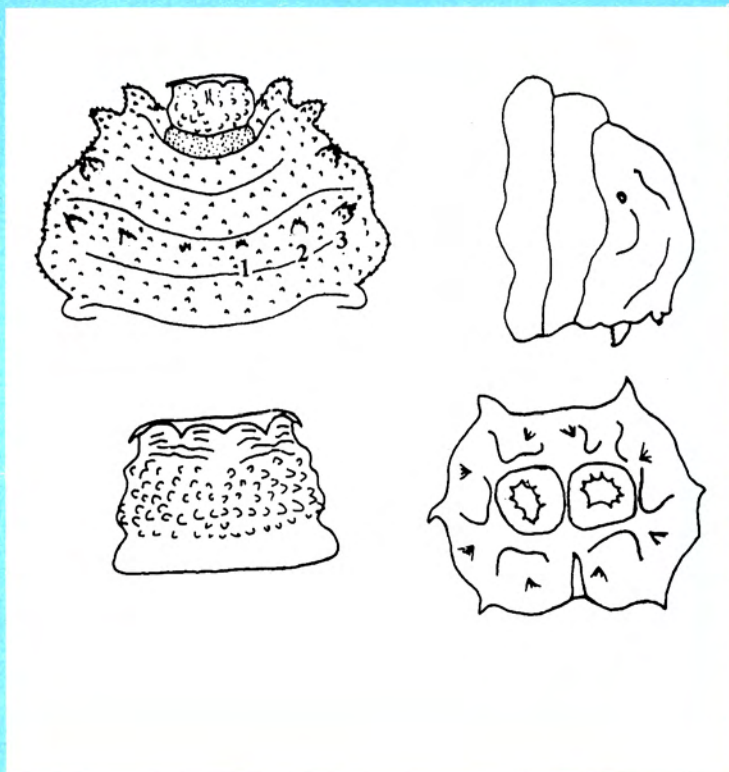


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Editor

Peter J. Chandler, 43 Eastfield Road,
Burnham, Slough, Berks. SL1 7EL

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- 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.;
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A Review of Diptera from exposed riverine sediments based on literature records

ANDREW GODFREY

90 Bence Lane, Darton, Barnsley, South Yorkshire S75 5DA

Summary

A literature search on Diptera associated with exposed riverine sand and shingle has been conducted. A list of British species recorded from this habitat is provided including 48 RDB and 40 Nationally Scarce species and includes comments by Alan Stubbs on habitats and allegiance to exposed riverine sediments. The families most associated with this habitat are discussed.

Introduction

In recent years the importance of exposed riverine sediments as an invertebrate habitat has been increasingly recognised. This has resulted in increased survey work and research on the invertebrates associated with this habitat. More effort has gone into study of the Coleoptera (see for example Fowles 1989, Eyre and Lott 1997, Hering and Plachter 1997, Smit *et al.* 1997) although attention has been focusing more recently on some of the other groups such as the Diptera and Araneae. A reasonable amount of work has also been done on aquatic invertebrates occurring in riverine sediments over the last few decades although, apart from some specialist studies (for example Ladle 1971, Gledhill 1982), much of this has been overlooked in Britain. Despite this research and survey work, little has been published on Diptera although an account is in preparation by G.E. Rotheray. Much of the existing information on Diptera is scattered through journals, recording scheme newsletters and unpublished reports. This article presents data based on a partial search of the literature. The aim is to indicate which species might be associated with exposed riverine sediments (ERS) and in so doing recognise species of concern and give an indication of the literature available on the subject. It is acknowledged that many (most?) of the species discussed in this paper are not restricted to ERS and may be equally or more characteristic of associated habitats such as upland streams, lowland rivers, riffles or riverbanks, but it is becoming clear that ERS may support diverse Diptera assemblages, often including rare or uncommon species and therefore an inventory of the species they support may prove useful. The paper may also set the scene for future papers on the author's own recording on ERS both in Britain and France.

Definition of exposed riverine sediments (ERS)

A variety of terms are in use for the habitats covered in this paper. Entomologists have tended to refer to coarse exposed river sediment as shingle and finer sediment as sand. More recently the term "exposed riverine sediments" (ERS) has been used (Eyre and Lott 1997). Geomorphologists refer to the features formed by these as point bars, side bars or mid-channel bars, depending on their position in the channel. A different terminology has been developed by freshwater biologists who often refer to interstitial gravels or riverine deposits. Freshwater biologists have paid particular interest to interstitial deposits because they allow sampling of the flowing water habitat sandwiched between a channel and groundwater (the hyporheic zone) as well as easy sampling of the groundwater fauna itself since this is often very near the surface. The small pore spaces between individual particles, darkness and generally decreasing oxygen levels with depth have led to the evolution of peculiar forms of oligochaetes, Hydracarina and

Malacostraca in particular (Williams 1984, Ward and Voeltz 1994).

Geomorphological setting

ERS are deposited by running water where flow decreases and they can no longer be carried within the body of water. The classic example is on the inside of meanders on lowland rivers where point bars may form but they may also form where there is a sudden change in gradient. In extreme cases, anastomosing or braided streams result (the best example in Britain probably being the Feshie Fan, Inverness-shire) but the more normal product is a mid-channel bar. Bars on the inside of meanders tend to be fairly stable but mid-channel or lateral bars on upland rivers and streams can be mobile, gradually moving downstream. A typical bar will have coarse material at the upstream end with finer material towards the downstream end.

On natural watercourses in Britain, particularly in the north and west, high rainfall in winter increases river capacity and flow resulting in spate conditions that scour the deposits, often removing vegetation and organic matter that has accumulated over the year. This scouring action is vital in ensuring the infertility of the sediments and preventing succession to scrub. Whilst material is removed, clearly new sediment is continually being transported and deposited from upstream as well as seeds that might germinate and produce plants to replace those lost by scouring. Unfortunately, with river regulation to control winter flooding and to ensure a continuous water supply, many rivers that might normally be subject to spates or winter flooding have been controlled with the result that ERS deposits come under threat from build-up of organic matter and scrub encroachment.

Literature consulted

Kirby (1994) allocated habitats to Red Data Book and Nationally Scarce invertebrates. He mentioned a total of five Diptera from "Freshwater river shingle", 11 from "Freshwater river sand" and three from "Freshwater river bare mud/silt". Kirby (*ibid.*) based his assessments of Diptera on Falk (1991) which only covered Tipulidae and related families, "Larger Brachycera", Syrphidae, Conopidae, Tephritidae and Sciomyzidae. Eyre and Lott (1997) carried out a desk study specifically on invertebrates associated with ERS and listed 43 Diptera, 441 Coleoptera, 57 Araneae and 7 Hemiptera associated with this habitat. Their list was based partly on a literature search and partly on consultations. They attempted to assess how closely associated species are with ERS and ascribed low, middle and high fidelity to species for this purpose. The degree of fidelity of many Diptera listed is not given, because of lack of information.

The most useful publications on ERS focusing specifically on Diptera rather than all insects are those of Stubbs (1991) and Rotheray and Robertson (1993). The former is a survey and assessment of the terrestrial fauna of several sites in Upper Strathspey threatened by flood alleviation measures. A number of shingle sites including the Feshie Fan, as well as marshes and adjoining habitats, were sampled and evaluated in terms of their Diptera in particular. The cranefly families, "Larger Brachycera" and Syrphidae were particularly well covered. Rotheray and Robertson (1993) presented the results of Diptera surveys also carried out in the Upper Strathspey area and identified a total of 405 species from a variety of riparian and other wetland habitats including river shingle. In their report Aviemore is the only location where ERS alone was sampled; the Feshie Shingle, Newtonmore and Nethy Bridge sites include grassland, scrub and open water. Because some of the Diptera will have been collected in habitats other than the shingle, only the Aviemore records are given in the Appendix.

Ingram studied the freshwater invertebrates of two shingle banks in North Yorkshire (Ingram 1994). Her records of Diptera are of larvae identified to genus level only. Falk and Crossley (1994 draft) is useful for the Empidoidea associated with shingle. Howe (1998) recorded the results of the Dipterists' Field Meeting based at Abergavenny in 1997; many records

are given in this for exposed sand and shingle on the Monnow, Usk and Wye. The papers by Chandler, Chvála, Crossley, Drake, MacGowan, Stubbs and Wood cited below are amongst those most relevant to particular species or groups.

A limited search of European and North American literature has also been made, since these include useful references to ERS and include species or genera found in Britain. Mention of non-British species or genera is made in the text but the list of species in the Appendix is confined to British species.

Results

A list of RDB, Nationally Scarce and Local (these terms are defined in Ball 1994) species recorded in literature from ERS is given in the Appendix. A number of species considered to be of interest by the author and given Unknown status as used by JNCC in the biological recording software Recorder and two species recently added to the British list and consequently without status, are also listed. Species considered to be 'tourists' (i.e. passing through the habitat) are excluded. It should be borne in mind that the list includes species restricted to ERS as well as species which are much more catholic in their choice of habitats. A summary of the Red Data Book (RDB), Nationally Scarce and Local species most characteristic of exposed river deposits is given in the Table below and the families most frequently encountered are described in more detail.

FAMILY	RDB1	RDB2	RDB3	RDB K and I	NAT. SCARCE	LOCAL
Tipulidae		3	1		2	4
Pediciidae			1		3	2
Limoniidae	1	5	4	1	7	17
Athericidae						1
Rhagionidae		1				1
Tabanidae					1	
Stratiomyidae		2			1	
Therevidae			5			1
Asilidae			1			
Hybotidae			4	2	5	5
Empididae	1		2		10	20
Dolichopodidae			3		5	9
Lonchopteridae					2	
Ephydriidae	1	1				
Scathophagidae	1		1		1	
Muscidae			1		2	4
Others	1	1	1		2	8
TOTAL	5	13	24	3	41	72

The statuses in the Table and Appendix are taken from the latest copy of Recorder (version 3.21b) and most were defined in Ball (1994). The category 'Others' in the Table includes other families with just one RDB, Nationally Scarce or Local species recorded from river shingle.

TIPULIDAE

Details of the ecology, status and distribution of species of *Nephrotoma* and *Tipula* species associated with shingle are provided in several publications (Falk 1991, Stubbs 1992, Kirby 1994, Eyre and Lott 1997). Stubbs (1991) recorded three *Nephrotoma* and nine *Tipula* species from the Feshie Fan including *Nephrotoma aculeata* (Loew) which is the only post-1930s site for

this species (Stubbs *pers. comm.*) and *Tipula laetabilis* Zetterstedt. Rotheray and Robertson (1993) recorded further species from Speyside localities but several of these may have been taken from adjoining grassland, scrub, riverside meadow or open water (e.g. *Nephrotoma appendiculata* (Pierre), recorded by them, is a grassland species).

Nephrotoma submaculosa Edwards was recorded on grass-covered shingle beside the River Tees (Coulson 1959) (this species is typical of sand shoals/sand on shingle in parts of Wales, North England and Scotland, Stubbs *pers. comm.*). The larvae of an unidentified *Tipula* species were found in shingle by the River Swale in North Yorkshire (Ingram 1994). *Tipula nodicornis* Meigen, *Nephrotoma dorsalis* (Fabricius) and *N. analis* (Schummel) have been recorded from Ballinluig Shingle Island and *N. submaculosa* from both Ballinluig Shingle Island and the nearby Tomdachoille Island on the River Tummel (Ball and Morris 1992). *Tipula nodicornis* is only known from sand shoals and coastal dunes, whilst *Nephrotoma analis* and *N. dorsalis* occur on sand shoals of rivers and sandy river banks more generally, also moderately sized sandy streams (Stubbs *pers. comm.*). Several species were found on sandy sections of the Monnow, Usk and Wye in 1997 including *Nephrotoma dorsalis* and *N. lunulicornis* (Schummel) (Howe 1998). *Tipula montium* Egger is a local species of rivers and lake ERS (Stubbs 1991 and *pers. comm.*).

PEDICIIDAE

Two genera are found on exposed riverine deposits, namely *Pedicia* and *Dicranota*, both of which have aquatic larvae. The latter includes one RDB species (*Dicranota simulans* Lackschewitz) and three Nationally Scarce species. The larvae of *Dicranota* have been recorded from river gravels (Ingram 1994, Ward and Voeltz 1994). Records of Pediciidae from ERS may be found in Coulson (1959), Falk (1991), Stubbs (1991), Rotheray and Robertson (1993), Kirby (1994), Eyre and Lott (1997) and Howe (1998).

LIMONIIDAE

Amongst the most useful references on this family is Stubbs (1991), who recorded fifteen species for the Feshie Fan including the RDB species *Dicranomyia omissinervis* (de Meijere), *Rhabdomastix laeta* (Loew) and *Symplecta meigeni* (Zetterstedt), all of which are regarded as sand species by Stubbs (*pers. comm.*). Also useful is Rotheray and Robertson (1993), who recorded nine species including two RDB species *Rhabdomastix laeta* and *R. inclinata* Edwards from this and other Feshie/Spey shingle sites. *R. inclinata* is regarded as a shingle species by Stubbs (*pers. comm.*). Falk (1991) provided details of twelve RDB or Nationally Scarce species found or possibly associated with sand or shingle whilst Eyre and Lott (1997) listed eleven species from ERS and suggested that the fidelity of all but one is high.

Several species were found recently on sandy sections of the Monnow, Usk and Wye including the following RDB species: *Symplecta pusilla* (Schiner), *Erioptera limbata* Loew, *Arctocnopa melampodia* (Loew), *Dicranomyia omissinervis*, *Rhabdomastix laeta* and *Scleroprocta pentagonalis* (Loew) (Howe 1998). The last mentioned may not be an ERS species and is usually associated with tiny streams.

The larvae of *Hoplolabis areolata* (Siebke) mentioned by Cuthbertson (1929) occur on ERS or sandy river edges; the other species listed by this author from sand or gravel at river edges are not considered relevant. *Hoplolabis areolata* is mainly southern whilst *H. vicina* (Tonnoir) is northern and western (Stubbs *pers. comm.*). The larvae of *Eloeophila verralli* (Bergroth) live in sand at the edges of streams (quoted in Kidd and Brindle 1959) whilst several other *Eloeophila* such as *E. apicata* (Loew) and *E. mundata* (Loew) have a poor affinity with ERS. Ingram (1994) recorded the larvae of *Antocha vitripennis* (Meigen) from river gravels in North Yorkshire.

Both *Hexatoma* species provide good examples of ERS species (e.g. Coe 1950, Brindle 1960). *H. bicolor* occurs in upland areas, often on faster flowing shingle whilst *H. fuscipennis* is more widespread on slower flowing sand, although both often occur on the same stretch of river in the north (Stubbs pers. comm.). *Gonomyia edwardsi* Lackschewitz and *Molophilus undulatus* Tonnoir are also characteristic ERS species (Stubbs pers. comm.).

CERATOPOGONIDAE

Amongst the Ceratopogonidae, a *Dasyhelea mutabilis* group species was found in large numbers in the capillary fringe of a sandy-bottomed Kansas river but was scarcely present in the main channel (Goldhammer and Ferrington 1992). Several ceratopogonid taxa were also recorded by Ward and Voeltz (1994), whilst reasonable numbers of larvae were also found by Ingram (1994).

CHIRONOMIDAE

Armitage *et al.* (1994) note that unstable sandy substrates associated with large rivers are avoided by most species with exceptions in the orthoclad genus *Rheosmittia* and the genera within the *Harnischia* group including *Beckidia*, *Chernovskiiia*, *Cyphomella* and *Robackia*. These authors also suggested that the larvae of some species that are extremely difficult to locate, may occur in the hyporheic zone. Pennak and Ward (1986) and Ward and Voeltz (1994) listed taxa recorded from interstitial gravels on the South Platte River, Colorado. Most of the species recorded in the former study were considered to be typical stream-dwelling species although *Krenosmittia* was thought to be a species whose larvae are adapted to living in the gravels beneath the river bed (see also Ferrington 1984). Hudson (1987) also mentioned *Krenosmittia* as well as *Lopescladius* and *Anaphrotenia* as occurring in the hyporheic zone. Williams (1984) discussed the importance of chironomids in this zone.

Goldhammer and Ferrington (1992) recorded species taken in emergence traps from the capillary fringe of sand-bottomed rivers in a Kansas river. The species *Paratendipes subaequalis* (Malloch) was virtually restricted to this zone rather than in the open stream habitat. Ingram (1994) recorded large numbers of chironomid larvae from river gravels in North Yorkshire.

Chironomids form an important part of the diet of ground beetles of the genus *Bembidion*, several of which are rare and characteristic of exposed river deposits (Hering and Plachter 1997). They may also form an important food item for predatory aquatic Diptera larvae such as Pediciidae, Athericidae and some Tabanidae.

ATHERICIDAE

The aquatic larva of *Atherix ibis* (Fabricius) is a reasonably well-known inhabitant of coarse sediment in fast-flowing streams and rivers and is perhaps more familiar to freshwater biologists than dipterists (Thomas 1997 provides a good review of this and other species). Adults can occur very regularly on ERS (e.g. Howe 1998 and personal observation). Larvae of *Atherix ibis* have been taken in aquatic samples on the Monnow at four sites, whilst *Ibisia marginata* (Fabricius) only occurred in the most downstream sample (Wright *et al.* 1992). Ingram (1994) recorded *Atherix* larvae in coarse shingle on the River Swale whilst the present author has reared *Atherix ibis* from a pupa found at shallow depth in the ERS by the River Severn at Dolydd Hafren Nature Reserve in 1994.

RHAGIONIDAE

Chrysopilus erythrophthalmus Loew has been swept from habitat considered suitable for *Lonchoptera nigrociliata* Duda (see below), which comprised bare stones in near shade (Drake and Chandler 1997). It was subsequently taken from the Monnow at Maerdy where there are extensive ERS (Howe 1998). Most records are from fast-flowing upland streams often in

woodland and the fully aquatic predatory larvae have been recorded from fast-flowing streams in France (Thomas 1978, 1997). The extent of utilization of ERS by larvae or adults is therefore unclear.

TABANIDAE

The full grown larvae and pupae of *Tabanus cordiger* have been found in river shingle in Wales (Rivers Usk and Afon Rheidol) (Stubbs 1998b and *pers. comm.*). It is assumed that the larvae are aquatic or subaquatic. The present author has taken unidentified *Tabanus* larvae in shallow water on the River Tees, by kick-sampling below eroding ERS at Egglestone Bridge, Co. Durham, whilst *Chrysops* larvae are known to develop in wet silt or sand by the side of rivers (Smith 1989, Eyre and Lott 1997).

STRATIOMYIDAE

Oxycera terminata Meigen, is often associated with ERS and is usually on stones at the water margin. On the River Monnow it is found on shaded sandy river banks (Drake 1991, Howe 1998). Falk (1991) suggested that this species may develop in moss, sand or shingle beside streams.

THEREVIDAE

This family has a number of rare or uncommon representatives on ERS and associated habitats (Falk 1991, Kirby 1994, Eyre and Lott 1997).

Spiriverpa humulata (Zetterstedt) is characteristic of this habitat (Drake 1991, Kirby 1994). Published records are from sand, gravel, shingle and stony ground and from a number of upland rivers, often with extensive ERS, including the Rivers Bollin and Etherow (both in Cheshire), Feshie, Monnow, Afon Rheidol, Rother (West Sussex), Rye (North Yorkshire), Spey, Twyi, Tyne and Usk (Verrall 1909, Wood 1913a, Collin 1948, Taylor 1953, Morgan 1990, Stubbs 1991, Drake 1992, Rotheray and Robinson 1993, Howe 1998).

Chorismia rustica (Panzer) has been bred from a pupa taken from a sandy river bank on the River Bollin, Cheshire by Peter Skidmore (Chandler 1975). Rivers from which it is recorded include the Rother (Chandler 1975), Irthing (Hodge 1987) and the Monnow (Howe 1998). Drake (1991) mentioned that *C. rustica* prefers partially shaded sandy banks.

The other species associated with this habitat according to the literature are *Acrosathe annulata* (Fabricius), *Thereva handlirschi* Kröber, *T. inornata* Verrall and *T. valida* Loew. In reviewing this paper, Alan Stubbs has suggested the latter three have unknown ecology but are not associated with ERS.

ASILIDAE

Rhadiurgus variabilis (Zetterstedt) is a well-known inhabitant of river shingle in Scotland (Stubbs 1991, Kirby 1994). Both Colonel J.W. Yerbury and C.G. Lamb found it on stones on bare ground at Speyside locations; it is not clear if these are along rivers or inland (Verrall 1909) (Peter Chandler has recorded it on rocks by the River Dee, *pers. comm.*). Falk (1991) stated that the habitat is usually shingle banks of upland rivers and to a lesser extent sandy glades in Caledonian pine forest. It is regarded as having a close association with ERS by Eyre and Lott (1997).

HYBOTIDAE

The Hybotidae represent one of the more important families associated with river gravels. Falk and Crossley (1994 draft) provided details of several species recorded from shingle. Three genera are particularly important, namely *Chersodromia*, *Tachydromia* and *Platypalpus*.

Chersodromia alata (Walker) is the only species of this genus found inland in Britain. Drake (1987a) reported it from the upper tidal part of the River Wampool in Cumbria where they were running on sparsely vegetated silty-sand. Prior to this record the few records were from coastal sites with the exception of Loch Leven, where they were found on the sandy loch shore (Nelson 1983). Chvála (1975, 1995) stated that it is found on sandy shores of rivers and lakes inland and described a new species *Chersodromia fluviatilis* from a dry stony river-bed in Slovenia (Chvála 1995).

Several species of *Tachydromia* are clearly closely associated with ERS. *Tachydromia acklandi* was described from specimens taken on the inland sand dunes at Dorback Burn (Chvála 1973). Haliday took *Tachydromia halidayi* (Collin) among shingle in the bed of the River Dodder near Dublin and this is the only Irish record of Diptera from ERS encountered by me (Collin 1961, Chandler 1978). Other rivers additional to the ones given in the above references from which *Tachydromia* species have been taken include the Feshie/Spey (Rotheray and Robertson 1993), Monnow (Howe 1998), Swale (Crossley 1992) and Wharfe (Crossley 1986). The non-British *Tachydromia rhyacophila* was described from a dry stony river-bed from Slovenia (Chvála 1995) and *T. sabulosa* from sandy banks along large rivers (Chvála 1975).

Platypalpus species are mentioned by several workers (Rotheray and Robertson 1993; Crossley 1986, 1992, 1995; Falk and Crossley 1994 draft; Howe 1998). *Platypalpus luteolus* (Collin), *P. melancholicus* (Collin) and *P. subtilis* (Collin) appear to show some affinity with ERS (personal observation).

Leptopeza borealis Zetterstedt (RDB3) was recorded from the River Wharfe at Otley (Crossley 1986) but has been omitted from the Appendix because it develops in dead wood.

EMPIDIDAE

Two groups are particularly important here, namely *Hilara* species and members of the subfamily Hemerodromiinae, although there are also records of *Empis* and *Rhamphomyia* species. Falk and Crossley (1994 draft) provided details of several species associated with sand or shingle. Three of these were also listed by Eyre and Lott (1997), but their association with ERS is given as unknown.

In Scotland Rotheray and Robertson (1993) recorded over 40 species from Speyside localities, the most significant being *Hilara abdominalis* Zetterstedt, *H. germanica* Engel, *H. lugubris* (Zetterstedt) (all Nationally Scarce) and *Wiedemannia phantasma* (Mik) (RDB3). Colonel Yerbury noted *Wiedemannia phantasma* skimming over the water and resting on boulders and on sandy patches at the edge of the Spey (Collin 1961). *Heleodromia irwini* was described from specimens taken on bare shingle and sand at the stream margin on the Dorback Burn (although a small stream it is subject to major spates) and from a stony river at the Bridge of Brown (Wagner 1985). MacGowan (1997) found sheltered shingles and stones to be the preferred area for *Hilara setosa* Collin in the Tay system and neighbouring rivers in Perthshire. He mentioned *H. beckeri* Strobl, *H. canescens* Zetterstedt, *H. chorica* (Fallén) and *H. nigrina* (Fallén) associated with *H. setosa*.

Crossley (1986) found several species from the River Wharfe at Otley which comprises shingle bars, namely *Hilara albiventris* von Roser, *H. apta* Collin, *H. biseta* Collin, *Chelifera aperticauda* Collin, *C. concinnicauda* Collin, *Hemerodromia unilineata* Zetterstedt and *H. baetica* Collin. He also recorded *Empis aestiva* Loew, *Hilara chorica* (Fallén), *Hemerodromia unilineata* and *Wiedemannia bistigma* (Curtis) by sweeping shingle at Billy Bank Wood on the River Swale in North Yorkshire (Crossley 1992).

Wood (1913a) recorded *Hilara albiventris* from "shingle beds and deposits of sand" on the Monnow. Perry (1986) swept *Clinocera wesmaeli* (Macquart) from the margins of the

Monnow, especially over wet shingle. Several *Hilara* species and hemerodromiines were taken from sandy sections of the Monnow, Usk and Wye in 1997 (Howe 1998).

DOLICHOPODIDAE

The Dolichopodidae are another family with several often rare or uncommon representatives on ERS or associated habitat.

Rotheray and Robertson (1993) recorded almost thirty species from Speyside shingle localities, including *Dolichopus argyrotarsis* Wahlberg, *Rhaphium gravipes* Haliday and *R. lanceolatum* Loew. MacGowan (1998) recorded *Dolichopus longicornis* Stannius as characteristic of river shingles and *Rhaphium fractum* Loew and *R. gravipes* as associated with this habitat in Scotland.

Wood (1913b) recorded *Rhaphium rivale* (Loew), *R. riparium* (Meigen) and *R. penicillatum* Loew from shingly reaches of the Monnow. It is not clear whether *Rhaphium fractum* and *Campsicnemus marginatus* Loew, mentioned in the same paper and taken on the Monnow and *Rhaphium nasutum* (Fallén) on the Wye are from shingle stretches. Wood (1913a) recorded *Rhaphium rivale* from "shingle beds and deposits of sand". Perry (1986) swept the following from "especially wet shingle" on the margins of the Monnow: *Rhaphium penicillatum*, *R. riparium*, *Argyra atriceps* Loew, *Campsicnemus marginatus* and *Syntormon macula* Parent. A number of dolichopodids were swept from sandy sections of the Monnow in 1997 including *Diaphorus hoffmanseggii* Meigen (otherwise only known from the Monnow at the turn of the century) and *Sciapus basilicus* Meuffels and Grootaert, which was new to Britain from here (Cole 1998, Howe 1998). Other interesting species included *Melanostolus melancholicus* (Loew), *Rhaphium penicillatum* and *Syntormon macula* (Howe 1998).

Crossley (1986) recorded several species from the River Wharfe at Otley, namely *Rhaphium fractum*, *R. nasutum* (Fallén), *R. rivale*, *Campsicnemus marginatus*, *Teuchophorus calcaratus* (Macquart) and *T. monacanthus* Loew. He also recorded *Dolichopus griseipennis* Stannius, *Medetera truncorum* Meigen, *Chrysotus gramineus* (Fallén) and *Campsicnemus marginatus* by sweeping shingle at Billy Bank Wood on the River Swale in North Yorkshire (Crossley 1992). In their national review of Empidoidea, Falk and Crossley (1994 draft) recorded three species from a range of water-side habitats including shingle, namely *Rhaphium fractum*, *R. gravipes* and *R. patulum* (Raddatz).

Kidd and Brindle (1959) recorded *Rhaphium crassipes* (Meigen) as common amongst low vegetation near water or running on sandy margins of the streams in Lancashire. Drake recorded *Campsicnemus marginatus* on the banks of two large stony rivers (Eden and Eamont) with shingle beaches and tall bankside vegetation (Drake 1987b).

PHORIDAE

Megaselia rivalis (Wood) was swept over bare shingle on the Monnow (Wood 1909). It is still only known from these specimens.

LONCHOPTERIDAE

Larvae of *Lonchoptera nigrociliata* Duda develop on river shingle (Drake 1996). This author found large numbers of adults and larvae on the stony shores of Shropshire streams. The larvae were found under dry or slightly moist stones. Another record of this species on ERS is provided by Richards (1939). *Lonchoptera mejerei* Collin was swept from vegetated river sand and shingle on the River Usk and from the Monnow (Howe 1998).

SYRPHIDAE

Over 60 species of Syrphidae have been recorded from ERS or associated habitat (e.g. Rotheray and Robertson 1993, Howe 1998). Whilst this is a large number in comparison with some of the other families very few, if any, species seem to be characteristic of this habitat. The mobility of members of this family and the fact that they may be visiting flowers on this habitat, probably accounts for many of the records. Amongst the species recorded from ERS but not considered to be a regular part of the fauna of this habitat and therefore not added to the list in the Appendix are *Chalcosyrphus eunotus* (Loew), *C. nemorum* (Fabricius), *Chrysotoxum bicinctum* (Linnaeus), *Xylota florum* (Fabricius) and *X. tarda* Meigen. In Scotland, *Xanthogramma pedissequum* (Harris) mainly occurs on river shingle at the northern end of its range (Dr G.E. Rotheray pers. comm. to A.E. Stubbs).

MICROPEZIDAE

Cnodacophora stylifera (Loew) is only known from river and stream margins with shingle banks and a rich sedge and alder carr community. Records are confined to the Spey Valley and Perthshire.

LAUXANIIDAE

Homoneura limnea (Becker) is only known from the Monnow valley and from two coastal dune systems in Wales. It may be associated with sandy banks on the Monnow, where it was rediscovered in 1998 (Howe 1998).

SPHAEROCERIDAE

Members of this family can be extremely abundant on river shingle, particularly on the wet sediment by the water's edge but very few have been recorded from this habitat. Pitkin (1988) stated that *Leptocera cryptochaeta* (Duda) has been taken from a gravel bar on a woodland stream, whilst *Leptocera lutosa* (Stenhammar), *Pseudocollinella humida* (Haliday) and *P. septentrionalis* (Stenhammar) were taken from shingly stretches of the Monnow (Howe 1998).

EPHYDRIDAE

The Ephydriidae represent one of the most abundant families associated with ERS (and other riparian habitats). Representatives of several genera may be encountered including *Scatella*, *Scatophila*, *Parydra*, *Hydrellia*, *Ditrichophora* and *Diclasioipa*. Howe (1998) listed several species taken on sandy stretches of the River Monnow.

At least three rare species are known from this habitat. *Athyroglossa ordinata* Becker was recorded from two coastal sites in Cornwall where, in the past, freshwater streams ran over dunes or beaches and a site in Herefordshire. *Ochthera schembrii* Rondani is only known from between 1904 and 1908 at Padstow where a freshwater stream entered the sea over a sandy substrate; because of its dubious connection with ERS it has been excluded from the Appendix. *Scatella obsoleta* Loew has been recorded from river shingle on the Spey and Tay in the Scottish Highlands. Goldhammer and Ferrington (1994) noted the presence of several species in the capillary fringe of a sandy-bottomed Kansas river.

SCATHOPHAGIDAE

Several of the records from ERS for this family appear to refer to specimens taken from wetland vegetation growing on ERS or along sheltered backwaters or inlets. For this reason, records of *Cordilura* have not been added to the Appendix. For example, Stubbs (1991) recorded *Cordilura picticornis* Loew from *Carex* on the Feshie Fan and *Cosmetopus dentimanus* (Zetterstedt) (RDB1) was taken on sandy sections of the Monnow in 1997 (Howe 1998), although this species

may be regarded as a river bank species because the two previous sites are chalk streams and it belongs to a group with predatory aquatic larvae. Similarly, Rotheray and Robertson (1993) recorded *Acanthocnema glaucescens* (Loew) and *Cordilura atrata* Zetterstedt from the Feshie Shingle, but the latter is normally associated with stands of marginal vegetation. *Acanthocnema glaucescens* was also taken from sandy sections of the Monnow in 1997 (Howe 1998). *Acanthocnema nigrimana* (Zetterstedt) occurs on shingle but no published record has been found.

ANTHOMYIIDAE

Alliopsis sitiens (Collin) inhabits shingle banks along the Spey and its tributaries and is only known from a few localities in the Spey Valley. There are several records of *Myopina myopina* (Fallén) from sand and shingle (Wood 1913a, Ball and Morris 1992, Rotheray and Robertson 1993).

MUSCIDAE

Coenosia stigmatica Wood (pRDB3) was swept from the Monnow amongst "a varied growth of mugwort, viper's bugloss, *Senecio*, butter-bur and other plants on one of its sandy deposits" (Wood 1913c).

Examples of other muscids found on ERS were given by Rotheray and Robertson (1993) and Howe (1998). No muscids appear to be restricted to ERS although several riparian or wetland species may be encountered.

River-associated representatives of many other Diptera families may be found in the literature, but none appear to include species considered at present to be restricted to ERS.

Discussion

The aim of this paper is to indicate the species recorded from ERS in the literature. Space limits treatment of all species encountered so attention is focused on Red Data Book, Nationally Scarce and Local species. Lack of work on groups such as the acalypterates and calypterates also limits the evaluation of these groups. Some families, e.g. Ephydriidae and Sphaeroceridae, will undoubtedly be shown to more important than is currently recognised and may include specialist species limited to this habitat. There is enough evidence in the literature to show that some Diptera favour sand (e.g. *Symplecta pusilla*, *Hexatoma* species, *Spiriverpa lunulata* and *Clorismia rustica*), whilst others favour shingle (e.g. *Tachydromia* species). Partly submerged stones by the river's edge may support *Clinocera*, *Wiedemannia* or *Limnophora*.

The differences in fauna between vegetated, part-vegetated and bare shingle are considerable, but this is not clear from the literature and requires systematic survey work. For example partly-vegetated or vegetated ERS can be rich in acalypterates, especially those families (e.g. tephritids, chloropids and lauxaniids) that feed on plants or decaying plant matter. The often flower-rich nature of ERS explains the abundance of syrphids and other flower-visitors, many of which must be regarded as casual visitors. On ERS covered with *Petasites* may be found some of the species that utilise this plant (*Limonia ornata*, *Beris morrisii* Dale and possibly *Phaonia zugmayeriae* Schnabl). Stands of emergent vegetation on ERS or along backwaters often support the species usually associated with these, such as *Cheilotrichia imbuta* and *Cordilura* species.

There are also considerable differences between dry ERS and those that are wet (i.e. the capillary fringe of Goldhammer and Ferrington 1992). The bare dry areas are often favoured by stenothermic species that may be found elsewhere on habitats lacking soil, or with only thin soils, such as asilids, therevids and *Paragus haemorrhous* whilst vast clouds of ephydriids and sphaerocerids with smaller numbers of dolichopodids, *Themira* (Sepsidae) and *Lispe* (Muscidae) may be encountered on the wet sediment by the river's edge. The presence of vertical banks for

nesting, bare ground that warms up quickly and abundance of flowers on ERS favour solitary bees and wasps and may result in records of their dipterous parasites. A small number of the specialised or rare species found on ERS occur on lake shore sediments (e.g. *Chersodromia alata*, *Tachydromia* species) or in gravel pits (e.g. *Chersodromia alata*, *Tachydromia terricola* Zetterstedt and *Melanostolus melancholicus*).

Surveys of ERS will produce many common species but this is also the case with Coleoptera (Eyre and Lott 1997). Some Diptera mentioned in this paper are commonly encountered in riffles as larvae (e.g. *Antocha vitripennis*, *Dicranota*, *Atherix*) and the adults of these recorded on ERS may have equally come from larvae in riffles or elsewhere in the channel as opposed to the submerged parts of ERS.

Many early records exist for the Monnow, Spey and other rivers to a lesser degree and a large number of these records probably refer to those from ERS (Pont 1995 referred to species described by G.H. Verrall and J.E. Collin as new to science including some collected by Colonel J.W. Yerbury in the Aviemore area and Dr J.H. Wood, who provided many of the early Monnow records). These records are excluded from this account because they could refer to other riparian habitats. Colonel Yerbury's collecting on the Spey and Dorback Burn at the turn of the century is an example. His notebooks state that he swept *Carex* and other marginal vegetation but he must also have swept the more open sediment by the river and the Dorback Burn (Yerbury undated).

It is not the purpose of this paper to explain the reasons why ERS is important to Diptera, the processes responsible for creating and maintaining valuable ERS habitat nor the threats to it, although allusion has been made to some of these. It is clear, however, that ERS is of value to Diptera and this is summarised in the Table provided above. Diptera studies have so far tended to concentrate on the terrestrial aspect of ERS, but the habitat is also known to be of considerable value for its unusual aquatic invertebrate fauna, which has been recognised on the Continent (extensive studies on the Danube, Rhône and Rhine for example) and in North America. It is likely that Diptera play an important role in the submerged parts of ERS and it is possible that there may be species (e.g. of chironomids and ceratopogonids) with specialised larvae adapted to living in the pore spaces between particles. Unfortunately, this is a fragile habitat which is easily damaged or disrupted and many sites are threatened. The threats to ERS were covered by Eyre and Lott (1997) and it is notable that several of the studies referred to in this paper were undertaken in response to threats or referred to these: for example, river pollution (Fowles 1989, Ingram 1994), gravel extraction (Ingram 1994) and river regulation (Stubbs 1991).

Conclusions

A large number of Diptera have been recorded from ERS despite the piecemeal nature of the recording. Whilst it is clear that sampling records many common riparian or wetland species, or species even more catholic in their choice of habitats, a large number of species are rare or local with a high proportion restricted to this specialised habitat. The more important families recognised to date are listed in the Table and studies on the Diptera of ERS should seek to sample these at least. Further work is needed on other families, particularly the acalyptrates and calyptrates and on differences in fauna between different particle sizes, degree of wetness and the extent of vegetation.

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APPENDIX: List of uncommon Diptera recorded from exposed river sediments

Numbers in the second column refer to source of the data. Records from sites with ERS and other riparian habitats, but for which the records do not specifically state ERS have generally not been added to the list, except if this is the only published record. Alan Stubbs (AES) has added comments on many species based on his knowledge and experience, which have been given in the end column. The list covers British species only and those with RDB, Nationally Scarce or Local status.

SPECIES	SOURCE OF RECORD	JNCC STATUS	COMMENTS (by AES)
Tipulidae			
<i>Nephrotoma aculeata</i> (Loew)	1,2,12,13,30	pRDB2	only ERS
<i>Nephrotoma analis</i> (Schummel)	28,57,30	Local	weak allegiance
<i>Nephrotoma dorsalis</i> (Fabricius)	1,2,12,13,24,28,30,33,57	Nat. Scarce	moderate allegiance
<i>Nephrotoma guestfalica</i> Westhoff	12,30,33	Local	terrestrial and river edge sand

<i>Nephrotoma lunulicornis</i> (Schummel)	1,2,12,13,24,30,33	Nat. Scarce	only ERS
<i>Nephrotoma submaculosa</i> Edwards	12,24,28,30,36	Local	ERS sand and coastal dunes
<i>Tipula bistilata</i> Lundström	1,2,12,13,24,30	RDB2	shaded ERS sand
<i>Tipula couckeii</i> Tonnoir	12,24,30,33	Local	rivers and lakes
<i>Tipula laetabilis</i> Zetterstedt	2,12,13,24,30	RDB2	shaded sand, including river banks
<i>Tipula nodicornis</i> Meigen	1,12,13,28,30	RDB3	ERS sand and coastal dunes
Pediciidae			
<i>Dicranota gracilipes</i> Wahlgren	24	Nat. Scarce	mainly stony rivers
<i>Dicranota guerini</i> Zetterstedt	3,13	Nat. Scarce	strong allegiance
<i>Dicranota robusta</i> Lundström	1,2,9,13,30	Nat. Scarce	strong allegiance
<i>Dicranota simulans</i> Lackschewitz	2,13,30	RDB3	strong ERS
<i>Dicranota subtilis</i> Loew	?36	Local	good allegiance
<i>Pedicia littoralis</i> (Meigen)	24	Local	small streams only
Limoniidae			
<i>Arctoconopa melampodia</i> (Loew)	1,2,13,24,28,30	pRDB2	sand ERS and sand landlips
<i>Cheilotrichia imbuta</i> (Meigen)	24	Nat. Scarce	weak allegiance, usually on emergent plants
<i>Erioptera flavata</i> (Westhoff)	24	Local	very weak allegiance <i>Carex</i> edge of rivers, etc.
<i>Erioptera limbata</i> Loew	2,13,30	RDB2	sand ERS
<i>Erioptera verralli</i> Edwards	2	RDB3	small wooded streams only
<i>Gonomyia edwardsi</i> Lackschewitz	2,13	pRDBK	strong allegiance
<i>Idiocera punctata</i> (Edwards)	2,13,30	RDB2	?ERS, streams
<i>Hoplotabix areolata</i> (Siebke)	56	Local	lowland
<i>Hoplotabix vicina</i> (Tonnoir)	24,33	Local	upland
<i>Molophilus crassipygus</i> de Meijere	24	Local	shaded streams/rivers
<i>Molophilus curvatus</i> Tonnoir	57	Local	small sandy stream edges
<i>Molophilus propinquus</i> (Egger)	1,2,13,30	Nat. Scarce	ERS and other wet sand
<i>Molophilus pusillus</i> Edwards	24	Local	sandy river and stream margins
<i>Molophilus undulatus</i> Tonnoir	(AES pers. comm.)	Local	sandy river and stream margins
<i>Ormosia lineata</i> (Meigen)	56	Local	small streams
<i>Ormosia pseudosimilis</i> (Lundström)	24	Local	terrestrial
<i>Rhabdomastix edwardsi</i> Tjeder	24,30,33,35	Local	shingle ERS
<i>Rhabdomastix inclinata</i> Edwards	2	pRDB2	strong allegiance
<i>Rhabdomastix laeta</i> (Loew)	1,2,3,13,30,36	RDB3	sand ERS
<i>Rhypholophus haemorrhoidalis</i> (Zetterstedt)	24	Local	terrestrial

<i>Scleroprocta pentagonalis</i> (Loew)	33	RDB3	shaded streams
<i>Symplecta hybrida</i> (Meigen)	33	Local	very weak
<i>Symplecta meigeni</i> (Zetterstedt)	1,2,13,24,30	RDB3	strong allegiance, <i>Carex</i> edges of rivers/ox bows
<i>Symplecta pusilla</i> (Schiner)	2,13,30,33,55	RDB1	sand ERS
<i>Eloeophila apicata</i> (Loew)	2,28	Nat. Scarce	rivers but not major shoals
<i>Eloeophila mundata</i> (Loew)	2	Nat. Scarce	rivers but not major shoals
<i>Eloeophila trimaculata</i> (Zetterstedt)	13	Nat. Scarce	rivers but not major shoals
<i>Eloeophila verralli</i> (Bergroth)	13,24,54	Nat. Scarce	rivers but not major shoals
<i>Hexatoma bicolor</i> (Meigen)	24,31	Local	strong allegiance, northern
<i>Hexatoma fuscipennis</i> (Curtis)	24,31,35	Local	strong allegiance
<i>Limnophila schranki</i> Oosterbroek	?33	Local	rivers but not major shoals
<i>Antocha vitripennis</i> (Meigen)	4,33	Local	rivers, but may not need ERS
<i>Dicranomyia didyma</i> (Meigen)	?33	Local	can occur on ERS
<i>Dicranomyia omissinervis</i> de Meijere	2,13,23,24,30,33,55	RDB2	ERS only
<i>Dicranomyia ornata</i> (Meigen)	?33	Nat. Scarce	<i>Petasis</i> on ERS
Athericidae			
<i>Atherix ibis</i> (Fabricius)	4,8,33,54	Local	sandy rivers, prefers ERS stretches
<i>Ibisia marginata</i> (Fabricius)	(AES pers. comm.)	Unknown	stony rivers, prefers ERS stretches
Rhagionidae			
<i>Chrysopilus erythrophthalmus</i> Loew	7,33	RDB2	?ERS
<i>Rhagio notatus</i> (Meigen)	33	Local	most sites are ERS
Tabanidae			
<i>Tabanus cordiger</i> Meigen	22,?33	Nat. Scarce	river ERS, but also small streams
Stratiomyidae			
<i>Oxycera analis</i> Meigen	27	RDB2	strong dependence on stream sediment, partly exposed
<i>Oxycera morrisii</i> Curtis	(AES pers. comm.)	Nat. Scarce	minor allegiance
<i>Oxycera terminata</i> Meigen	13,14,33	RDB2	larvae on small stones at river edge
Therevidae			
<i>Acrosathe annulata</i> (Fabricius)	?3	Local	strong allegiance
<i>Clorismia rustica</i> (Panzer)	1,2,18,29,33,53	RDB3	strong allegiance
<i>Spiriverpa lunulata</i> (Zetterstedt)	1,2,8,13,14,18,24,26, 27,30,32,33,43,51,52	RDB3	strong allegiance
<i>Thereva handlirschi</i> Kröber	1,2,13	RDB3	ecology unknown

<i>Thereva inornata</i> Verrall	1,2	RDB3	ecology unknown
<i>Thereva valida</i> Loew	2,13,	RDB3	ecology unknown
Asilidae			
<i>Rhadiurgus variabilis</i> (Zetterstedt)	1,2,13,14,24,32	pRDB3	weak allegiance, larval location unclear, but adults sometimes on ERS
Hybotidae			
<i>Chersodromia alata</i> (Walker)	2,16,30,39,45,49	pRDB3	
<i>Drapetis ephippiata</i> (Fallén)	33	Local	
<i>Platypalpus albifacies</i> Collin	33	Local	
<i>Platypalpus cothurnatus</i> Macquart	33	Local	
<i>Platypalpus cryptospina</i> (Frey)	33	Nat. Scarce	
<i>Platypalpus ecalceatus</i> (Zetterstedt)	3	Nat. Scarce	
<i>Platypalpus interstinctus</i> (Collin)	33	Local	
<i>Platypalpus luteolus</i> (Collin)	11	Nat. Scarce	
<i>Platypalpus melancholicus</i> (Collin)	33	pRDB3	
<i>Platypalpus niger</i> (Meigen)	33	Local	
<i>Platypalpus pallidicornis</i> (Collin)	33	Local	
<i>Platypalpus subtilis</i> (Collin)	8,11,34,41	Nat. Scarce	
<i>Tachydromia acklandi</i> Chvála	2,33,49	pRDB3	
<i>Tachydromia connexa</i> Meigen	33,49	pRDBK	
<i>Tachydromia costalis</i> (von Roser)	33	pRDB3	
<i>Tachydromia halidayi</i> (Collin)	2,33,34,38,44,49	Nat. Scarce	
<i>Tachydromia woodi</i> (Collin)	2,11,49	RDB1	
Empididae			
<i>Clinocera wesmaeli</i> (Macquart)	10	Local	
<i>Dolichocephala oblongoguttata</i> (Dale)	33	Local	
<i>Wiedemannia bistigma</i> (Curtis)	24,33,34	Local	
<i>Wiedemannia phantasma</i> (Mik)	2,24,44,49	pRDB3	
<i>Wiedemannia insularis</i> Collin	3	Local	
<i>Empis picipes</i> Meigen	3	Local	
<i>Hilara albiventris</i> von Roser	11,43	Nat. Scarce	
<i>Hilara anglo-danica</i> Lundbeck	33	Local	
<i>Hilara apta</i> Collin	11	Local	
<i>Hilara biseta</i> Collin	11	Nat. Scarce	
<i>Hilara clypeata</i> Meigen	33	Local	
<i>Hilara lurida</i> (Fallén)	33	Local	
<i>Hilara nigrina</i> (Fallén)	15	Local	
<i>Hilara nitidula</i> Zetterstedt	3	Local	
<i>Hilara obscura</i> Meigen	33	Local	
<i>Hilara pseudochorica</i> Strobl	8,33	Nat. Scarce	
<i>Hilara recedens</i> Walker	33	Nat. Scarce	
<i>Hilara setosa</i> Collin	15	pRDB3	
<i>Hilara sturmi</i> Meigen	33	Local	
<i>Hilara thoracica</i> Macquart	33	Local	
<i>Rhamphomyia anomalipennis</i> Meigen	3	Local	
<i>Rhamphomyia geniculata</i> Meigen	3	Local	
<i>Rhamphomyia hybotina</i> Zetterstedt	33	Local	
<i>Rhamphomyia micropyga</i> Collin	3	Nat. Scarce	
<i>Rhamphomyia sulcatina</i> Collin	3	Nat. Scarce	

<i>Rhamphomyia umbripennis</i> Meigen	3	Local	
<i>Chelifera aperticauda</i> Collin	11	Nat. Scarce	
<i>Chelifera concinnicauda</i> Collin	11	Nat. Scarce	
<i>Chelifera monostigma</i> (Meigen)	24,25	Nat. Scarce	
<i>Hemerodromia baetica</i> Collin	11	Local	
<i>Hemerodromia laudatoria</i> Collin	2,49	Nat. Scarce	
<i>Hemerodromia unilineata</i> Zetterstedt	11,34	Local	
<i>Heleodromia irwini</i> Wagner	2,42,49	pRDB1	
Microphoridae			
<i>Microphor anomalus</i> (Meigen)	33	Local	
Dolichopodidae			
<i>Argyra atriceps</i> Loew	10,33	Local	
<i>Melanostolus melancholicus</i> (Loew)	33	pRDB3	
<i>Dolichopus acuticornis</i> Wiedemann	33	Local	
<i>Dolichopus argyrotarsis</i> Wahlberg	33	Nat. Scarce	
<i>Dolichopus longicornis</i> Stannius	21	Local	
<i>Sybiotoma crinipes</i> Staeger	33	Local	
<i>Hydrophorus litoreus</i> Fallén	33	Local	
<i>Rhaphium fractum</i> Loew	2,11,21,49	Nat. Scarce	
<i>Rhaphium gravipes</i> Haliday	2,21,49	Nat. Scarce	
<i>Rhaphium nasutum</i> (Fallén)	2,8,11	Local	
<i>Rhaphium patulum</i> (Raddatz)	2,49	Nat. Scarce	
<i>Rhaphium penicillatum</i> Loew	10,46	pRDB3	
<i>Rhaphium rivale</i> (Loew)	2,8,11,43,46	Nat. Scarce	
<i>Selapus basilicus</i> Meuffels & Grootaert	25,33	New to Britain	
<i>Campsicnemus marginatus</i> Loew	10,11,33,34,48	Local	
<i>Syntormon macula</i> Parent	10	pRDB3	
<i>Teuchophorus calcaratus</i> (Macquart)	11	Local	
<i>Teuchophorus monacanthus</i> Loew	11,58	Local	
Phoridae			
<i>Megaselia rivalis</i> (Wood)	19	Unknown	
Lonchopteridae			
<i>Lonchoptera meijerei</i> Collin	6,33	Nat. Scarce	
<i>Lonchoptera nigrociliata</i> Duda	6,33,50	Nat. Scarce	
Syrphidae			
<i>Paragus haemorrhous</i> Meigen	28	Local	more terrestrial end of ERS
<i>Parasyrphus nigritarsis</i> (Zetterstedt)	(AES pers. comm.)	RBD1	on riverside alder and can probably use ERS
<i>Xanthogramma pedissequum</i> (Harris)	28	Local	alder or willow ERS important in Scotland
Micropezidae			
<i>Cnodacophora sellata</i> (Meigen)	33	Local	river banks
<i>Cnodacophora stylifera</i> (Loew)	2,24,30	pRDB3	river banks
<i>Micropeza corrigiolata</i> (Linnaeus)	24	Local	ERS one of its habitats

Tephritidae			
<i>Campiglossa absinthii</i> (Fabricius)	43	Nat. Scarce	
<i>Tephritis formosa</i> (Loew)	33	Local	
<i>Tephritis hyoscyami</i> (Linnaeus)	33	Local	
Lauxaniidae			
<i>Homoneura limnea</i> (Becker)	2,17,33	pRDB2	
Ephydriidae			
<i>Scatella obsoleta</i> Loew	17	pRDB2	
<i>Athyroglossa ordinata</i> Becker	17	pRDB1	
Scathophagidae			
<i>Acanthocnema nigrimana</i> (Zetterstedt)	58	RDB3	
<i>Acanthocnema glaucescens</i> (Loew)	73,733	Nat. Scarce	
<i>Cosmetopus dentimanus</i> (Zetterstedt)	33	RDB1	
Anthomyiidae			
<i>Alliopsis sitiens</i> (Collin)	5	Unknown	
<i>Myopina myopina</i> (Fallén)	3,28,30,43	Local	strong allegiance
Muscidae			
<i>Coenosia bilineella</i> (Zetterstedt)	24	Local	
<i>Coenosia stigmatica</i> Wood	47	pRDB3	
<i>Lipsocephala verna</i> (Fabricius)	33	Local	
<i>Limnophora riparia</i> (Fallén)	33	Local	
<i>Helina calceata</i> (Rondani)	33	Nat. Scarce	
<i>Helina maculipennis</i> (Zetterstedt)	57	Local	
<i>Phaonia zugmayeriae</i> (Schnabl)	57	Nat. Scarce	
Sarcophagidae			
<i>Sarcophaga subulata</i> Pandelle	33	Nat. Scarce	

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***Hilara setosa* Collin and *Hilara gallica* (Meigen) (Diptera, Empididae) in Yorkshire** - In a recent review of the distribution of *Hilara setosa*

Collin in Britain, Iain MacGowan has shown that this species is relatively common in the middle reaches of the Tay system in northern Scotland (MacGowan, I. 1997. *Dipterists Digest* (Second Series) 4, 4-5). The only English record of which I was aware in 1994, when I completed the manuscript for a national review of Empidoidea, was an unpublished one from Castle Eden Dene, County Durham in 1981, with no further details (S. Falk and R. Crossley in preparation. *A Review of the Scarce and Threatened Flies of Great Britain. Part 2: Empidoidea*. Joint Nature Conservation Committee, Peterborough), presumably that referred to by Dr MacGowan (*op. cit.*).

On 28 August 1994, I collected a male and female *H. setosa* near the banks of the River Rye in Duncombe Park National Nature Reserve, North Yorkshire, and on 25 August 1995 a further male was taken in the vicinity of the River Derwent where it flows through Forge Valley Woods National Nature Reserve near Scarborough, also in North Yorkshire. These constitute the first, and only records of this species for Yorkshire, and the dates confirm the late seasonal appearance which has been noted by other observers (MacGowan *op. cit.*).

At the Duncombe Park site the Rye is shallow and quick-flowing over mainly gravel and shingle, with overhanging trees on one bank and a heavily grazed pasture on the other. At Forge Valley, the Derwent is narrow and has become heavily silted in recent years. It flows through thickly wooded banks with lush riverside vegetation.

The occurrence in Britain of *Hilara gallica* (Meigen) is based on a single male collected at Allerthorpe, Yorkshire in June 1926 by Dr W.J. Fordham (Collin, J.E. 1961. Empididae. *British Flies* 6, viii + 782 pp. Cambridge University Press). This had originally been reported by W.J. Fordham (1927. *The Naturalist* p.335), in a list of Diptera on Allerthorpe Common with the comments, "A grey species with yellow legs. This fly is not yet recorded for Britain". In the following year C.A. Cheetham noted it again, without comment and in error as "*Rhamphomyia*" *gallica*, in a list of additions to Yorkshire Diptera (1928. *The Naturalist* p.185.). The specimen was presented to Mr Collin and it is now in the Verrall/Collin collection at the University Museum, Oxford where, through the courtesy of Dr J.W. Ismay, I was able to examine it in October 1997. The specimen is pinned through the top of the thorax in butterfly fashion where there is some damage, but otherwise it is intact. The original label, probably in Fordham's hand, is "All C 6.26", (presumably Allerthorpe Common), with a white round label in Collin's hand "Allerthorpe E. Yorks 6.26 W J Fordham".

There is also a mount of male genitalia labelled "*H. gallica* Continent" which, according to Dr Ismay (*pers. comm.*) was probably of a continental specimen dissected by Collin for his book. There is also a label in Collin's hand "B.M. Devon C.G. Jones" (or "James"); such labels were added when he saw a specimen in another collection (J.W. Ismay, *pers. comm.*). At my request Mr John Chainey kindly examined the National Diptera Collection at the Natural History Museum, London and reported that there were no specimens standing under *H. gallica*, nor were there pin holes to indicate that there had been any in the past.

Due to the apparent absence of any subsequent reports of this distinctive species I have suggested in my review of Empidoidea (Falk and Crossley, *op. cit.*), that it is possibly extinct in Britain. However, I collected a single male *H. gallica* on 8 June 1997 near Barmby Moor, East Yorkshire, and a single female at the same place on 4 July 1997. Several of both sexes were again taken at the same locality in 1998 on various dates between 13 May and 15 June, mostly by sweeping the foliage of oak trees. The site is a small area of relict sandy heathland about two kilometres from Allerthorpe Common, and as Dr Fordham lived in retirement at Barmby Moor it is very probable that he collected at this heathland site as well as at the much more extensive heathland (as it then was) at Allerthorpe.

Thanks are due to John Chainey and John Ismay for their assistance, to John Coldwell for locating references in *The Naturalist*, and to English Nature, York, for permission to collect at Duncombe Park and Forge Valley Woods National Nature Reserves - **ROY CROSSLEY**, 1 The Cloisters, Wilberfoss, York YO41 5RF

***Chetostoma curvinerve* Rondani (Diptera, Tephritidae) in Surrey** - On

3 April 1988, I took the specimen of *Chetostoma curvinerve* Rondani reported from White Beech, Surrey in the recent note by Peter Chandler (1998. *Dipterists Digest (Second Series)* **5**, 107-108). This site is part of the Chiddingfold woods on the clays of the low Weald, which mainly comprise oak (*Quercus*)/ash (*Fraxinus*) woodland with willows (*Salix*) in wetter places and a varied ground flora typical of the wealden woods. Honeysuckle (*Lonicera*) is relatively widespread in these woods, which were formerly well known for the broad-bordered bee hawk moth, so an association with this plant is a possibility. My specimen was taken basking on dry leaves on a sunny bank within the wood. Chandler (*op. cit.*) suggested that the grid square for this record (for which the reference is SU 983356) had been omitted from the map provided by Laurence Clemons. However, this was an error as this record was included on the map and that omitted was the less precise record for Guildford (Laurence Clemons, *pers. comm.* to Peter Chandler).

The opportunity is taken here to report some further previously unpublished records from Surrey, on which information has been provided by Ian White. On 4.viii.1986, a specimen was found on a bedroom ceiling at Ripley (TQ 0556) by K.M. Harris. This specimen, deposited in the Natural History Museum, London (BMNH), was bright orange, suggesting recent emergence. There was *Lonicera* growing around the front door of the house.

On 10.iv.1998 a single male was obtained from a garden at Wotton, near Dorking (TQ 133469) by J.D. Holloway. It fell out of rhubarb indoors several days after a number of sticks were harvested from under Victoria plum (*Prunus domestica*). This specimen was very dark in colour and consequently considered not to have recently emerged. There was *Lonicera* growing about 5m away. Fruiting *Rubus idaeus* (raspberry), *Fragaria* (strawberry) and *Ribes* species (red- and blackcurrants) were also present nearby.

Finding of this mature specimen in April again supports the as yet unconfirmed suggestion by Chandler (*op. cit.*) that *C. curvinerve* overwinters as an adult. This was also supported by observations in Israel where Amnon Freidberg (*pers. comm.* to Ian White) found large numbers on oak trees (*Quercus*) in x. and xi.1976. Four specimens with this data and one from France, Lot, Douelle, collected on 6.ii.1936 by L. Lhomme are in BMNH. The Israeli and French specimens were intermediate in colour between the two Surrey specimens examined by Ian White.

I would like to thank Laurence Clemons for clarifying the position on the previous records and Ian White for kindly permitting use of the additional data - **ROGER K.A. MORRIS**, c/o 241 Commonsides East, Mitcham, Surrey CR4 1HB

***Syrphus rectus* Osten Sacken and its potential implications to the recording of *Syrphus* species**

MARTIN C.D. SPEIGHT

Research Branch, National Parks & Wildlife, 7 Ely Place, Dublin 2, Ireland

Summary

Attention is drawn to the apparent occurrence of *Syrphus rectus* Osten Sacken in the British Isles. The separation of this taxon from other European *Syrphus* species and its status are discussed. It is concluded that many records of *Syrphus ribesii* (Linnaeus) are probably unreliable, if based on females, whatever status should be accorded to European specimens corresponding to *S. rectus*. It is further concluded that, if the separate identity of European *S. rectus* is confirmed by further work, all existing records of *S. ribesii* and of male *S. vitripennis* Meigen will become suspect and, if not checked from voucher specimens, may have to be discarded.

Introduction

In his revision of European *Syrphus*, Goeldlin (1996) added three species: *S. auberti* Goeldlin, essentially a high-alpine, central European insect; *S. admirandus* Goeldlin, a northern European species of tundra and taiga and, more controversially, the enigmatic North American *S. rectus* Osten Sacken. This brings the European *Syrphus* fauna to 10 species, all of them keyed out in Goeldlin's paper (*op. cit.*).

Syrphus rectus is recorded widely in North America, from the Pacific to the Atlantic coasts and from central Canada south to Texas, but only in the female sex. The male is stated by Vockeroth (1992) to be indistinguishable from *S. vitripennis* Meigen.

In adding *S. rectus* to the European list, Goeldlin (1996) pointed out that the few European specimens available to him (three in all) differed in minor respects from North American *S. rectus*, prompting him to recognise the European form as a distinct subspecies, *S. rectus bretolensis*. Whether due to misgivings about the separate identity of *S. rectus bretolensis*, or to a failure to find the taxon, syrphid workers in Europe have not published additional records of it since Goeldlin's (1996) paper appeared. In Germany, at least, where one of Goeldlin's specimens was collected, scepticism certainly seems to play a role, because in the recently published list of German syrphids, Ssymank *et al.* (1999) refer to *S. rectus bretolensis* as a probable synonym of *S. vitripennis*.

I have had the opportunity to examine the three European specimens consigned by Goeldlin (1996) to *S. rectus bretolensis* and to examine North American material identified as *S. rectus*. Whatever about the male, the female of *S. rectus* is absurdly easy to separate from females of the three *Syrphus* species currently recognised as occurring in both Britain and Ireland, namely *S. ribesii* (Linnaeus), *S. torvus* Osten Sacken and *S. vitripennis*. However, if reliance were put upon the keys provided by Stubbs and Falk (1983), for determination of females of these species, *S. rectus* would remain entirely undetected, unless due note were taken of the additional information provided in the accompanying text. This is because a feature of primary importance in separating females of *S. rectus* from *S. ribesii* is that there are large areas bare of microtrichia on the wings of *S. rectus*, while in *S. ribesii* the entire wing membrane is consistently covered in microtrichia - in both of these species the females have almost entirely yellow legs. *S. rectus*-type females would be separated from those of *S. ribesii* using the key in Speight (1988), but in that key the *S. rectus* females would run to *Syrphus sexmaculatus* Zetterstedt.

They say that familiarity breeds contempt and this saying certainly applies to *S. ribesii*, which must be one of the most widely distributed and frequently encountered syrphids in Europe. Given that females of *S. ribesii* are apparently so easily separated from those of *S. torvus* and *S. vitripennis* by the fact that the legs of the former are almost entirely yellow, while in the other two species they are extensively black, is it likely that the wings of apparent females of *S. ribesii* have been systematically scrutinised, just to ensure microtrichial coverage is complete?

Having been made aware that females of *S. rectus* could occur undetected among material of *S. ribesii*, unless microtrichial coverage is checked, and wishing anyway to check the constancy of microtrichial coverage in *S. ribesii*, during the past few years I have laboriously examined the wings of all female *S. ribesii* I have encountered. This has not been very exciting, since every female I have examined has shown not the slightest variation in microtrichial coverage. But this has helped to convince me that European *S. rectus*-type females are very unlikely to be aberrant specimens of *S. ribesii*. During the same period, I have also examined a substantial number of females of *S. vitripennis* from various European countries, but have encountered none with the extent of the black markings on the hind femora reduced, so that they might be regarded as exhibiting a condition intermediate between *S. vitripennis* and *S. ribesii*.

It is with this background that recently I found myself checking yet another small group of mixed *Syrphus* specimens from a Malaise trap sample from County Donegal (Ireland). Among them I found a female which corresponds almost exactly to the North American *S. rectus*. A detailed comparison between features of this specimen, *S. ribesii* and *S. vitripennis* is given below. It would be convenient to be able to dismiss this specimen as belonging to one or other of those species, but the specimen is so distinct that I am unable to take that course. Even so, it remains difficult to accept the unique occurrence of one specimen of *S. rectus* in a set of Malaise trap samples, many of which contained a few specimens of the other three *Syrphus* species. The obvious question raised by such an occurrence is, "if one, why not more"? While preparing this text I also had the opportunity to examine *Syrphus* material collected in Luxembourg. All but one of the specimens proved typical of the three generally-occurring species. However, one apparent female of *S. ribesii*, which had been put aside as problematic on account of the restricted coverage of microtrichia on its wings, also corresponds with *S. rectus* - once again an isolated female in a series of specimens, all from the same locality.

Until localities are known at which *S. rectus* can be found regularly, evidencing the existence of populations of this taxon, the suspicion must remain that the occasional specimens encountered represent something other than a distinct species. In the interim, on morphological grounds alone this taxon has to be recognised as being as easily distinguished as any of the generally-accepted European *Syrphus* species and, at the very least, as warranting serious investigation of its status, distribution and biology. With that end in view I have produced this account- hopefully it will help to draw attention to this puzzling taxon and encourage work on it.

The following brief text details the distinguishing features of the female of *Syrphus rectus*, in comparison with *S. ribesii*, *S. torvus* and *S. vitripennis*, incorporating a simple key, and provides locality data for the two specimens which have precipitated discussion of this problem.

Distinguishing features of the female of *Syrphus rectus*

S. rectus* and *S. ribesii

In general appearance the females of these two species are well-nigh identical. The most easily observed difference is in the microtrichial coverage of the wings. This is consistently entire in *S. ribesii* but substantially incomplete in *S. rectus*, where the second basal cell, for example, is devoid of microtrichia over most of its surface. The pattern of bare areas is similar to that observed in *S. vitripennis*, but rather more extensive than is typical for *S. vitripennis*. A second, less-easily observed feature (thus omitted from the key) is the shape of the pro-basisternum. In *S.*

ribesii the anterior and lateral margins of this sclerite are strongly recurved (Fig. 1A), whereas in *S. rectus* they are more-or-less straight, giving it an almost rectangular appearance, similar to its condition in *S. sexmaculatus* and *S. vitripennis* (Fig. 1, B, D). A third feature, easily observed, is that in *S. rectus* the brownish longitudinal stripes along the lateral margins of the abdominal sternites, which occur in *S. ribesii*, are missing. North American *S. rectus* may have their hind femora almost entirely yellow, as in *S. ribesii*, or exhibit a black ring (figured by Goeldlin 1996) at about the middle of their length - reminiscent of the black annulation on the hind femora of *Parasyrphus annulatus* (Zetterstedt). In European *S. rectus* the hind femora are either coloured like those of *S. ribesii* (Fig. 1E) or have a vaguely-defined, dark brown/black, longitudinal streak at about the middle of their length, antero-laterally, as in the Irish specimen (see Fig. 1F). Finally, the face in *S. rectus* characteristically has frequent black hairs from the antennae down to below the level of the central prominence (as in the Irish specimen), whereas in *S. ribesii* the face is almost entirely yellow-haired.

S. rectus and *S. sexmaculatus*

In having almost entirely yellow legs and wings with areas bare of microtrichia, the females of *S. rectus* and *S. sexmaculatus* are very similar. However, the areas bare of microtrichia are more extensive in *S. rectus* than in *S. sexmaculatus* and the pale markings on each abdominal tergite are in the form of a pair of well-separated spots in *S. sexmaculatus*, while a complete yellow band (to a variable extent cut away posteriorly, in the mid-line) is present in *S. rectus*. Also, the frons is yellow immediately dorsal to the lunule in *S. sexmaculatus*, where it is black in *S. rectus* and the peg-like setulae on the ventral surface of the mid basitarsus are entirely pale (yellowish) in *S. sexmaculatus* but mostly black in *S. rectus*.

S. rectus and *S. torvus*

The almost-entirely yellow femora of the female of *S. rectus* serve to distinguish this species easily from *S. torvus* females, in which the hind femora, in particular, are entirely black/dark brown from the base for most of their length. The complete coverage of microtrichia found on the wings of *S. torvus* and its distinctly hairy eyes also help to distinguish that species from *S. rectus*. The eyes in females of *S. rectus* are virtually bare. The black hairs occurring on the genae of *S. torvus*, beneath the eyes, are absent in *S. rectus*. Similarly lacking are the black hairs of the postero-lateral hair fringe of the front femora, found in *S. torvus*. Finally, in *S. torvus* (Fig. 1C), the shape of the pro-basisternum is as in *S. ribesii*.

S. rectus and *S. vitripennis*

The almost-entirely yellow femora of the female of *S. rectus* serve to distinguish this species easily from *S. vitripennis* females, in which the hind femora, in particular, are entirely black/dark brown from the base for most of their length. In addition, the antero-lateral and dorsal surfaces of almost the apical half of the hind femora (i.e. more than the apical third, but just short of the apical half) are predominantly covered in short, black, spinose hairs in *S. rectus* (see Fig. 1F), whereas in *S. vitripennis* these parts of the hind femur are predominantly to almost exclusively covered in yellow hairs, any black hairs usually being clustered in a small group at the tip of the femur, in an area not much longer than the femur is deep.

S. rectus rectus and *S. rectus bretolensis*

In comparing females of the North American *S. rectus* with the three European specimens available to him, Goeldlin (1996) said that, in comparison with the European material, *S. rectus* differs in having (in translation from French to English) "a distinctly narrower face, distinctly shorter pilosity, particularly on the abdomen and legs, and also in the coloration of the hind legs;

essentially, the hind femur is, usually, marked with a brownish or blackish annulation within the apical half of its length and the hind tibiae are more-or-less distinctly infuscated and the pilosity of the antero-lateral surface of the hind femur is predominantly black on its apical half. The abdominal markings are also different. Osten Sacken gave the name *rectus* to this species because the pale bands on tergites 3 and 4 are almost straight, in contrast to the European material." The Irish specimen here consigned to *S. rectus* also differs from the North American material in most of these features. The exception is the coloration of the hairs on the apical half of the antero-lateral surface of the hind femora, which in the Irish specimen resembles the North American material, not the central European specimens (including the female from Luxembourg). Among the features in which the Irish specimen differs from the North American material, only the width of the frons and shape of the black mark on the hind femur give me some concern, since other European *Syrphus* species tend to vary in their expression of the other features anyway - especially the shape of the pale markings on the tergites.

Whether the Irish specimen should be regarded as belonging to *S. rectus bretolensis* or to *S. rectus rectus* is in my view an open question, which I feel should be left until more apparent *S. rectus* material of European origin is available for consideration. At present the Irish specimen seems to fit somewhere between the two subspecies, but not with either. Of more importance is that it does NOT correspond to either *S. ribesii*, *S. torvus* or *S. vitripennis* as at present defined, and is clearly much closer to the North American *S. rectus* than to present concepts of any of these other three species. The Luxembourg specimen, on the contrary, is indistinguishable from *S. rectus bretolensis* except in that its hind femora are entirely yellow, there being no trace whatever of a black mark on them, and in having no black hairs on the face.

Quick key to the females of the *Syrphus* species of Britain and Ireland

- | | | |
|---|---|----------------------------|
| 1 | Wings entirely covered in microtrichia | 2 |
| | Wings with extensive areas bare of microtrichia | 3 |
| | | |
| 2 | Hind femora black/dark brown from the base, for most of their length | |
| | <i>torvus</i> Osten Sacken | |
| | Hind femora yellow for almost their entire length (blackish basally for a distance only slightly greater than the depth of the femur) | <i>ribesii</i> (Linnaeus) |
| | | |
| 3 | Hind femora black/dark brown from the base, for most of their length | |
| | <i>vitripennis</i> Meigen | |
| | Hind femora yellow for almost their entire length (blackish basally for a distance no greater than the depth of the femur and also often on a narrow annulus or antero-lateral smudge at about the middle of the length of the femur) | <i>rectus</i> Osten Sacken |

The two *Syrphus rectus* records

Ireland: County Donegal: Derrylahan, Glenveagh National Park. C0323 (NB4), 12 August - 2 September 1999, female, Malaise trap; unimproved, oligotrophic *Molinia* grassland at edge of shallow slope with a sparse cover of scattered trees (*Quercus*) and scrub (*Corylus/Ilex/Crataegus/Salix*), at low altitude; coll. and det. MCDS; deposited in the collections of the National Museum of Ireland, Dublin.

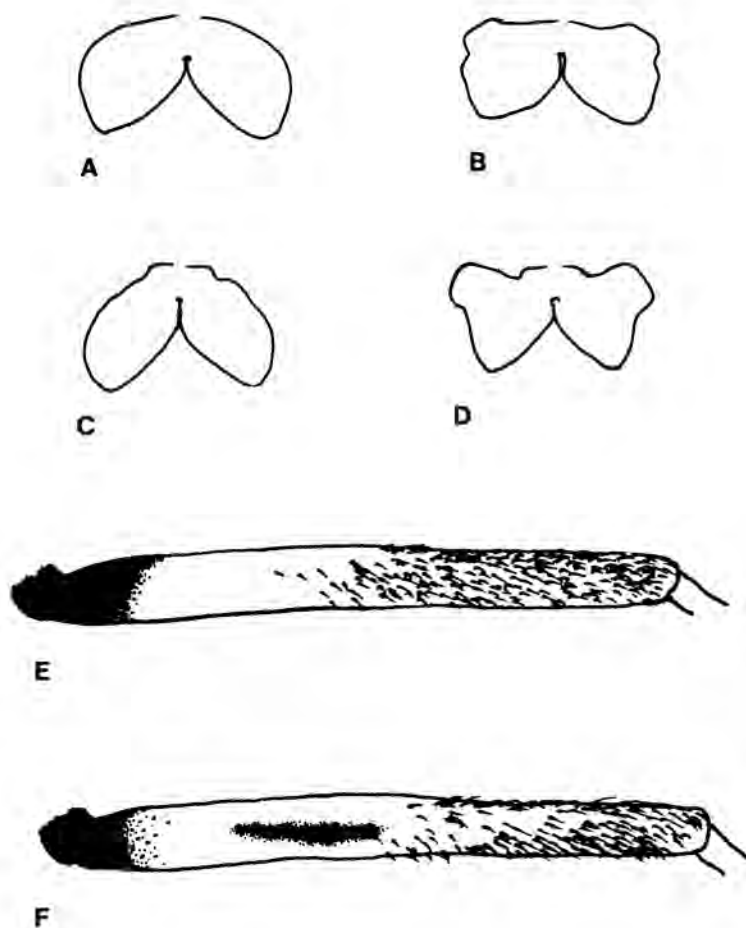


Fig. 1. *Syrphus* species, A-D = probasisternum; E, F = left hind femur, anterolateral view (i.e. outer side). A, E = *S. ribesii*; B = *S. sexmaculatus*, C = *S. torvus*, D = *S. vitripennis*, F = *S. rectus* (Donegal).

Luxembourg: Banzelt, Widdeberg, 17-31 July 1991, female, yellow trap in centre of field of maize (*Zea mays*). Collector unknown, det. MCDS. In the collections of the National Museum for Natural History, Luxembourg.

The Malaise trap which yielded the Irish specimen was one of a pair. From the sample containing the *S. rectus*, one female of *S. ribesii* and two females of *S. vitripennis* were also determined. The other trap of the pair yielded one female of *S. ribesii* in the same trapping period. Of the three continental specimens of *S. rectus* mentioned in Goeldlin (1996), one was collected from a lay-by beside a German motorway and the other two came from Malaise traps set up to monitor syrphid movements over a high pass in the Swiss Alps (Col de Bretolet), none of which is very informative in regard to the habitat preferences of the species.

Concluding remarks

As of now, any European record of *S. ribesii*, based on a female whose wing microtrichial coverage was not checked, is suspect. And this remains the case, even if European "*S. rectus*" ultimately prove to be a form of *S. vitripennis*. Specimens with the morphological characters of female *S. rectus* nonetheless represent a taxonomic puzzle which requires to be solved. The most certain way to solve this puzzle would probably be to capture live females corresponding to *S. rectus*, obtain eggs and rear the larvae through to adulthood. This should not prove to be a difficult procedure. If the only product of this process were more specimens of apparently *S. rectus*, it would reinforce the contention that this taxon is a distinct species in Europe. Other results would be more likely to demonstrate the converse. In the interim, European *Syrphus* females with the characteristics of *S. rectus* require to be treated as a separate entity - however irksome a reality that may be, in respect of the consequent requirement to check microtrichial coverage of the wings of every putative *S. ribesii* female! If it is eventually concluded that European *S. rectus*-type females do represent a distinct taxon, and that, as in North America, the males are indistinguishable from those of *S. vitripennis*, the utility of records of *S. vitripennis* based on males will also require review. A final, uncomfortable possibility also has to be taken into consideration - if *S. rectus bretoletensis* is shown to be a peculiar variant of *S. vitripennis*, that will not necessarily solve the problem of *S. rectus* in Europe, because the Irish *S. rectus* female referred to here is slightly different from *S. rectus bretoletensis* and may not represent the same taxon. In the absence of breeding studies, better data on the distribution and variability of *S. rectus*-type specimens in Europe would be helpful, as a step towards understanding the significance of specimens like those reported in this note.

Acknowledgements

I am most grateful to Evelyne Carrières for drawing my attention to the Luxembourgish specimen mentioned in this note and for the opportunity to include reference to it here. I would also like to thank Pierre Goeldlin and Tore Nielsen for their encouraging remarks on the text.

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Dolichopodidae (Diptera) as prey of Common Butterwort (*Pinguicula vulgaris* Linnaeus) -

On 29.vi.1998, near Inverinate, Wester Ross, Scotland, I found a male of *Sympycnus aeneicoxa* (Meigen) and a male of *Hercostomus cupreus* (Fallén) alive, but entrapped on leaves of separate plants of *Pinguicula vulgaris*. These plants were part of a colony of about 175 (excluding small seedlings) growing in and near a roadside seepage close to a bridge over An Leth-allt (NG 909232). During the following two days, dead specimens of a male *Hercostomus aerosus* (Fallén) and a male of *Sympycnus desoutterii* Parent were brushed from leaves of other plants of *P. vulgaris* at this site. Common butterworts were also found on 2.vii.1998 in a ditch near a woodland path at another site near Inverinate (NG 931215). Nine *H. aerosus*, 3 *H. cupreus*, 2 *Chrysotus gramineus* (Fallén), and 1 *Campsicnemus loripes* (Haliday) were found dead on the leaves of *P. vulgaris* at this site. All these specimens were male, and no females or specimens of the family too damaged to sex or identify were found.

Sweeping vegetation at the first site on 28.vi-l.vii.1998 yielded among other dolichopodids 7 male and 17 female *H. cupreus*, 5 female *H. aerosus*, and 2 male and 1 female *S. desoutterii*. At the second site sweeping vegetation on 2.vii.1998 produced 3 male and 1 female *H. cupreus*, 5 male and 6 female *H. aerosus*, and 1 male of *C. gramineus*. Thus, females of both species of *Hercostomus* were present at both sites, though the overall ratios of males: females in the sweep samples i.e. 10:18 for *H. cupreus* and 5:11 for *H. aerosus*, are not significantly different from 1:1. However, the overall ratio of 10:0 for the specimens of *H. aerosus* found on the leaves of *P. vulgaris* is significantly different from 1:1 (chi sq = 10.0, P = 0.002).

Butterworts are known to prey on Diptera, particularly Nematocera, but most identifications have not been taken to family level, and I know of no previous records of Dolichopodidae from *P. vulgaris*. P.S. Karlsson, K.O. Nordell, S. Eirfelt, and A. Svensson (1987. *Oecologia* 73, 518-521) compared the trapping efficiency of three species of *Pinguicula* with each other, and with dummy leaf rosettes of paper covered with non-drying glue placed close to real plants. In contrast to the other two species, *P. vulgaris* caught more prey than the dummy traps. These authors concluded that *P. vulgaris* has some means of attracting prey which is lacking in the other species, e.g. an odour. If the preliminary observations reported here are confirmed, it would seem that this means of attraction is more effective with males than females, at least in *Hercostomus*. I thank Jonathan Stein for help with literature - C.E. DYTE, 14 Priory Way, Datchet, Slough, Berks., SL3 9JQ

Another note on the occurrence of *Dorycera graminum* (Fabricius) (Diptera, Ulidiidae) in Kent - Earlier (1994. *Entomologist's Record and Journal of Variation* 106, 38 and 1998, *loc. cit.* 110, 83-84) I drew attention to some recent and historical County records for this fly which, possibly by virtue of its inclusion in the U.K. Biodiversity Action Plan, has currently attracted attention. C. Plant (1998. *Entomologist's Record and Journal of Variation* 110, 84) and R. Jones (1998. *British Journal of Entomology and Natural History* 10, 166) gave brief details of other recent Kent records.

On 15 May 1999, I attended a Kent Field Club meeting at Preston Court in East Kent, V.C. 15 (TR 2460). The site is managed by the Countryside Commission and consists largely of grazing marsh, adjacent to the River Stour, but with a small area of broad-leaved woodland dominated by alder *Alnus glutinosa*, ash *Fraxinus excelsior*, field maple *Acer campestre* and the occasional willow *Salix* species and oak *Quercus robur*. At 13.30, whilst generally recording on the south-east end of the wood at approximately TR 241602 I encountered a gravid female of *D. graminum* through sweeping the lower branches of an elm *Ulmus procera*. At the spot there were also colonies of bramble *Rubus fruticosus* agg., field maple *Acer campestre* and oak *Quercus robur*. The herbaceous flora was ascertained to be largely nettle *Urtica dioica*, red campion *Silene dioica* and a small amount of white bryony *Bryonia dioica*. A short while later I swept a male *graminum* from the same patch of elm and thereafter my collecting companion Norman Heal beat another female from a stand of honeysuckle *Lonicera* species growing over elder *Sambucus nigra* and a male from elm.

A month later, on 12 June, I participated in another Kent Field Club survey of several areas along the River Darent in West Kent, V.C.16. At 14.30 a single, gravid, female was swept from a sickly-looking specimen of spindle *Euonymus europaeus* at Horton Kirby (TQ 558683). Many of the leaves of this bush were infested by what I presumed to be the eriophyid mite *Eriophyes convolvens*. Repeated sweeping of the plant and the surrounding vegetation failed to reveal further specimens.

K.N. Alexander (1998. *Dipterists Digest (Second Series)* 5, 5) recorded *D. graminum* from sheltered sites in Worcestershire and Surrey, but mentioned only the herbaceous flora, including hogweed *Heracleum sphondylium* and hemlock water-dropwort *Oenanthe crocata*, in reference to the circumstantial association with Apiaceae (= Umbelliferae).

Given that at Preston Court the female was found on the foliage of elm, which is frequently colonised by a range of cecidogenous arthropods, and that at Horton Kirby was taken by sweeping a mite-infested spindle, it was hypothesised that the larvae could be predatory upon the earlier stages of mites or even aphids. Dr. J.W. Ismay and Mr. A.E. Stubbs (*pers. comms*), however, think that such an association is unlikely. A cursory glance at the aculeus of one of my specimens shows that it is blunt-ended and not, I would think, adapted for boring or piercing -

LAURENCE CLEMONS, 14 St. John's Avenue, Sittingbourne, Kent ME10 4NE.

The status of hoverflies (Diptera, Syrphidae) in Shetland

M.G. PENNINGTON

Shetland Entomological Group, 9 Daisy Park, Baltasound, Unst, Shetland ZE2 9EA.

Summary

The known Shetland fauna of Syrphidae comprises 40 species of which four require confirmation. Previous records are evaluated and details are given of the known records of all species; all but one of the confirmed species has been recorded in the 1990s. The status of each species found in Shetland is assessed. These are defined as residents, those which may be both resident and immigrant and those which are solely immigrants; the significance of migration in colonisation of the islands is discussed. The Shetland fauna is compared with that of the adjacent archipelagoes: Orkneys (46 confirmed species) and the Faeroes (28 confirmed species).

Introduction

Shetland is a relatively isolated archipelago in the North Atlantic. Mainland Scotland is 140km south-west, Norway is 275km to the east and the Faeroe Islands are 300km to the north-east, although parts of Shetland are nearer to Norway than they are to Mainland Scotland. During the last ice age Shetland was almost completely covered in ice and current evidence suggests that any land-bridge which existed after the ice age was only open for a short period (Flinn in Johnston 1999). Consequently, Shetland's current fauna results from colonisation in the 12,000 years since the retreat of the last ice age. In other words, all the hoverflies in Shetland must have been immigrants at some point.

Although most hoverflies are believed to wander to some extent there is some debate over the nature of such movements. The term migration is often used to imply a regular movement from one specific area to another for a specific purpose e.g. to survive the winter in a warmer area or to find breeding habitat in the summer. A few hoverfly species, especially *Episyrphus balteatus*¹ and *Eupeodes corollae*, are well-known migrants. However, insects do habitually wander over small distances and the terms itinerant or trivial movements have been used to describe them, although some authors refer to all movements as migration. When referring to islands, however, the term immigration may be an acceptable alternative, as used by Pennington *et al.* (1997), as it merely indicates a movement into the islands from outside.

Hoverfly migration is most easily detected if it is channelled or concentrated in some way, as it is in Alpine passes (Aubert *et al.* 1976, cited in Stubbs and Falk 1983), or on isolated islands where the arrival of insects not normally present is more obvious. Parsons (1996) has demonstrated the value of an island in detecting hoverfly movements. He recorded 40 species of hoverfly on Steep Holm, a small island in the Bristol Channel in southern England, although only a handful of species were capable of maintaining closed, resident populations because of the very limited habitat on the island. Although Shetland is much larger and with a greater range of habitats, there is still the potential to detect immigration amongst the limited resident fauna. As Shetland is at least 140km from the nearest large landmass immigrants must have undertaken fairly significant movements to arrive in the islands. It is hoped that Shetland records will increase awareness of both the distance over which some hoverflies can wander and the range of species that could be involved.

¹ authors of species recorded in Shetland can be found in the list of species

Historical records from Shetland

Dale (1893) published the first list of Diptera from Shetland, based on specimens collected in June 1890 and including eight syrphids - *Platycheirus manicatus*, *P. peltatus sensu lato*, *Rhingia campestris*, *Cheilosia albipennis*, *Lejogaster metallina*, *Eristalis arbustorum*, *E. interruptus* and *E. intricarius*. Grimshaw (1905) later queried the record of *E. interruptus*, and this species is still unconfirmed, while there have been no subsequent records of *C. albipennis*. Bloomfield (1904) published details of four species collected by the hymenopterist F.D. Morice in August-September 1894, adding *Eupeodes corollae*, *Helophilus pendulus* and *Sericomyia silentis* to the list. The ornithologist W. Eagle Clarke, who worked alongside Percy Grimshaw at the Royal Scottish Museum in Edinburgh, collected six species from Fair Isle in September 1906, including *Platycheirus albimanus* and *Eristalis tenax*, both new to Shetland (Grimshaw 1906). Records collected from Scottish lighthouses by the ornithologist William Evans (1915) include a record of *Scaeva selenitica* at Muckle Flugga lighthouse, Unst in 1914, another addition to the list.

No other published records have been traced until Carpenter (1950) collected three species in September 1949, including the first published records of *Eristalis horticola* (still the only record) and *Syrphia pipiens*. Previously unpublished records made by Angela Davis on Fair Isle in July 1957 were given by Riddiford *et al.* (1993), adding two further species, *Episyrphus balteatus* and *Scaeva pyrastris*.

There follows another gap in published records, but specimens collected from Fair Isle in August 1982 by Sir Arthur Duncan, former Chairman of the Nature Conservancy and long-time Chairman of the Fair Isle Bird Observatory, later proved to include two species new to Britain. These were *Eupeodes lundbecki* (Watt and Robertson 1990) and *Helophilus affinis* (Stuke 1996), although following the identification of the Fair Isle specimen another earlier British specimen of *E. lundbecki* was located. Burbidge *et al.* (1986) gave records of 11 species recorded from Yell and Fetlar in July 1985, including the first published records of *Platycheirus clypeatus sensu lato* and *Ripponensia splendens*, although the latter species has not been found subsequently. Laurence (1991) recorded 18 species found on visits during the 1980s, including the first published records of *Syrphus torvus*, *Melanogaster hirtella*, *Neoscia tenax*, *Eristalis abusivus* and *E. pertinax*.

By the end of 1991 there were published records of 27 species of hoverfly in Shetland. Further records have since been published by Laurence (1997) and Pennington (in Johnston 1999), so there are now records of 40 species from Shetland, four of which still require confirmation. All except one of the confirmed species have been recorded in the 1990s.

List of species recorded in Shetland

The phrase "throughout the islands" indicates that the species has been found in all areas that have been worked in recent years. In practice this means Unst, Foula, Fair Isle and scattered areas of Mainland, with a few records from Yell and elsewhere. Unless otherwise stated all records are by the author, Brian Laurence or Terry Rogers while all Foula records are from Frances Ratter and all Fair Isle records are from Nick Riddiford. Nomenclature follows Chandler (1998), but synonyms used by Stubbs and Falk (1983), Torp (1994) or Stubbs (1996) are included. Status in Great Britain and Ireland is based on information in Stubbs and Falk (1983) and Stubbs (1996), status in Orkney is based on Andrew and Watt (1993) and status in Faeroe is from Jens-Kjeld Jensen (*pers. comm.*).

[*Cheilosia albitarsis* Meigen, 1822

Requires confirmation. The only record is in the list of specimens collected in June 1890 by Dale (1893), without any further details. One of the commonest species of the genus in Britain but it has not been recorded from Orkney, where four other species of *Cheilosia* occur, or from Faeroe.]

Episyrphus balteatus (De Geer, 1776)

Immigrant. Surprisingly not recorded until July 1957 on Fair Isle (Riddiford *et al.* 1993). Now annual in variable numbers, between early June and early October. There was a huge influx throughout the islands in early July 1994, including about 1000 in Terry Rogers' one acre garden at Eswick, central Mainland on 6 July 1994. In 1995-97 there were smaller numbers, mostly in August, but in 1998 another large influx occurred early in the season, peaking on 22 June when there were about 1000 at Eswick again. As an immigrant this species can be encountered anywhere in Shetland, but it is most often found in gardens or around trees. Very common throughout Britain, but now considered unlikely to overwinter except in the mildest areas. Fairly common in Orkney and although only recorded recently in Faeroe it is now just about annual.

Eristalis abusivus Collin, 1931

Status unknown. The only record is given by Laurence (1991), on the basis of one collected on the island of Trondra on 3 June 1987. This species is probably overlooked amongst the much commoner *E. arbustorum*, although small samples taken on Unst have not located it. The possibility that this specimen was an immigrant should not be ruled out. Local in Britain and scarce in Scotland; especially in coastal marshes. Fairly common in Orkney and very common in Faeroe.

Eristalis arbustorum (Linnaeus, 1758)

Resident. First recorded in June 1890 by Dale (1893). Frequent, but rarely common, in lowland habitats throughout the islands, including Fair Isle and Foula, between late May and early October. No evidence of immigration in Shetland and not a recognised migrant, but recorded wandering rarely to Steep Holm in the Bristol Channel by Parsons (1996). Common and widespread in Britain and common in Orkney and Faeroe.

[*Eristalis horticola* (De Geer, 1776)

Requires confirmation. The only record is by Carpenter (1950) at Scousburgh, south Mainland in September 1949. It seems unlikely that this relatively conspicuous species could have gone overlooked amongst other *Eristalis* species, although it is possible. The specimen could, therefore, relate to an immigrant. However, some of the Coleoptera recorded by Carpenter were later proved to be misidentifications (Smith and Smith 1983). Found throughout Britain, but rather local in the north. Not recorded from Orkney or Faeroe.]

[*Eristalis interruptus* (= *E. nemorum*) (Linnaeus, 1758)

Requires confirmation. Included in the list of species collected by Dale (1893) in June 1890, although Grimshaw (1905) queried this record. Recent records from the island of Burra and at Easter Quarff in south Mainland on 17 August 1993 were not supported by specimens. However, this species could be overlooked amongst the much commoner *E. arbustorum*. Common and widespread in Britain but easily overlooked. Uncommon in Orkney and not recorded from Faeroe.]

Eristalis intricarius (Linnaeus, 1758)

Resident. First recorded in June 1890 by Dale (1893). Common in lowland habitats throughout the islands, including Fair Isle and Foula, between mid May and early October. Specimens in Shetland do not show great variation, unlike those in the rest of Britain, most resembling the commonest local bumblebee *Bombus muscorum agricolae* Baker 1996, with an orange stripe on the thorax and a yellow-white tail. Widespread but generally uncommon in Britain. Very common in Orkney and Faeroe.

Eristalis pertinax (Scopoli, 1763)

Probably a resident reinforced by immigration. First recorded by Laurence (1991) on the basis of records in Lerwick and on Bressay in September 1990. Reasonably common in crofting land or gardens in south and central Mainland and known to breed, as adults have been reared from larvae by Jill Blackadder. On Unst there are only occasional records, all during periods of immigration, usually odd singles but several in August 1997. These suspected immigrants have all been found hovering strongly over apparent territories, either around trees or along upland streams. The earliest hoverfly on the wing in Shetland, with records from early May to early October. Very common and widespread in Britain, but not normally an acknowledged migrant, although Parsons (1996) recorded this species regularly on Steep Holm in the Bristol Channel. Common in Orkney but not recorded from Faeroe.

Eristalis tenax (Linnaeus, 1758)

Probably a scarce resident reinforced by immigration. First record: three collected on Fair Isle in September 1906 (Grimshaw 1906), although not recorded there since. Fairly frequently recorded in crofting land and gardens in south and central Mainland in mid June to late September. Singles on Foula in September 1995 and Unst in August 1997 are almost certain immigrants. Widespread and often abundant in Britain and a known migrant. Parsons (1996) recorded this species as a common immigrant on Steep Holm in the Bristol Channel. Uncommon in Orkney and the only record from Faeroe was in 1996.

Eupeodes (= *Metasyrphus*) *corollae* (Fabricius, 1794)

Immigrant. First recorded by Morice in 1894 (Bloomfield 1904). Common, although generally scarcer than *Episyrphus balteatus*, and recorded throughout the islands between mid May and early October. This species is often commonest early in the summer and the most noticeable influxes in recent years have been in June 1997, June 1998 (when large numbers were seen landing on a boat going round the island of Noss) and early July 1994. There is another smaller peak in records in the second half of August. As an immigrant it turns up in a variety of habitats, but unlike other migrants it is less likely to congregate around trees and bushes. Very common in Britain, but now considered unlikely to overwinter except in the mildest areas. Fairly common in Orkney and even recorded from Sule Skerry, but uncommon in Faeroe.

Eupeodes (= *Metasyrphus*) *lundbecki* (Soot-Ryen, 1946)

Immigrant, recorded on three occasions. A specimen in the National Museums of Scotland (NMS), collected on Fair Isle by Sir Arthur Duncan on 11 August 1984, was subsequently identified as the second British record of this species (Watt and Robertson 1990). Two females were collected by Frances Ratter from flowers of *Angelica sylvestris* on her croft on Foula on 13 August 1996, both specimens determined by Colin Plant. Considerable insect immigration occurred at this time (Pennington 1997). A very rare immigrant to Britain from Scandinavia. Stubbs (1996) listed just four British specimens, including the Fair Isle record, but the Foula records are additional to his list. There are no records from Orkney or Faeroe.

Eupeodes (= *Metasyrphus*) *luniger* (Meigen, 1822)

Immigrant, recorded on two occasions. One was collected by Nick Riddiford from a beach on Fair Isle in June 1993. Another was collected sunning itself on a leaf of *Acer pseudoplatanus* at Norwick, Unst on 17 September 1995. Possibly more regular but overlooked amongst similar species during immigration. Common throughout Britain and a known migrant. Evans (1915) gave a record from Auskerry, Orkney in September 1913 although the species is not included in Andrew and Watt (1993). There are no records from Faeroe.

Helophilus affinis Wahlberg, 1844

Immigrant, recorded just once. Stuke (1996) recorded finding a specimen, misidentified under *H. hybridus* Loew, 1846 in the NMS, that had been collected from Fair Isle by Sir Arthur Duncan on 2 August 1982. This is the only record for the British Isles and there are no records from Faeroe.

Helophilus pendulus (Linnaeus, 1758)

Resident and probably also immigrant. First recorded by Morice in 1894 (Bloomfield 1904). Common in lowland habitats throughout the islands, including Fair Isle and Foula, between late May and late September. An increase noted in coastal localities on Unst during obvious insect migration in August 1996. Common and very widespread in Britain and a notable wanderer. Very common in Orkney, even recorded from Sule Skerry (Plant 1995) and also common in Faeroe.

Helophilus trivittatus (Fabricius, 1805)

Immigrant, recorded on two occasions (Pennington 1996). Frances Ratter collected one on Foula on 6 July 1994, during considerable insect immigration. Another was collected from *Cirsium vulgare* flowers at Sandwick, Unst on 18 August 1995 (specimen in NMS), although there were only a few other migrant Syrphidae around. Scarce though widespread in Britain with single specimens often found, "leaving doubt as to whether a stray or a breeding site has been found" (Stubbs and Falk 1983). Scottish records are mainly from the south-west but there are a few from the east coast and one from an oil-rig, suggesting immigration (Watt 1997). The migratory tendencies of this species are more widely accepted on the Continent (Gatter and Schmid 1990, cited by Stuke 1996). Not recorded from Orkney or Faeroe.

Lejogaster metallina (Fabricius, 1777)

Resident. First recorded in June 1890 by Dale (1893). Common in damp lowland habitats throughout the islands except Fair Isle, between mid June and early August, although once recorded in September. Largely associated with *Ranunculus*, but seems to be restricted to lowland areas, despite its habitat preferences in the rest of Britain. Frequent in Britain, usually in more acidic or boggy areas. Common in Orkney, widespread but scarce in Faeroe.

Melanogaster (= *Chrysogaster*) *hirtella* (Loew, 1843)

Resident. First recorded by Laurence (1991) on the basis of specimens collected at Haroldswick on Unst in July 1983. However, now known to be common in damp lowland habitats throughout the islands except Fair Isle and Foula, between early June and late July. Extremely fond of the flowers of buttercups *Ranunculus*, and found almost wherever they occur, even extending into upland areas along suitable streams. Common and widespread in Britain, preferring richer marshes or aquatic margins, and common in Orkney. There is an old unconfirmed record from Faeroe.

Melanostoma mellinum (Linnaeus, 1758)

Resident. First recorded by Laurence (1997) on the basis of a specimen swept from a ditch at Tresta, West Mainland in June 1993. Now known to be fairly common throughout the islands (except Fair Isle where possibly overlooked) between late May and late August. On Unst at least, found in a variety of habitats but commonest on the margins of hills or on unimproved crofts, but also found along streams on moorland, where melanics occur with some frequency. One of the commonest resident species in Britain, extending onto mountains and moorland. A migrant in the Alps according to Aubert *et al.* (1976, cited in Stubbs and Falk 1983). Recorded from Orkney and Faeroe.

Melanostoma scalare (Fabricius, 1794)

Resident. First recorded at a light trap at Baltasound on 9 August 1995. Another six specimens collected on Unst in 1996 and 1997 between late June and mid August, five from heathy areas and one from a lochside mire. These come from a total of 35 *Melanostoma* specimens critically examined, a ratio of 4:1 in favour of *mellinum*. Presumably overlooked in the rest of Shetland. Common and widespread in Britain. Recorded from Orkney and Faeroe. The status of *Melanostoma* species is unclear and *scalare* and *mellinum* may be either part of one highly variable species or part of a species complex (Chandler 1998).

Meliscaeva auricollis (Meigen, 1822)

Immigrant. The first record was of one collected by Roger Tallack from around *Fuchsia* in Lerwick on 26 August 1993. Since then the species has been found in each year except 1995, in small influxes involving the summer generation between late July and early September. The only records of the spring generation involve up to three at Eswick, central Mainland in late June and early July 1998. All records so far are from around trees or bushes in central Mainland and Unst. Frequent in southern England but scarce in Scotland and Ireland. Regular in small numbers in recent years in Faeroe, but not recorded from Orkney.

Neoascia podagrica (Fabricius, 1775)

Resident. First recorded by Nick Riddiford on Fair Isle in 1992 and this remains the only known locality, although it is common there around crofts in July. Almost ubiquitous in Britain and found wherever lush vegetation occurs. The most widespread of four species of *Neoascia* in Orkney but not recorded from Faeroe.

Neoascia tenur (Harris, 1780)

Resident. First recorded by Laurence (1991) on the basis of specimens collected from beside the Loch of Spiggie in July 1982 and at Sandness on 5 July 1983. Further specimens have been collected by Frances Ratter from several sites on Foula in late June and July 1994-96. This species is obviously scarce, even though it is easily overlooked, as it has been searched for elsewhere without success. Widespread in Britain, especially around eutrophic lakes and richer boggy areas. Known from one site in Orkney and two sites in Faeroe.

Parasyrphus punctulatus (Verrall, 1873)

Immigrant, recorded on two occasions. First recorded by Laurence (1997) on the basis of a male collected in the plantations at Kergord on 7 June 1993. A female was collected by Frances Ratter on Foula on 24 May 1995. While the first record may suggest a possible breeding site, the second must surely have been an immigrant. A widespread woodland species in Britain but there are no records from Orkney or Faeroe.

Platycheirus albimanus (= *P. cyaneus*) (Fabricius, 1781)

Resident but possibly also immigrant. First recorded on Fair Isle in September 1906 (Grimshaw 1906). Common and widespread throughout the islands, between late May and mid September, but once in early October. Unusually common on Unst in June 1997 while the sole October record may also indicate immigration. The most catholic of Shetland hoverflies in habitat preferences, found in most lowland habitats, especially around crofts, gardens and roadsides, but also common along streams on the edge of hills and moorland. Not normally thought of as a migrant, but Stubbs (1998) noticed a small increase in association with known migrants. Common in Britain including Orkney and also common in Faeroe.

Platycheirus clypeatus (Meigen, 1822)

Resident. The first records are of *P. clypeatus sensu lato* on Yell in 1985 (Burbidge *et al.* 1986) since when the *P. clypeatus* complex has been split into three species. On Unst at least, *clypeatus sensu stricto* effectively replaces *manicatus* in lowland marshes and damp grassland. There are also records from Fair Isle, Foula and central Mainland in late June to late August. A specimen from Foula in 1994 was closer to *P. occultus* Goeldlin de Tiefenau, Maibach and Speight 1990, but this requires confirmation. Common and widespread in Britain, especially in marshes and lush meadows. Fairly common in Orkney and Faeroe.

Platycheirus manicatus (Meigen, 1822)

Resident. First recorded in June 1890 by Dale (1893). Common to abundant in drier grassland habitats in late May to mid September, but commonest in late June and July. Replaced by *P. clypeatus* in wetter areas and absent from hills, but otherwise found throughout the islands, including Fair Isle and Foula. In spring it is common around *Silene dioica*, presumably because this plant often carries heavy infestations of aphids. Very common and widespread in Britain, preferring dry grassland. Very common in Orkney, even recorded from Sule Skerry where breeding habitat would be very scarce, and common in Faeroe.

Platycheirus nielseni Vockeroth, 1990

Resident. Formerly included under *P. peltatus*. Specimens of *P. peltatus sensu lato*, which were probably this species, were recorded in June 1890 (Dale 1893), at Uyeasound on Unst in 1983 (Laurence 1997) and on Yell in 1985 (Burbidge *et al.* 1986). In 1996 and 1997 *P. nielseni* was found to be fairly common in acidic grassland along upland streams on the boggy, western ridge of Unst in late July and early August and it is likely that it will be found in similar areas elsewhere in the islands. Widespread and common on moorlands in the north and west of Britain. *P. peltatus sensu lato* (but probably *P. nielseni*) is quite common in Orkney, but none of the group has been recorded from Faeroe.

Platycheirus ramsarensis Goeldlin de Tiefenau, Maibach and Speight, 1990

Resident. Formerly regarded as part of the *P. clypeatus* complex, the only records involve several in acidic grassland on Hermaness Hill on Unst on 1 July 1996 and a female collected by Frances Ratter in *Luzula* moorland on Foula on 5 July 1996. Likely to occur in similar areas elsewhere in the islands. Widespread in boggy uplands in the north and west of Britain but not yet recorded from Orkney. Recently discovered in Faeroe.

Platycheirus scutatus (Meigen, 1822)

Status uncertain. The only record is of one caught by Neil Marks from around a small plantation of conifers at Lerwick Observatory in June 1993. It may be present at other plantations but the possibility that this specimen was an immigrant should not be ruled out. Widespread in Britain

but commonest in southern England. Fairly common on Orkney but only known from Tórshavn in Faeroe where it is common around gardens and plantations.

Rhingia campestris Meigen, 1822

Resident. First recorded in June 1890 by Dale (1893). Locally very common between late May to mid September but commonest in June and July. Found throughout the islands, including Fair Isle and Foula, and commonest in the best agricultural land such as south Mainland or Baltasound, Unst. Scarce or absent in less agricultural areas such as north Yell or west Mainland. Present in many areas where cattle are nowadays absent, most notably on Fair Isle. Therefore the species is probably utilising dung of other species of livestock for breeding, most likely sheep dung. Very common in Britain where cows occur but strays widely, and very common in Orkney, but not recorded from Faeroe.

[*Ripponensia* (= *Orthonnevra*) *splendens* (Meigen, 1822)]

Requires confirmation. Two females were reported caught in a sweep net at Tresta on Fetlar in July 1985, although no other species from this tribe were recorded (Burbidge *et al.* 1986). Although the specimens were identified by Dr J. Owen, this is an essentially southern species which would be surprising in Shetland and the record has been queried by several authorities. As the specimens have not been located the record is best considered unconfirmed. Found in lush fens and marshes, mainly in England, but extending into Scotland and Ireland. Not recorded from Orkney or Faeroe.]

Scaeva pyrastris (Linnaeus, 1758)

Immigrant. First recorded on Fair Isle in July 1957 (Riddiford *et al.* 1993). Just about annual in small numbers throughout the islands between early June and late August, but with most records in late June and July. Widespread in Britain but now considered unlikely to overwinter in many areas. Recorded from Orkney and Faeroe.

Scaeva selenitica (Meigen, 1822)

Immigrant. First recorded by Evans (1915) from Muckle Flugga on 14 August 1914. Laurence (1991) gave another record from Bridge of Walls on 10 July 1985. Much more sporadic in occurrence than the previous species although there are records in each year since 1992, except 1995. Recorded between early June and early October throughout the islands, but with most of the 16 recent records in either October 1992 or June 1997. Scarce but widespread in Britain, and although probably resident in some areas, it is also a migrant. Recorded for the first time in Faeroe in 1996, but not yet recorded from Orkney.

Sericomyia lappona (Linnaeus, 1758)

Resident. First recorded by Laurence (1997) on the basis of a specimen from Swining in central Mainland in June 1993. Rather scarce and local, so far nearly all records are from central Mainland between mid June and mid July, especially in the plantations at Kergord. There is one record from Bigton in south Mainland. Scarce but widespread in boggy localities in Britain although only recently discovered in Orkney. Common in Faeroe where the following species is absent.

Sericomyia silentis (Harris, 1776)

Resident. First recorded by Morice in 1894 (Bloomfield 1904). Common and recorded throughout the islands, except Fair Isle and Foula, between early July and early September. Common on hills, heaths and blanket bogs but also frequently recorded on flowers in crofting

land in late summer. Common and widespread in Britain, although local in the south-east. Common in Orkney but not recorded from Faeroe.

?Sphaerophoria scripta (Linnaeus, 1758)

Immigrant. All specimens have been females and so indeterminate, but a male seen in the field by Terry Rogers at Eswick on 11 September 1994 had the short wings characteristic of this species. The first records were females collected at Eswick on 8 July 1994 and Foula on 5 September 1994. Females have been recorded almost annually since, between late June and mid August at either Eswick or on Unst. One of the commonest grassland species in parts of Britain, boosted by migration in some years. Only *S. ruelandii* (Wiedemann, 1830) has been recorded in Orkney and *S. fatarum* Goeldlin de Tiefenau, 1989 has been recorded in Faeroe.

Syrphid pipiens (Linnaeus, 1758)

Probably a scarce or sporadic resident reinforced by immigration. First recorded in south Mainland in September 1949 (Carpenter 1950). Recorded from Fair Isle, Foula and Unst, between late June and mid August. Most records appear to relate to immigrants, but it is fairly regular in south Mainland and may be resident there and it is sometimes found elsewhere where breeding may occur, such as around old haystacks in Haroldswick on Unst in 1995-96, although absent there in 1997-98. Elsewhere on Unst most records have coincided with immigration, while singles on Foula in mid September 1995 and 1996 would also appear to be immigrants. Widely distributed in Britain, although scarce in parts of Scotland. Periodic abundance has been noted, and this species was included in a list of suspected immigrants in south Cornwall in August 1994 (Truscott 1996). Common in Orkney but the only record from Faeroe is from 1910.

Syrphid ribesii (Linnaeus, 1758)

Syrphid torvus Osten Sacken, 1875

Syrphid vitripennis Meigen, 1822

All immigrants, recorded in Shetland throughout the islands, except Fair Isle (where they have presumably been overlooked), between mid June and late September. Most records are in late July and August when these flies are typical components of insect immigration, although there was also a large influx in early July 1994. Nearly always recorded around trees or plantations, particularly *Acer pseudoplatanus*. *S. torvus* was first recorded at Loch of Hillwell, south Mainland in July 1982 (Laurence 1991), *S. ribesii* and *S. vitripennis* were both first recorded in the influx of July 1994. Of 51 specimens from 1994-97, which have been critically examined, 22 have been *vitripennis* (44%), 22 *torvus* (44%) and 7 *ribesii* (13%), or an approximate ratio of 3:3:1. All three species are common and often abundant in Britain and they are known migrants. Only *S. ribesii* and *S. vitripennis* have been recorded from Orkney, while in Faeroe *S. torvus* has only been recorded from Tórshavn and *S. vitripennis* is a scarce migrant.

Discussion

Hoverflies recorded in Shetland fall into three groups - those that are primarily or wholly resident, those that are solely immigrants and a few which appear to be both immigrant and resident. Many of the migrant hoverflies in Shetland are species that have aphidophagous larvae, whereas most of the resident species have larvae that are either less specific predators or have different larval habits. However, as Shetland has been isolated by water since the last ice age all the species currently found in Shetland must have initially arrived as immigrants.

The most obvious migrants in Shetland belong to the genera usually included in the tribe Syrphini (as they are in Stubbs and Falk 1983) - *Episyrphid*, *Eupeodes*, *Meliscaeva*,

Parasyrphus, *Scaeva*, *Sphaerophoria* and *Syrphus*. It is now known that the migrants in this group cannot overwinter in northern Europe (Torp 1994, Stubbs 1996). They are also strictly aphidophagous and many species prey on specific species of aphid associated with particular species of trees. These aphids are prone to periodic population abundances and subsequent dispersal. The migratory tendencies of the hoverflies preying on them are presumably their own adaptation to the habits of their prey. It is also not surprising that these hoverflies are only migrants to a group of cool, treeless islands like Shetland, although when large numbers occur they may breed in the few suitable areas in the islands.

The only other species recorded in Shetland solely as immigrants are two species of *Helophilus*, *H. affinis* and *H. trivittatus*, both of which are obviously extremely rare. However, many of the hoverflies in the 'eristaline' genera *Eristalis* and *Helophilus* are also immigrants to Shetland to some degree, although it is difficult to assess their status as they are also resident. One or two species, notably *Eristalis arbustorum* and *E. intricarius*, show no signs of immigration, but in the case of *E. pertinax*, *E. tenax*, and also the unrelated *Syritta pipiens*, it is suspected that any Shetland breeding population is dependent on continued immigration. The reasons for the wandering behaviour of these species are less clear, but they are generally robust species and may therefore simply have a greater capability to move over long distances. The favoured breeding sites of *Eristalis* and *Helophilus* are in water with a high organic content, and the itinerant nature of species in these genera has certainly enabled them to make rapid use of man-made sites.

There is some evidence that some species in the genera *Platycheirus* and *Melanostoma* are itinerant to some degree, although there is little evidence of this in Shetland as yet. As rather small species they are probably unlikely to be regular immigrants to Shetland, purely because of the distances involved. However, the favoured habitats of species in these genera are grassland or moorland, which are widespread in Shetland, and the larvae are general predators, so even small numbers of *Platycheirus* or *Melanostoma* species arriving in the islands could have become quickly established. Other genera recorded in Shetland show little or no sign of itinerant or migratory tendencies and they have relatively unspecialised larval habits – *Rhingia* develops in dung, *Lejogaster*, *Melanogaster*, *Neoascia* and the previously mentioned *Syritta* all develop in rotting vegetation while *Sericomyia* develops in peat. Again, although these species are not known immigrants, the amount of suitable habitat in Shetland would mean that only a few individuals need arrive due to some freak event for the species to become established.

Records from light traps in Shetland support the disputed theory that it is mainly migrants that are attracted to light, although it is impossible to know whether hoverflies found in moth-traps are merely local insects disturbed by the light or by the observer visiting the trap. However, of the 107 individuals recorded, most records coming from traps at Baltasound on Unst and Eswick in central Mainland, over 80% of the records involve the immigrant aphidophagous species. There are only three records of any of the 'eristaline' hoverflies at light, despite the fact that they are known migrants and include some of the commonest resident species in Shetland. Most of the remaining records of hoverflies at light involve *Platycheirus* or *Melanostoma*, which appear to become very active in daylight and leave the trap, so most records involve insects found at night or while emptying traps indoors.

Not surprisingly, the total number of hoverfly species recorded in Shetland falls between the totals for the two neighbouring archipelagos. The Shetland list includes 40 species, of which four require confirmation. In Orkney to the south of Shetland, there are records of 46 species, excluding two that require confirmation (Andrew and Watt 1993). In Faeroe to the north of Shetland, there are records of 28 species, excluding two that require confirmation (Jens-Kjeld Jensen *pers. comm.*).

There is a higher proportion of resident species and fewer migrants recorded so far in Orkney. A total of 17 species have been recorded in Orkney that have not been recorded in Shetland. These include some species that could conceivably be overlooked in Shetland such as *Platycheirus angustatus* Zetterstedt, *P. podagratus* (Zetterstedt), two additional species of *Neoascia*, *Orthonevra geniculata* Meigen and *Trichopsomyia flavitarsis* (Meigen). Some other species recorded from Orkney may possibly occur in Shetland as immigrants in the future - *Epistrophe grossulariae* (Meigen), *Leucozona lucorum* (Linnaeus), *Sphaerophoria ruepellii* (Wiedemann), *Anasimyia lineata* (Fabricius) and *Helophilus hybridus* Loew. Of these *Leucozona lucorum* at least is apparently resident in Orkney (Laurence 1997). Other species found in Orkney, such as four species of *Cheilosia*, *Volucella bombylans* (Linnaeus) and *Xylota segnis* (Linnaeus) would appear to be absent from Shetland because of a lack of suitable habitat. Other than the recently separated *Platycheirus ramsarensis*, which has presumably not been searched for in Orkney, the other eight species found in Shetland that have not been found in Orkney are all migrants.

Faeroe has fewer resident species than Shetland, with some common Shetland species like *Rhingia campestris* and *Sericomomyia silentis* absent. The only resident species recorded in Faeroe but not recorded from Shetland are *Platycheirus podagratus*, which is also present in Orkney, and the montane *Platycheirus melanopsis* Loew, which is unlikely to be found in Shetland. Two species have appeared in Faeroe as suspected migrants that have not been recorded in Shetland, *Sphaerophoria fatarum* and more surprisingly *Xanthandrus comtus* (Harris). Otherwise, the list of immigrant species for the two islands are quite similar, although slightly more species have reached Shetland, as would be expected.

Shetland is already famous as a place for finding rare birds and recent observations have begun to prove that rare migrant Lepidoptera also turn up on a regular basis (Pennington *et al.* 1997). It is becoming obvious that Shetland has the same potential for turning up Syrphidae. The records of *Eupeodes lundbecki* and *Helophilus affinis* prove that extremely rare species may occur. The immigrant species occurring in Shetland suggest that a wider range of hoverflies may be migrant than is widely accepted. Continued recording in the islands may help to establish which species are regular migrants to northern Britain, and perhaps give some clues as to which species may be looked for as migrants elsewhere.

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Flower-feeding in *Ortochile nigrocoerulea* Latreille (Diptera, Dolichopodidae)

- Standard works on Diptera describe adults of the Dolichopodidae as predators (e.g. Assis-Fonseca, E. C. M. d' 1978. *Handbooks for the Identification of British Insects* 9(5), 1-90) but several reports show that other food sources are sometimes used. White (1976. *Entomologist's Record* 88, 94-96.) recorded *Dolichopus trivialis* Haliday and *D. unguilatus* (Linnaeus) feeding on aphid honey-dew, and an unidentified species of this genus feeding on honey. Speight (1978. In Stubbs, A. and Chandler, P. (Eds.) *A dipterist's handbook*, 229-236) stated that dolichopodids feed at flowers but, because their mouth-parts are short, they are largely confined to flowers with well exposed nectaries, such as buttercups. They are also recorded feeding at flowers in which the nectar is slightly concealed and at those with short tubes, for instance a *Dolichopus* species at *Cirsium heterophyllum* and *Pilosella officinarum*, *Hercostomus nigripennis* (Fallén) at *Bellis perennis* (Willis, J. C. and Burkill, I. H. 1903, *Annals of Botany* 17, 313-349), a *Dolichopus* species at *Aster tripolium* and *D. plumipes* (Scopoli) at *Achillea millefolium* (Knuth, P. 1980. *Handbook of flower pollination* Vol. 2, Translation by J. R. Ainsworth Davis, Clarendon Press, Oxford). However, it is not common to see this behaviour and I was surprised to see several dolichopodids feeding avidly at flowers of an Asteraceae.

These were seen on a hot afternoon in early April 1999 at a 'tea-stop' on a road-side near Villamartin in Andalucia, southern Spain, where rather lumpy rolling hills begin to give way to the limestone sierra. The patch of dry ground was a disturbed remnant of an earlier phase in Spanish agricultural history set in the now-intensively farmed landscape that appears to characterise much of this country. Clumps of *Chrysanthemum coronarium* var. *discolor* (crown daisy) and other unidentified Asteraceae were scattered across the area. *Chrysanthemum coronarium* is a common arable species of Mediterranean Europe and has typical daisy-shaped flowers about 4cm across, with a yellow central capitulum and bicoloured white and yellow petals (in var. *discolor*).

The flies were readily recognisable as *Ortochile* (included by Assis-Fonseca, *op. cit.*, within *Hercostomus*) from their long proboscis. The species was identified (using Parent, O. 1938. *Faune de France* 35, 1-717) as *O. nigrocoerulea* Latreille, 1809, a rare species in Britain. Both sexes were seen thrusting their mouthparts deep into the florets of the capitulum, in the manner of honey bees. About ten individuals were seen doing this. None were seen feeding on flowers of other species although a *Matricaria* species was frequent here. One pair of flies were in copula on a flower, but no further note was taken of this aspect of their behaviour.

Once seen in action, the tapered shape of the proboscis (Assis-Fonseca, *op. cit.*) is clearly well adapted for feeding on these flowers, although its resemblance to the similarly shaped proboscis of many Empididae could lead one to assume that it is merely another variation for a predatory habit. The length of the head from the neck to the tip of the proboscis is about 1.75mm, which is just about the distance measured on some of the florets from the opening to the surface of the pool of nectar at its base. The neck of this species of *Ortochile* is placed relatively higher on the occiput than in a random selection of *Dolichopus* and *Hercostomus* (including *H. nigripennis* which has a longer proboscis than many dolichopodids). This appears to be an adaptation to further lengthen the amount of head that can be thrust into the tubular florets of Asteraceae.

A habit as conspicuous as feeding on flowers should make this species relatively easy to spot if it were more widespread here, although it has not been seen in Britain since 1960. The species has been recorded on the flowers of *Leucanthemum vulgare* on which females were described as abundant (although the males much scarcer) but it is not stated whether they were seen feeding (Andrews, H. W. 1939. *Entomologist's Record and Journal of Variation* 51, 128-129) - C.M. DRAKE, 22 Park Road, Deeping St James, Lincs, PE6 8ND

Northern records of *Parasyrphus nigratarsis* (Zetterstedt) (Syrphidae) -

On 16.vi.1995 Bill Fakes found an egg cluster of the dock beetle, *Gastrophysa viridula* (De Geer) (Coleoptera, Chrysomelidae), on a *Rumex* species at Workington, Cumbria (NY 015290), among which were two pale eggs. From these eggs syrphid larvae emerged which ate the beetle eggs and larvae. Unfortunately the syrphid larvae died in culture (Fakes, B. 1996. *The Carlisle Naturalist* 4, 14-15). A year later, on 8.vi.1996, further syrphid larvae were found at the same site and situation, but again they died. More larvae were found on the same beetle at Camerton (NY 041309) on 9.vi.1996. The dead larvae were sent to SMH and passed to GER for identification. They resembled the larva of *P. nigratarsis*.

On 13.vi.1997 Bill discovered two more larvae at the Grange, near Keswick, Cumbria (NY 2519), one feeding on *Chrysomela aenea* Linnaeus on *Alnus glutinosa* and the other on *G. viridula* on *Rumex*. The *Rumex* larva was sent to GER and a year later an adult female *P. nigratarsis* emerged. Further collecting by Bill in 1998 produced more larvae from *G. viridula* on *Rumex* in the Lune Valley, Lancashire and from Derwent, Cumbria. From these larvae, some of which were sent to GER, a male *P. nigratarsis* emerged in April 1999. On 12.v.1999 SMH also discovered a syrphid egg among *G. viridula* eggs on *Rumex* at Edenside, Carlisle (NY 397567). A larva of *P. nigratarsis* subsequently emerged and ate the early stages of the beetle. Brief searches by SMH on 27.v.1999 revealed *P. nigratarsis* eggs and larvae associated with *G. viridula* on dock elsewhere on the River Eden in north Cumbria: at Kirkandrews (NY 362588) and Langwathby (NY 565335).

These records stretching over a period of five years constitute a considerable advance in knowledge of the biology and distribution of this RDB 1 species in Britain. First, it had not been recorded previously from Cumbria or Lancashire where it is clearly well established. Previously it was known from Yorkshire, south-west Wales, north-east Scotland and north-west Ireland (MacGowan, I. and Watt, K. 1994. *Dipterists Digest (Second Series)* 1, 26-29; Rotheray, G.E. 1997. *Entomologist's Gazette* 48, 127-134). Second, the use of a non-arboreal chrysomelid as prey has not been known previously (Rotheray, *loc. cit.*). The repetition of records over five years shows that *G. viridula* is a regular part of the prey range used by *P. nigratarsis*. Future recording of this rare syrphid should include searches of chrysomelids on *Rumex* and possibly other chrysomelids that aggregate as larvae. M.C.D. Speight (1991. *Dipterists Digest* 8, 3-5) points out that *P. nigratarsis* may be under-recorded because adults fly high in the canopy. Searching for larval stages among chrysomelids on *Rumex* from late April to the end of June might overcome this problem and permit a more accurate evaluation of status and distribution.

It is sad to report that Bill Fakes died in 1999 and was unable to co-author this note. We wish to pay tribute to the dedication and enthusiasm with which Bill studied chrysomelids and *P. nigratarsis*. Without his hard work these new data about *P. nigratarsis* would not have been discovered - **G.E. ROTHERAY**, National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF and **S.M. HEWITT**, Tullie House Museum, Castle Street, Carlisle CA3 8TP

The early stages of *Cheilosia illustrata* (Harris) (Diptera, Syrphidae)

GRAHAM E. ROTHERAY

National Museums of Scotland, Chambers Street, Edinburgh, EH1 1JF

Summary

The third stage larva and puparium of *Cheilosia illustrata* (Harris) are described. The structure of the early stages and biology of this species, which was found to develop on large roots of *Heracleum sphondylium*, are compared with other species of *Cheilosia* Meigen and discussed in the context of phytophagy as a larval feeding mode in the Syrphidae.

Introduction

Syrphidae are well known for their biodiverse larval stages (Metcalf 1916; Vockeroth and Thompson 1987; Rotheray 1993). Within the Palaearctic fauna, the main larval feeding modes are mycophagy, phytophagy, saprophagy and predation (Rotheray and Gilbert 1999). Of these feeding modes, phytophagy is the least well known in terms of larval stages (Rotheray 1993). In Britain phytophagous species comprise the following taxa: *Cheilosia* Meigen and *Portevinia* Goffe. Two other taxa are also associated with feeding in live plants, *Eumerus* Meigen and *Merodon* Meigen. However, not all larvae of species of *Cheilosia* are phytophagous. Some are mycophagous such as *Cheilosia longula* (Zetterstedt) which feeds in the fruiting bodies of various macrofungi (Rotheray 1990); however, the continental species *C. morio* (Zetterstedt), which develops in sap exudations on conifers, feeds on the live cambium so is strictly phytophagous. Some species of *Eumerus* and *Merodon* may not be strict phytophages but feed indirectly on plant tissues that are first decayed by fungi living within live plants (Creager and Spruijt 1935). The extent to which these larvae encourage fungal decay within live plants is uncertain. Some *Cheilosia* species may have a similar relationship to fungal decay in plants. For example *Cheilosia pagana* (Meigen) appears to feed in this way on decaying roots of umbellifers (Apiaceae) (Stubbs 1980; Rotheray 1990).

Cheilosia illustrata (Harris) is a large and common species throughout the British Isles with, for *Cheilosia*, an unusual body shape and colour pattern resembling bumble-bees (Stubbs and Falk 1983). Apparently the only data concerning the larva of *C. illustrata* is a report of it being reared from roots of a *Pastinaca* species (Vappula 1941), but this has not been confirmed. Adults are often found feeding at flowers of umbellifers and from this habit, the foodplant of the larva was suggested to be a species of umbellifer (Stubbs and Falk 1983). In this paper, rearing records are given, aspects of the biology considered and a description of the third stage larva and puparium provided.

Description of the third stage larva and puparium of *Cheilosia illustrata* (Harris)

Overall appearance: a subcylindrical off-white larva lacking prolegs and crochets with protruding mouth-hooks, a lightly sclerotised dorsal plate on the prothorax, spiky spiracular plates and three pairs of spiracular openings.

Third stage larva. Length 12mm; width 5mm; subcylindrical in cross section, tapering anteriorly, truncate posteriorly (Fig. 1). **Cephalopharyngeal skeleton:** mouth-hooks with 3-4 basal "teeth" protruding from the mouth (Fig. 3); mandibular sclerites fused at base and square-shaped ventrally (ms, Fig. 9); mandibular apodeme about half as narrow and about as long

as mouth-hook with lightly sclerotised mandibular lobes attached (ml, Fig. 7); intermediate sclerite forming a large inclined, rectangular block and heavily sclerotised (is, Fig. 7); pharyngeal sclerite about equally developed dorsally and ventrally and heavily sclerotised (ps, Fig. 7); dorsal bridge present (db, Fig. 8); slight ventral pharyngeal ridges apparently present (vr, Fig. 9).

Head: antennomaxillary organs on slight, fleshy, tapering lobes projecting forward of the dorsal lip; dorsal lip bare, without setae; lateral lips little developed.

Thorax: prothorax and mesothorax nearly completely coated in vestiture comprising broad-at-base, pointed-at-tip spicules; bare patches without vestiture ventrally, also dorsum of prothorax with triangular shaped dorsal plate (a lightly sclerotised region behind the sensilla at the posterior of the segment), prothorax with a pair of deep grooves either side of the head; flexible collar present (smooth retractile area of integument surrounding the mouth); anterior fold little developed; anterior spiracles present with about 5 spiracular openings arranged in a crescent at the tip of a brown basal projection; mesothoracic prolegs absent.

Abdomen: vestiture similar to that on the thorax coating entire surface, larger on segments 6-8; sensilla mounted on shorter than broad fleshy projections with several apical setae, sensilla 2 and 3 on dorsum of 7th abdominal segment on larger projections than sensilla 1 (Fig. 2); prolegs absent; mid-ventral sensilla 10 and 11 on abdominal segments 1-7 approximated; dorsally segment 7 inclined posteriorly from fold bearing dorsal sensilla, this inclination continuous with the inclined anal segment.

Anal segment: about equally developed dorsally and ventrally with two transverse dorsal folds (Fig. 2) and wedge-shaped in lateral view (Fig. 1); 3 pairs of fleshy lappets on lateral margins (Fig. 2); 3rd (apical) lappets larger than first two pairs; anal opening transverse.

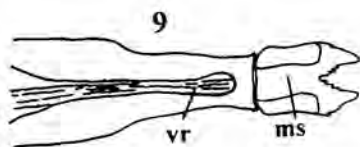
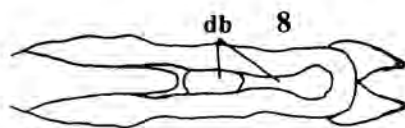
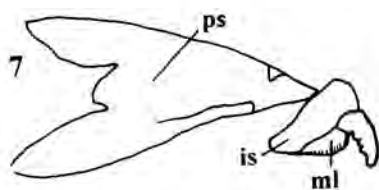
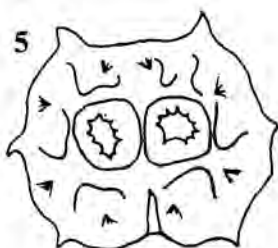
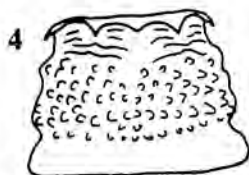
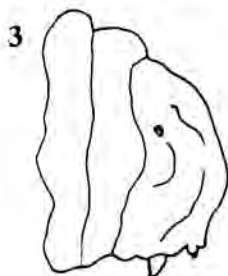
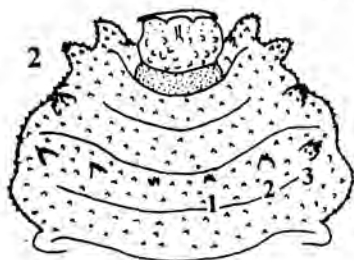
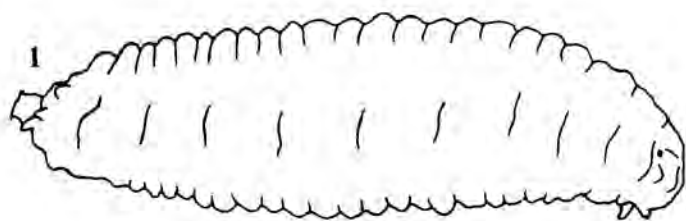
Posterior respiratory process (Fig. 4): length 0.57mm; basal width 0.71mm; base lightly nodulate; ridge present just above base, above this ridge surface nodulate and expanded to just below tip; spiracular plates with 3 pairs of spiky projections; spiracles consisting of 3 pairs of V-shaped openings, sometimes one of the openings divided; four pairs of interspiracular setae present shorter than the length of the spiracular openings (Fig. 5).

Puparium: length 7-8mm; dorsal surface inflated and arched dorsally, pale brown; pupal respiratory process: length 0.57mm; width at base 0.25mm; with raised pads bearing respiratory openings about the upper half (Fig. 6).

Material examined.

Three larvae, 21.x.1995, Meall nan Tarmachan, Ben Lawers Range, Perthshire, Scotland, altitude 600m, collected GER and A.E. Whittington, all in the root of a *Heracleum sphondylium* (Apiaceae) plant; one larva preserved, two pupated December 1995 and a male and female emerged late March 1996.

Figs. 1-9, *Cheilosia illustrata*: 1, whole larva, lateral view, length 12mm; 2, seventh and anal segments, dorsal view, 1, 2 and 3 = sensilla of the 7th segment; 3, thorax, lateral view; 4, posterior respiratory process, dorsal view, length 0.57mm; 5, posterior respiratory process, apical view; 6, pupal spiracle, ventral view, length 0.57mm; 7, cephalopharyngeal skeleton, lateral view, ml = mandibular lobes, is = intermediate sclerite, ps = pharyngeal sclerite; 8 cephalopharyngeal skeleton, dorsal view, db = dorsal bridge; 9, cephalopharyngeal skeleton, ventral view, ms = mandibular sclerite, vr = ventral pharyngeal ridges.



Discussion

In comparison with other known *Cheilosia* larvae, the larva of *C. illustrata* appears to be most similar to that of *C. variabilis* (Panzer) (Rotheray 1990). Both these larvae share a large pair of mouth-hooks bearing small 'teeth' (Fig. 7), and a similar shaped, nodulate posterior respiratory process with spiracular plates bearing three spiky projections (Figs 4 and 5). Also, they both feed in the roots of their food plants. However, *C. variabilis* feeds on *Scrophularia* species (Scrophulariaceae), not an umbellifer. The larva of *C. illustrata* can be distinguished from that of *C. variabilis* and other *Cheilosia* species with spiky projections on the margins of the spiracular plates, such as *Cheilosia albitarsis* (Meigen), by having three pairs of spiracular openings on the posterior respiratory process and having sensilla pairs 2 and 3 on the dorsum of the 7th abdominal segment on larger fleshy projections than the first sensilla (Fig. 2). *Cheilosia albitarsis* has up to 17 short pairs of spiracular openings and *C. variabilis* has 4 pairs.

It is typical of *Cheilosia* that common and widespread species, like *C. illustrata*, are rarely reared, or have not been reared at all. Reasons why encountering larvae of common species is problematic were discussed by Rotheray (1993). One of these reasons is that some species select a narrow size range of available foodplants. Also, the larvae may remain small and inconspicuous throughout summer and develop only late in the year. Such is the case with the larva of *C. albitarsis* feeding on *Ranunculus* roots (Ranunculaceae) (Rotheray 1991). Female *C. albitarsis* preferentially select large foodplants on which to oviposit, and larvae remain small until the autumn when they feed rapidly, eventually leaving the plant to pupate in the soil. In this case, autumn feeding is an advantage because it coincides with the time that the root is fully developed.

Selecting large foodplants and autumn feeding are also features of *C. illustrata*. Of about 30 *H. sphondylium* roots examined, the only ones ($n = 7$) found with *C. illustrata* larvae were large individuals. Infested roots did not have the more common 'carrot-shape' but were large and 'onion-shaped'. These large, onion-shaped roots were relatively scarce. The presence of *C. illustrata* larvae was obvious in these large roots from wet material, dark red in colour, issuing from tunnels bored into the root. Larvae (up to five per plant) were readily found in such tunnels and were actively tunnelling and feeding and three larvae reared continued to do so for several weeks before pupariation in December.

Cheilosia is an unusual genus within Syrphidae on account of the variable form and feeding habits of the larva (Rotheray and Gilbert 1999). Most other Palaearctic syrphid genera comprise species with remarkably uniform larvae. A pattern of shared characters exists in the variable form of *Cheilosia* larvae. They have suites of characters exclusively associated with particular feeding strategies such as leaf-mining, tunnelling and mycophagy (Rotheray 1990). The key factor appears to be the solidity of the food (Rotheray 1990). The larva of *C. illustrata* is similar to other tunnelling *Cheilosia* larvae and shares with them the following characters: one large pair of mouth-hooks with small basal teeth; dorsal plate on the prothorax; vestiture comprising sharply tapered and lightly sclerotised spicules; flattened anal segment; an ornamented posterior breathing tube.

A single large pair of mouth-hooks, strengthened by being fused at the base, presumably forms a more effective rasping organ for removing firm plant tissues than smaller, more numerous teeth seen in leaf-mining and mycophagous *Cheilosia* larvae (Rotheray 1990). A dorsal plate seems to protect the prothorax from wear and tear during characteristic up-and-down movements of the thorax when tunnelling. A vestiture comprising tapered and sclerotised spicules protects the integument and may also assist in movement through tunnels. An inclined and flattened anal segment and an ornamented posterior breathing tube appear to be mechanisms

to protect the spiracular openings from being blocked with plant tissue (Rotheray 1990). Unlike some Diptera larvae, these *Cheilosia* larvae are unable to groom and clean themselves.

Most tunnelling *Cheilosia* larvae have sclerotised mandibular lobes (Rotheray 1990). When sclerotised, they appear to add support to the mouth-hooks. In contrast, mycophagous larvae have soft and fleshy mandibular lobes that are used to gather semi-liquid food into the mouth (Rotheray and Gilbert 1999). In *Eumerus* larvae they are also soft and fleshy and serve a similar function. The mandibular lobes of *C. illustrata* are lightly, not heavily sclerotised. As with plants infested with *C. pagana* and *Eumerus* larvae, *C. illustrata* larvae are associated with copious amounts of wet, semi-liquid material that appears to result from fungal decay of plant material. This material may be an important source of food and they may not be strict phytophages. The lightly sclerotised mandibular lobes are possibly an intermediate stage in the shift from feeding on fungal decay of plant tissues to strict phytophagy. Further understanding of such shifts in feeding habit and associated morphology depends on more detailed observations of feeding behaviour and on rearing more *Cheilosia* larvae.

Acknowledgements

I am grateful to Andy Whittington and Dave Horsfield for accompanying me to the Ben Lawers range to search for Diptera larvae and to Andy for helping me search *H. sphondylium* plants. I am also grateful to Jens-Hermann Stuke for translation of some German language references.

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Corrections and changes to the Diptera Checklist (2) - Editor

It is intended to publish here any corrections to the text of the recently published Diptera checklist (publication date was 13 November 1998; the final 'cut-off' date for included information was 17 June 1998) and to draw attention to any subsequent changes. All readers are therefore asked to inform me of any errors or changes and I would like to thank all those who have already brought these to my attention.

The latest volume of *Zoological Record* (1997-1998) has been consulted and has confirmed that most changes affecting the British list published during the period covered (up to June 1998) were included in the checklist. Future updating should be assisted by the newly established monthly abstracting service based at the University of California, which provides details of all taxonomic changes published in a large number of scientific journals (899 as of July 1999). This is accessible under the name "New Entomological Taxa. Section E: Diptera" at the website www.sciref.org; the first of these monthly reports was for March 1999. Access to this, subsequent to the freely available March and April issues, is by subscription or exchange with journals sent for abstracting and an exchange has been set up with *Dipterists Digest*.

The Fourth Edition of the *International Code of Zoological Nomenclature* has now been published and its provisions will come into effect as predicted on 1 January 2000. Details of significant changes from the previous Code can be found on the ICZN website (www.iczn.org).

In the notes below where names of genera and species are given as in the Checklist, authorship is not stated here. Corrections are in page order; changes are listed under families; names new to the British list are given in bold type.

The notes below refer to the loss of two names due to synonymy (indicated by *) and addition of 9 species, a net gain of 7 resulting in a new total of 6686 species.

Corrections

- p. 14 STIGMATOMERIA is feminine so the species should be *crassicornis* (Stannius, 1831).
- p. 15 The reference under *Mycetophila strigatoides* should be Chandler (1977c) not (1978b).
- p. 18 Spelling of Winnertz in last line of Note 8 is incorrect.
Chandler (1978b) should become (1977c), so only one reference belongs to 1978.
- p. 45 *Threticus lucifugus* was described in *Pericoma*, not *Psychoda*.
- p. 75 PACHYGASTERINAE should be PACHYGASTRINAE (as indicated in previous issue in the case of LEPTOGASTRINAE).
- p. 134 *Sepsis pilipes* Wulp, 1871 should be *pilipes* van der Wulp, 1871.
- p. 158 In *Camilla, subfusipes* is misplaced and should be below *aerata* as a synonym of *glabra*.
- p. 183 *Athrycia impressa* (Wulp, 1869 - *Plagia*) should be (van der Wulp, 1869 - *Plagia*).
- p. 215 The name *maculosa* should be added to the Index; it appears on pp. 1, 13, 15, 172, 186.

Changes

Mycetophilidae. The genus **CREAGDHUBHIA** Chandler, 1999 and its species **mallochorum** Chandler, 1999 were added by P.J. CHANDLER (1999. *British Journal of Entomology and Natural History* 12, 121-134).

Chironomidae. *Brillia modesta* is a junior primary homonym of *Chironomus modestus* Say, 1823 and should be replaced by *bifida* (Kieffer, 1909 - *Metriocnemus*) (M. Spies and F. Reiss. 1996. *Spixiana Supplement* 22, 61-119) (P.H. Langton pers. comm.).

Dolichopodidae. The species added in the present issue was reported in the previous issue.

Phoridae. The complex of species related to *Megaselia pulicaria* has been revised by H. DISNEY (1999. *Journal of Natural History* **33/8**, 1159-1216), resulting in the following changes to the British list, in addition to all of those cited as Disney (in press) in the checklist:

Megaselia dimidia * was synonymised with *M. angusta*.

M. angustina, cited as a synonym of *angusta* in the checklist, was raised to subspecies rank for the Canary Islands population of *angusta* so should be deleted from the British synonymy.

M. nectergata Disney, 1999 was added.

M. oviaraneae Disney, 1999 was added.

M. rotundapicis Disney, 1999 was added.

Syrphidae. *Syrphus rectus* Osten Sacken, 1875 ++ is added in the present issue from Ireland.

Pipunculidae. The 1997-1998 volume of *Zoological Record* devotes about 20 pages to transfer of all species of *Eudorylas* to NEODORYLAS Kuznetsov, 1995, but the maintenance of EUDORYLAS as the name of this genus is recommended pending a likely application to ICZN mentioned in the previous issue of *Dipterists Digest*.

Opomyzidae. *Geomyza nartshukae* Carles-Tolra, 1993 was added by J.W. VAN ZUIJLEN (1999. *Studia dipterologica* **6**, 205-206), based on specimens collected in Somerset by Martin Drake.

J.W. VAN ZUIJLEN (1999. *Studia dipterologica* **6**, 129-143) also revised the Fallén collection of Opomyzidae and designated lectotypes for *tripunctata* and *punctella*; he also discussed the problem concerning the Linnaean types of *combinata* and *germinationis* cited in Note 1 of the checklist. In the same paper sternite 8 of the females of *halachowskyi*, *hackmani* and the two non-British members of the "*combinata*" group was figured.

Chloropidae. Some changes proposed by M. VON TSCHIRNHAUS (1992. *Decheniana Beihefte* **31**, 445-497; reference cited under Agromyzidae in the Checklist), previously overlooked by *Zoological Record*, are cited in the 1997-1998 volume. These include the raising of *Comioscinella mimula* from synonymy, thus confirming its status in the checklist (discussed in Note 7). The proposal in the same paper that *Cetema simile* is a synonym of *C. elongatum* is incorrect; E. NARTSHUK (1999. *International Journal of Dipterological Research* **10**(1), 67-70) has established that *simile* is a distinct species.

Ephydriidae. There are three changes in NOTIPHILA sensu stricto (C.M. Drake pers. comm.). *N. aquatica* was recorded as British in error in the Checklist, the specimens concerned being *subnigra* Krivosheina, 1998 which should replace *aquatica* on the list. The *Notiphila* sp. mentioned in the previous issue (6, p. 41) has been determined as *graecula* Becker, 1926, which should be added to the list. Both species can be named from the paper by M. KRIVOSHEINA (1998. *International Journal of Dipterological Research* **9**(1), 31-63). In the same paper, *N. supposita* * was synonymised with *N. maculata*.

Sarcophagidae. The genus TAXIGRAMMA Perris, 1852 and its species *hilarella* (Zetterstedt, 1844 - *Miltogramma*) are added in the present issue.

Tachinidae. *Siphona hokkaidensis* Mesnil, 1957 is added in the present issue.

***Taxigramma hilarella* (Zetterstedt, 1844) (Diptera, Sarcophagidae), a genus and species new to Britain**

PETER J. CHANDLER

43 Eastfield Road, Burnham, Slough, Berks SL1 7EL

Summary

The genus *Taxigramma* Perris, 1852 is newly recorded from Britain on the species *T. hilarella* (Zetterstedt). Its distinctions from related genera are given.

This is a belated addition to the British list as it is based on a specimen which I collected on 22 July 1973, whose identity was not recognised until this year. This is a relatively small species, belonging to the large group of Sarcophagidae associated as larvae with the nests of solitary Hymenoptera Aculeata.

Until recently this species was included in the genus *Hilarella* Rondani, 1856 and it was described and figured as *H. hilarella* by Pape (1987), from which it can be determined. Pape (1996) placed *Hilarella* in synonymy under *Taxigramma* Perris, 1852. Two species occurring in Scandinavia were included in each of these genera by Pape (1987) and the presence of arisal pubescence used as a key character to distinguish the *Hilarella* species from *Taxigramma*. Pape (1996) also noted that *Hilarella* has also been distinguished from *Taxigramma* by a less costalised wing venation, but clear distinctions between these taxa could not be maintained and he considered that the closed cell r_{4+5} , shared by them, suggested that they were a monophyletic group.

Pape (1987) treated *Taxigramma* as neuter, as is usually the case with generic names ending in the Greek neuter noun *gramma*, but subsequently (1996) treated it as feminine on the same basis as *Miltogramma*, having decided that the latter name was based on the Greek feminine noun *gramme*. This is discussed by Chandler (1998), where Pape was followed in assigning feminine gender to *Miltogramma*.

A male of *T. hilarella* was found in the large sandpit which forms a clearing in heathland and *Pinus* woodland at Horsell Common, Surrey. This is a site rich in aculeates which nest in and around the sandpit and several species of Sarcophagidae associated with them are frequent there. Pape (1987) cited only the sandwasp *Ammophila sabulosa* (Linnaeus) as a host of *hilarella* but most members of this group are not very specific in their choice of hosts, often including unrelated genera of aculeates.

On the same visit in 1973 several *Senotainia conica* (Fallén) and a female of *Miltogramma punctata* Meigen were also collected. Having recognised the identity of the specimen of *T. hilarella*, visits were made to the site on 23 and 30 July and 6 September 1999. These visits were on hot sunny days and there was much aculeate activity in the area. Because *T. hilarella* is about the same size as *S. conica* and superficially similar in build and appearance, its recognition in the field was not anticipated and specimens of Sarcophagidae were collected indiscriminately on these visits. Both sexes of *S. conica* were found to be numerous on all visits, with smaller numbers of *Metopia argyrocephala* (Meigen) and *Miltogramma punctata*, but no further material of *Taxigramma* was found so it has not been possible to confirm whether it still occurs there. The continuity of the site should not have precluded its survival, the sandpit having remained extensive although the surroundings have become more wooded. However, there is considerable public usage of the area and the effects of disturbance may have been detrimental.

Taxigramma hilarella is a Holarctic species and according to Pape (1996) it is widespread in North America and the eastern part of the Palaearctic Region. It is also found widely in central and northern Europe, including France and Germany. Pape (1987) recorded it from Denmark and the southern parts of Sweden and Finland. It is therefore surprising that it should have been found at only a single site in Britain, although it may have been overlooked amongst other small Sarcophagidae.

The size range of *T. hilarella* was given by Pape (1987) as 3.5-6.0mm in body length. The British specimen has a body length 5.4mm and wing length 4.0mm. It is a slender bodied predominantly grey fly with the abdomen tapered apically. The head is more silvery and the thorax has some darker reflections dorsally but no distinct markings, while the abdomen has three large triangular black markings set posteriorly on each tergite, a little less distinct on tergite 1+2 and the central spot narrower on tergite 5.

The most recent British key to the Sarcophagidae was by van Emden (1954), who treated this family as a subfamily of the Calliphoridae. *T. hilarella* does not run well through his key as the arista has relatively short pubescence, but with some hairs longer than its diameter, so it could run either way from couplet 2. In the first alternative it runs best to *Ptychoneura* (now *Oebalia* Robineau-Desvoidy) and in the second to *Sarcophila*. As indicated in Pape's (1987) key, it is distinguished from *Sarcophila* by the absence of anterodorsal setae on tibia 2 and from both genera by wing cell r_{4+5} being closed at or close to the wing margin. *Senotainia conica* also usually has this cell open, but one female collected on 6 September 1999 has the cell closed on both wings; this is evidently an aberrant specimen as 21 males and 19 females from this year's catch have the cell open. *S. conica* differs from *T. hilarella* in its bare arista and in its vibrissal angle being almost as prominent as the frons; the male genitalia obviously differ in structure and the fine hairs on the male fore tarsus figured for *hilarella* by Pape (1987) are absent in *conica*.

The short arisal hairs distinguish *T. hilarella* and *T. stictica* (Meigen) from the two species referred to *Taxigramma* by Pape (1987), who described these hairs as being slightly longer than the greatest arisal diameter. However, the British specimen has some hairs in the middle part of the arista practically twice the maximum arisal diameter. *T. stictica* is restricted to the Palaearctic Region but is commoner than *hilarella* in Denmark and Sweden; it is distinguished by being more yellowish with the abdominal markings smaller, but with four spots on each tergite. The British specimen also agrees with the figures given by Pape in the structure of its male genitalia, which were exerted before drying.

Acknowledgements

I would like to thank Steven Falk for confirming that no other British records of the genus *Taxigramma* were known to him and for useful discussion.

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***Siphona hokkaidensis* Mesnil, 1957 (Diptera, Tachinidae), new to Britain**

PETER J. CHANDLER

43 Eastfield Road, Burnham, Slough, Berks SL1 7EL

Summary

Siphona hokkaidensis Mesnil is added to the British list and its distinctions from other species of *Siphona* are given.

Several males of *Siphona* which ran to *S. boreata* Mesnil in the Handbook to the British species of Tachinidae by Belshaw (1993) differed from that species in having the first flagellomere (= segment 3 of antenna) more strongly enlarged apically. In the key to the European species by Andersen (1996) these specimens run to *S. hokkaidensis* Mesnil, a name which he applied to a newly revised taxon previously misidentified in Europe as *S. nigricans* (Villeneuve).

Andersen showed that *nigricans* was a boreal species, only confirmed to occur in north Sweden and differing in the entirely dark abdomen of both sexes from *hokkaidensis*, which has large yellow lateral patches, especially in the male. As the specific name implies, *hokkaidensis* was described from Japan but was recorded widely in western Europe from Sweden and Norway south to the Pyrenees by Andersen (*op. cit.*), who noted that it was rare except in Germany where it had been reported as locally common by Tschorsnig and Herting (1994) under the name *nigricans*. It also appears as *nigricans* in the German checklist (Tschorsnig and Ziegler, 1999), which was drafted prior to the publication of Andersen's revision (Tschorsnig, *pers. comm.*).

Only males of *hokkaidensis* have been examined. They run to this species in Andersen's key because the male claws are short, there are long lateral marginal setae on tergite 1+2, four postsutural dorsocentral setae, scape and pedicel more or less brownish yellow, tegula dark brown to blackish and the entirely dark brown first flagellomere is distinctly wider apically than the maximum width of femur 1. It has a similar general appearance to other species of *Siphona*: the head with yellowish pollinosity and a darker yellow frons, the thorax yellowish brown dusted, the abdomen with tergites 1+2 and 3 broadly yellow laterally (sometimes extended onto the sides of tergite 4) with only the central part more brownish dusted like the succeeding tergites and dark spots around the bases of setae and setulae. The specimens examined are 3.2-3.8mm in wing length, the body length 3.8-4.4mm (3.5-4.5mm given by Andersen).

The large antenna with the first flagellomere strongly broadened apically in lateral view is in common with *S. nigricans* but serves to distinguish the species from other *Siphona* recorded in Britain. *S. boreata* has this segment less strongly broadened apically and only slightly broader than the maximum width of femur 1. It also has a dark mark dorsally on the apex of femora 2 and 3, while *hokkaidensis* has the femora and tibiae entirely yellow. Belshaw (1993) gave records from Scotland, Ireland and Silwood Park in Berkshire for *boreata*; I have examined a male from Long Arm carr at Chobham Common, Surrey which I collected on 5 July 1984.

One of the British specimens of *S. hokkaidensis* has been dissected and found to agree with the figures of the genitalia given by Andersen (1996), who also figured the head of this and other species of the genus.

Like the common species *geniculata* (De Geer), *S. hokkaidensis* is a parasite of crane-fly larvae, a record from *Tipula irrorata* Macquart (Tipulidae) being cited by Andersen (1996). Of the other species of *Siphona* found in Britain six parasitise Lepidoptera and the biology of the remaining three including *boreata* is unknown.

S. hokkaidensis is evidently widespread in Britain as the few specimens examined indicate and has probably been overlooked among collections of this difficult genus.

The use of Andersen's key, in preference to that by Belshaw, for certain determination of British material of the genus *Siphona* is recommended.

British material of *Siphona hokkaidensis* (all collected by the author):

Yorkshire, New Millerdam Country Park, 31.vii.1979, 1 male; Staffordshire, Coombe Valley Nature Reserve, 18.vii.1990, 1 male; Perthshire, Mugdock Wood, 12.vii.1995, 1 male.

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New records of Asilidae (Diptera) at Hartslock nature reserve in Oxfordshire - Hartslock, a BBONT nature reserve near Goring-on-Thames in south Oxfordshire (V.C. 23, SU 616796) is described in the note by Chris Raper and Martin Harvey (1999. *Dipterists Digest (Second Series)* **6**, 46). The habitat is mainly unimproved chalk grassland and is proving to have a rich Diptera fauna thanks to recording efforts by Chris Raper. The site is on hills rising above the south bank of the Thames and was formerly in Berkshire.

An opportunity to sample the fauna of this interesting area was provided by the BENHS field meeting at this site on 10 July 1999, when I was surprised to find two uncommon species of Asilidae. A female *Machimus rusticus* (Meigen), caught on marginal vegetation below the hedge at the top of one of the fields, was carrying a male *Chloromyia formosa* (Scopoli) (Stratiomyidae) as prey. *M. rusticus* is a very local species of calcareous grassland habitats in the south of England, which had not previously been recorded from this area. The common species *M. atricapillus* (Fallén) was frequently seen, both in open grassland and along adjacent woodland edge during the visit, but no other individuals of *rusticus* were noted.

However, of more interest was the capture by sweeping longer patches of open grassland, of a female *Leptarthrus vitripennis* (Meigen). This is a recent addition to the British list of which the status was discussed by R. Hawkins (1998. *British Journal of Entomology and Natural History Society* **11**, 12-14), who reported three records from Surrey and has since informed me of a further Surrey record. A record from Kent has been reported by L. Clemons (1999. *Bulletin of the Kent Field Club* **44**, 78-88); it would appear that the Hartslock record is the sixth from Britain and the most westerly so far. A recent increase in the population of this species seems likely and *Leptarthrus* from calcareous habitats should always be checked carefully; the two species can occur together and *L. brevisrostris* (Meigen) has also been found at Hartslock (C. Raper, pers. comm.) - **PETER J. CHANDLER**, 43 Eastfield Road, Burnham, Slough, Berks SL1 7EL

***Campsicnemus umbripennis hispanicus* Strobl (Diptera,
Dolichopodidae) new to Britain**

IVAN PERRY

27 Mill Road, Lode, Cambridge, CB5 9EN

Summary

Campsicnemus umbripennis hispanicus Strobl is recorded from Britain and Portugal for the first time. Its distinction from the typical form is given, along with the known distribution of both subspecies.

During the Dipterists Forum Field Meeting to Dorset in 1998, I made two visits to an area of the coast with active landslips known as the Spittles (SY 3493). On the second occasion, on 2 July, I collected a single male dolichopodid, whose identity I failed to recognise. On returning home I was able to confirm by using Assis-Fonseca (1978) that the specimen was as I suspected a species of *Campsicnemus* and one not included in that key. The distinctive features were darkened, narrow wings with the anal lobe poorly developed, legs all dark green apart from the apex of the first and middle femora which were orange and a short middle first tarsomere with a thickened dorsal spine, somewhat similar to *C. curvipes*.

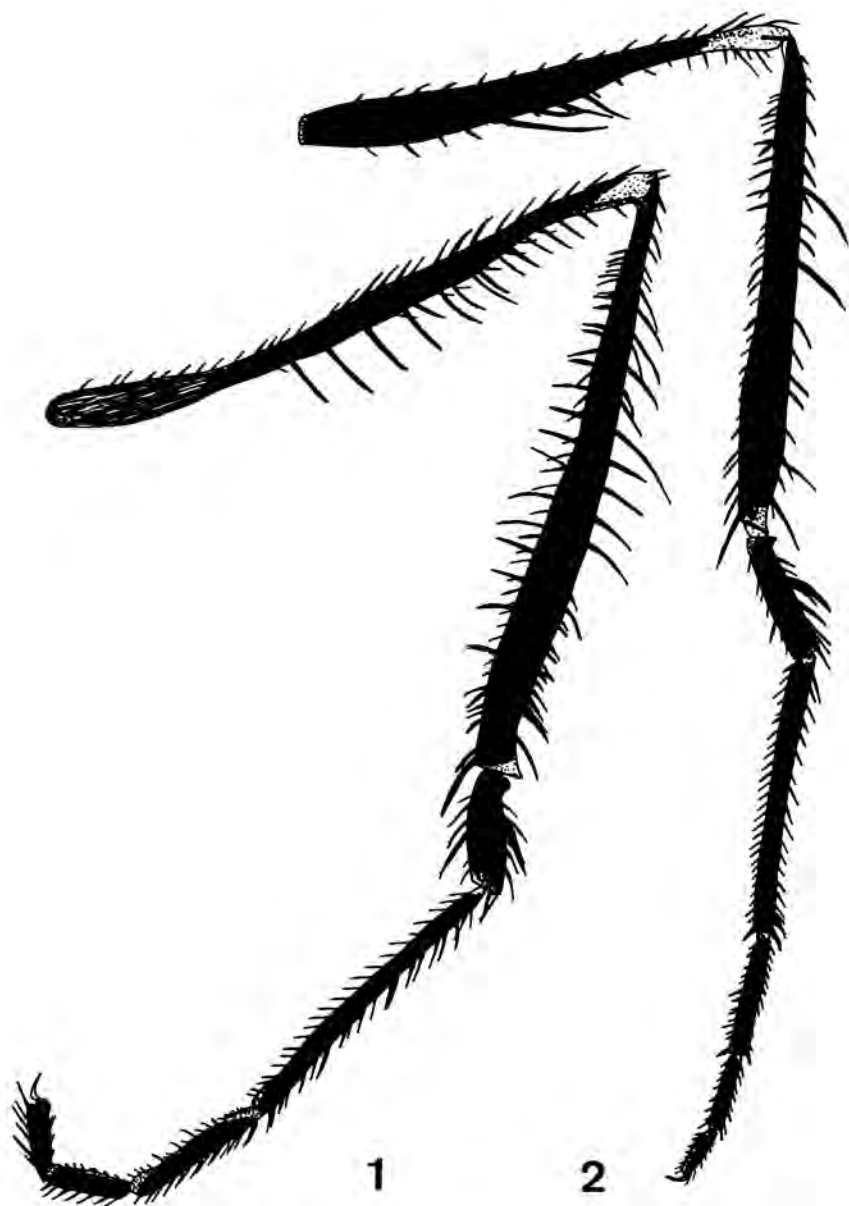
Whilst at the Forum's Annual Meeting at the National Museum of Wales, Cardiff in November, the opportunity was taken to briefly consult Parent (1938). An illustration in that publication of the middle leg of *Campsicnemus umbripennis* Loew, 1856 was very similar to the Dorset specimen, but differed in particular in the arrangement of the bristles beneath the middle femora. At this point I was fortunately able to pass the specimen to Peter Dyte, who was also at the meeting and I am grateful to him for providing much of the subsequent information.

Peter was able to identify the specimen as *C. umbripennis hispanicus* Strobl, 1899, listed as a subspecies of *C. umbripennis* in the Palaearctic Catalogue (Negrobov 1991). In the key provided by Parent (1938) it is treated as a variety and, as mentioned above, the most distinctive difference is the arrangement of the bristles beneath the middle femur. In the typical form *C. umbripennis umbripennis* Loew, 1856, there is an anterior ventral row of 12 bristles distributed from the middle to the apex and a posterior ventral row of 6-7 more robust evenly spaced spines about the middle (Fig. 1). In the subspecies *hispanicus* there is just a single row of ventral bristles consisting of 4-5 robust spines at the middle with the most basal one distinctly longer than the rest (Fig. 2).

The typical form is widely distributed from Afghanistan and Turkmenia in the east across southern and central Europe to France and Spain in the west. The variety *hispanicus* has a much more restricted distribution and although being widely distributed in Spain, the only other area it is known from is the French Pyrenees, where Parent (1938) reported that it occurred in the company of the typical subspecies. Britain and now Portugal (1 male, Algarve, near Tavira, edge of river Segua, 11.v.1989, C.E. Dyte) can be added to that list.

The Dorset specimen was taken by general sweeping above the landslips, either where there were several wet depressions in an area of open grassland, or along the coastal path which was damp and partly shaded by scrub and trees. None were found on the landslips themselves although I and several members of the party spent some time collecting there.

Figs. 1-2. Male mid legs of *Campsicnemus umbripennis* Loew, anterior view: 1, *C. umbripennis umbripennis*; 2, *C. umbripennis hispanicus* Strobl.



1

2

The discovery of species of flies with a Lusitanian distribution along the south-west coast of Britain is not unknown, indeed the crane fly *Helius hispanicus* Lackschewitz (Limoniidae) has been found just a few miles away (Stubbs 1992). It seems very likely that there are other similar species that, because they have small discrete populations, have avoided detection.

Acknowledgements

I am extremely grateful to Peter Dyte for identifying *Campsicnemus umbripennis hispanicus*, allowing me to publish his record from Portugal and for supplying much of the information contained here. I also thank Peter Chandler for providing the figures for this paper.

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***Callicera aurata* (Rossi) (Diptera, Syrphidae) in the Lake District** - On 26 July 1998 I took a female *Callicera aurata* (Rossi) inside the main greenhouse at Lingholm Gardens, near Keswick. The Gardens and adjacent Woodland Garden contain numerous mature beech trees (*Fagus sylvatica*). This is the most northerly record to date and a first for Cumberland (V.C. 70). There is a previous, possibly overlooked, record for the south of the Lake District (V.C. 69), taken in a garden at Grasmere (Oldfield, T. 1963. A syrphid new to Westmorland. *The Field Naturalist* Vol. 8 (N. S.), No. 4).

Callicera aurata may possibly be migratory, but in view of the previous record, the suitable habitat and the fact that July 1998 was virtually without sunshine, it is reasonable to assume that *aurata* is breeding in the Lake District, even though this extends its range considerably to the north - **JOHN B. PARKER**, 11 Queen Street, Penrith, Cumbria CA11 7XF

Corrections - Some errors arose in the previous issue of *Dipterists Digest* due to faulty word-processing. The word "fallen" was transmuted into Fallén on pages 31 (line 7) and 53 (2nd paragraph line 5) while other instances of the word avoided this change.

In my own paper on Scatopsidae, the author of *Anapausis soluta* was erroneously given as Duda in the captions to the figures and in the keys to both sexes, after late substitution of *tenuicauda* by *soluta*. It is correctly given as (Loew) elsewhere in the paper - **EDITOR**

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