new to Scotland

Additions here increase the recorded Scottish species to 24; of the three species confused under *Anapausis soluta* (Loew) of previous authors, two occur in Scotland and at least one in Ireland so 25 of the 45 British species are now known to be Scottish. New records of *Reichertella pulicaria* are also included. A list of species confirmed to occur in Scotland is provided in Table 1.

Colobostema infumatum (Haliday)

This newly revised species was recorded by Laurence and James (1995) from Wales; it could otherwise only be confirmed from Haliday's Irish types. Two Scottish specimens, previously confused with *C. nigripenne* are recorded here. True *nigripenne* was also collected by J.R. Malloch in Dunbartonshire, at Cardross, 11.vii.1908 and on various dates at Bonhill.

Dunbartonshire, Cardross, 23.vii.1908 male, J.R. Malloch; Aberdeenshire, Linn of Dee, 19.vii.1991 male (PJC).

Colobostema triste (Zetterstedt)
Only records from southern England were cited by Freeman (1985); I have several records from Hampshire and Berkshire. D'Arcy-Burt and Chandler (1987) recorded it from Ireland.
Dunbartonshire, Bonhill, 12.ix.1905 male, J.R. Malloch.

Thripomorpha verralli (Edwards)
This is distributed as the previous species (Freeman 1985; D'Arcy-Burt and Chandler 1987).
Dunbartonshire, Cardross, 11.viii.1906 male and 15.vii.1907 female, J.R. Malloch; South Uist, Loch Druidibeg NNR, machair, 16.vii.1966 male, A.R. Waterston.

Apiloscatopse bifilata (Haliday in Walker)
The Scottish material reported here comes from the same era as the one known English record from Cusop, Herefordshire (taken by G.H. Verrall in 1905).
Dunbartonshire, Bonhill, 1.ix.1906 (1 male, 2 females) and 7.ix.1907 (1 female), J.R. Malloch; Clyde Isles, Arran, 1.x.1903, J. Waterston.

Apiloscatopse picea (Meigen)
This and the following are common autumnal species in the south.
Dunbartonshire, Bonhill, 12.ix.1908 male and female, J.R. Malloch.

Apiloscatopse scutellata (Loew)
This visits ivy flowers (*Hedera helix*) like *A. picea* and *A. flavicollis* (Meigen); this and the latter are known to develop in fungi.
Dunbartonshire, Bonhill, vii-ix.1906-1908, J.R. Malloch; Selkirkshire, Selkirk, 12.ix.1962, A.R. Waterston; Midlothian, Miltonbridge, ix-x.1951, R.O. Darwish; East Lothian, Bilsdean, 18.ix.1963, J.B. Cumming; Inverness-shire, Glengarry, 22.ix.1962 at light, E.C. Pelham-Clinton.

Reichertella pulicaria (Loew)
There are published records from Aberlady Bay, West Lothian as well as the Western Isles (Jura) and Northern Isles (Orkney and Shetland), but specimens on which these records are based have not been examined. It is otherwise known from southern England and Ireland.
Dunbartonshire, Bonhill, vi. and vii. 1901-1909 and Cardross, 24.vii.1908, J.R. Malloch.

Ectaetia christii Rotheray and Horsfield	*Apiloscatopse bifilata* (Haliday in Walker)
Anapausis soluta (Loew) sensu lato	*A. flavicollis* (Meigen)
Colobostema infumatum (Haliday)	*A. picea* (Meigen)
C. nigripenne (Meigen)	*A. scutellata* (Loew)
C. triste (Zetterstedt)	*A. subgracilis* Haenni and Greve
Efcookella albitarsis (Zetterstedt)	*Reichertella geniculata* (Zetterstedt)
Parascatopse litorea (Edwards)	*R. pulicaria* (Loew)
Thripomorpha bifida (Zilahi-Sebess)	*Scatopse lapponica* Duda
T. coxendix (Verrall)	*S. notata* (Linnaeus)
T. halterata (Meigen)	*Coboldia fuscipes* (Meigen)
T. paludicola Enderlein	*Swammerdamella acuta* Cook
T. verralli (Edwards)	*S. brevicornis* (Meigen)

Table 1. List of Scottish Scatopsidae

Coboldia fuscipes (Meigen)
This is a synanthropic species, developing in a wide variety of decomposing materials, so the lack of previous Scottish records is surprising.
Ayrshire, Auchincruive, i.1954, E.C. Pelham-Clinton; 2 females reared from cow dung x.1953, without other data, are probably from this site as are *Scatopse notata* with the same rearing data.

Notes on other species
Records from nests of birds and mammals based on specimens in the E.B. Basden collection (NMS) are cited below. Also included are some flower visiting records and a few other records which add to knowledge of distribution.

Thripomorpha coxendix (Verrall)
Buckinghamshire, Medmenham, 1.vi.1934 male reared from nest of a mole (*Talpa europaea*), E.B. Basden.

Apiloscatopse flavocincta (Duda)
Previously only three records from Cambridgeshire and Suffolk (Collin 1954; Hutson 1973).
Kent, Orpington, Crofton Heath, 27.ix.1964 male (PJC).

Reichertella geniculata (Zetterstedt)
Fife, Isle of May, 6.vii.1958 female on flowers of *Potentilla anserina*, E.C. Pelham-Clinton; Kent, Deal, 10.vi.1973 abundant including *copulae* at *Pastinaca* and *Heracleum* flowers (PJC).

Scatopse lapponica Duda
This was added to the British list by Hutson (1973) from a male found on the Isle of Eigg in Scotland and Freeman (1985) knew of no further records. However, in NMS *lapponica* was found to be mixed with *S. notata* (Linnaeus) in both J.R. Malloch and E.B. Basden collections.
Dunbartonshire, Bonhill, vi-vii.1906-1907 4 males, 3 females, J.R. Malloch; Buckinghamshire, Burnham, v.1934, 1 male, 2 females ex soil taken from a rabbit (*Oryctolagus cuniculus*) burrow, E.B. Basden; Buckinghamshire, East Burnham, 16.iv. and 17.v.1933, 2 females ex nest of blackbird (*Turdus merula*), E.B. Basden.

Scatopse notata (Linnaeus)
This is a very widespread synanthropic species. The NMS collections include material from the Scottish islands of Orkney, St. Kilda, Flannan Isles and Arran. It has been reared from cow dung at several mainland Scottish sites but will develop in most decomposing material of vegetable origin. It was also frequently reared by E.B. Basden, including nests of rook (*Corvus frugilegus*), moorhen (*Gallinula chloropus*), blackbird, little owl (*Athene noctua*), brown rat (*Rattus norvegicus*), rabbit and grey squirrel (*Sciurus carolinensis*) and also an old wasp (*Vespula* species) nest from sites in Buckinghamshire and Berkshire.

Coboldia fuscipes (Meigen)
Berkshire, Temple, iv.1933 ex nest of rook and v.1934 ex old wasp (*Vespula* species) nest, E.B. Basden.

Swammerdamella brevicornis (Meigen)
This was reared by E.B. Basden from nests of coot (*Fulica atra*), swan (*Cygnus olor*), mole and rabbit at sites in Berkshire and Buckinghamshire.

***Pharsoreichertella simplicinervis* (Duda, 1928)**

Hampshire, Alice Holt Forest, 4.ix.1971 female at *Angelica sylvestris* flowers by pond (PJC).

This species is Holarctic in distribution and both sexes were figured by Cook (1956), who described it from North America as *Scatopse brevipalpis* Cook. Cook (1974) decided that his *brevipalpis* was a synonym of *S. simplicinervis* Duda, described from Poland. He then placed it in *Reichertella* Enderlein and referred it to a newly described subgenus *Pharsoreichertella* Cook. This subgenus was raised to generic rank by Amorim (1994) and the revised status was accepted by Haenni (1998).

Pharsoreichertella is separated principally on genital characters. The male has tergite 7 produced posteriorly in one or more processes and the female has tergite 8 well developed and bearing spiracles. In *Reichertella* sensu stricto the male tergite 7 is not produced apically and in the female tergite 8 is reduced medially and lacks spiracles. In *P. simplicinervis* the male has tergite 7 produced medially in a single rounded lobe and sternite 7 has a narrow median incision. Cook's (1956) figure of *brevipalpis* shows the female tergite 8 as broad at the mid line, although emarginate both anteriorly and posteriorly However, the photograph and key in his 1974 paper indicate that, as in the British specimen (Fig. 1), it is narrowly divided medially while being produced basally at the dorsal lateral margins to form two "diamond-shaped" lobes. The female sternite 8 (Fig. 2) is deeply emarginate medially and thus comprising two lobes which are rectangular in form

The British specimen (wing length 2.8mm) was recognised as something unusual by the presence of a weak spur on vein M_1 in the same position as in *Scatopse* species and Duda (1928) mentioned the indication of such a spur, but this is evidently not always present in *P. simplicinervis* because Cook placed it among species separated on the absence of this spur. The wing venation (Fig. 3) is otherwise similar to *Reichertella* species, from which it differs in the anal vein more distinctly reaching the margin. Vein R_{4+5} exceeds the level of the base of the median fork as much as in *Reichertella geniculata* but differs from that species in being more curved and slender apically while it is more parallel to the costa and distinctly thickened in the sharply upcurved apical part in *geniculata*.

P. simplicinervis is shining black, with the halteres and sides of the first abdominal segment yellow. The legs are mainly dark but with the basal half of all tibiae contrasted yellow; only the basal third of the tibiae is yellow in *R. geniculata* and the tibiae are all dark in *R. pulicaria*. *Scatopse* species have the legs entirely dark and genital structure quite different as illustrated by Freeman (1985).

Acknowledgements

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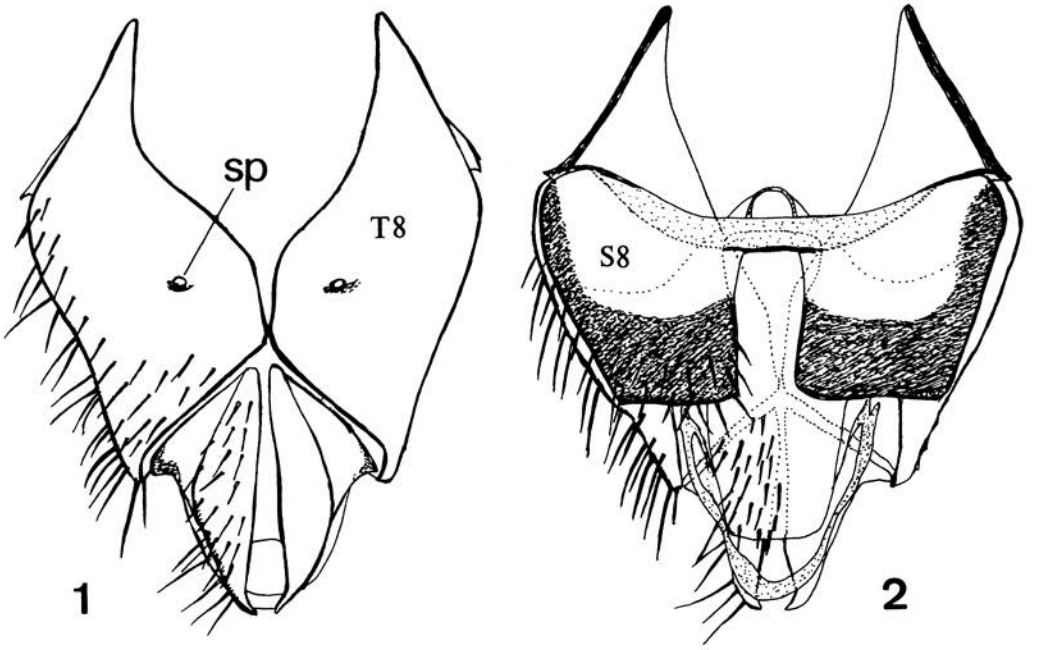

Figs 1-2. ***Pharsoreichertella simplicinervis*** **(Duda, 1928), female genitalia: 1, dorsal view; 2, ventral view (S = sternite, T = tergite, sp = spiracle).**

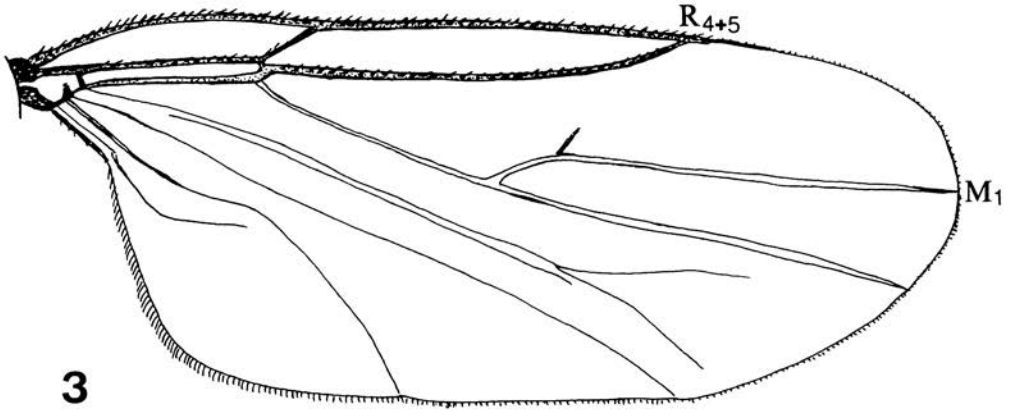

Fig. 3. ***Pharsoreichertella simplicinervis*** **(Duda, 1928), female wing**

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The identity of *Xylophagus ater* Meigen (Diptera, Xylophagidae) - The name *ater* Meigen, 1804 was restored for the British species (Chandler, P.J. (Ed.) 1998. *Checklists of Insects of the British Isles (New Series) Part 1: Diptera.* Royal Entomological Society), because specimens named as *ater* in Meigen's collection were the species called *compeditus* Wiedemann in Meigen, 1820 by N.P. Krivosheina and B.M. Mamaev (1972. *Entomologicheskoe Obozrenie* **51,** 430-445, English translation in *Entomological Review, Washington* **51,** 258-267), the name recently in use for the British species earlier known as *ater*. The true identity of *compeditus* has not yet been determined and the correct name of the species to which Krivosheina and Mamaev (1972) applied the name *ater* has yet to be established.

The purpose of this note is to designate a lectotype for *ater* Meigen, so that usage of this name can be fixed. Meigen's collection at the Museum National d'Histoire Naturelle in Paris contained 2 males and 1 female, all labelled "Meigen" and on the reverse "721 40"; one male and the female also bore labels inscribed "*Xylophagus ater*" and with the sex. The latter male had one antenna and the hind legs missing, but was otherwise in good condition; dissection showed it to have genital structure as British males. It is here designated lectotype of *Xylophagus ater* Meigen and has been so labelled. I am grateful to Loïc Matile for enabling me to borrow these specimens - **PETER J. CHANDLER,** 43 Eastfield Road, Burnham, Slough, Berks SL1 7EL

Dipterists Digest 1998 **5**, 89-92

Mosquitoes (Diptera, Culicidae) in Scotland

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During curation of the collections of the National Museums of Scotland, Edinburgh (NMS) it was found that the mosquitoes (Culicidae) had not been revised recently. Some species previously unrecorded from Scotland were found and significant extensions to the range of some other species were demonstrated. Some further Scottish records were provided from my own collection (PJC).

The distribution of British mosquitoes was summarised for each species in the recent key works by Cranston *et al.* (1987) and Snow (1990). This information was updated in the form of distribution maps for all species, which have appeared in *Dipterists Digest* (Rees and Snow 1990, 1992, 1994, 1995 and 1996). These maps have been further updated by Snow *et al.* (1998).

Of the 32 species known to occur in Britain, Cranston *et al.* and Snow recorded 15 species plus the *Anopheles maculipennis* Meigen complex from Scotland. They also implied that *Aedes caspius* (Pallas) occurred in Scotland, citing a wide coastal distribution in Britain. However, Rees and Snow (1996) were unable to confirm its occurrence north of Wales and East Anglia, so it is not considered to be Scottish.

Rees and Snow (1992) added *Culex torrentium* Martini to the Scottish list, indicating three post 1970 10km squares in Perthshire (two adjoining) and Arran but without stating the origin of these records; Snow *et al.* (1998) indicated only two squares, omitting one of those in Perthshire. *C. torrentium* is indistinguishable from *C. pipiens* Linnaeus except in details of the male genital structure, the external characters cited in the above mentioned key works having been found to be unreliable, so records of either species based only on females cannot be accepted. While the *C. pipiens* complex (i.e. typical *pipiens* and form *molestus* Forskål) was shown to be widespread in Scotland, confirmed Scottish records were shown only on the map for its autogenous form *molestus* by Rees and Snow (1992) and Snow *et al.* (1998), although most of the records assigned to the complex can be assumed to refer to the typical *pipiens* form. However, examination of material in NMS showed that the 53 males previously identified as "*pipiens*" comprised 36 *C. pipiens* and 17 *C. torrentium*. On eight occasions at six sites both species had been collected simultaneously.

Three species can be recorded from Scotland for the first time here, bringing the number of confirmed species to 19 plus the *Anopheles maculipennis* complex. It is unknown whether only one or both British species of this complex occur in Scotland. Snow (1990) stated that both species "appear to be found throughout Britain" but Rees and Snow (1990) assigned all Scottish records to the complex. The maps for the individual species indicated that *A. messeae* Falleroni was recorded from northern England and this was said to frequent cold animal shelters (some NMS material is from a cattle byre) while *A. atroparvus* van Thiel requires warmer resting sites. Only adults, which cannot be determined further, are present in NMS material.

The mosquitoes confirmed to occur in Scotland are listed in Table 1. Scottish specimens of all of these are present in NMS with the exception of *A. rusticus*, *A. sticticus* and C. *richiardii*, although reliable separation of *C. fumipennis* and *C. morsitans* has not proved practicable.

A likely further addition is *Aedes geniculatus* (Olivier) recorded north to Gosforth Park, Northumberland by Rees and Snow (1995). I have found it further north in the woods by the River Wansbeck at Bothal, Northumberland, 26.vii.1988 (donated to NMS).

Anopheles maculipennis complex	*Coquilletidia richiardii* (Ficalbi)
A. claviger (Meigen)	*Culex pipiens* Linnaeus
A. plumbeus Stephens	*C. torrentium* Martini
Aedes cinereus Meigen	*C. territans* Walker
A. cantans (Meigen)	*Culiseta fumipennis* (Stephens)
A. detritus (Haliday)	*C. litorea* (Shute)
A. dorsalis (Meigen)	*C. morsitans* (Theobald)
A. punctor (Kirby)	*C. alaskaensis* (Ludlow)
A. rusticus (Rossi)	*C. annulata* (Schrank)
A. sticticus (Meigen)	*C. subochrea* (Edwards)

Table 1. List of mosquitoes recorded from Scotland

Species new to Scotland

***Aedes dorsalis* (Meigen)**

2 females, Kirkcudbright, Kirkconnell Flowe, 23.ix.1971 and 1 female, same site, 4.ix.1978, A. Duncan (NMS).

Rees and Snow (1996) recorded this species from England north to Cumbria, so this extension to its range is not surprising.

***Culiseta litorea* (Shute)**

1 male, Dumfriesshire, Newlands, 25.v.1949 and 1 male, Dumfriesshire, Lochar, 8.vi.1951, both A. Duncan (NMS).

This species is only reliably distinguished from other members of the subgenus *Culiseta*, i.e. *C. fumipennis* (Stephens) and *C. morsitans* (Theobald) in characters of the male genital structure. Rees and Snow (1994) recorded it only from England, north to Cambridgeshire and from Northern Ireland (Belfast).

***Culiseta subochrea* (Edwards)**

1 male, Fife, St Andrews, 12.ix.1947, D.J. Jackson (NMS).

Most records on the map given by Rees and Snow (1994) are from the south and east coasts of England, with a few inland records in the south-east. On the east coast it is recorded as far north as Newcastle-upon-Tyne, so this further extension up the east coast is not unexpected. The NMS collection also includes two males taken at sugar at Dungeness, Kent, 23.ix.1955 by E.C. Pelham-Clinton.

Notes on other species

***Aedes cantans* (Meigen)**

Rees and Snow (1996) gave details of the known Scottish records including some in NMS; however, material relating to the records cited for Aberfoyle was not found in the collection. The following records can be added:

1 female, Dumfriesshire, Caerlaverock, 31.vii.1981, A. Duncan (NMS); 1 male, Ross, Loch Achilty, 28.v.1994 (PJC, donated to NMS).

***Culex torrentium* Ficalbi**

This species was first recognised as British by Mattingly (1951), too late for inclusion in the Royal Entomological Society Handbook by the same author. It was, however, as indicated by Rees and Snow (1992) confirmed from museum specimens to have been present in Britain at

least since the beginning of this century. This is reinforced by the material in NMS, where there is a male from Burley-in-Wharfedale, Yorkshire, viii.1897 and the earliest Scottish specimen is from Maxwelltown, Dumfriesshire, ix.1900 (both collected by P.H. Grimshaw). Details of the Scottish records shown on the map by Snow *et al.* (1998) are included in the *British Mosquito Recording Scheme* database as follows (K.R. Snow, *pers. comm.*): Perthshire, Killin, Loch Tay, viii.1983 and Arran, Tormore, 18.ix.1988 (collectors not recorded and both apparently based on females). Other Scottish records are as follows (all based on dissected males):
Kirkcudbright, Crona, 27.ix.1979 and Kirkconnell Flowe, 29.ix.1979 (both A. Duncan); Renfrewshire, Kilbarchan, Old Manse, 22.viii.1946, F.J. Ramsay; Midlothian, Miltonbridge, suction trap, 20.ix.1951, 12.x.1951, 23.iv.1952, R.O. Darwish; Midlothian, Edinburgh, Inverkeith, 4 hatched from pupae, 26.vii.1921, W. Evans; East Lothian, Aberlady, viii.1936, R. Waterston (all above NMS); Perthshire, Weem Castle woods, 28.vii.1995 (PJC).

***Culex pipiens* Linnaeus**
The NMS material (dissected males) included material from all localities cited above for *C. torrentium* except Crona and Inverkeith. There were also specimens from Dunbartonshire, Bonhill; Argyll, Kintyre, Machrihanish (at a light trap) and Dumfriesshire, Tynron and Castlehill. Specimens determined by Isobel Baldwin (confirmed by A.M. Hutson) as the autogenous form *molestus* Forskål from Fife, Dunfermline are females and presumably determined on the basis of biological evidence, although this is not recorded on the specimens.

***Culex territans* Walker**
This is represented in NMS by a female from Inverness-shire, Kincraig, 31.v.1908, P.H. Grimshaw. This rarely recorded but widespread species was recorded in Scotland only from two adjacent 10km squares in the Highlands by Rees and Snow (1992), one of these referring to Logie, Elgin according to Cranston *et al.* (1987).

***Culiseta alaskaensis* (Ludlow)**
This is a mainly northern species and widely scattered Scottish records were cited by Cranston *et al.* (1987) and mapped by Rees and Snow (1994). Some extensions to its range are provided by NMS material, of which full details are cited below:
1 female, Dunbartonshire, Bonhill, 4.v.1907 and 1 male, same locality, 21.viii.1909, J.R. Malloch; 1 female, Midlothian, Edinburgh, Chambers Street, 30.ix.1909, P.H. Grimshaw; 1 female, Midlothian, Newington, ix.1912, Annandale; 1 female on horse, Fife, Kinshaldy, 5.vi.1949, J.D. Beaton; 3 females, Inverness-shire, Aviemore, 17.iv.1955, E.C. Pelham-Clinton; 1 female, Elgin, Gordonstoun, 19.v.1945 and 2 males, same locality, 10.vii.1949, R. Richter.

Acknowledgements

I am grateful to the authorities of the National Museums of Scotland for the opportunity to study their collections and to Keith Snow for information on *Culex torrentium* and other useful comments.

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***Thyridanthrax fenestratus* (Fallen) (Diptera, Bombyliidae) rediscovered in Berkshire** - *Thyridanthrax fenestratus* is a distinctive bee-fly, with wings marked with black patches. It is found on dry, sandy heaths and appears to be confined to the heathland areas of southern England. A distribution map for this species can be found in Drake (1991. *Provisional atlas of the Larger Brachycera (Diptera) of Britain and Ireland.* Biological Records Centre, Huntingdon).

On 6.viii.1998, whilst carrying out a survey for Bracknell Forest Borough Council, I found a single female of this species at Wildmoor Heath (SU 8462) near Crowthorne, Berkshire. This would appear to be only the second record for this species from Berkshire and the first since 1942. The larvae of this rare (RDB 3) species develop in the nest cells of sand wasps, *Ammophila* (Hymenoptera, Sphecidae), though it is not known whether they feed only on the wasp grub or also its food supply of paralysed caterpillars. However, J. Pontin (1961. *Entomologist's monthly Magazine* **97,** 26) obtained an adult male from an *Ammophila* pupa so it appears that feeding on the larva is certain, if not the caterpillars too.

Two species of *Ammophila* are known from Britain, *A. sabulosa* (Linnaeus) and *A. pubescens* (Curtis). Distribution maps for both species were given by M. Edwards (1997. *Provisional atlas of the aculeate Hymenoptera of Britain and Ireland. Part 1.* Biological Records Centre, Huntingdon). *A. sabulosa* is found throughout much of southern Britain while *A. pubescens* appears to be more restricted in distribution and confined to southern heathlands, though both species can occur together at suitable sites. It is not known which, if either, of these two species is the preferred host of *Thyridanthrax*; however, the distributions of *A. pubescens* and *Thyridanthrax* are so similar it would appear that *A. pubescens* is the main, or even the only host species. Both species of *Ammophila* have been recorded from Wildmoor Heath, though I only found *A. sabulosa* on my visits to the site. My thanks to Martin Drake, National Recording Scheme organiser for "Larger Brachycera", for providing details of *Thyridanthrax* records - **MATTHEW N. SMITH,** 24 Allnatt Avenue, Winnersh, Berks, RG41 5AU

Dipterists Digest 1998 **5**, 93-94

Notable Tipulidae (Diptera) from Surrey, North Hampshire and Essex

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***Tanyptera nigricornis* (Meigen).** The provisional distribution maps of *Tanyptera atrata* (Linnaeus) and *T. nigricornis* in Stubbs (1992) strongly suggest that these species may be allopatric. There appear to be only two areas (the Spey Valley, and North Merionethshire) where both species have been recorded from the same 10km squares. We can now add the Thursley area of Surrey (SU 94).

Denton (1997) reported the presence of *T. atrata* at several localities in Surrey and North Hampshire. However, one of these records made at Thursley must be corrected, as the specimen is in fact *T. nigricornis*, which was belatedly identified by Alan Stubbs in April 1998.

A further specimen collected by RF in 1992, has also proved to be *T. nigricornis*. This female had drowned in a pool of oil in a garage in Elstead, Surrey (SU 9142). On 20.v.1998 RF took a female *T. nigricornis* in Botany Bay Woods (SU 9834). It was flying near a stack of birch logs in a sunny glade, on clayey soil. On 21.v.98, JD also found a female at Mountain Wood, near W.Horsley (TQ 0950). It was crawling on the ground in a grassy glade running through deciduous woodland dominated by birch. The substrate was sandy and free draining.

These records of *T. nigricornis* appear to be the first for Surrey, although Jill Fry photographed a female which is almost certainly *T. nigricornis* on Thursley in 1976. The appearance of this large and spectacular fly at several sites on a variety of soils, in such a well worked county is remarkable. However, the differences in ecology between the *Tanyptera* species remains enigmatic.

***Ctenophora flaveolata* (Fabricius).** JD found a female of this RDB2 species at Mountain Wood, Surrey on 21.v.1998, in mature deciduous woodland with old beech. The previous Surrey records were both from the Sheepleas, about 1km to the north.

***Ctenophora pectinicornis* (Linnaeus).** JD caught a female of this notable species at Mountain Wood, on 21.vi.98, where it showed great interest in a parked car, repeatedly bumping into it and investigating the wheel arches and tyres!

***Prionocera pubescens* Loew.** On 11.vi.96, JD swept a male of this RDB2 cranefly from the carr bog area of Shortheath Common, North Hampshire (SU 7736). The "Schwingmoor" type habitat has open floating *Sphagnum* bog with cranberry *Vaccinium oxycoccus* (the largest population in Southern England (Francis Rose, *pers. comm.*)). Extensive areas of swampy carr with stands of sallow (*Salix* species) are also present. The commoner *P. turcica* (Fabricius) was abundant at this site in August 1998.

The previous records of *P. pubescens* from Southern England, were from Thursley Common NNR, over the border in Surrey.

***Tipula* (*Lunatipula*) *helvola* Loew.** JD swept a male of this Notable species, from rough grassland beneath old oak trees growing along a hedgerow at Grange Farm, Chigwell, Essex (TQ 4394) on 16.vii.98. There are no published records of this species from Essex, but Peter

Chandler (*pers. comm.*) found it on the BENHS field meeting at Thorndon Park on 30.vii.1989

***Tipula* (*Schummelia*) *verburyi* Edwards.** This notable cranefly was fairly abundant in shaded acidic carr woodland at Mint Lane, Liss Forest, North Hampshire (SU 7928) on 8. and 31.vii.1988 (JD).

Acknowledgements

I would like to thank Alan Stubbs and Peter Chandler for their help and advice.

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Two uncommon Tachinidae (Diptera) from Greater London -

Rondania fasciata (Macquart). Several were swept from ox-eye daisy *Leucanthemum vulgare* on 24.v.1998 at Surbiton Water Works, Surrey (TQ 1767). The site was a flower-rich open area on disturbed sandy soil, adjacent to the River Thames.

Medina separata (Meigen). I swept a single female from dry herb rich grassland growing on an old industrial site at Bittacy Hill, Middlesex (TQ 2391) on 11.ix.1998. Peter Chandler (*pers. comm.*) has also found a single female in a ride through Lord's Wood, Bromley, Kent (TQ 415665) on 26.v.1974. This species was only recently recognized as British (Ford, T.H. 1989. *Entomologist's monthly Magazine* **125,** 139-140) and may be identified using the keys and figures provided by R. Belshaw (1993. *Handbooks for the Identification of British Insects* **10**(4a(i)), 169 pp.), who cited only four confirmed British records. However, Belshaw suggested that two rearing records from ladybirds attributed to the more frequent *M. luctuosa* (Meigen) may refer to *M. separata*. The two species are very similar and it is likely that they have been confused in collections - **JONTY DENTON,** 26 Bow St., Alton, Hants, GU34 1NY

***Medina separata* (Meigen) (Diptera, Tachinidae) reared from *Calvia quattuordecimguttata* (Linnaeus) (Coleoptera, Coccinellidae)** - In view of the above note by Jonty Denton, it is of interest to report that a male of *Medina separata* (Meigen) emerged on 16.iii.1998 from an over-wintering adult of the ladybird *Calvia quattuordecimguttata* (Linnaeus), an apparently new host record. The beetle had been collected from holm oak (*Quercus ilex*) on 5.xii.1997 at Shirley, Surrey (TQ 3665) by A.J. Wren. Previous rearing records of this species are from adults of the beetle families Chrysomelidae and Coccinellidae, in the latter case involving the common species *Adalia decempunctata* (Linnaeus). I wish to thank Peter Chandler for determining the fly - **ROGER HAWKINS,** 30d Meadowcroft Close, Horley, Surrey RH6 9EL

Dipterists Digest 1998 **5**, 95

Pachycerina pulchra (Loew, 1850) (Diptera, Lauxaniidae), a species new to Fennoscandia

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The lauxaniid fly *Pachycerina pulchra* (Loew, 1850) is here recorded as new to Fennoscandia. One female was collected in a Barber trap located near Lake Svevatn in Kvam community, Hordaland province in Western Norway between 22 November 1997 and 23 April 1998. The locality is in a Scots pine (*Pinus sylvestris*) forest dominated by heather (*Calluna vulgaris*), bog bilberry (*Vaccinium uliginosum*) and purple moor-grass (*Molinia caerulea*) and described as shaded. Dr. László Papp, Budapest, Hungary has determined the specimen.

Pachycerina pulchra is a rare fly hitherto recorded from Germany, both in the western and eastern areas, Austria, Poland, Hungary (Papp 1984) and North Korea (Sasakawa and Kozánek 1995). *P. pulchra* is one of five species of the genus *Pachycerina* known from the Palaearctic (Shatalkin 1995, Sasakawa and Kozánek 1995). *P. pulchra* is a peculiar fly and rather different from three of the other Palaearctic species, i.e. *P. alpicola* Czerny, 1932, *P. ninae* Shatalkin, 1995 and *P. seticornis* (Fallén, 1820) which seem to be closely related. *P. pulchra* is closely related to *P. longistylata* Sasakawa and Kozánek, 1995; however, our female has the arista with white pubescence and the four rows of acrostichal setae typical of *P. pulchra*.

P. pulchra was described by Czerny (1932). The very long antennae, especially the third flagellomere, makes it look somewhat like a *Lauxania*. The face laterally above the mouth is bright yellow in contrast to the otherwise dark colour. *Pachycerina seticornis* (Fallén, 1820) is the only other member of the genus known from Fennoscandia and Denmark (Greve and Skartveit in press).

Acknowledgements

We are grateful to Dr. László Papp, Budapest, Hungary who determined the specimen. We are also grateful to Professor Dagfinn Moe for information on English plant names.

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Breeding habits and early stages of seven saproxylic acalypterates (Diptera)

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Saproxylic Diptera are those dependent on dead and decaying wood (Speight 1989). In relation to other saproxylic organisms, saproxylic Diptera are poorly known with basic data such as life histories and breeding sites lacking or poorly documented. Consequently studies of dead wood tend to neglect Diptera. Yet saproxylic Diptera are biodiverse with lineages in many families being involved, from tipulids to muscids. In Britain alone several hundred species are saproxylic, utilizing a wide range of life history strategies and feeding modes.

Over the past ten years the Malloch Society has been investigating saproxylic Diptera, particularly in Scotland. The emphasis has been on discovering breeding sites and rearing larvae. Some of the results are reported here. In this paper breeding sites and early stage descriptions are given for *Strongylophthalmyia ustulata* Zetterstedt (Strongylophthalmyiidae), *Neophyllomyza acyglossa* (Villeneuve) (Milichiidae), *Periscelis annulata* (Fallén) (Periscelidae) and two species each of *Chymomyza* Czerny and *Stegana* Meigen (Drosophilidae).

Strongylophthalmyia ustulata Zetterstedt (Strongylophthalmyiidae)

Puparium. Length 4.25mm; width 1.25mm; tapering anteriorly, truncate posteriorly, dark red-brown in colour and, in both specimens studied, somewhat dorsoventrally flattened (Fig. 1); anterior spiracles (Fig. 2) bifurcating from a pale basal projection, each arm bearing 7-8 spiracular facets; posterior spiracles (Fig. 3) borne on short fleshy projections; spiracular plates inclined and irregular in outline bearing two outer spiracular openings and one inner; ecdysial scar dorsal in position; anal segment with a large fold laterally and ventrally; anus apparently lacking surrounding setae or spicules; locomotory organs (Fig. 5) comprising interrupted rows of spicules, some rows more interrupted than others; head skeleton (Fig. 4) with mandible, intermediate sclerite and parasomal bar black and heavily sclerotised, more so than pharyngeal sclerite which is translucent; mandible with narrow, curved mouth-hook and rectangular-shaped mandibular sclerite; crescent-shaped dental sclerite present; intermediate sclerite broader at tip; parasomal bar narrow; pharyngeal sclerite with dorsal apodeme and ventral pharyngeal ridges.

Distinguishing features. The bifurcating anterior spiracles, irregular-shaped posterior spiracular plate which is borne on a short fleshy projection and lacks an apical hook and the anus not surrounded by spicules, appear to distinguish this species from other acalypterate larvae and puparia.

Material examined. Two puparia collected in thick, wet, decaying cambial layers under the bark of a small (about 18cm diameter) dead standing aspen (*Populus tremula*) snag (tree with the top broken off) on 10.vi.1998 at Dulsie Bridge, Inverness-shire; adult females emerged a few weeks later. Additional Malloch Society records include a female reared by G.E. Hancock on 21.vii.1990 at Dulicht Wood near Grantown, Inverness-shire from under bark of a fallen *P. tremula* and a male at the same site on 22.vii.1990, observed by R.M. Lyszkowski, emerging from the bark of a fallen *P. tremula*. Independently of the Malloch Society, adults were found by

I. Perry (*pers. comm.*) at Dulsie Bridge in 1991.

Previous knowledge. Early stages of *Strongylophthalmyia* have apparently not been described previously, although Krivosheina (1984) gave a few details. *Strongylophthalmyia ustulata* has been reared from under bark of *P. tremula* (Morge 1963; Krivosheina 1981) and adults have been found on fallen *P. tremula* in Finland (Frey 1935).

Neophyllomyza acyglossa (Villeneuve) (Milichiidae)

Puparium. Length 3mm; width 0.8mm; truncate posteriorly, tapering anteriorly, conspicuous folds at either end (Fig. 6); anterior spiracles with 3 facets (Fig. 7); posterior spiracles (Fig. 8) not mounted on basal projections but on inner margins of wedge-shaped constrictions at the tip of the end segment; 3 oval-shaped spiracular openings and 4 groups of interspiracular setae; ecdysial scar elongate and central in position; anus with spicules on anterior margin; locomotory organs (Fig. 10) comprising 2 main crescent-shaped rows of spicules with additional rows comprising smaller spicules; head skeleton (Fig. 11) translucent, pharyngeal sclerite little sclerotised; intermediate sclerite slightly darker and elongate, as long as pharyngeal sclerite; mandibular sclerite slightly darker still and small; ventral pharyngeal ridges apparently present but inconspicuous.

Distinguishing features. The form of the posterior spiracles and the elongate intermediate sclerite appear to distinguish this species.

Material examined. Nine adults reared from puparia found in moist soft decayed sapwood of fallen *Betula*: 7 puparia from Glen Strathfarrar, Wester Ross, 17.v.1997, 2 puparia from Struan, Perthshire, 9.v.1998. Additional Malloch Society records are 3 adults reared from puparia found in decayed sapwood of a fallen *Betula* at Balnabeggan, Perthshire, 9.v.1998; adults emerged 16-18.vi.1998.

Previous knowledge. The only previous rearing record appears to be from wet decayed sapwood of *Betula* in Russia (Kovalev 1976).

Periscelis annulata Fallén (Periscelidae)

Puparium. Length 3.8mm; width 1.3mm; truncate anteriorly and posteriorly, dorsoventrally flattened and not strongly sclerotised or contracted; all segments with fleshy projections anteriorly, laterally and ventrally, some bearing terminal and/or lateral setae; integument coated in spicules, micro-setae and coriaceous except on parts of the thorax; anterior spiracles (Fig. 11) with 4-6 facets; posterior spiracles borne on long (longer than other projections) fleshy projections at the tip of the end segment; spiracular plate small, less than half width of the base of the supporting fleshy projection, with 3 oval-shaped spiracular openings and 4 groups of broad inter-spiracular setae (Fig. 12); locomotory organs not developed separately from spicules and setae that coat the ventral surface; head and prothorax of mature larva with mouth directed downwards, oral ridges at side of mouth not developed and underside of lobes bearing antennomaxillary organs coated in strong setae; head skeleton (Fig. 13) black and heavily sclerotised except for posterior sections of pharyngeal sclerite; mandibles separate; mandibular sclerite rectangular in shape and not longer than mouth-hook, accessory teeth and dental sclerite apparently absent; intermediate sclerite broadening anteriorly and longer than mandibular

sclerite, in ventral view "H" shape symmetrical, i.e. projecting equally before and behind cross-strut; parasomal bar very elongate, longer than intermediate sclerite; pharyngeal sclerite with dorsal bridge and ventral pharyngeal ridges present.

Distinguishing features. The presence of fleshy projections on each segment, the absence of locomotory organs, the poorly developed oral ridges and head skeleton with parasomal bars longer than the intermediate sclerite distinguish this species.

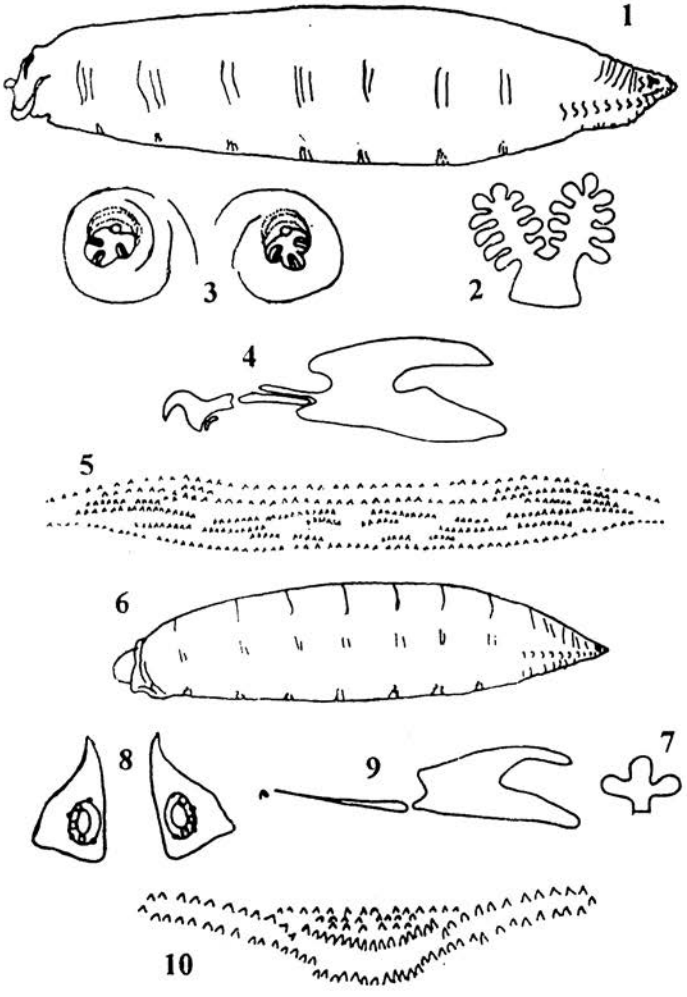
Material examined. One puparium and 3 larvae from a small sap-run on *Acer*, near the Eastern General Hospital, Leith, Edinburgh, 24.viii.1997; a male emerged from the puparium on 17.vi.1998. Additional records were 1 male, same data except emerged 15.vi.1998; 1 adult male on exposed sapwood of live *Fraxinus* tree, Leith Links, Edinburgh, 16.vii.1997; 2 adult males near small sap-run on *Acer*, Leith Links, Edinburgh, 3-6.viii.1997. This is a Notable species in Falk (1991).

Previous knowledge. Little descriptive detail is available for periscelid larvae and puparia. Teskey (1976) gave a few descriptive details of periscelid larvae and the larva of *P. annulata* was figured by Teskey (1981). These details were reproduced by Ferrar (1987) and Smith (1989). More recently, Papp (1995) also provided a description of the third instar larva of *P. annulata*.

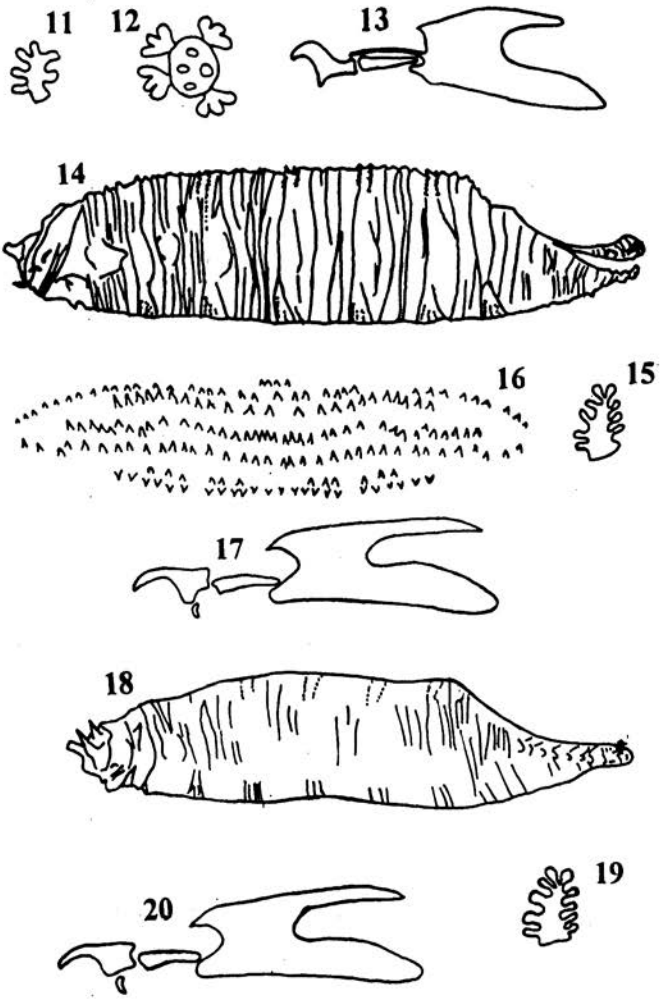
Chymomyza costata Zetterstedt (Drosophilidae)

Puparium. Length 3.5mm; width 0.75mm; truncate anteriorly and posteriorly with dorsum of thorax depressed and anal segment inclined and indented at base (Fig. 14); each segment with several transverse folds obscuring the segmental boundaries; anterior spiracles (Fig. 15) with 9-10 facets arranged round the sides of a taller than broad triangular-shaped felt chamber; posterior spiracles borne on sclerotised projections; spiracular plates kidney-shaped with 3 spiracular openings on the rim and the ecdysial scar dorsal in position; anal segment with 4 pairs of fleshy projections, 2nd and 3rd projections about as long or shorter than posterior breathing tubes; anus surrounded by spicules, 3 rows anteriorly and one row posteriorly with a larger medial spicule posteriorly; locomotory organs (Fig. 16) comprising 7 interrupted rows of spicules on abdominal segments 1-7; spicules of row 5 larger than others; posterodorsal margins of abdominal segments 2-6 with 1-2 interrupted rows of spicules; head skeleton (Fig. 17) black and heavily sclerotised; mandibles separate with narrow curved mouth-hooks and rectangular-shaped mandibular sclerites; dental sclerite not present; intermediate sclerite broader at tip; pharyngeal sclerite without dorsal apodeme; ventral pharyngeal ridges present.

Distinguishing features. The one-two rows of dorsal spicules on abdominal segments 2-6, the flattened dorsum of the thorax, the size and form of the projections on the end segment and the separated mandibles appear to distinguish the puparium of this species from other acalypterate puparia. The puparium can be separated from that of *C. fuscimana* by the 2nd and 3rd projections on the end segment being shorter than the projections bearing the posterior breathing organs and in having many transverse folds so that the puparium appears wrinkled and not smooth.



Figs 1-10, puparia of saproxylic acalypterates, 1-5, *Strongylophthalmyia ustulata*, Strongylophthalmyiidae: 1, puparium, lateral view, head to the right, length = 4.25mm; 2, anterior spiracle, posterior view, length = 0.19mm; 3, posterior spiracles, apical view, length = 0.23mm; 4, head skeleton, lateral view, length of pharyngeal sclerite to tip of parasomal bar = 0.33mm; 5, locomotory organ from 3rd abdominal segment, length = 0.2mm. 6-10, *Neophyllomyza acyglossa*, Milichiidae: 6, puparium, lateral view, head to the right, length = 3mm; 7, anterior spiracle, posterior view, length = 0.05mm; 8, posterior spiracles, apical view, length (of wedge-shape projection) = 0.2mm; 9, head skeleton, lateral view; length = 0.26mm; 10, locomotory organ from 3rd abdominal segment; length = 0.13mm.



Figs 11-20, puparia of saproxylic acalypterates, 11-13, *Periscelis annulata*, Periscelidae: 11, anterior spiracle, posterior view, length = 0.18mm; 12, posterior spiracle, apical view, length of fleshy projection to spiracular plate = 0.48mm; 13, head skeleton, lateral view, length = 0.25mm. 14-17, *Chymomyza costata*, Drosophilidae: 14, puparium, lateral view, head to the right, length = 3.5mm; 15, anterior spiracle, posterior view, length = 0.28mm; 16, locomotory organ from 3rd abdominal segment, length = 0.26mm; 17, head skeleton, lateral view, length = 0.54mm. 18-20, *Chymomyza fuscimana*, Drosophilidae: 18, puparium, lateral view, head to the right, length = 3mm; 19, anterior spiracle, posterior view, length = 0.25mm; 20, head skeleton, lateral view; length = 0.52mm.

Material examined. Five puparia found in decaying sap under bark of exotic conifer stump, May 1992, Twiglees Burn, Castle O'er Forest, near Eskdalemuir, Dumfriess-shire; 2 males and 3 females emerged by the end of May 1992. This is a Notable species in Falk (1991); however, we found it commonly under bark of *Picea* and *Pinus* stumps at 12 sites across Scotland from Dumfriess-shire to Easter Ross. Additionally a male and a female were taken on a bracket fungus on *Betula* on 20.vii.1997 at Struan, Perthshire.

Previous knowledge. Brief details of the head skeleton and puparium were given by Hackman *et. al.* (1970) from material reared in the laboratory obtained from field-caught adults. Burla (1995) referred to adults seen on a *Picea* stump.

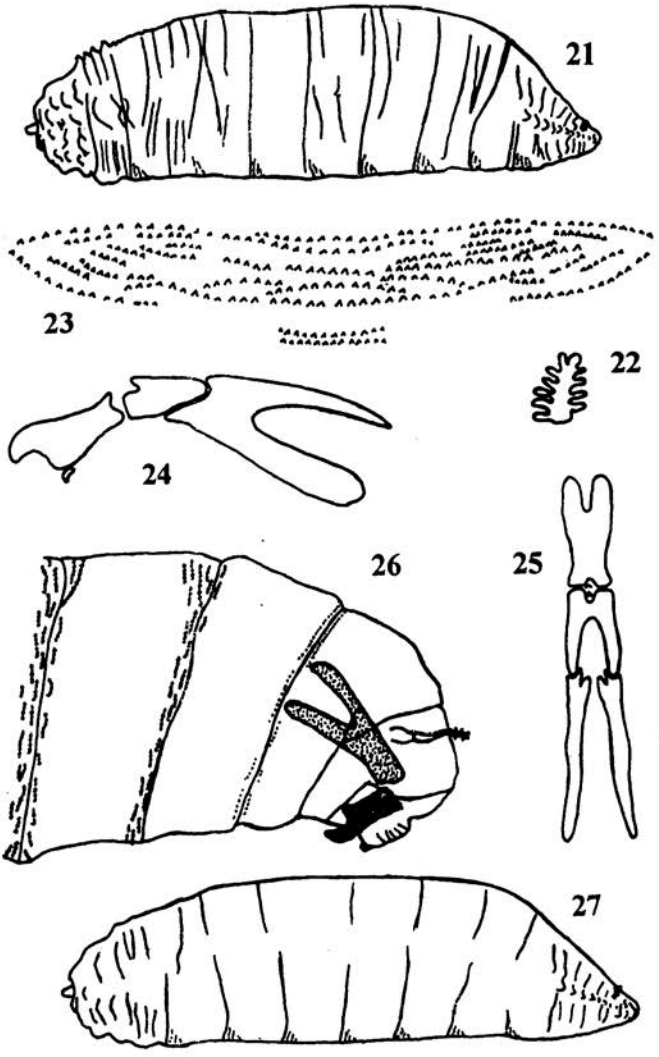
***Chymomyza fuscimana* Zetterstedt (Drosophilidae)**

Puparium. Length 3mm; width 0.6mm; truncate anteriorly and posteriorly with dorsum of thorax depressed, anal segment inclined and indented at base (Fig. 18); in the 3 specimens examined, anterior and posterior ends curved; integument mostly smooth with few transverse folds obscuring the segmental boundaries; anterior spiracles (Fig. 19) with 9-10 facets arranged round the sides of a taller than broad triangular-shaped felt chamber; posterior spiracles borne on sclerotised projections; spiracular plates kidney-shaped with black margins and 3 spiracular openings on the rim; ecdysial scar central in position; anal segment with 4 pairs of fleshy projections, 2nd and 3rd projections longer than posterior respiratory organs; anus surrounded by spicules, 3 rows anteriorly and one row posteriorly with a larger medial spicule posteriorly; locomotory organs comprising 6-7 interrupted rows of spicules on abdominal segments 1-7; spicules of rows 2 and 5 larger than others; posterodorsal margins of abdominal segments 2-6 with 2 interrupted rows of spicules; head skeleton (Fig. 20) black and heavily sclerotised; mandibles separate with narrow curved mouth-hook and rectangular-shaped mandibular sclerite; dental sclerite not present; intermediate sclerite broader at tip; pharyngeal sclerite without dorsal apodeme; ventral pharyngeal ridges present.

Distinguishing features. The one-two rows of dorsal spicules on abdominal segments 2-6, the flattened dorsum of the thorax, the size and form of the projections on the end segment and the separated mandibles appear to distinguish this species from other acalypterate larvae. The puparium can be separated from that of *C. costata* by the 2nd and 3rd projections on the end segment being longer than the projections bearing the posterior breathing organs and in being smoother without many transverse folds.

Material examined. Three puparia collected in decaying sap under bark of a *Populus* log, 17.viii.1996, Falls of Clyde, Lanarkshire, 1 male emerged 23.viii.1996, collected by D. Robertson.

Previous knowledge. Burla (1995) recorded *C. fuscimana* from *Fagus* and *Picea* in Switzerland.



Figs 21-27, *Stegana*, Drosophilidae, 21-26, *Stegana coleoptrata*: 21, puparium, lateral view, head to the right, length = 3.5mm; 22, anterior spiracle, posterior view, length = 0.34mm; 23, locomotory organ from the 3rd abdominal segment, length = 0.19mm; 24, head skeleton, lateral view, length = 0.43mm; 25, head skeleton, dorsal view; 26, thorax of mature larva, lateral view, height of metathorax = 1.1mm 27, *Stegana nigrothorax*, puparium, lateral view, head to the right, length = 3.5mm.

Puparium. Length 3.5mm; width 1mm; truncate posteriorly, tapering anteriorly and dorsum of thorax flattened (Fig. 21); thorax and abdominal segments 6-8 with numerous transverse folds obscuring the segmental boundaries; anterior spiracles (Fig. 22) with 10-12 facets arranged round the sides of a taller than broad triangular-shaped felt chamber; posterior spiracles borne on short, about as long as broad, projections, spiracular plates inclined and kidney-shaped with 3 transverse spiracular openings; locomotory organs (Fig. 23) consisting of numerous rows and bars of evenly-sized spicules; spicule band continuing on abdominal segments 1-4 to circumvent the segment; end segment with 4 pairs of short, about as long as broad, projections, one pair set back about halfway along the upper lateral margins of the segment, remaining 3 pairs around the tip; anterior margin of anus with spicule band; prothorax of mature larva with 2 pairs of lateral, angled folds along which the integument collapses when the segment contracts, mouth inclined downwards with mandibles characteristically at right angles to the intermediate sclerite, mouth-hooks protruding from mouth (Fig. 26); head skeleton (Fig. 24) with anterior part of the pharyngeal sclerite, intermediate sclerite and mandible black and heavily sclerotised; mandibles large (>half length and height of pharyngeal sclerite); mandibular sclerites fused and mouth-hooks thick and broad (Fig. 25); intermediate sclerite thick and broad in lateral view and abutting into the anterior part of the pharyngeal sclerite (Fig. 24); intermediate sclerite apparently fore-shortened with anterior section of the "H" much shorter than the posterior part (Fig. 25); parastomal bars either absent or fused to the intermediate sclerite.

Distinguishing features. The end segment with four pairs of projections, complete spicule bands on abdominal segments 1-4, taller than broad anterior spiracles, head skeleton with fused mandibular sclerites and short, thick intermediate sclerite abutting the intermediate sclerite distinguish *Stegana* from other acalypterate larvae. The puparium of *S. coleoptrata* appears to be separated from that of *S. nigrithorax* by having more transverse wrinkles and by the posterior breathing organs which have inclined spiracular plates in the former species. They are flattened in *S. nigrithorax*.

Material examined. Six larvae collected in dry, black, powdery fungi growing under the outer epidermis of bark lenticels of a fallen *Betula* tree, Balnagard, Perthshire, 20.iii.1997, 4 males and 2 females emerged in June 1997; 4 larvae collected in the same microhabitat under the outer epidermis of bark of a fallen *Betula* tree, Fungarth, near Dunkeld, Perthshire, 1.iv.1998, larvae preserved. The Malloch Society recorded this species from 5 additional sites in Midlothian, Perthshire, Angus and Inverness-shire. Rearing records were mostly from *Betula* but also included *Acer* and *P. tremula*. This species was given Notable status by Falk (1991).

Previous knowledge. The larva and puparium have been described by Morge (1956).

Stegana nigrithorax Strobl (Drosophilidae)

Puparium. Length 3.5mm; width 1mm; truncate posteriorly, tapering anteriorly and dorsum of thorax flattened (Fig. 27); thorax and end segment with transverse folds obscuring the segmental boundaries; anterior spiracles with 10-12 facets arranged round the sides of a taller than broad triangular-shaped felt chamber; posterior spiracles borne on short, about as long as broad, projections, spiracular plates flat and kidney-shaped with 3 transverse spiracular openings; locomotory organs consisting of numerous rows and bars of evenly-sized spicules; spicule band continuing on abdominal segments 1-4 to circumvent the segment; end segment with 4 pairs of short, about as long as broad, projections, one pair set back about halfway along the upper lateral margins of the segment, remaining 3 pairs around the tip; anterior margin of anus with spicule

band; head skeleton similar to *S. coleoptrata* with anterior part of the pharyngeal sclerite, intermediate sclerite and mandible black and heavily sclerotised; mandibular sclerites fused and mouth-hooks thick and broad; intermediate sclerite thick and broad in lateral view and abutting into the anterior part of the pharyngeal sclerite; intermediate sclerite apparently fore-shortened with anterior section of the "H" much shorter than the posterior part; parastomal bars either absent or fused to the intermediate sclerite.

Distinguishing features. The end segment with four pairs of projections, complete spicule bands on abdominal segments 1-4, taller than broad anterior spiracles, head skeleton with fused mandibular sclerites and short, thick intermediate sclerite abutting the intermediate sclerite distinguish *Stegana* from other acalypterate larvae. The puparium of *S. nigrithorax* appears to be separated from that of *S. coleoptrata* by having fewer transverse wrinkles and by the posterior breathing organs which have flattened spiracular plates in the former species. They are inclined in *S. coleoptrata*.

Material examined. Two puparia found in tunnels through the fungus, *Hypoxylon fragiforme* growing on *Fagus* bark, Burnham Beeches, Buckinghamshire, 22.iii.1998; 3 males and 5 females emerged later (collected by I. Sims). This is also given Notable status in Falk (1991).

Previous knowledge. Early stages apparently undescribed. Reared previously by P.A. Buxton and P.J. Chandler from the fungus *H. fragiforme* growing on *Fagus* bark (Chandler 1987).

Discussion

The seven species considered here develop in a range of saproxylic microhabitats from sap-runs on live trees (*P. annulata*), decaying sap under bark (*S. ustulata* and both *Chymomyza* species) and decaying sapwood (*N. acyglossa*). All these species appear to feed on micro-organisms involved in the decay of sap and sapwood. Rearing records from Scotland and Europe suggest that *S. ustulata* is particularly associated with *P. tremula*, *N. acyglossa* with *Betula* and *C. costata* confined to conifers. *Chymomyza fuscimana* uses a broader range of trees including both broad-leaved and coniferous species.

The *Stegana* species differ from the others considered here in feeding on fungi. *Stegana coleoptrata* appears to favour fungi associated with decaying *Betula* but we also reared it from *Acer* and *P. tremula*. *Stegana nigrithorax* appears to be confined to fungi on *Fagus*.

Considering the similarity of microhabitat in species feeding on micro-organisms, little evidence of convergence in larval morphology is apparent among the species considered here. All have specific morphologies in relation to respiratory, locomotory and gustatory organs. In particular all have widely varying head skeletons. These differences support the differing phylogenetic position of the species involved, in pointing to repeated, independent invasions of the saproxylic microhabitat.

Morphologically and biologically the *Stegana* species are particularly distinctive. Their elongate, inclined prothoraces, large broad mouth-hooks and fused mandibular sclerites facilitate gathering and scraping dry powdery food into the mouth. Indeed *S. coleoptrata* feeding tracks are conspicuous through the oval-shaped patches of fungal growth that characteristically occur round the lenticels under *Betula* bark. The encrusting fungus, *H. fragiforme* on *Fagus* which is food for *S. nigrithorax*, is similarly dry and powdery but characteristically forms bubble-like growths. In these circumstances, the morphology of the thorax and head skeleton probably facilitate tunnelling.

Other features are more difficult to explain. For example the elongate intermediate sclerite and tiny mandible of *N. acyglossa*. The larva of this species probably gathers micro-organisms from the surface of soft, decayed sapwood. Other acalypterates that apparently feed in a similar way are Clusiidae. The head skeletons of clusiids are similarly poorly sclerotised and have very reduced mandibles (GER, unpublished observations). This may be an example of convergence, although the functional significance of a poorly sclerotised and reduced head skeleton is unclear.

Pupariation of *S. ustulata* took place in the decaying sap. Puparia were coated with dried sap and were difficult to find. This is in contrast to lonchaeids and other acalypterates occurring under *P. tremula* bark. Pupariation in these groups tends to occur close to cracks in the bark or loose bark resulting in aggregations; puparia are not coated in dry sap. Pupariation in *S. ustulata* may be part of an evolved response to avoid aggregations of other puparia and so escape predation and parasitism. The advantage of pupariating close to cracks in the bark is that it facilitates escape from the breeding site by the adult. The form of the adult *S. ustulata* is remarkable for its narrow, elongate shape. The wings are also narrow and the legs are long. Such a shape may facilitate movement through decaying sap and emergence from the development site. Indeed, R. Lyszkowski observed an adult emerging from a narrow crack in *P. tremula* bark. Puparia of *N. acyglossa* were also found dispersed throughout decayed sapwood suggesting that they too, do not move to places where adults can readily emerge. However, emergence may not be such a problem for *N. acyglossa* as decayed sapwood is relatively loose.

Larvae and puparia of *C. costata* were often abundant in decaying sap of recently felled conifer stumps where the bark is loose near the cut surface but firmly attached lower down. Larvae were usually found low down and puparia higher up suggesting movement towards looser areas which, again, facilitates escape by the adult. Puparia of *S. coleoptrata* were found on the black areas of fungal growth surrounding bark lenticels. Adults possibly lay eggs through the lenticels and the subsequent generation escapes through them. Larvae feed throughout winter.

We rarely found either adults or larvae of *P. annulata* until late in our survey. However, we did not search many small sap-runs, which may be preferred by this species.

Strongylophthalmyia ustulata is fairly widespread across northern Europe but is apparently rare (Krivosheina 1984). In Britain it was first recorded from suction trap samples at Monks Wood NNR, Cambridgeshire in 1971-2 (Cole 1981). With no other records, it was given a RDB 1 (endangered) status in Shirt (1987) and Falk (1991). The records detailed here extend the British distribution of this species to include Scotland and confirm the breeding site as wet decaying cambial layers under bark of aspen, *P. tremula*.

The position of *Strongylophthalmyia* has been uncertain. Previously it was included within the Psilidae but Hennig (1958) considered it a separate family with affinities to the Tanypezidae. Some authors treat it as a subfamily of Tanypezidae (see Ferrar 1987). By comparing the puparium of *S. ustulata* with the description and figures of *Tanypeza longimana* Fallén in Foote (1970) and psilids in Ferrar (1987), it appears that *S. ustulata* is most similar to *T. longimana*. Both species share a similar head skeleton and both have bifurcating anterior spiracles and posterior spiracles borne on short fleshy projections. In psilids, the pharyngeal sclerites of the head skeletons are longer and narrower and the intermediate sclerites are shorter and broader than those of *T. longimana* and *S. ustulata*. In addition psilids apparently have hook-like apical projections associated with the posterior breathing organs. Such projections are absent in *T. longimana* and *S. ustulata*. *Tanypeza longimana* and *S. ustulata* may be separated from each other by the shape of the posterior spiracular plate, which is irregular in outline in *S. ustulata* but apparently has a smooth outline in *T. longimana* (Foote 1970).

Acknowledgements

We are particularly grateful to Peter Chandler for determining *N. acyglossa* and for passing on to us puparia of *S. nigrithorax* (kindly passed to him by Ian Sims) and for general help and information. We are also grateful to Ivan Perry for sharing his data with us and to the contributions made to the saproxylic project by other members of the Malloch Society, of which the present study is a part. We are pleased to acknowledge the financial assistance provided by Scottish Natural Heritage and the Worldwide Fund for Nature for the Malloch Society Project on saproxylic Diptera.

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Inland records for *Chetostoma curvinerve* Rondani (Diptera, Tephritidae) - The distribution of *Chetostoma curvinerve* Rondani was summarised by L. Clemons (1997. A provisional atlas of the Tephritidae (Diptera) of Britain and Ireland. *British Tephritidae Newsletter* No. **6,** 42 pp. Dipterists Forum). The map he provided emphasised the extreme southern distribution with records from south coastal counties from Devon to Sussex, apart from two inland sites in Surrey and West Sussex. As indicated by Clemons, the records from six of the seven British sites listed in his text were made from 1973 to 1988, with only one old record from Devon prior to this period. These six sites were those listed as post 1960 by S. Falk (1991. A review of the scarce and threatened flies of Britain (Part 1). *Research and survey in nature conservation.* **No. 39.** Peterborough, Nature Conservancy Council) who revised the status of the fly from RDB1 to RDB2.

According to Laurence Clemons (*pers. comm.*) the differences between the map and data given in the text are due to the omission of the White Beech, Surrey record from the map (grid square uncertain) and the inclusion on the map of a record from Chichester, 5.ii.1989 reported by P. Grainger (1990. *British Tephritidae Newsletter* **5,** 1). In this note, Peter Grainger indicated that the fly had been found indoors at his parents' home and thought that it could have been imported, although he also noted that the weather was warm and sunny on the day of capture.

More recently, one female of this species has been recorded from Covert Wood, near Canterbury, Kent (TR 182494), 1.v.1997 (L. Clemons. 1998. Diptera Report 1997. *Bulletin of the Kent Field Club* **43,** 73-76). This example was found on twigs of low-growing beech (*Fagus sylvatica*) (Clemons, *pers. comm.*).

C. curvinerve was first confirmed as British by A.E. Stubbs (1975. *Proceedings of the British entomological and natural history Society* **1975,** 103-105), who found it in a formal garden in Sussex in 1973. Some more recent records are also from gardens and the possibility that this distinctive species may have become established recently due to association with a garden plant cannot be excluded.

A record from Yorkshire in an account of picture-winged flies of the northern counties (Coldwell, J.D., Ely, W.A. and Whiteley, D. 1996. *Sorby Record* **32,** 20-26) is considerably further north than all other records but was apparently erroneous (W. Ely, *pers. comm.*).

The life history of *C. curvinerve* remains unknown. Recent key works to the Tephritidae have drawn attention to the recorded biology of two other Palaearctic species of *Chetostoma* species, i.e. *C. continuans* Zia from fruit of a honeysuckle (*Lonicera* species) in Russia and *C. stackelbergi* (Rohdendorf), recorded in western Europe as a brood parasite in galls of the sawfly *Hoplocampoides xylostei* (Giraud) (Hymenoptera, Tenthredinidae) on *Lonicera xylosteum*. It is thus possible that *C. curvinerve* is associated with *Lonicera*, which may explain a predilection for gardens but there is no evidence as yet for such an association. However, according to L. Clemons (*pers. comm.*) there are records of tropical species of the genus developing as cambium miners in woody plants so this cannot be ruled out as a possible alternative biology of *C. curvinerve* in the absence of evidence to the contrary.

This species appears to have had a good year in 1998, with four new records all further north than the previously recorded distribution. Two of these were exhibited at the BENHS Exhibition, including the first Welsh record from Clyne Park, Swansea, Glamorgan (SS 613912), 18.viii. (collected by Bryan Formstone). The fly was wing waving on *Rhododendron* foliage and the site is a large woodland garden, specialising in rhododendrons and azaleas; in places the woodland is very wet with a stream and flushes (B. Formstone, *pers. comm.*). The other exhibit was the northernmost confirmed English record from Kingwood Common, Oxfordshire, 21.vi., a site in the Chiltern Hills comprising woodland with remnant heath (collected by Martin Harvey); the precise habitat was sparse woodland with brambles (*Rubus fruticosus*) (M. Harvey, *pers. comm.*). These records further extend the recorded British flight period, which was given by Clemons as February to April and October and extended to May by his subsequent Kent record.

On 22.iv.1998 at Burnham Beeches, Buckinghamshire, I swept a female of *C. curvinerve* from foliage of holly (*Ilex aquifolium*) in a sparsely vegetated area under mature beeches (*Fagus sylvatica*) near the stream south of Middle Lake (SU 949845). This fits in with the pattern of most previous records, which are mainly early or late in the year and this is evidently one of the tephritids which passes the winter as an adult and probably migrates away from its breeding sites in the autumn, then returning in the spring. A similar pattern is found with the scathophagid *Norellia spinipes* Meigen, which develops in garden or naturalised daffodils (*Narcissus* species) but migrates into woodland in the autumn.

The fourth record was of a female found dead between double glazing of his lounge at Maidenhead, Berkshire in mid vii.1998 by Bernard Verdcourt; the specimen has been donated to the BENHS collection. *Lonicera* is well established in the garden but subsequent investigation of the plant failed to locate any potential development site for the fly (Verdcourt, *pers. comm.*). This specimen was clearly of garden origin and a similar origin for some of the other 1998 specimens cannot be excluded.

These occurrences suggest that this species may now be widespread in the south of Britain. Occurrence primarily in gardens may explain the apparently sporadic finds and the absence of any clear habitat associations for specimens found away from gardens. It appears that the range of *C. curvinerve* is increasing, although whether this is due to climatic factors or to new introductions in plant material is not known. Investigation of garden *Lonicera* or related plants may assist in elucidating the biological requirements of this species.

I am grateful to the collectors cited above for enabling me to include details of their records and to Laurence Clemons for drawing my attention to other recently published records and for useful discussion on the distribution and biology of *C. curvinerve* - **PETER J. CHANDLER,** 43 Eastfield Road, Burnham, Slough, Berks SL1 7EL

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