

Dipterists Digest



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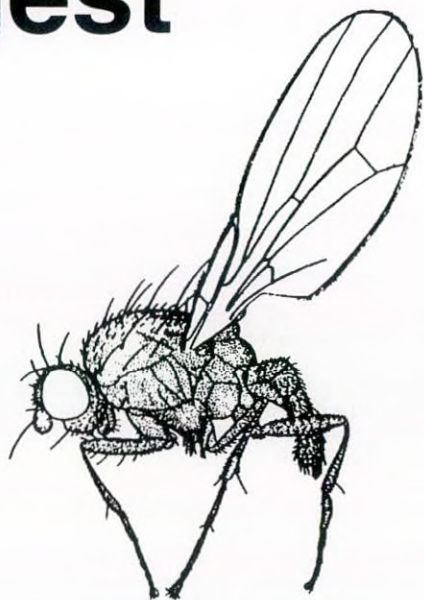
ANNOUNCEMENT

Dipterists will be aware that 16 September 2011 is the centenary of the death of George Henry Verrall (1848-1911), who did so much to lay the foundations of the study of British Diptera. He is best known for his two large volumes of *British Flies*, but also compiled the first checklists of British Diptera (1888 and 1901). His nephew James Edward Collin (1876-1968) built on his work and provided continuity to recent generations of dipterists.

To mark this centenary Volume 18 Part 2 will be dedicated to the memory of George Henry Verrall and contributions related to his life and work are requested for inclusion in that issue.

Cover illustration: A male of the soldierfly *Stratiomys chamaeleon* (Linnaeus) (Stratiomyidae) from Parsonage Moor, Cothill Fen SSSI, Oxfordshire, July 2010 (see article on this species on pages 141-144). Photograph Judy Webb.

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

The scope of **Dipterists Digest** is:

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

Articles must not have been accepted for publication elsewhere and should be written in clear and concise English. Items exceeding 3000 words may be serialised or printed in full, depending on competition for space. **Contributions should preferably be supplied either as E-mail attachments or on 3.5" computer disc or CD in Word or compatible formats and accompanied by hard copy.**

NEW INSTRUCTIONS: Articles should be supplied in A5 format with text in 9-point font, title 12 point and author's name 10.5 point, with 0.55" side margins. Figures should be supplied separately as jpeg files to fit in the above page format, or as hard copy.

Style and format should follow articles published in the most recent issue. A short Summary (in the form of an Abstract) should be included at the beginning of each article. References to journals should give the title of the journal in full. Scientific names should be italicised. Authors of scientific names should be given in full and nomenclature should follow the most recent checklist, unless reflecting subsequent changes. Figures should be drawn in clear black ink, about 1.5 times their printed size and lettered clearly. **Colour photographs will also be considered.** Descriptions of new species should include a statement of the museum or institution in which type material is being deposited.

Authors will be provided with twenty separates of papers of two or more pages in length.

Articles and notes for publication should be sent to the Editor at the address given above. Enquiries about subscriptions and information about the **Dipterists Forum** should be addressed to the Membership Secretary, Mick Parker, 9 East Wyld Road, Weymouth, Dorset DT4 0RP, UK

Chetostoma curvinerve (Rondani) (Diptera, Tephritidae) in Britain

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Summary

The original description of *Chetostoma curvinerve* (Rondani, 1856) is reproduced and the origin of the widely used spelling of the generic name as *Chaetostoma* is traced. British literature and other records are summarised. The phylogeny and life history of related species are discussed, with a view to elucidating the, currently unknown, host plant.

Nomenclature

Chetostoma curvinerve was described by Camillo Rondani (1856: 112) thus:

‘Genus 17. CHETOSTOMA mihi

Spec. Typ: (nova) CHETOSTOMA CURVINERVIS Mihi.

UU. *Epistomium* setis validis destitutura, — *Vena longitudinalis* quarta nec manifeste incurvata nec retroflexa.

V. *Scutellum* setis quatuor praeditura, — *Femora* quatuor postica inferne breviter sed distincte omnino ciliata.’

While the etymology was not given the generic name is assumed to be derived from the ancient Greek words *χαίτη*, flowing hair, mane and (sometimes) a hedgehog spine and *στόμα*, mouth – a reference to the conspicuous bristles on the parafacialia.

More detailed descriptions were published later (Rondani 1869, 1871).

When comparing the European and American fauna of ‘Trypetina’ Loew (1873: 332) stated: “Subgenera with a small number of species, occurring in Europe and wanting in North America, are: ...5. *Chetostoma* (one species, distinguished by the bristly sides of the face)”. A decade later Achille Costa (1884) described *Chaetostoma princeps* (now regarded as a synonym of *Chetostoma curvinerve* Rondani) from two females, one from Aritzo woods and the other from Sa Minda valley, Sardinia on 21 and 27 July 1883 respectively. As a footnote he said that while Rondani wrote *Chetostoma*, he (Costa) had changed the spelling to *Chaetostoma*. During the twentieth century this emendation was accepted by several taxonomists, e.g. Hendel 1927; Hering 1938 and 1953; Zia 1938; Ito 1953; Rohdendorf 1955; Blanc 1959 and Richter 1965, but *Chaetostoma* is now reserved for a genus of fish.

Identification

Discounting the earliest keys by Curtis (1838), Walker (1835, 1853) and Wingate (1906) the only key to the genera and selected species of British Tephritidae, prior to the Handbook by White (1988), was by Collin (1947). Here *Chetostoma* was described at couplet 22(23) as *Chaetostoma* thus: “Mouth-edge at sides towards front with a series of about six, strong, spinose bristles.” Cyril Hammond illustrated the whole fly in the paper by Stubbs (1975). The more recent works by Merz (1994) and Smit (2010) supersede that of White (1988) in providing more detailed descriptions of the adult morphology and in keying the other, more widespread, European species of the genus - *Chetostoma stackelbergi* (Rohdendorf, 1955).

British literature references

The first reference in the British literature was by Verrall (1901), who included it in his revised checklist as *Chaetostoma curvinervis* Rnd. Presumably Verrall knew of the specimen taken by John Yerbury at Bickley, South Devon on 1 April 1893, now in the Natural History Museum, London but Yerbury did not publish details of this. As the species was omitted from the checklist by Kloet and Hincks (1945) the next reference was by Collin (1947) who wrote: "*Chaetostoma Giraudi*, Frauenfeld. The description by Frauenfeld of a *Spilographa Giraudi* in 1864 (Verh. Ges. Wien., xiv, 382) appears to be long overlooked. The name is not given in Kertesz' "Katalog" of the Palaearctic species (1905). Frauenfeld gave a figure of the wing, and this together with the description leave little room for doubt that his species was the same as that described by Rondani in 1870 as *Chaetostoma curvinervis*." Presumably the reason why Collin gave the year of Rondani's description as 1870 was because Becker *et. al* (1905) [referred to by Collin as "Kertesz' Katalog"] stated:

'Chetostoma

ROND., Prodr., I. 112. (1856) et Prodr., VII. Orthalid. 26. VI. (1870).

curvinervis ROND., Prodr., VII. Orthalid. 26. 1. (1870). Italia.

princeps A. COSTA, Atti Accad. Napoli Mém., III. 63. (1864). Italia.'

The nomenclatural confusion was highlighted by Stubbs (1975). He stated "Even the name has its own problems. *Chetostoma curvinerve* was described as a new genus and species by Rondani in 1856. It is thus surprising that Hendel (1927) in his Palaearctic monograph on trypetids came to use the name *Chetostoma giraudii* Frauenfeld, 1864 for the single European species in the genus, with *curvinervis* Rondani, 1869 as a synonym, thus ignoring the original description. Perhaps it was through following Hendel that Collin in 1947 used Frauenfeld's name, citing the date of Rondani's name as 1870, though curiously his collection has a space for *curvinervis* Rondani. Stone (1965), in the North American catalogue, adopted Rondani's 1856 names and accepts the synonymy of the Frauenfeld description, so the interpretation of this recent checklist is adopted - "especially having checked the original papers embroiled in this conclusion." Note that Hendel actually used the generic name *Chaetostoma*, not *Chetostoma*.

Brian Cogan prepared the Tephritidae checklist for Kloet and Hincks (1976) and gave *giraudii* Frauenfeld, 1864 as a synonym of *curvinervis* Rondani, 1856, overlooking that Stone *et. al.* (1965) had already changed the specific name to *curvinerve* on the grounds that 'stoma' is of neuter gender. In subsequent checklists (White 1986 and 1988, Chandler 1998b) the species was referred to as *Chetostoma curvinerve* Rondani, 1856 without synonyms.

When Alan Stubbs (Stubbs 1975) recorded a female at Hawkhurst Court Green, East Sussex on 12 May 1973 the assumption was that this represented the second captured British specimen, after that by Yerbury on 1 April 1893 mentioned earlier. Peter Chandler (Chandler 1987), however, subsequently found a specimen in Gurth Waller's collection, donated to Maidstone Museum after his death in 1984, from Havant, Hampshire dated 28 April 1973. One of the aims of Chandler's note was to report his discovery of a male at Gwendraeth Wood, Kennack Cove, Cornwall on 4 October 1983 but another record, by Martin Speight from Bournemouth, Dorset on 17 April 1978 was also mentioned.

Shirt (1987) gave no further information other than to classify '*Chetostoma curvinervis*' as Category 1 Endangered, i.e. taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating.

White (1988) keyed and, briefly, described the species. He stated "The biology of our single species is unknown but the related *C. continuans* Zia develops in the fruit of *Lonicera* species in the U.S.S.R. (Kandybina 1966), and it seems likely that our *C. curvinerve* has a similar biology" and gave the status and distribution as "Very rare, recently recorded only from Cornwall, Dorset, Surrey and Sussex; old record from Devon. Central and southern Europe and Israel."

Grainger (1990) recorded having taken a female in his parents' home, subsequently ascertained to be Summersdale, Chichester, West Sussex, on 5 February 1989.

In his review of the scarce and threatened flies of Great Britain Falk (1991) downgraded the status of the species from Endangered (RDB1) to Vulnerable (RDB2) and stated "Six known post 1960 sites: Kennack Cove, Cornwall (1983); Havant, Hampshire (1973); Bournemouth, Dorset (1978); Mens and the Cut, Sussex (1977); Guildford (1986) and White Beech (1988), Surrey." While the Mens and the Cut record undoubtedly referred to Stubbs' capture at Hawkhurst Court Green the source, according to Falk's original record card, was Horsham Natural History Society via Nature Conservancy Council, so 1977 was possibly the year the record was submitted.

The eight dots (representing 10km squares) given in my distribution map (Clemons 1996) referred to all records cited above, with the exception of that for "Guildford" (data then unknown) and the addition of a record by Roger Dumbrell from Abbot's Wood, East Sussex on 28 March 1976 (Peter Hodge *pers. comm.*).

A record from Covert Wood, near Canterbury, Kent, on 1 May 1997 was published by me (Clemons 1988, 2000) and this was repeated by Chandler (1998c) who gave details of four more records. These were 22 April 1998, Burnham Beeches, Buckinghamshire – female swept from holly *Ilex aquifolium* foliage (Peter Chandler); 21 June 1988 Kingwood Common, Oxfordshire – sparse woodland and remnant heath with brambles (Martin Harvey); mid July 1998 Maidenhead, Berkshire – female found dead between double glazing in lounge (Bernard Verdcourt) and 18 August 1998 Clyne Park, Swansea, Glamorgan – wing waving on *Rhododendron* foliage (Bryan Formstone). The specimens taken by Martin Harvey and Bryan Formstone were exhibited at the Annual Exhibition of the British Entomological and Natural History Society held at Imperial College, London on 31 October 1998 (Chandler 1998a).

Roger Morris (Morris 1999) provided more information on the White Beech, Surrey record. This was based on a specimen he had found on 3 April 1988, basking on dry leaves on a sunny bank in a wood mainly comprising oak *Quercus robur* and ash *Fraxinus excelsior* with willows *Salix* species in wetter places and a varied ground flora. Two other unpublished records from Surrey were also mentioned – a specimen found on a bedroom ceiling at Ripley on 4 August 1986 by Keith Harris and a male in a garden at Wooton, near Dorking on 10 April 1998 by Jeremy Holloway. The latter specimen had fallen out of rhubarb indoors, several days after a number of sticks had been harvested from under a Victoria plum (*Prunus domestica*); there was *Lonicera* growing about 5m away, and fruiting raspberry *Rubus idaeus*, strawberry *Fragaria* and red- and blackcurrants *Ribes* species were also stated to be present nearby. This specimen was very dark in colour and consequently considered not to have recently emerged.

Ken and Rita Merrifield (Merrifield 2000) reported finding another Cornish specimen from Pendarvis Wood on 26 April 1999.

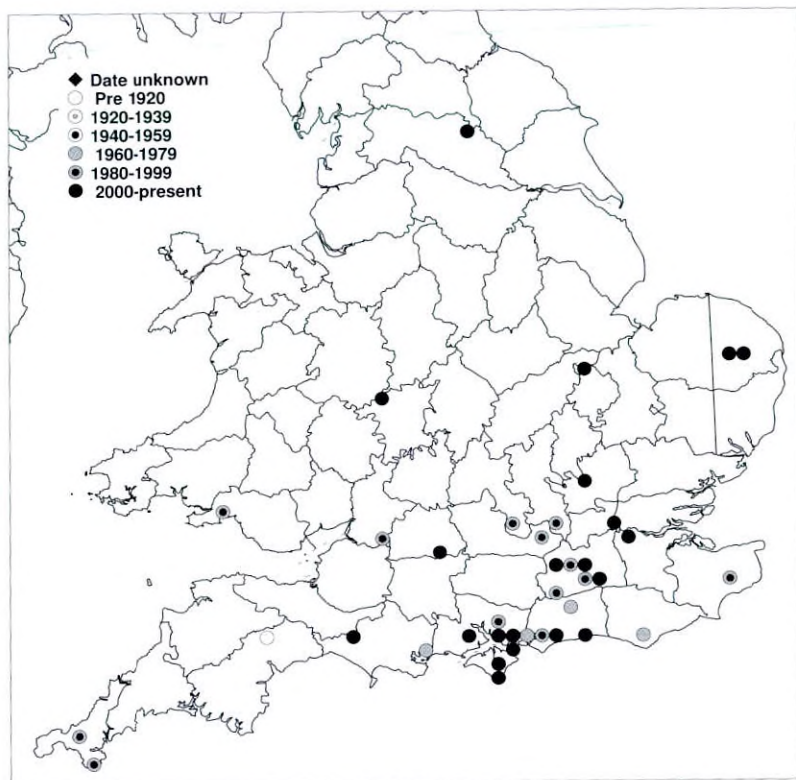


Fig. 1. Known British distribution of *Chetostoma curvinerve* by hectad.

On 1 September 1999 David Gibbs beat a single male from the foliage of an oak tree at Monk Wood, Somerset (Gibbs 2002, giving the author's name in error as Robineau-Desvoidy, 1830). In the same journal Adam Wright (Wright 2002) mentioned finding two specimens basking on ivy *Hedera helix* in weak sun in Borthwood Copse, Isle of Wight on 8 March 2000 and another basking on an ivy leaf at the same locality on 13 February 2001.

By 24 December 2003 when the second *Provisional atlas* was compiled (Clemons 2003) the number of known records had risen to twenty-one from eighteen 10 km squares.

In 2007 I reported (Clemons 2007) the capture of another Kent specimen on 22 April 2006 thus: "The weather had improved substantially when I visited Ruxley Gravel Pits, on behalf of the Kent Wildlife Trust, on 22nd and fifty-six species were named. From a snowberry *Symphoricarpos albus* bush at TQ47207005 a single female *Chetostoma curvinerve* Rondani was swept. This represents the second known Kent record, the other being from Covert Wood TR182494 on 1st May 1997. The adult flight period is remarkable in that 89% of national records are from the months January to May and the only other Tephritidae regularly encountered during the same period are species of *Tephritis*. The larval biology has yet to be elucidated but I do not subscribe to the view that eggs are laid in honeysuckle *Lonicera* spp berries simply because they have generally fallen or been eaten

when most adult *C. curvinerve* are on the wing. There may, however, be an association with berry-bearing plants since several recent national records have been from ivy *Hedera helix* foliage, five of the known sites are small private gardens and the most prolific site is a cemetery where specimens were repeatedly found on cherry laurel *Prunus laurocerasus*."

Alan Stubbs (Stubbs 2010) recorded the species from his Peterborough garden on 6 and 16 May 2010 and listed some hypothetical food-plants.

Summary of known British data

As of 30 October 2010 fifty-seven records of *Chetostoma curvinerve* from thirty-nine sites in thirty-nine hectads (10 km squares) and attributable to thirty-two recorders have been ascertained. Of these twenty-five have been from suburban sites such as private gardens and cemeteries (four being found indoors) and nineteen from woodland.

The chronological list is shown in Table 1. The national distribution is shown in Fig. 1.

Date	Site	Comment	Collector
1 April 1893	Bickleigh, South Devon		John Yerbury
28 April 1973	Havant, West Sussex		Gurth Waller
12 May 1973	Hawkhurst Court, East Sussex	♀	Alan Stubbs
28 March 1976	Abbot's Wood, East Sussex		Roger Dumbrell
17 April 1978	Bournemouth, Dorset		Martin Speight
4 October 1983	Kennack Cove, West Cornwall	♂	Peter Chandler
4 August 1986	Ripley, Surrey	On bedroom ceiling	Keith Harris
3 April 1988	White Beech (Pockford Bridge), Surrey	Basking on dry leaves on a sunny bank in wood	Roger Morris
5 February 1989	Summersdale, Chichester, West Sussex	On window indoors on a mild, sunny day	Peter Grainger
4 May 1989	Botley Wood, South Hampshire		Chris Palmer
1 May 1997	Covert Wood, East Kent	♀ swept from beech <i>Fagus sylvatica</i> twig	Laurence Clemons
10 April 1998	Wotton, near Dorking, Surrey	♂ fallen from harvested rhubarb	Jeremy Holloway
22 April 1998	Burnham Beeches, Buckinghamshire	♀ swept from holly <i>Ilex aquifolium</i> foliage	Peter Chandler
21 June 1998	Kingwood Common, Oxfordshire	Sitting on bramble <i>Rubus</i> species in semi-shaded area under trees	Martin Harvey
July 1998	Kimbers, Maidenhead, Berkshire	♀ found dead between double glazing of house	Bernard Verdcourt
18 August 1998	Clyne Park, Swansea, Glamorgan	Wing waving on <i>Rhododendron</i> foliage	Bryan Formstone

Date	Site	Comment	Collector
26 April 1999	Pendarvis Woods, West Cornwall		Ken and Rita Merrifield
1 September 1999	Monk Woods, North Somerset	♂ on foliage of oak <i>Quercus robur</i>	David Gibbs
8 March 2000	Borthwood Copse, Isle of Wight	Two specimens basking on ivy <i>Hedera helix</i> leaf	Adam Wright
9 March 2000	3 Bryanstone Road, London N8, Middlesex	♀ in suburban garden	Dan Hackett
16 March 2000	101 Havant Road, East Cosham, South Hampshire	Basking on ivy <i>Hedera helix</i> leaves in private garden	Martin Harvey
15 May 2000	Roydon Woods Hampshire Wildlife Trust Reserve, South Hampshire		Chris Palmer
13 February 2001	Borthwood Copse, Isle of Wight	♂ basking on ivy <i>Hedera helix</i> leaf, temperature 12°C	Adam Wright
30 March 2001	3 Bryanstone Road, London N8, Middlesex		Dan Hackett
11 April 2001	The Grove, Horley, Surrey	On privet <i>Ligustrum</i> sp. next to holly <i>Ilex aquifolium</i>	Roger Hawkins
16 February 2002	25 Connaught Road, Norwich, East Norfolk	On laurel <i>Prunus laurocerasus</i> hedge	Stuart Paston
29 March 2002	Priory Woods, Isle of Wight		Adam Wright
8 April 2002	Borthwood Copse, Isle of Wight		Adam Wright
5 May 2002	Crangleford Woods, East Norfolk	♀ photographed on sycamore <i>Acer pseudoplatanus</i> leaf	Tony Irwin
19 March 2003	Wroxall Copse, Isle of Wight	Three specimens on ivy <i>Hedera helix</i> leaves	Adam Wright
27 March 2003	Wroxall Copse, Isle of Wight	Pair in copula on ivy <i>Hedera helix</i> leaf	Adam Wright
17 April 2003	Ribbesford Wood, Worcestershire	At 125W MV Skinner moth trap 2200 - 0100 hours in ancient deciduous woodland with some conifer plantation	Jeff Rush
17 April 2003	Wheathampsted, Hertfordshire	♀ in Malaise trap in garden	J B Murray
27 July 2003	Brookwood Lye, Surrey	♀ swept in wet, ungrazed meadow, near canal with scrub	Andrew Halstead

Date	Site	Comment	Collector
16 October 2003	Jones' Mill, Pewsey, South Wiltshire		Ken and Rita Merrifield
25 January 2004	Earlham Cemetery, Norwich, East Norfolk	♀ on ivy <i>Hedera helix</i> foliage	Stuart Paston
2 February 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
7 February 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
9 February 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
21 February 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
23 February 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
15 March 2004	25 Connaught Road, Norwich, East Norfolk	♂♂ observed head- butting on cherry laurel <i>Prunus laurocerasus</i>	Stuart Paston
16 March 2004	25 Connaught Road, Norwich, East Norfolk		Stuart Paston
16 March 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
21 March 2004	Earlham Cemetery, Norwich, East Norfolk		Stuart Paston
19 May 2004	13 Willow Walk, Ripon, North-west Yorkshire	♀ on patio door	Jim Jobe
22 April 2006	Ruxley Gravel Pits, West Kent	♀ swept from snowberry <i>Symphoricarpos albus</i>	Laurence Clemons
5 May 2006	Lewcombe Farm, Dorset		Mick Parker
9 March 2007	Worthing, West Sussex	♂ on <i>Rhododendron</i> bush in suburban garden with ivy <i>Hedera helix</i> and a variegated holly <i>Ilex</i> sp. bush nearby	Brian Valentine
11 March 2007	Worthing, West Sussex	On <i>Rhododendron</i> bush in suburban garden with ivy <i>Hedera helix</i> and a variegated holly <i>Ilex</i> sp. bush nearby	Brian Valentine
30 April 2007	Botley Wood, South Hampshire	♀ in Malaise Trap	Keith Wheeler
11 May 2007	Botley Wood, South Hampshire	♀ in Malaise Trap	Keith Wheeler
19 May 2007	Bookham Common, Surrey	♀	Ivan Perry

Date	Site	Comment	Collector
15 March 2009	Rewell Wood, Arundel, West Sussex	♀ at rest on low vegetation	George Else
19 September 2009	Worthing, West Sussex	Mating pair on <i>Rhododendron</i> bush in suburban garden with ivy <i>Hedera helix</i> and a variegated holly <i>Ilex</i> sp. bush nearby	Brian Valentine
6 May 2010	181 Broadway, Peterborough, Huntingdonshire	Sitting on blackcurrant <i>Ribes nigrum</i> leaf in suburban garden	Alan Stubbs
16 May 2010	181 Broadway, Peterborough, Huntingdonshire	On blackcurrant <i>Ribes nigrum</i> bush in suburban garden	Alan Stubbs

Table 1. Known British records of *Chetostoma curvinerve*.

Discussion

There are at least fourteen described species of *Chetostoma* distributed within the Nearctic, Neotropical, Oriental and Palearctic regions (Table 2) and of these only *C. curvinerve* and *C. stackelbergi* have been found in Europe.

Species	Nearctic	Neotropical	Oriental	Palearctic
<i>admirandum</i> (Hering, 1953)			+	
<i>californicum</i> (Blanc, 1959)	+	+		
<i>continuans</i> (Zia, 1938)				+
<i>curvinerve</i> Rondani, 1856				+
<i>dilutum</i> (Zia, 1938)				+
<i>ermolenkoi</i> Korneyev, 1990				+
<i>interruptum</i> (Hardy, 1964)			+	
<i>japonicum</i> (Ito, 1949)				+
<i>melliculum</i> (Richter, 1965)				+
<i>mirabile</i> (Chen, 1948)			+	
<i>miraculosum</i> (Hering, 1938)			+	
<i>mundum</i> (Ito, 1953)				+
<i>rubidum</i> (Coquillett, 1899)	+			
<i>stackelbergi</i> (Rohdendorf, 1955)				+

Table 2. Known World distribution of *Chetostoma* species (based on Norrbom *et al.* 1998).

In addition to Britain *Chetostoma curvinerve* has also been recorded from Austria, Belgium, Germany, Italy, the Netherlands, Spain, Switzerland and the former Yugoslavia (Smit 2010). It is of interest that *Chetostoma curvinerve* was first recorded in Spain in August

1993, in Switzerland in April 1995 (Merz 1996) and in the Netherlands in April 2000 (Aartsen 2001).

Ho-Yeon Han (Han 1999) erected a new subtribe - Chetostomatina (Trypetinae, Trypetini), which included the genera *Anomoia* Walker, 1835, *Chetostoma* Rondani, 1856, *Montiludia* Ito, 1984, *Myoleja* Rondani, 1856, *Paramyiolia* Shiraki, 1933, *Parastenopa* Hendel, 1914 and an unnamed new genus. The distinguishing characters refer to the female postabdominal structures, i.e. eversible membrane nearly smooth, without strong spinules; taeniae reaching apex of eversible membrane and aculeus long and slender (in most taxa laterally flattened and ventrally serrate). He also stated that the eggs of Chetostomatina are uniquely shaped, having a pointed apex but this character was based on a very limited sample. Cladistically, *Chetostoma* is most closely linked to *Paramyiolia* (biology unknown) with *Myoleja* and *Anomoia* placed next and Han (1999) wrote "Although *Chetostoma* clearly belongs to the *Chetostoma* group characterized by the sagittally flattened aculeus tip, its relationship within the clade is not well understood. Its wing pattern has some similarity to that of *Anomoia*, but whether this constitutes a synapomorphy is ambiguous. Absence of the honeycomb pattern on the glans may instead indicate relationship to *Paramyiolia*, but again, this is not an unequivocal synapomorphy because loss or reduction of pattern on the glans is common in other genera of Trypetini."

Among Chetostomatina with known biology *Anomoia purmunda* (Harris) develops in a wide range of Berberidaceae and Rosaceae (Fox Wilson 1935, White 1988) and the Sumatran species *A. alboscutellata* (Wulp) develops in the green twigs of arabica coffee (*Coffea arabica*) (White and Elson-Harris 1992). *Chetostoma californicum* (Blanc) has been reared from fruits of *Lonicera albiflora* (Foote et al. 1993) and *C. continuans* (Zia) from those of *L. maackii* and *L. xylosteum* (Kandybina 1966), in the latter case from laboratory-reared adults. *Myoleja lucida* (Fallén) and *M. sinensis* (Zia) also develop in fruits of *Lonicera* species, while *Parastenopa limata* (Coquillett) develops in the fruits of many *Ilex* species (White 1988, Foote et al. 1993, Han 1999) and *P. ogloblini* (Blanchard) mines the tender shoots of *Ilex paraguariensis* (Han 1999). Two other species of *Parastenopa* have been reared from galls caused by other arthropods. *Parastenopa elegans* (Blanchard) has been reared from galls on *Ilex paraguariensis* caused by the psyllid *Metaphalera spergassiniana* Lizer and *P. marcetiae* (Bezzi & Tavares) from ovoid galls on *Marcetia* sp. probably caused by cecidomyiid larvae on the axillary buds of the plant (Han 1999). When recording *Chetostoma stackelbergi* (Rohdendorf) as new to The Netherlands van Aartsen (1992) referred to a letter from 'Dr. V. Richter of Leningrad' stating an association with galls of the blennocampine sawfly *Hoplocampoides xylostei* (Giraud) on *Lonicera xylosteum*. The fact that the sawfly is unknown from the Netherlands and also Norway and Spain where *C. stackelbergi* occurs (www.faunaeuropaea.org accessed 21 May 2010) raises further problems.

Thus three species of *Chetostoma* are in some way associated with *Lonicera* but is this the case with *C. curvinerve*?

The confusion of the correct genus for Moses Harris' '*Musca caesio*' (Harris 1780) (now *Philophylla* Rondani, 1870) resulted in many hypotheses as to the larval host plant in the mid twentieth century (Allen 1963, d'Assis-Fonseca 1964, Smith 1955, Uffen 1964). White (1988) drew attention to the aculeus of *P. caesio* being more typical of leaf-mining Trypetini than of the frugivorous *Anomoia purmunda* and *Myoleja lucida* before adding as a note in proof that *P. caesio* had been reared from mines in the petioles of an *Urtica* species. It is interesting to observe that the species was included in the leaf-mining genus *Acidia* for much of its taxonomic history and also in *Euleia* (Shaw 1952). If form matches function it must therefore be pertinent to examine the aculeus structure of other Chetostomatina in

relation to biology. Unfortunately, diagrams in the widely available literature are few. White (1988) illustrated the aculei of *Anomoia purmunda* (right lateral and dorsal view) and *Chetostoma curvinerve* in right lateral view, Merz (1994) illustrated those of *A. purmunda*, *C. curvinerve*, *C. stackelbergi* and *Myoleja lucida* in left lateral view and Han (1999) figured those of *A. purmunda*, *Chetostoma californicum* (Blanc) and *M. lucida* in dorsal and left lateral view. While there are striking differences between the three genera it is difficult to appreciate why the aculeus of *M. lucida*, which is used to deposit eggs into the relatively soft fruits of *Lonicera*, is so deeply serrate whereas that of *A. purmunda*, used for oviposition in the much harder fruits of, for example, *Crataegus*, is less so. Furthermore these bear little similarity to the aculei of other frugivorous Tephritidae such as *Ceratitis capitata* (Wiedemann), *Goniglossum wiedemanni* (Meigen) and *Rhagoletis* species, or to that of *Euphranta toxoneura* (Loew), which oviposits in equally tough *Pontania* galls.

Adult phenology may provide a clue. Figs 2-6 show the percentage of records per month for *Chetostoma curvinerve*, three other frugivorous species - *Anomoia purmunda*, *Goniglossum wiedemanni* and *Rhagoletis alternata* and the sawfly inquiline *Euphranta toxoneura*. One caution in interpreting the diagrams is that they are based on the British Isles as a whole where the emergence / flight times may differ markedly according to local and annual climate.

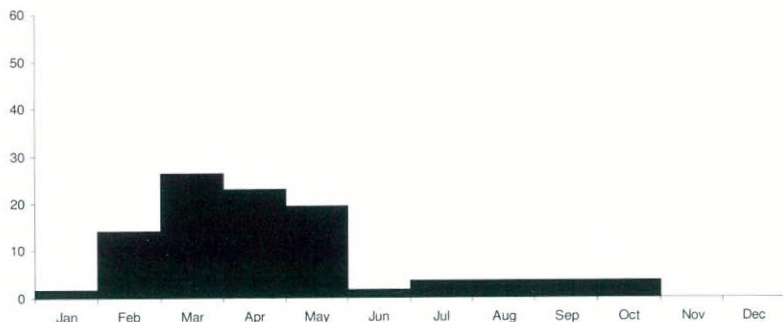


Fig. 2. Monthly phenology for *Chetostoma curvinerve* Rondani

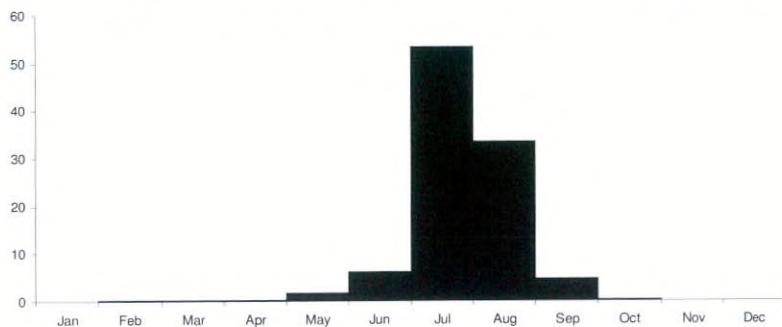


Fig. 3. Monthly phenology for *Anomoia purmunda* (Harris)

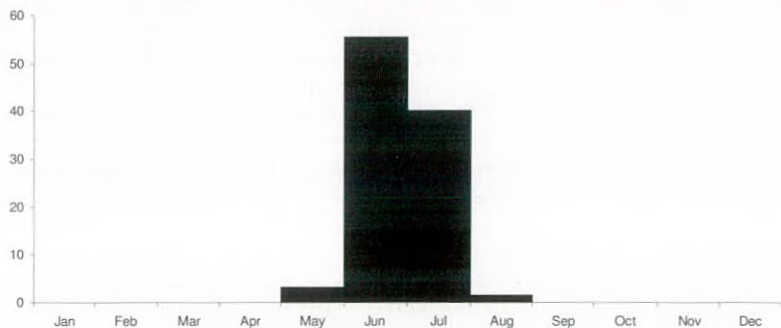


Fig. 4. Monthly phenology for *Goniglossum wiedemanni* (Meigen)

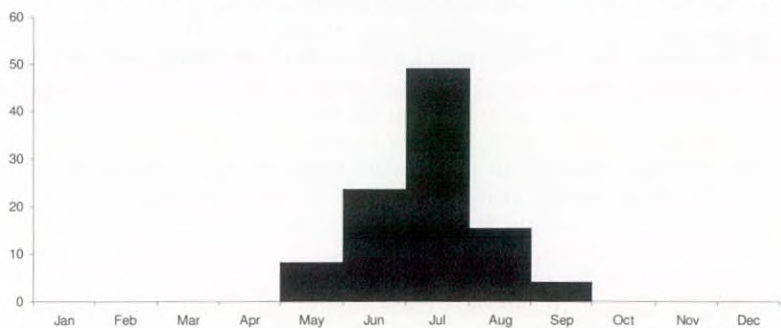


Fig. 5. Monthly phenology for *Rhagoletis alternata* (Fallén)

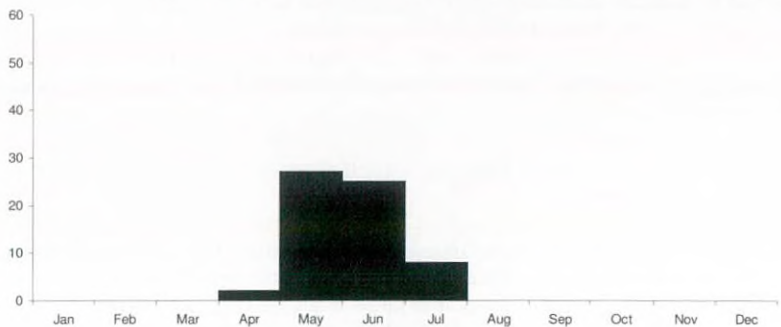


Fig. 6. Monthly phenology for *Euphranta toxoneura* (Loew)

Anomoia purmunda begins to appear in numbers after its usual host, *Crataegus monogyna*, has flowered while *Rhagoletis alternata*, which develops in *Rosa* species, begins to peak during the flowering period of the plant. In both cases the fruits have a relatively long maturation period. *Goniglossum wiedemanni* largely flies when *Bryonia dioica* is flowering

and in early fruit and then virtually disappears when the berries have ripened. *Euphranta toxoneura* cannot find its *Pontania* host until the leaves of *Salix* species have developed.

From the phenology it is unlikely that, in Britain, *Chetostoma curvinerve* is associated with a sawfly that galls the leaves of deciduous trees or shrubs. Furthermore the British cecidogenous sawflies are mostly species of Nematinae, e.g. *Euura* and *Pontania*, associated with Salicaceae not widely cultivated in small gardens - the source of a large percentage of records. While many records have been from observations on evergreen leaves this may simply reflect that in the earlier months of the year, at least, the fly has nothing else on which to alight. An association with galls caused by other arthropods on, for example, roots cannot, however, be discounted.

The next step is to examine fruits. If honeysuckles *Lonicera* species were the host it might be expected that the majority of records for *C. curvinerve* would be from June to September or October, especially as entomologists are active during that period. However, only 16% of records are from those months (the absence of records from November and December may reflect the fact that, by then, most dipterists have ceased field work). Cherry-plum *Prunus cerasifera* and sloe *P. spinosa* both flower when the fly is at its peak but, given the importance of their fruits (less so now than in former years) it is unlikely that infestations by *C. curvinerve* larvae would have escaped the attention of the agricultural or horticultural authorities. For this reason the fruits of other commercially grown plants, e.g. *Ribes* and *Fragaria*, may also be discounted. Cherry laurel *Prunus laurocerasus* is another relatively early flowerer with blossom appearing in April. The fruits are mostly mature by about August but again the flight period of *C. curvinerve* is not synchronised with their development. Hollies *Ilex* species begin to flower in May and, unless eaten by birds, the resultant fruits may persist on the tree for a year or more after. Of the other circumstantial plants named in the records above ivy *Hedera* species deserves special consideration. It flowers in the autumn (as early as August) and fruits may be found until at least the end of April. If conditions are often unfavourable for *C. curvinerve* to fly in November to January the sudden appearance of the species in February and March, when the berries are maturing, matches the pattern of *Anomoia purmunda* and *Rhagoletis alternata*. It is relevant to note that Smit (2005) tabulated the data from six sites by seven recorders in the Netherlands and from this it can be seen that most Dutch specimens have also been found in March. One criticism against ivy is that its blossom attracts many late-flying Diptera and is thus the centre of focus for many late-working dipterists, who would undoubtedly have found more specimens. Another problem is that almost all female *C. curvinerve* examined had no mature eggs (Bernhard Merz *pers. comm.*) and therefore would have been unable to oviposit in any of the plants on which it had been taken.

The final aspect of biology, which may not only reveal more records but also help to elucidate the host, concerns synthetic attractants. From the known data 1.8% of British *C. curvinerve* records have been from lepidopterists' light traps and this compares favourably with 1.7% for *Anomoia purmunda*. However, the latter is also a frequent visitor to organic solvents used by the decoration industry (Smith 1984, Laurence 1990, O'Connor 1998). From these, and other, accounts all one has to do is smear some paint or thinners on a substrate and then stand back and watch as males swarm to the point. While there is no known evidence that species of *Chetostoma* behave in a similar manner it is something worthy of investigation.

Acknowledgements

This paper was stimulated by a request for data from Alan Stubbs in May 2010. It would have been much briefer without the continual support of a small group of Tephritidae recorders who regularly send information. John Smit kindly provided public domain files for two recent Dutch papers and Valerie McAtear, Librarian of the Royal Entomological Society, promptly sent photocopies of articles from the more obscure journals. Peter Chandler and Bernhard Merz provided valuable comments. The distribution map was produced using DMAP for Windows (version 7.3a (32-bit) developed by Alan Morton).

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A second Scottish record of *Cheilosia velutina* Loew (Diptera, Syrphidae) and two other hoverfly species new to Fife - On 31 July

2010 a medium sized *Cheilosia* specimen was taken from a hogweed flower head (*Heracleum sphondylium*) while undertaking fieldwork for our local bumblebee atlas near Kingsbarns in Fife (V.C. 85, NO5811). It was subsequently identified as male of *Cheilosia velutina* Loew, 1840 using the keys and descriptions in *British Hoverflies* (Stubbs, A.E. & Falk, S.J. 2002. *British Hoverflies, an illustrated identification guide*. Second edition. 469 pp. British Entomological and Natural History Society, Reading) and checked using the keys by M.P. van Veen (2004. *Hoverflies of Northwest Europe: Identification keys to the Syrphidae*. 254 pp. KNNV Publishing, Utrecht). The specimen was collected along a farm track and waste ground amongst cereal fields just off a minor road. The habitat comprised a small area of mixed scrub and ruderal vegetation. *Cheilosia velutina* is a species I was unfamiliar with; on checking the distribution using the Hoverfly Recording Scheme website (www.hoverfly.org.uk) I was surprised and pleased to find that this is only the second Scottish record. The map showed this species to be found predominantly in south and east England. The first Scottish record was taken at Crichton Glen, Midlothian on 19 May 1984 (V.C. 83, NT3761) by David Robertson.

In addition, two further hoverfly species new to Fife are here recorded. A single female of *Meligramma guttatum* (Fallén, 1817) was taken from sycamore leaves on woodland edge at Glen Burn, West Lomond on 27 June 2010 (V.C. 85, NO1706). Finally, a single female of *Orthonevra nobilis* (Fallén, 1817) was taken on the coastal path at East Wemyss on 28 July 2010 (V.C. 85, NT3496).

I am grateful to Graham Rotheray at the National Museums of Scotland (NMS) Collection Centre for checking my identification of *C. velutina*. Also, to David Robertson for kindly supplying data on his earlier find. As vouchers for these records, specimens have been deposited in the collections of the National Museums of Scotland - **BRIAN H. LITTLE**, 3, Alexander the Third Street, Kinghorn, Fife, KY3 9SD

Hydrobaenus distylus (Potthast) (Diptera, Chironomidae) new to Britain

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Summary

Pupal exuviae of *Hydrobaenus distylus* (Potthast, 1914), a species not found previously in Britain, were collected from a Kent Reservoir. Information is provided for the identification of pupal exuviae and adult males

Introduction

On 12 May 2004 in a sample of flotsam skimmed by LPR from the surface of Bough Beech Reservoir, Kent (TQ496494), were five pupal exuviae of *Hydrobaenus distylus* (Potthast, 1914). The sample was part of a CPET survey sent to PHL for identification. Collections later in the year (16 June and 5 August) produced no further exuviae of this species. No adults have yet been collected in Britain.

Identification

The exuviae can be identified from Sæther (1976), Langton (1991) or Langton and Visser (2003). Care has to be taken with keys that have been published to cover only the British Chironomidae (Wilson and Ruse 2005), where it will run to *Paratrissocladius excerptus* (Walker). The authorship of Potthast, 1914 assigned to *H. distylus* follows Spies and Sæther (2004).

Fig. 1 is of the hypopygium of the adult male (from Roque-Haute, Hérault, Languedoc-Roussillon, France) and the following modification of the key to orthoclaudiine genera in Langton and Pinder (2007, p.72) will serve to place the species in the British fauna.

- 34. Robust acrostichal setae begin at the anterior margin of the scutum
BRYOPHAENOCLADIUS Thienemann
Acrostichal setae very small, restricted to the middle of the scutum34a
- 34a. Tergite IX with 2-3 small setae on either side of the base of the anal point.
Sternapodeme of hypopygium transverse, not arched
PARALIMNOPHYES Brundin
Tergite IX with a crowd of strong setae around the base of the anal point.
Sternapodeme of hypopygium arched anteriad (Fig. 1)
HYDROBAENUS Fries (*distylus* (Potthast))

Bough Beech Reservoir

At 63m altitude its valley was flooded for water storage and completed in 1968. It is mostly filled with water pumped from a local river. Twenty of its 115 hectares belong to a nature reserve. It has a maximum depth of 21m and a mean depth of 8m. From August 2003 to July

2005 monthly water samples had the following averages: pH 7.9, conductivity 391 $\mu\text{S}/\text{cm}$, alkalinity 97.5 mg CaCO_3/l , total nitrogen 4.5mg/l, and total phosphorus 0.33mg/l.

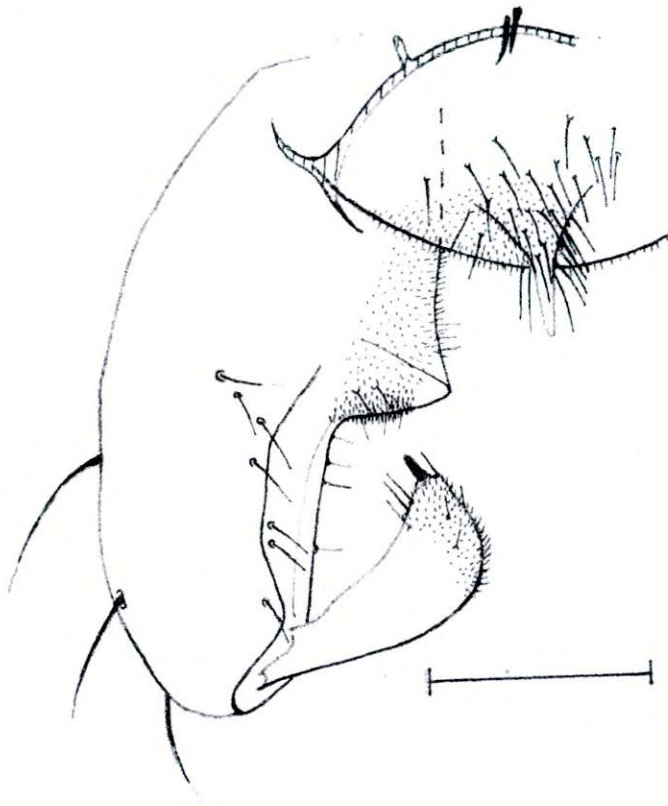


Fig. 1. Hypopygium of *Hydrobaenus distylus* (Potthast); sternapodeme cross-hatched. Scale line = 0.1mm.

Other chironomid species collected with *H. distylus* were *Cricotopus* (*Isocladius*) *sylvestris* (Fabricius), *Orthocladius* (s. str.) *oblidens* (Walker), *Orthocladius* (s. str.) *obumbratus* Johannsen, *Paracladius conversus* (Walker), *Paratrichocladius rufiventris* (Meigen), *Psectrocladius* (s. str.) *oxyura* Langton, *Psectrocladius* (s. str.) *sordidellus* (Zetterstedt), *Dicotendipes nervosus* (Staeger), *Harnischia curtilamellata* (Malloch), *Parachironomus biannulatus* (Staeger), *Parachironomus parilis* (Walker), *Polypedilum* (*Pentapedilum*) *sordens* (van der Wulp), *Cladotanytarsus mancus* (Walker) and *Tanytarsus lestagei* Goetghebuer.

Acknowledgement

We are grateful to Dr. Joel Moubayed-Breil for specimens of adult male *H. distylus*.

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***Sarcophaga villeneuvei* Bottcher (Diptera, Sarcophagidae) new to East Anglia** - A Diptera survey of Flordon Common (TM1897, V.C. 27, Norfolk), undertaken in 2010 as part of a wider research project by the Norfolk and Norwich Naturalists Society, produced a surprising record of *Sarcophaga villeneuvei* Bottcher 1912, a RDB species not previously recorded from East Anglia.

The specimen, a male, was obtained on 23 April from a yellow water trap used by Tim Strudwick to sample Hymenoptera and subsequently passed by me to Tony Irwin of the Castle Museum, Norwich who made the determination following examination of the genitalia. The thorax seemed to be deformed which may explain the lack of all but the posterior pair of postsutural dorsocentral bristles, the specimen otherwise agreeing with the external characters described by T. Pape (1987. The Sarcophagidae (Diptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* **19**, 203 pp). Flordon Common is a calcareous spring-fed fen in the valley of the River Tas. It is grazed by cattle and also includes an area of chalk grassland on higher ground bordering the fen.

The only known post-1960 records for *S. villeneuvei* are from Carmarthenshire (1989) (Peter Chandler *pers. comm.*) and Chew Valley Lake near Bristol (2003). F.I. van Emden (1954. Diptera Cyclorrhapha (Tachinidae, Calliphoridae). *Handbooks for the Identification of British Insects* **10 (4a)**, 1-133) stated that it was rare on marshes and gave sites in Dorset, Oxfordshire, Somerset and Cheshire.

The early date of capture is of interest as it significantly extends the flight period of June-August (van Emden) and suggests that sampling the fly fauna of marshes before the season is in full swing might produce more records of this poorly known species. Other species of Sarcophagidae recorded during the survey were *S. pumila* Meigen, *S. carnaria* (Linnaeus) and *S. subvicina* Rohdendorf - **STUART PASTON**, 25 Connaught Road, Norwich, Norfolk NR2 3BP

Some further recent non-coastal records of *Odontomyia ornata* (Diptera, Stratiomyidae) - Following the report of *O. ornata* at Otmoor, Oxfordshire in 2009 (Drake, C.M. 2010. An unusual inland record of the rare soldierfly *Odontomyia ornata* (Diptera, Stratiomyidae) *Dipterists Digest (Second Series)* **17**, 60), the following records of *O. ornata* from Gloucestershire may be of interest:

- 14 June 2005, one on flowering umbellifers, The Mythe, Tewkesbury, V.C. 33 (SO8834) (MGM)
- 01 June 2007, three seen, same locality as 2005 (MGM)
- 16 June 2008, male on flowers of *Oenanthe pimpinelloides* (Corky-fruited Water Dropwort), near Flaxley, V.C. 34 (SO6914) (NJP)
- 20 June 2009, female ovipositing on a bamboo cane used as a depth-gauge in a recently created pond, same site as 2008 (NJP)
- 16 June 2010, about four individuals seen, near Whitminster, V.C. 34 (SO7608) (NJP)
- 20 June 2010, female ovipositing, same site and position as 2009 (NJP).

There are no Gloucestershire records prior to 2005.

The Mythe lies on the east bank of the River Severn, straddling its tributary the Mythe Brook. The site includes a large fishing lake and an area of neglected osier beds within which are two smaller ponds, created or restored by clearance work several years ago. The whole of this site was inundated during the severe floods of summer 2007 and since then no further *O. ornata* have been seen there. The Flaxley site is a small area of traditional orchards and hay meadows, set among more intensive mixed farmland, in the low hills on the boundary between the Severn Vale and the Forest of Dean plateau. It is only about 1.5 km from the closest part of the river Severn near Newnham, but the river valley in this part of the county has little, if any, classic *O. ornata* habitat, with few suitable ditches or ponds. The site itself has a number of wet "flushes", and some small ponds have been created recently. The Whitminster site, in the Severn Vale south of Gloucester, appears to be more suitable for *O. ornata* as it comprises a series of disused, but still flooded, sections of canal, and parts of the river Frome including a number of more or less static backwaters.

It could be said that these sites are not entirely "inland", as the river Severn is tidal up to Tewkesbury. However, they are 50 to 80 km upriver of the known *O. ornata* stronghold in the Gwent Levels, and they are certainly not "coastal".

All the records listed above have been sent to the Gloucestershire and national recorders, but they have evidently not yet found their way onto the NBN Gateway (as of October 2010).

It is worth noting that the ovipositing female seen on 20 June 2010 was accompanied by a female *Stratiomys singularior*, which was also ovipositing on the same bamboo cane. This is another species traditionally thought of, in Britain, as an inhabitant of coastal marshes, but there are a few recent Gloucestershire records in or near the Severn floodplain. Both species may have been overlooked in the past, but it is also possible that they are currently extending their range and/or ecological niches - perhaps following in the footsteps of *S. potamida*, which was formerly rare but has recently become much commoner - **N. JOHN PHILLIPS**, Yorkleigh Cottage, Pope's Hill, Gloucestershire, GL14 1LD, and **MARTIN G. MATTHEWS**, 56 Stanford Road, Ashchurch, Tewkesbury, Gloucestershire, GL20 8QU

A new species of *Chaetocladius* Kieffer (Diptera, Chironomidae) from the Dorset coast

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Summary

A species of *Chaetocladius*, belonging to an unresolved sibling species group around *Chaetocladius laminatus* Brundin, is reported to have been collected from the Dorset coast.

Introduction

On 10 March 2008 PDA discovered three adult male chironomids at Worbarrow Bay, Dorset (SY865803), sheltering under a chalk boulder adjacent to a freshwater seepage through slumped chalk from the cliff above. They were identified as belonging to a species of *Chaetocladius* not previously recorded for the British Isles. A rock fall has since destroyed the original habitat.

Identification

Characteristic for the Dorset specimens are the rounded triangular gonostyli, the small, narrow anal point and the low antennal ratio. The described Palaearctic *Chaetocladius* with triangularly inflated gonostyli and small narrow anal points are *C. dentiforceps* (Edwards), *C. laminatus* Brundin and *C. holmgreni* (Jacobson). *Chaetocladius dentiforceps* was described from British material (Edwards 1929) and is widespread in the West Palaearctic, while *C. laminatus* was described from Sweden and is widespread in the Palaearctic, but local, eclosing in early spring and late autumn from springs (Lehmann 1971, Lindegaard *et al.* 1975, Stur *et al.* 2005). *Chaetocladius holmgreni* was first described from Spitzbergen and Bear Island by Holmgren as *Chironomus festivus* (1869), a junior primary homonym of *Chironomus festivus* Say, 1823 and subsequently renamed *holmgreni* by Jacobson (1898) (Ashe and Cranston 1990). It has since been recorded for Arctic Siberia (Zelentsov and Shilova 1996) and Vrangal Island in the Russian Far East (Makarchenko and Makarchenko 2004). *Chaetocladius dentiforceps* is exceptional in having a long awl-shaped extension on the outer corner of the gonostylus (Langton and Pinder 2007, Fig. 142A) and has a high antennal ratio (2.0; table 2). The tables show how similar the morphometric and numeric characters are for all three species. Brundin's figure of the hypopygium of *C. laminatus* shows a triangular gonostylus with an acute point (Fig. 1a) and he gives the AR as 1.54-1.73. The gonostylus shape of *C. holmgreni* figured by Brundin (1956, Fig. 23; Fig. 1k) and Makarchenko and Makarchenko (2004, Figs 8, 9; Fig. 1j) has a broadly rounded outer angle. The AR for *C. holmgreni* given by Makarchenko and Makarchenko (2004) is 1.10-1.13. The gonostyli of the three specimens from Dorset have rounded outer angles (Fig. 1 g, h, i), but are a little more triangular in shape than those figured for *C. holmgreni*. The AR for the Dorset specimens is 1.04-1.12.

Table 1. Leg measurements (in μm) and ratios.

Foreleg

specimen	F	ti	ta1	Ta2	ta3	ta4	ta5	LR	BR
Dorset a	970	940	620	360	280	160	130	0.66	1.7
Dorset b	800	860	600	340	260	170	140	0.70	2.0
<i>holmgreni</i> ¹	816	960	640	384	248	176	136	0.67	2.0
<i>dentiforceps</i>	1060	1200	800	460	320	200	120	0.67	2.6
<i>laminatus</i> Iceland	760	860	560	320	240	140	100	0.65	2.2
<i>laminatus</i> Denmark	1020	1180	780	460	340	200	140	0.66	1.7

Midleg

specimen	F	ti	ta1	ta2	ta3	ta4	ta5	LR	BR
Dorset a	900	880	380	260	200	140	100	0.43	2.0
Dorset b	820	860	380	240	200	140	120	0.44	2.4
<i>holmgreni</i> ¹	848	928	400	256	192	128	128	0.43	2.0
<i>dentiforceps</i>	1060	1160	520	300	260	160	120	0.45	2.5
<i>laminatus</i> Iceland	800	800	340	220	160	120	100	0.43	2.8
<i>laminatus</i> Denmark	1060	1100	480	320	240	160	140	0.44	1.9

Hindleg

specimen	F	ti	ta1	ta2	ta3	ta4	ta5	LR	BR
Dorset a	1000	1040	620	340	280	160	120	0.60	2.3
Dorset b	980	1060	600	350	280	180	120	0.57	2.7
<i>holmgreni</i> ¹	984	1072	640	360	272	160	128	0.60	3.7
<i>dentiforceps</i>	1220	1360	780	440	340	200	160	0.57	3.5
<i>laminatus</i> Iceland	940	960	560	300	220	140	120	0.58	2.6
<i>laminatus</i> Denmark	1140	1320	760	460	340	200	160	0.58	2.0

¹Makarchenko and Makarchenko (2004)

Specimens of *C. laminatus* from Denmark and Iceland have gonostyli very similar to that on Brundin's figure. The AR of the Danish specimens is 1.8 and 2.0, whereas that for the Iceland specimens is 1.13 and 1.23 (Table 2). The low antennal ratios of the Iceland specimens may not represent the lower extent of the range for *laminatus*, but may indicate that they represent another species in a sibling swarm (see below).

Elisabeth Stur and Torbjørn Ekrem (Museum of Natural History and Archaeology, Trondheim) inform us that they have four distinct Col sequences for species near *C. laminatus* (including *C. holmgreni*), and the rounded outer angles of the gonostyli are not restricted to *C. holmgreni*. The three Dorset specimens are mounted on slides and not suitable therefore for DNA analysis.

The material is held in the collections of the authors.

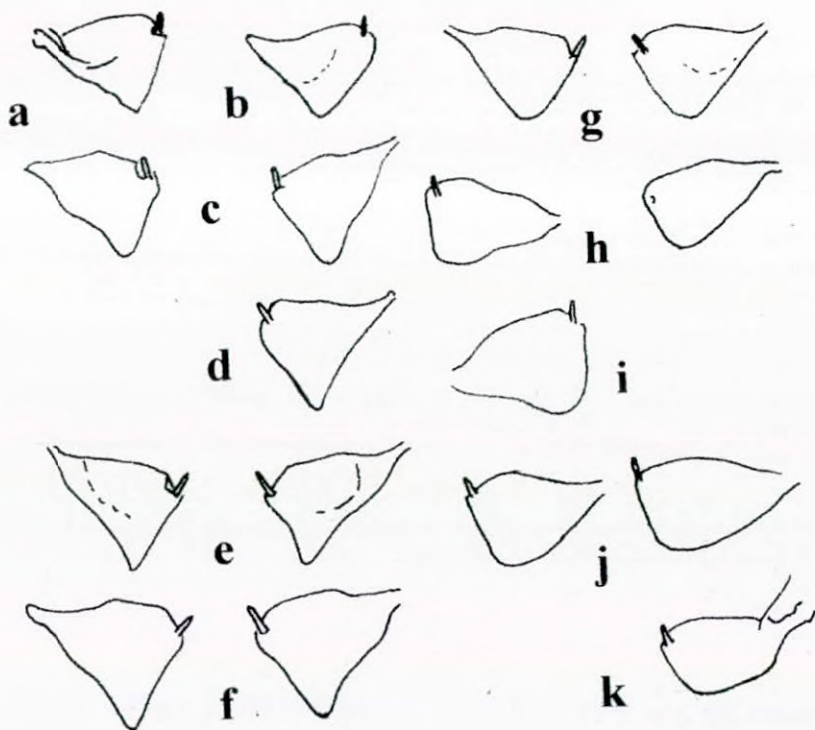


Fig. 1. Gonostylus shapes of some *Chaetocladius* species: a. *C. laminatus* (redrawn from Brundin 1956), b. *C. laminatus* (redrawn from Zelentsov *et al.* 1996), c and d. *C. laminatus* (Iceland), e and f. *C. laminatus* (Denmark), g, h and i. sp. Dorset, j. *C. holmgreni* (redrawn from Makarchenko and Makarchenko 2004), k. *C. holmgreni* (redrawn from Brundin 1956).

Conclusion

On the basis of published antennal ratios and gonostylus shape, the Dorset specimens would identify as *C. holmgreni*. The strain posed by the known distribution of this species would leave considerable doubts as to its correct placement. The species is not *C. laminatus* as described by Brundin. Stur and Ekrem's researches show that there is a sibling swarm in this area and we defer specific identification until their studies are completed. For future reference we suggest *Chaetocladius* sp. Dorset as a temporary name. Dipterists are alerted to the presence of this species in Britain and the need for further specimens for DNA analysis.

Table 2. Antennal Ratio and seta numbers.

specimen	AR	frontals	verticals	clypeals	dorsocentrals
Dorset a	1.04	5	8	7	10
Dorset b	1.12			5	11
<i>holmgreni</i> ¹	1.10-1.13	5	7	7	11-14
<i>dentiforceps</i>	2.0	0	10	7	11
<i>laminatus</i> ²	1.54-1.73				
<i>laminatus</i> Iceland	1.13				
<i>laminatus</i> Iceland	1.23	0	9/10	4	9
<i>laminatus</i> Denmark	2.0	0	11	8	10
<i>laminatus</i> Denmark	1.8	0	14	9	9

specimen	squamals	scutellars	R setulae	R ₁ setulae	R ₄₊₅ setulae
Dorset a	8	6	15	4	0
Dorset b	7		15	5	3
<i>holmgreni</i> ¹	c.12	9	17	2-5	0
<i>dentiforceps</i>	15	6	15	3	0
<i>laminatus</i> Iceland	6/7	5 (3+2)	13	3	0
<i>laminatus</i> Denmark	13	8	16	3	0

¹Makarchenko and Makarchenko (2004) ²Brundin (1956)

Key

The following couplets will serve to expand the key to adult *Chaetocladius* males in Langton and Pinder (2007).

2. Anal point very slender and delicate in appearance. 2a
 Anal point otherwise. 3
- 2a. Gonostylus rounded triangular (Hypopygium, Fig.2)..... **Chaetocladius** sp. Dorset
 Gonostylus narrow, over twice as long as broad
 **Chaetocladius dissipatus** (Edwards)

Acknowledgements

We are grateful to Dr. Y. Makarchenko for copies of Russian papers on *Chaetocladius* and for his opinion, to Dr C. Lindegaard-Petersen for specimens of *C. laminatus* from Denmark and Iceland, to Drs E. Stur and T. Ekrem for information on their present researches into the genus *Chaetocladius* and to Dr O. Hoffrichter for referencing information, also to M. Spies for comments on the final draft.

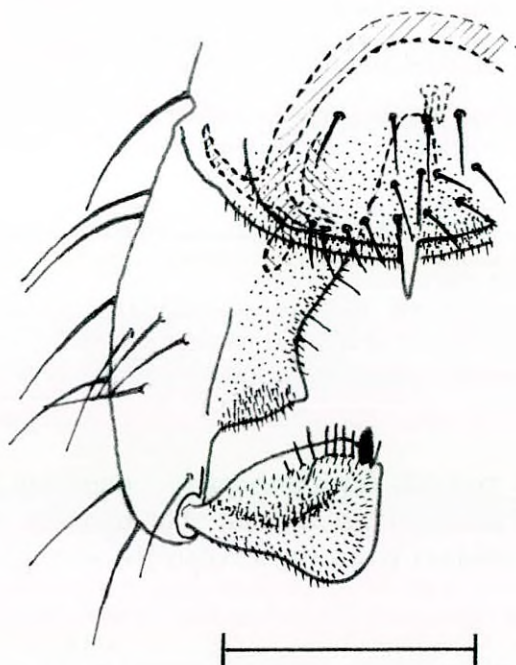


Fig. 2. Hypopygium of *Chaetocladius* sp. Dorset.

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Mainland Britain records for *Limnophyes angelicae* Sæther and the deletion of *Pseudosmittia holsata* Thienemann & Strenzke (Diptera, Chironomidae) from the British list – This note relates to two

species that were introduced to the British list in the checklist (Chandler, P.J. (Ed.). 1998. Checklists of Insects of the British Isles (New Series). Part 1: Diptera (Incorporating a List of Irish Diptera). *Handbooks for the Identification of British Insects* **12**(1), i-xix, 1-234. Royal Entomological Society, London), but for which no published records exist for mainland Britain. *Limnophyes angelicae* Sæther, 1990 was, however, recorded from Ireland by D.A. Murray and W.A. Murray (2003. A reassessment of Chironomidae (Diptera) of Clare Island, Co. Mayo, with first records of *Acamptocladius reissi* Cranston and Sæther and *Limnophyes angelicae* Sæther (Orthoclaadiinae) for the Irish faunal checklist. *Bulletin of the Irish Biogeographical Society* **27**, 255-269) and by P.H. Langton (2004. Additions to the Irish List of Chironomidae (Diptera), including the first species of the millennium new to the British Isles. *Dipterists Digest (Second Series)* **10**, 131-134).

Limnophyes angelicae is widespread in mainland Britain, particularly in the north and montane regions and the following localities are known to us: SCOTLAND, Highland: Loch Insh, NH835053, 23.viii.1982; Loch an Ordain, NC093229, 29.vii.1979; Dumfries & Galloway: Loch Grannoch, NX541700, 20.vii.1985; Tayside: R. Spey, NN437946, 24.viii.1982. WALES, Gwynedd: Llyn Bochlwyd, SH656594, 30.ix.03; Llyn Idwal, SH644595, 22.v.2003; Llyn Llagi, SH648483, 7.vii.1998; ENGLAND, Cumbria: Greendale Tarn, NX147044, 30.vii.08; Norfolk, Ranworth Broad, TG355155, 17.vi.1998.

No specimen of British origin of *Pseudosmittia holsata* Thienemann & Strenzke, 1940 has been located and records of its capture are missing. Until confirmed specimens have been found, this species must be deleted from the British List – **PETER H. LANGTON**, University Museum of Zoology, Cambridge (address for correspondence: 5, Kylebeg Avenue, Coleraine, Northern Ireland BT52 1JN) and **LES P. RUSE**, Centre for research in Ecology, Whitelands College, Roehampton University, Holybourne Avenue, London SW15 4JD

***Cladotanytarsus donmcbeari* sp. nov. (Diptera, Chironomidae)
from Loch Leven, Kinross-shire, Scotland**

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Summary

The adult male and pupal exuviae of *Cladotanytarsus donmcbeari* sp. nov. are described from material collected in Loch Leven. Comparison with similar Palaearctic species is made and supplementary couplets are provided for identification using standard keys.

Introduction

On 27 April 2000, returning from the funeral (in Elgin) of Don (Donald) McBean, we stopped off on S.F.McB's suggestion at Kinross on Loch Leven. A skim collection for chironomid exuviae near the shore yielded 8 pupal exuviae, one drowned adult male and one pharate adult male of a species of *Cladotanytarsus* with a long, narrow anal point unlike any other recorded for Britain. Comparison with the descriptions of similar species from the West Palaearctic reveals that it is undescribed.

Terminology follows that of Sæther (1980), except that the flattened setae on the pupa are referred to as taeniae (Langton 1994). Abbreviations used: AR antennal ratio, ratio of the length of the apical flagellomere divided by the combined length of the more basal flagellomeres; LR, leg ratio, ratio of metatarsus length to tibial length; BV "Beinverhältnis", combined length of femur, tibia and basitarsus divided by the combined length of tarsomeres 2-5; SV "Schenkel-Schiene-Verhältnis", ratio of femur plus tibia to metatarsus; BR bristle ratio, ratio of longest seta of tarsomere 1 divided by the minimum width of the tarsomere, measured one third from apex.

***Cladotanytarsus donmcbeari* sp. nov.**

Adult male

The pharate adult male is designated the holotype; the remainder of the material paratypes, collected 27 April 2000 in Loch Leven, at Kinross, Kinross-shire, Scotland (NO126018). The holotype and a paratype pupal exuviae will be deposited in the Zoologische Staatssammlung, Munich, and the adult male paratype and a pupal exuviae will be deposited in the University Museum of Zoology, Cambridge, the remainder in the author's collection.

Body length 3.4mm (n=1); wing length 1.8mm (n=1 adult), 1.9-2.3mm (n=9, converted pupal wingsheath lengths (Langton 2002)). Colour (collected in isopropanol, mounted in Euparal): green; clypeus and tentoria brownish; antennal pedicel and plume conspicuously brown, flagellomeres pale brown; thorax, scutal stripes brown, closely approximated; sternum and postnotum brown; halteres with knob very pale, stem brownish; legs, coxae, trochanters and joints between femur and tibia brown; abdomen apex brownish.



Figs 1-4. *Cladotanytarsus donmcheani* sp. nov., male genitalia: 1, hypopygium; 2, anal point of holotype pharate adult male; 3, anal point of paratype male; 4, median volsella. Scale bars: Fig. 1, 0.1mm, Figs 2-4, 0.05mm.

Head: frontal tubercles small and narrow, 20 μ m long, 5-8 μ m wide; AR 1.2; palpomeres 2-5 lengths 28, 92, 100, 132 μ m; clypeus with 10, 12 setae.

Thorax: 5 acrostichal setae, 10, 11 dorsocentral setae. 1 prealar seta and ?4 scutellar setae. Wing with dense macrotrichia on membrane at tip. Lengths (in μ m) and proportions of legs:

Legs	fe	ti	ta1	ta2	ta3	ta4	ta5	LR	BV	SV	BR
P1	680	380	640	400	300	200	120	1.7	1.7	1.7	2.8
P2	720	620	320	180	140	100	80	0.52	3.3	4.2	5.0
P3	800	820	-	-	-	-	-	-	-	-	-

Spurs tibia 1 with 1, tibia 2 with 1 long and 1 short, tibia 3 with 2; tibial combs 2 on legs 2 and 3 well separated; sensilla chaetica 4 near apex of tarsomere 1 of leg 2.

Hypopygium (Fig 1): anal point long and narrow (Fig. 2, 3), 40µm long, crests approximated, anal papillae absent; anal tergite with blunt lateral teeth; superior volsella narrowed and curved to tip, with 3 setae at base and 3 setulae dorsally; digitus long and slender extending well beyond the tip of the superior volsella, slightly sinuous, tip hooked; inferior volsella greatly expanded and curved over dorsally at apex; stem of median volsella short, 30µm long, with long branched setae, longest about 60µm long (Fig. 4). Gonocoxites with a row of very long setae ventrally.

Pupa (*Cladotanytarsus* n. spec. Langton and Visser 2003)

Exuvial length 3.6-4.7mm (m=4.0mm, n=8), colourless with cephalothorax dorsally pale brownish.

Cephalothorax: at most a narrow band of granules present along suture, but often evanescent. Cephalic tubercles broad conical at base, narrow cylindrical at apex (Fig. 8); cephalic tubercles 60-64µm (n=2) long, apex 32-40µm long, 16-24µm wide (n=3), frontal setae taeniate or bristle-like 70-116µm long (m=95µm, n=7). Frontal apotome weakly granulate. Thoracic horn (Fig. 6) 148-220µm long (m=190µm, n=6); 5.6-9.0 times as long as broad (n=4), with setae along one edge at base and more generally distributed on apical half, longest setae 0.45-0.71 horn length (n=5). Nose of wingsheaths weak or absent. Lateral antepronotal taenia 130-164µm long (n=3). Median antepronotal taenia 138-200µm long (n=5). 3 precorneal taeniae on a swollen mound 136-204µm long; 4 dorsocentral bristle-like setae 30-66, 100-120, 36-66, 60-74µm long, first and second closely approximated, separated from the closely approximated third and fourth by 226-240µm (n=3).

Abdomen (Fig. 5): tergites II-VI with an anterior pair of point patches, 42-64, 64-84, 62-84, 60-74, 42-66µm long, lengths of point patches compared to length on IV 0.64-1.0 : 0.95-1.25: 1.0 : 0.88-1.06 : 0.67-0.91 (m=0.75: 1.07: 1.0: 0.93: 0.77, n=8), length of point patches compared to the length of the segment on which they occur: 0.11-0.14, 0.17-0.22, 0.17-0.23, 0.15-0.20, 0.14-0.18 (n=4). Tergites otherwise smooth. Segment VIII with a posterolateral comb (Fig. 7) 50-80µm wide (m=61µm, n=8) of 6-10 marginal and 5-13 ventral teeth on a cuticular cushion.

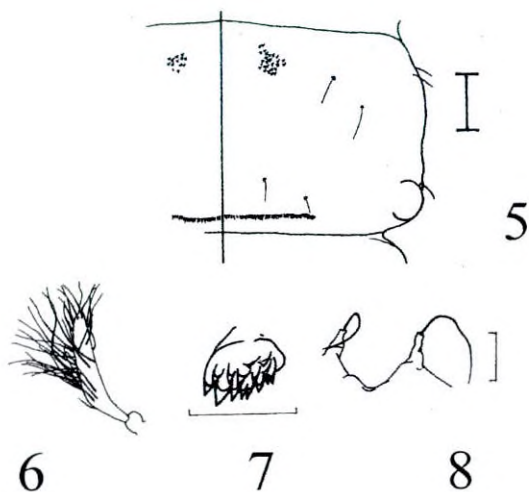
Chaetotaxy (setae in bold are taeniae):

	I	II	III	IV	V	VI	VII	VIII	IX
dorsal	3	3	5	5	5	5	5	2	2
lateral	?	3	3	3	3	3	4	5	31-42
ventral	?	3	3	3	3	3	3	1	0

Pedes spurii A and vortex absent. Pedes spurii B on segment II well developed.

Male genital sheaths 300-320µm long, 1.5 times as long as the anal lobes; female genital sheaths 160-180µm long. 0.8-0.9 length of anal lobe.

Anal lobes 1.16-1.6 times as long as broad (m=1.41, n=7).



Figs 5-8. *Cladotanytarsus donmcbeari* sp.nov., pupa: 5, segment II dorsal; 6, thoracic horn; 7, comb of segment VIII; 8, cephalic tubercles and frontal setae. Scale bars: Fig. 5, 0.1mm, Figs 6-8, 0.05mm.

Etymology

Named in memory of Don McBean, much loved father and father-in-law, who was so generous with his hospitality and who located many fruitful freshwater sites for PHL.

Systematic considerations

Previously described West Palaearctic male adult *Cladotanytarsus* with narrow anal points are *C. cyrylae* Gilka, 2001 from Poland, *C. sagittifer* Gilka, 2009 from the United Arab Emirates and *C. ecristatus* Reiss, 1991 from Morocco, for none of which is the pupal stage known. *Cladotanytarsus cyrylae* is much smaller than *C. donmcbeari*, with a wing length of only 1.1-1.3mm, its anal point broadening widely at base to the anal tergite and setae of median volsella much shorter in relation to the stem of the appendage (Gilka 2001, Figs B-E); *C. sagittifer* has an exceptionally long black anal point (Gilka 2009, Figs 13, 14) and short branched setae on the median volsella; *C. ecristatus* has a broader superior volsella and longer median volsella with short branched setae (Reiss 1991, Fig. 2). The long, narrow anal point without expanded base and the very long branched setae of the median volsellae are characteristic for *C. donmcbeari*. The pupal exuviae (as *Cladotanytarsus* n. spec.) are identifiable from the key to West Palaearctic chironomid exuviae (Langton and Visser 2003). For recorded British *Cladotanytarsus* an additional couplet at the beginning of the genus in Langton and Pinder (2007, p. 194) will serve to identify the male of the new species:

- A1 Anal point narrow, the dorsal keels closely approximated. Median volsella short with branched setae to nearly twice as long as stem *Cladotanytarsus donmcheani* sp. nov.
- Anal point broad, the dorsal keels separating from each other well before base and enclosing minute clusters of spinules. Median volsella short or long, but with branched setae much less than twice length of stem to Couplet 1 in Langton and Pinder (2007)

Ecology

With a surface area of just over 13 square kilometres, Loch Leven is the largest lowland loch in Scotland. Scottish Natural Heritage (SNH) (2010) describes it as having "international ecological importance". The habitat is unique in many respects as indicated by its status as a Site of Special Scientific Interest (1956), National Nature Reserve (1964), Ramsar Site (1976) and Special Protected Area (2000), with neighbouring land managed by the Royal Society for the Protection of Birds. The loch is generally shallow with an average depth of just under 4 metres. There are numerous challenges to habitat management. Two thirds of the surrounding area is arable crops and livestock (SNH 2007).

Uniquely important for breeding and migratory species of waterfowl, Loch Leven also has a large fishery and acts as a water supply to various industries. Reduction in nutrient load has been an ongoing restoration project for three decades as eutrophication has caused many cyanobacterial blooms, which alter the fauna and flora due to poor light penetration. Water flushing through Loch Leven is low. The year 2000 (relevant collection year) is noted as the start of recovery towards more acceptable levels of water quality, although in 2007 it was still highly eutrophicated (Carvalho *et al.* 2008). Loch Leven is known as a habitat for rare flies and beetles (Table 1, SNH 2007). It is alkaline (Carvalho *et al.* 2008) and has a sandy floor with mud in deeper areas (SNH 2007).

Recently, in recognition of the importance of non-biting midges to the ecology of Loch Leven, an impressive sculpture has been placed on the loch side (Fig. 9).

Acknowledgement

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Fig. 9. Sculpture by David Wilson, commissioned by SNH, at Burleigh Sands, close to the shore of Loch Leven, depicting a chironomid midge (Photograph by Sarah Stenhouse, ecologist at SEPA Aberdeen, used with permission).

Previously unreported mate guarding and 'clustering' by a nest ectoparasite (Diptera, Hippoboscidae)

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Summary

The discovery of mate guarding and the formation of concentrated aggregations of males into 'clusters' or 'mating balls' by louse flies, *Crataerina pallida* Latreille, 1812 (Hippoboscidae), a parasite of the common swift *Apus apus* Linnaeus, 1758, are reported.

Crataerina pallida Latreille, 1812 (Hippoboscidae) is an obligate haematophagous nest ectoparasite of swifts (Kemper 1951; Bequaert 1953). However, due to the difficulties of accessing swift colonial nesting sites there is a paucity of knowledge about this parasite, and particularly about its reproductive habits (Marshall 1981).

Common swifts nest beneath a roadway bridge spanning the Bigge Reservoir at Olpe, Germany (51°04'00" N 07°81'00" E). Nests were visited on a daily basis throughout the swift breeding season and *C. pallida* populations were observed. Particular attention was paid to parasite mating behaviour. This parasite is closely associated with the host nests, with mating occurring on the nest rim or in direct proximity to the nest rather than upon hosts directly. Although mating is often ephemeral, males would frequently remain situated positioned over females for much longer periods of time post copulation. Typically, such waiting lasted approximately five to ten minutes in length, but on one occasion was observed to continue to approximately 20 minutes.

In addition, large aggregations of *C. pallida* adults in ball-like 'clusters', were observed frequently at nests. Fig. 1 shows an example of one such ball-like mass of parasites at one nest (Nest: DR-K6-231), observed on 14 June 2008. This is the first time such congregations and aggregations of this parasites have been seen and reported. Close examination showed such aggregations to comprise predominantly males, centred around a single or small numbers of females.

Although anecdotal, these reports indicate the presence of strong mating competition in this species, with males contesting fiercely for access to female copulation. Such strong mating competition may be expected. *Crataerina pallida* is viviparous, with larvae developing singly in-uterus before being deposited at the 4th instar stage. So, although *C. pallida* populations are heavily female biased for much their active life-cycle, female reproduction is limited and thus females are likely to be a limited resource for males. In addition, at emergence from winter diapause population sex ratios are equal (Bequaert 1953). Female preponderance only occurs later due to heavy male mortality, possibly as a direct consequence of severe mate competition. Males remaining positioned over females post mating may be ensuring paternity and thus be increasing their own fitness. Likewise the formation of 'clusters' of parasites may occur, due to the males actively competing for females.

The possible presence of mating competition has implications for the functioning of this host-parasite system. As the males and females remove different amounts of resources

from hosts (Kemper 1951), and therefore cause different levels of costs to hosts, this may be influencing the effect this parasite has on hosts. Previous studies have found no effect of parasitism by this species on hosts (Tompkins *et al.* 1996).

Walker and Rotherham (2010a, 2010b) provide a fuller account of this subject.



Fig. 1. Mating cluster observed at nest DR-K6-231 on 14 June 2008.

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Plastron respiration in the larvae of the intertidal fly *Aphrosylus celtiber* Haliday (Diptera, Dolichopodidae)

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Summary

Evidence of plastron respiration during tidal submergence of the larvae of *Aphrosylus celtiber* Haliday, 1855 (Diptera, Dolichopodidae) is presented.

Introduction

In the British Isles *Aphrosylus celtiber* Haliday, 1855 is a widespread, often abundant dolichopodid, inhabiting marine intertidal terrains of rocks and man-made structures where acorn or sessile barnacles (Crustacea, Cirripedia) are prevalent. The larvae are carnivorous, occupying barnacle colonies, which provide food, pupation sites, protection from predators, and the twice daily submergence by sea water. Although the primary food source is probably living barnacles on which they are predators (Poulding 1998), invertebrates such as small annelids and chironomid larvae found within the barnacle colony and the peripheral clusters of mussels *Mytilus edulis* Linnaeus, 1758 (Mollusca, Mytilidae) cannot be excluded. The life history in general is well documented (Roubaud 1903, Hinton 1967) but information on the biology of the larval stages is scanty, with no firm evidence of any respiratory adaptations to survive under water for long periods when the habitat is inundated by the tide.

Roubaud (1903) observed that the larvae were able to retain an air bubble over the posterior spiracles by means of the terminal lobes when submerged. However, Hinton (1976) stated that the larvae of all intertidal Diptera except *Canace*, which are plastron breathers, rely on cutaneous respiration when submerged. My own observations both in the field and in the laboratory found that the larvae of *A. celtiber* retain air over the posterior spiracles when covered in seawater. Subsequent stereoscan electron microscopy (SEM) of fixed final-instar larvae revealed dense clusters of hair-like microtrichia emerging from the posterior spiracles into the cavity formed by the lobes over the spiracular disc. This finding indicated that a film of air over the posterior spiracles is in direct contact with a microtrichial structure originating from the spiracles. Such a mechanism enables the larvae to become temporary plastron breathers when inundated with seawater and thus provides additional oxygen for their survival during periods of submergence. A plastron is a permanent bubble or film of air kept at constant volume under water by entrapment within hydrophobic microtrichia or cutaneous structure over the spiracles. By acting as a gill this permits an exchange of oxygen and carbon dioxide at the air-water interface to provide a constant supply of oxygen during submergence. The oxygen pressure in the bubble is initially reduced as the oxygen is reduced by respiration, and is replaced by diffusion from the surrounding water to maintain equilibrium. The loss of nitrogen by passive diffusion also adds to the lowering of the pressure within the bubble and is replaced by oxygen at a faster rate than nitrogen due to the latter's lower solubility in water. The volume of the bubble of air therefore remains constant with the oxygen component being maintained or even increased, depending on the metabolic requirements of the organism.

Materials and methods

Final-instar larvae were collected from a colony of *A. celtiber* occupying the invertebrate and plant community on the surface of a large conduit between Marazion and Long Rock, Cornwall (Poulding *op. cit.*). The site is covered twice daily at each high tide for 5–6 hours to a maximum depth of approximately 4 metres depending on the sea state. The surface biota is dominated by mussels *Mytilus edulis* and acorn barnacles *Chthamalus montagui* Southward, 1976, interspersed by small amounts of seaweed (*Fucus* species) and the green alga *Enteromorpha*. The larvae were studied *in situ* at the barnacle colonies and in the laboratory where they were kept temporarily in small seawater aquaria containing clumps of intact barnacles and *Enteromorpha*.

For microscopy whole final stage larvae were fixed in 70% alcohol for SEM, and for histological studies dissected parts of the terminal segment were fixed in either 70% alcohol, a variant of Bouin's picric acid fixative, or 10% formalin in sea water. To minimise damage to external structures, ultra sound was not used to remove fine debris prior to SEM procedures but cleaning procedures were restricted to careful washing in seawater before fixation. After the primary fixation in 70% alcohol the preparation of larvae for SEM followed that of Colwell (1991) and for histological studies the techniques as given in Bancroft and Cook (1994).



Fig 1. Final-instar larva of *Aphrosylus celtiber* after fixation, showing lobes on terminal segment.

Morphology of larva and respiratory system

The mobile larva before fixation extends to 10mm in length but with some fixation methods this increases to 12mm or more. The whitish body is cylindrical, partially translucent, and 2–3mm in diameter, tapering in the anterior third but truncated posteriorly (Fig. 1). There are twelve visible segments – the head capsule (HC), three thoracic (T1–3) and eight abdominal (A1–8). Raised, spiculated locomotory welts are present on the anterior ventral surfaces of segments T2–3 and A1–8. The last posterior abdominal segment A8 is the longest of the body segments, terminating in a circular pattern of ten separate lobes or lappets of varying length and width – four larger primary lobes and six smaller secondary lobes. These enclose a shallow disc or plate bearing the two posterior spiracles at the bases of the two posterior primary lobes (Fig. 2). The paired main dorsal trunk of the tracheal system, joining the anterior spiracles on T1 and the posterior spiracles on T8, is visible through the semi-

translucent dorsal surface of the larva. The lobulated terminal segment with four larger lobes is characteristic of most genera of Dolichopodidae, including *Aphrosylus* but is absent in *Thrypticus* and *Neurigona* (Dyte 1967).



Fig. 2. Spiracular disc of final-instar larva of *Aphrosylus celtiber* with posterior spiracles at base of dorsal lobes (x 100).

The respiratory system in *Aphrosylus*, like most of the larvae in orthorrhaphous Brachycera, is amphipneustic with the paired dorsal tracheal trunks joining the posterior spiracles on the spiracular disc of A8 and the anterior spiracles on the lateral surfaces of thoracic segment T1. In *A. celtiber* each of the two posterior spiracles consists of a radial pattern of seven lenticular openings or slits and a central ecdysial scar from the previous instar (Fig. 3). Each spiracle is bounded by a narrow sclerotised rim that, in the living larva, is only slightly raised above the surface of the surrounding terminal disc. The spiracular slits open into a circular atrium or chamber with ramifying cross struts and microtrichia that extend almost to the base of the atrium before it joins a dorsal branch of the trachea.

Results

As part of a morphological and anatomical study of the larva of *A. celtiber*, a preliminary scan by SEM of two final stage larvae revealed clusters of fine, hair-like microtrichia emerging from the periphery of the slits of the posterior spiracles to form a dense mass over each spiracle (Fig. 4). The microtrichia were up to $150\mu\text{m}$ in length, $<1\mu\text{m}$ in diameter and at a density of approx. 4 per μm^2 . Subsequent serial histological sections of posterior spiracles of further final stage larvae showed that these microtrichia originated around the perimeter of each slit, just below the lenticular openings. At this level further microtrichia were visible,

radiating from the wall as part of the so-called 'felt-chamber' between the ramifying cross struts.



Fig. 3. Posterior spiracle of larva of *Aphrosylus celtiber*, showing seven radial lenticular openings into the atrium, and a central ecdysial scar from previous moult (x 400).

Discussion

Before being submerged by seawater the larvae retain a bubble of air over the spiracular disc by means of the lobes of the terminal segment. This acts as a source of oxygen for diffusion into the tracheal system via the spiracles when contact with the atmosphere is prevented by seawater. Such an air store is either a temporary compressible gas gill from which the air is gradually depleted by respiration and dissolving in the ambient water, or a more permanent incompressible gill held in place by hydrophobic microtrichia or other cutaneous structures over the spiracles, allowing the larva to survive for longer under water. The latter respiratory adaptation, or plastron, is widely used by insects in both aquatic and terrestrial species to survive permanent or temporary submergence but has not otherwise been demonstrated in Dolichopodidae. Hinton (1967) studied the pupal respiratory horns of several genera of the family but found that of the species studied only in *A. celtiber* were they modified into plastrons.

The larvae of *A. celtiber* in the study area are separated from the free atmosphere for a minimum of 5–6 hours during periods of high tide. In addition, the structure of the barnacle colony retains seawater in the spaces between the barnacles and in empty shells or tests until it drains away or is evaporated. Both these sites are used as refuges by the larvae at all states of the tide, and in wet weather do not dry out, prolonging the time without access to the atmosphere. The cluster of dense microtrichia around the spiracles, and the retention of an air bubble over the spiracular disc by the terminal lobes, indicate that respiration in part depends on a plastron or permanent physical gill when the larvae are submerged by the sea. In addition, this mode of respiration using an air bubble as a plastron most likely supplements

respiration through the cuticle. Cuticular respiration occurs in all aquatic insects (Chapman 1998) and in nearly all intertidal larvae (Hinton 1976). Due to the difficulties of separating the amounts of oxygen used by direct contact with air via the posterior spiracles and that obtained by direct diffusion through the cuticle, information on the proportions utilised by insect larvae is scanty. It was estimated that cuticular respiration satisfied some 10-20% of the oxygen requirements in the larvae of Hydrophilidae (Coleoptera) and some Diptera (Krivosheina 2005, referring to the findings of Gilyarov 1947). Total reliance on cuticular respiration from dissolved oxygen by aquatic dipteran larvae is restricted to smaller species found in well-aerated water. Final stage larvae of *A. celtiber*, living in or between barnacles, are unlikely to obtain sufficient oxygen from cuticular respiration alone to provide for their metabolic requirements when submerged by seawater.

Conclusions

The survival of the larvae of *A. celtiber* during submergence at high tides, depriving them of contact with the atmosphere for long periods, depends on gas-bubble respiration utilising air held in place by hydrophobic microtrichia over the spiracles in the form of an incompressible gill or plastron.



Fig. 4. SEM micrograph of posterior spiracular disc of larva of *Aphrosylus celtiber*, showing clusters of hair-like microtrichia over spiracles at bases of dorsal lobes (arrowed) (x 200).



Fig. 5. SEM micrograph of edge of spiracular opening on posterior spiracle of larva of *Aphrosylus celtiber* (x 2000).

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Hoverflies (Diptera, Syrphidae) recently encountered on Gibraltar, with two species new for Iberia

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Summary

An account is given of the Syrphidae of Gibraltar with a brief description of their habitats: 42 species are recorded, 19 in the subfamily Syrphinae and 23 in the subfamily Milesiinae. *Eumerus hungaricus* Szilády, 1940 and *Merodon eques* Fabricius, 1805 are new to Iberia.

Introduction

In spite of a huge surge in interest in fieldwork and taxonomy of the Syrphidae over the last 20 years, much remains to be learnt about the fauna in the Mediterranean Region and new species continue to be discovered. Dirickx (1994), Peck (1988) and Sack (1932) are major works that provide useful data on the distribution of hoverflies around the Mediterranean. However, these works are now outdated in this regard because new species have been described since, new synonymies recognised and many species are now known to be more widely distributed (Speight 2010). Neither Marcos-García *et al.* (2002) in the catalogue of the Diptera of Iberia, nor Dirickx (1994), give any data for Gibraltar.

Merodon geniculatus Strobl, 1909 was recorded as occurring in Gibraltar (Marcos-García *et al.* 2007). This was based on a reference to this effect by Vujić *et al.* (1996). However, this is an error as Vujić *et al.* give the locality as 20km NE of Gibraltar. Without doubt, therefore, the locality is in Spain. This notwithstanding, it is possible that the species occurs in Gibraltar.

Identifications were based on a range of texts, revisionary papers and on comparative material in the first author's collection and in a number of museum collections.

In spite of its small size, the British Overseas Territory of Gibraltar presents a surprising richness of flora and fauna. The northern shore of the Strait of Gibraltar is the southernmost point of the European mainland and is the part of Europe that is closest to North Africa. Although a few old studies exist on its entomofauna (e.g. Walker 1888 and 1889; Saunders 1888 and 1890; Champion 1891 and 1898; Jacobs 1913), these also include the Spanish hinterland, localities given are often vague, they are now outdated and none deal with Diptera. The Rock's insect fauna is only recently receiving attention again and this article is the result of collaborative work aimed at recording the dipterous fauna.

Material and methods

In 2008, the Invertebrate Section of the GONHS (Gibraltar Ornithological and Natural History Society) commenced a survey of the Diptera of the Rock. The first author was invited to collaborate and visited the Rock from 29 September to 4 October 2008. A second visit was made from 21 to 27 March 2010. During these visits collecting in the field was done throughout daylight hours, weather permitting. Between these dates, GONHS entomologists

(see acknowledgements) collected regularly throughout the year with a light trap in the Botanic Gardens, as well as with sporadic visits to other sites using hand nets as well as sifting soil and leaf litter. During the two visits, suitable sites were identified for sampling at the time (not just for hoverflies) and subsequently, paying attention to sampling in all seasons. All the material, whether preserved dry or in alcohol, was forwarded to MJE for identification. This article deals only with the Syrphidae.

Study Area

Gibraltar forms a small peninsula located near the southernmost point of the Iberian Peninsula, where the Mediterranean opens into the Atlantic Ocean (approx. N36°07', W5°20'; Fig. 1). It is dominated by the Rock of Gibraltar, a mountain composed of Jurassic limestone that rises from sea level to 426m at its highest point. The Rock forms part of the Gibraltar Arc, which links the Betic (southern Spain) and Rif (northern Morocco) mountain ranges (Rose and Rosenbaum 1991).

Gibraltar comprises 6.8km² and is densely populated (approx. 4310 persons per km²), but supports a variety of terrestrial habitats such as maquis, garigue, dunes, gardens and some small remnants of woodland. Firebreaks in the maquis of the west-facing slopes and a small area of flat land dominated by low garigue and pseudosteppe at the southern end of Gibraltar provide a habitat most similar to meadows. Together with the sandy and rocky coasts all these habitats host a diverse flora and fauna that include endemic and restricted-range species, some of which are shared with North Africa (Perez 2006). The vegetation of Gibraltar is in some ways more similar to that of the northern Rif than that of neighbouring Spain (Galán de Mera *et al.* 2000) and is diverse, with >630 species recorded growing wild on the Rock in the last three decades (Linares *et al.* 1996, Linares 2010). As much as 31% of the land area of Gibraltar receives protection at a local and European level.

Gibraltar's climate is summarised (Table 1). The prevailing winds are easterly and westerly. Easterly winds frequently produce a cloud (the 'Levanter') that forms as humidity off the Mediterranean condenses against the cliffs on the east of the Rock. This provides a high level of humidity, even during the summer months. Outside of cave systems, there are no natural sources of fresh water on the Rock and wetland habitats are entirely absent. However, following periods of more sustained rainfall, small water bodies do form periodically, such as rock pools, tree holes and various flooded artificial containers. The warm temperatures and sometimes persistent presence of water allow the development of aquatic species of other dipterous families such as Simuliidae.

Table 1. Mean temperature and rainfall at Gibraltar for the period 1993-2002 (data courtesy Meteorological Office, Gibraltar).

mean annual temperature	18.7°C
mean temperature of coldest month	13.9°C (Jan)
mean temperature of warmest month	24.6°C (Aug)
mean annual rainfall	782mm
mean rainfall of wettest month	203mm (Dec)
mean rainfall of driest month	1mm (Jul)

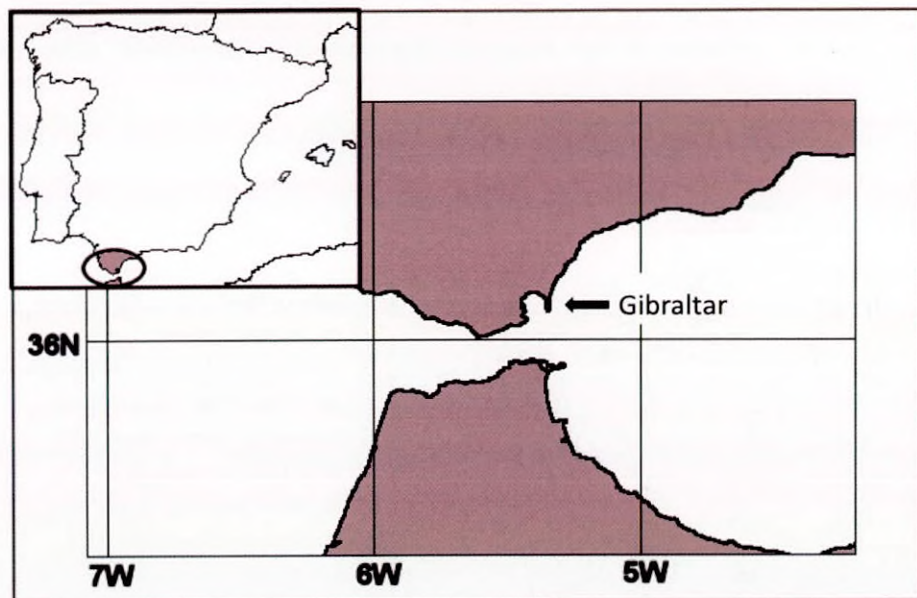


Fig. 1. Location of Gibraltar in the Strait and in Iberia (inset).

Main Habitats

All sites in Gibraltar at which Syrphidae were collected are shown and numbered on a map (Fig. 2). These numbers accompany the habitat summaries described below to indicate which habitat types occur at which sites.

Maquis (sites 5, 6, 7 and 8)

Most of the Upper Rock Nature Reserve is covered in a thick, tall maquis that is composed almost entirely of fruiting shrubs such as *Olea europea*, *Osyris quadripartita*, *Rhamnus alaternus*, *Pistacia lentiscus* and *Pistacia terebinthus*, with a smaller contribution by *Phillyrea latifolia*, *Laurus nobilis*, *Rhamnus oleoides*, *Genista linifolia*, *Calicotome villosa*, *Coronilla valentina* and scattered *Ceratonia siliqua*. Pockets of such vegetation also exist throughout Gibraltar outside of the nature reserve.

Garigue (sites 7, 11 and 12)

The most important patches of this habitat are on Windmill Hill Flats and the area of the Upper Rock Nature Reserve known as the Mediterranean Steps. This second site is situated to the south east of the Rock and is a steep ascent to the top of the Rock amidst rocky outcrops, scree and small patches of maquis. Windmill Hill Flats is comprised largely of open habitat (see *Meadows* below) but includes some areas of maquis and garigue, especially close to cliffs. These areas have a very similar, rich flora to parts of the Mediterranean Steps, dominated by low-lying shrubs, grasses and herbaceous plants such as *Euphorbia squamigera*, *Ephedra fragilis*, *Teucrium lusitanicum* and *T. fruticosum*, *Prasium majus*, *Chamaerops humilis*, *Asteriscus maritimus* and *Stipa tenacissima*, with an abundance of the bulbous

Asphodelus albus and *A. ramosus*, *Scilla peruviana*, *Urginea maritima*, *Allium ampeloprasum* and *Gladiolus communis*. A large proportion of this habitat occurs on warm, south-facing slopes.

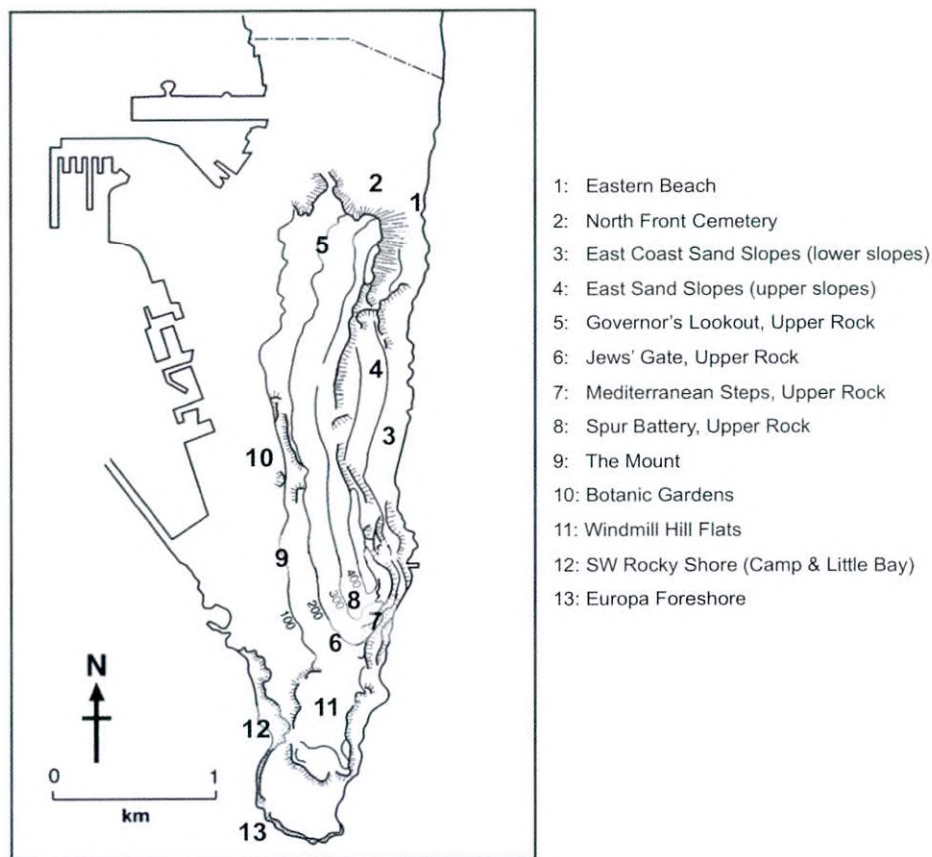


Fig. 2. Map of Gibraltar showing all the sites at which Syrphidae were collected during this survey.

Sandy Habitats (sites 1, 2, 3 and 4)

Sandy Beaches in Gibraltar are almost entirely restricted to its eastern side. These are fairly small and are almost entirely lacking in dune systems, with only small vestiges of these in some more sheltered corners. Still, these harbour some elements of a dune fauna and flora.

The North Front Cemetery, which lies immediately north of the Rock's north face, is all that remains in Gibraltar of the once extensive sandy habitat on the isthmus connecting the Rock to Spain. Although fairly degraded, the cemetery holds a rich array of grasses and herbaceous flowering plants, the composition of which is quite different to that of most other

habitats on the Rock. In the spring especially, some parts of the cemetery take on the appearance of grassland or flowery meadow.

The most extensive areas of sandy habitat occur on the large, stabilised sand slopes of the east side of the Rock. These sit against the Rock at a steep angle below high cliffs. The majority of the slopes were covered in corrugated iron sheeting for most of the 20th Century to form a water catchment, but this was dissembled in the 1990s and the slopes were seeded with native species, forming a large extension to the existing sandy habitat (Cortés *et al.* 2000). The lower slopes that border the sea consist of typical dune vegetation with species such as *Ononis natrix*, *Malcolmia littorea* and *Euphorbia terracina*, and are also noteworthy for their bulbous plants, especially *Asphodelus albus*, *Urginea maritima*, *Allium sphaerocephalon*, *Dipcadi serotinum* and *Pancreatum maritimum*. The upper, rehabilitated slopes have developed a more grassland-like character.

Meadow (sites 5 and 11)

There are two main areas of approximately this type of habitat on Gibraltar. Artificially maintained firebreaks cross the maquis at 90° to each other on the western slopes of the Rock. The flora on these is diverse. It is dominated by herbaceous plants and includes ca. 40% of the entire flora of Gibraltar. Significant stands of the umbellifers *Ferula tingitana* and *Smyrniolum olusatrum* occur, attracting many flying insects during the spring when they are in flower. The other expanse of meadow-like vegetation is found on Windmill Hill Flats, which is dominated by large and fairly open areas that are rich in flowering plants. Due to a lack of grazing, umbellifers are especially abundant at this site; *Ferula tingitana* flowers during the spring whilst *Foeniculum vulgare* is in flower during mid- to late summer. Grasses dominate some patches on Windmill Hill Flats, forming a habitat that is not common in Gibraltar. Areas of grassland can also be found on the upper reaches of the East Sand Slopes (see *Sandy Habitats*).

Gardens and Regenerating Woodland (sites 9 and 10)

With regard to hoverfly fauna, this is an important habitat that provides a rich and diverse source of aphids upon which many hoverfly larvae depend. These habitats also provide many nectar rich flowering plants all year, as well as plenty of mature trees and dead wood. The most important are the Botanic Gardens and the Mount. The Botanic Gardens comprise some 6 ha of managed gardens that include several artificial ponds, the only freshwater habitats in Gibraltar. The Mount comprises an old colonial property towards the southern end of the Rock, near the Botanic Gardens. Part of the property consists of barely-managed garden, whilst the entire upper part, which falls within the boundary of the Upper Rock Nature Reserve, consists of regenerating woodland with *Olea europaea*, *Celtis australis*, *Laurus nobilis* and *Ulmus minor*, with an understorey that includes *Acanthus mollis* and *Rubus ulmifolius*, some dead wood as well as some clearings. Many smaller gardens are interspersed throughout the South District of Gibraltar.

Rocky Shoreline (sites 12 and 13)

An important mosaic of rocky shoreline and adjacent littoral habitat is present on the southwest of the Rock. Areas adjacent to these rocky shores include cliffs and rocky slopes with typical littoral floras. Prominent plant species include *Suaeda vera*, *Frankenia laevis*, *Limonium emarginatum* and *L. sinuatum*, *Lavatera arborea* and *L. mauritanica*, *Rumex scutatus*, *Beta vulgaris* and *Asteriscus maritimus*. Many areas adjacent to these rocky habitats

have an open and rocky garigue habitat that is quite similar to that found on Windmill Hill Flats, with a comparable flora and fauna.

Species and records

The specimen data listed below refers to the voucher specimens retained in the collections of Martin J. Ebejer and the Gibraltar Ornithological and Natural History Society. The collector's initials given in the data refer to Charles Perez (CP), Keith Bensusan (KB), Martin J. Ebejer (MJE) and Rhian Guillem (RG). Species are listed in alphabetical order under each subfamily.

SYRPHINAE

Chrysotoxum intermedium Meigen, 1822

2♂, Europa Foreshore, 30.ix.2008, MJE; 1♀, Mediterranean Steps, 1.x.2008, MJE; 1♂, Upper Rock, Jew's Gate, 23.iii.2010, KB.

A very common species in Gibraltar and central and southern Europe. Although we identify this species as *C. intermedium*, we acknowledge that more than one species exists under this name and a taxonomic revision is required.

Dasysyrphus albostrigatus (Fallén, 1817)

2♂, Upper Rock, Jew's Gate, 23.iii.2010, MJE; 1♂, The Mount, 23.iii.2010, MJE.

A frequent species in southern Europe and many Mediterranean countries, including North Africa.

Epistrophe ochrostoma (Zetterstedt, 1849)

1♂, Upper Rock, Jew's Gate, 23.iii.2010, MJE; 1♀, Windmill Hill Flats, 26.iii.2010, MJE; 1♂1♀, Upper Rock, Governor's Lookout, 28.v.2010, KB.

Known from Morocco and southern Spain, this species is the most southerly reaching of the genus.

Episyrphus balteatus (De Geer, 1776)

1♀, Botanic Gardens, 3.x.2008, CP; 1♀, Botanic Gardens, -.x.2009, light trap, in alcohol, KB; 1♂, Botanic Gardens, 14.i.2010, KB; 1♀, Camp Bay, SW Coast, 13.iii.2010, KB and RG.

This is an extremely common and widespread species across the whole Palaearctic. It is a known migrant and in the warmer parts of the Mediterranean it can be found all year.

Eupeodes corollae (Fabricius, 1794)

1♀, Botanic Gardens, 29.ix.2008, MJE; 1♀, Botanic Gardens, 1.x.2008, MJE; 1♀, Upper Rock, Mediterranean Steps, 2.x.2008, MJE; 1♀, North Front Cemetery, 13.iii.2010, KB and RG; 1♀, Upper Rock, Spur Battery, 21.iii.2010, KB; 1♂, Windmill Hill Flats, 26.iii.2010, MJE; 5♂2♀, East Sand Slopes, 12.iv.2010, KB.

An extremely common species all over Europe and the Middle East, it is a well-known migrant. Many thousands were present on the East Sand Slopes on 12.iv.2010.

Eupeodes nuba (Wiedemann, 1830)

1♂, Europa Foreshore, 30.ix.2008, MJE.

Although not rare, this is not a frequently encountered species. Its range extends from Southern Europe to North Africa and the Middle East.

Melanostoma mellinum (Linnaeus, 1758)

2♀, North Front Cemetery, 22.iii.2010, MJE; 1♀, Windmill Hill Flats, 26.iii.2010, MJE.

Very common throughout Europe.

***Meliscaeva auricollis* (Meigen, 1822)**

1♀, Botanic Gardens, 3.x.2008, MJE; 1♂, Upper Rock, Governor's Lookout, 28.ii.2010, KB and RG; 4♂2♀, Upper Rock, Spur Battery, 21.iii.2010, KB; 1♂, Botanic Gardens, 25.iii.2010, KB.

Very common throughout Europe. This species can be found all year round.

***Paragus bicolor* (Fabricius, 1794)**

1♂, North Front Cemetery, 22.iii.2010, MJE; 1♂, Upper Rock, Mediterranean Steps, 31.iii.2010, KB.

Common throughout Europe and the Mediterranean.

***Paragus haemorrhous* Meigen, 1822**

1♀, Botanic Gardens, 29.ix.2008, MJE; 1♂, Botanic Gardens, 1.x.2008, MJE; 1♂, Botanic Gardens, 3.x.2008, MJE; 1♂, Botanic Gardens, 7.vii-27.vii.2009, light trap (in alcohol), KB; 1♂, Botanic Gardens, 10.viii.2009, KB; 2♂, Botanic Gardens, 22.vii.2010, KB.

Common throughout Europe and the Mediterranean.

***Paragus quadrfasciatus* Meigen, 1822**

1♂, Botanic Gardens, 28.vii-12.viii.2009, light trap (in alcohol), KB; 1♂1♀, Camp Bay, SW Coast, 30.viii.2009, KB.

Common throughout Europe and the Mediterranean.

***Paragus tibialis* (Fallén, 1817)**

1♂, SW Rocky Shore, 29.ix.2008, MJE; 1♂, Botanic Gardens, 29.ix.2008, MJE.

An almost cosmopolitan species, it is common wherever it occurs and in the Mediterranean can be found all year.

***Scaeva albomaculata* (Macquart, 1842)**

1♀, Windmill Hill Flats, 26.iii.2010, MJE.

A migrant species, common throughout Europe, North Africa and the Middle East.

***Scaeva dignota* (Rondani, 1857)**

1♀, Windmill Hill Flats, 26.iii.2010, MJE.

An uncommon species in southern Europe and the western Mediterranean.

***Scaeva pyrastris* (Linnaeus, 1758)**

1♀, Windmill Hill Flats, 26.iii.2010, MJE.

Very common throughout Europe, the Mediterranean and North Africa.

***Simosyrphus aegyptius* (Wiedemann, 1830)**

1♂, SW Rocky Shore, 29.ix.2008, MJE; 1♂, Europa Foreshore, 30.ix.2008, MJE.

Widely distributed from the Canary Islands through North Africa to the Middle East. In Europe it has been found in Spain and the Balearic Islands.

***Sphaerophoria rueppellii* (Wiedemann, 1830)**

1♀, Botanic Gardens, 3.x.2008, MJE.

Very common and widespread throughout Europe, North and East Africa and the Middle East.

***Sphaerophoria scripta* (Linnaeus, 1758)**

1♂1♀, Botanic Gardens, 17.vi.2008, RG; 1♂, Sandy Beach and Dune at Eastern Beach, 25.iii.2010, RG; 1♂, Catalan Bay, 25.iii.2010, RG; 1♂, Upper Rock, Mediterranean Steps, 26.iii.2010, KB; 3♂, East Sand Slopes, 12.iv.2010, KB.

Very common and widespread throughout Europe, North Africa and the Middle East. Thousands present on the East Sand Slopes on 12.iv.2010, together with greater numbers of *Eupeodes corollae*.

***Xanthogramma marginale* (Loew, 1854)**

Fig. 7, habitus.

2♂, Windmill Hill Flats, 26.iii.2010, MJE; 1♂, same data, KB; 2♀, Windmill Hill Flats, 26.ix.2010, KB; 1♀, Windmill Hill Flats, 27.ix.2010, KB.

This species is known only from the Iberian Peninsula and Morocco.

MILESIINAE

***Ceriana vespiformis* (Latreille, 1804)**

5♂, Botanic Gardens 14.viii.2009 KB; 1♀, Botanic Gardens 20.vii.2010 KB.

A widespread species in many countries around the Mediterranean.

***Eristalinus aeneus* (Scopoli, 1763)**

1♀, Europa Foreshore, 30.ix.2008, MJE; 1♂, Upper Rock, Mediterranean Steps, 2.x.2008, MJE; 1♂, Upper Rock, Mediterranean Steps, 6.viii.2009, KB.

Very common. Large numbers may congregate in suitable habitats, usually on mud, flowering plants and even around coastal saline rock pools.

***Eristalinus taeniops* (Wiedemann, 1818)**

1♂, SW Rocky Coast, 29.ix.2008, MJE; 2♂, Windmill Hill Flats, 30.ix.2008, MJE.

A common and widespread species in Africa and southern Europe.

***Eristalis arbustorum* Linnaeus, 1758**

1♀, Botanic Gardens, 14.vii.2010, KB; 2♂2♀, Botanic Gardens, 20.vii.2010, KB.

A very common and widespread species in Europe and the Mediterranean.

***Eristalis similis* (Fallén, 1817)**

1♂1♀, Upper Rock, Spur Battery, 21.iii.2010, KB; 2♂, Botanic Gardens, 25.iii.2010, KB; 1♂, Windmill Hill Flats, 26.iii.2010, MJE; 2♂1♀, Upper Rock, Mediterranean Steps, 1.iv.2010, KB.

The flight period appears to be much shorter than that of *E. tenax*, the species to which it bears most resemblance in the field. It is common on Gibraltar and widespread around the Mediterranean.

***Eristalis tenax* (Linnaeus, 1758)**

1♀, Upper Rock, Mediterranean Steps, 2.x.2008, MJE; 1♀, Upper Rock, Mediterranean Steps, 7.xi.2009, KB; 1♂, Upper Rock, Mediterranean Steps, 01.vi.2010, KB; 1♂1♀, Botanic Gardens, 20.vii.2010, KB.

Almost cosmopolitan. Large numbers often found on flowering plants. May occur all year round.

***Eumerus amoenus* Loew, 1848**

2♀, Europa Foreshore, 30.ix.2008, MJE; 1♂, The Mount, 23.iii.2010, MJE; 2♀, Upper Rock, Jew's Gate, 23.iii.2010, MJE; 1♂2♀, Windmill Hill Flats, 26.iii.2010, MJE; 1♀, same data, KB; 2♀, Upper Rock, Mediterranean, Steps, 26.iii.2010, RG; 2♀, Upper Rock, Mediterranean Steps, 1.iv.2010, KB.

This is one of the commonest species of the genus, found in many countries around the Mediterranean.

***Eumerus barbarus* Coquebert, 1804**

1♂, East Coast Sand Slopes, 1.x.2008, MJE; 2♂, East Coast Sand Slopes, 22.iii.2010, RG.

An easily recognised species and a common one in the countries bordering the south of the Mediterranean.

***Eumerus etnensis* van der Goot, 1964**

2♂, Europa Foreshore, 30.ix.2008, MJE; 1♂3♀, Windmill Hill Flats, on *Foeniculum vulgare*, 27.ix.2010, KB; 1♂1♀, Windmill Hill Flats, on *Foeniculum vulgare*, 30.ix.2010, KB; 1♂, Windmill Hill Flats, on *Foeniculum vulgare*, 2.x.2010, KB.

Described from Sicily, this species is known from Gibraltar (Smit *et al.* 2004), France, Portugal, Spain and Malta.

***Eumerus hungaricus* Szilády, 1940**

1♂, Botanic Gardens, 29.ix.2008, MJE; 1♂, Upper Rock, Jew's Gate, 23.iii.2010, MJE; 1♂, Upper Rock, Mediterranean Steps, 1.iv.2010, KB.

Previously known from Italy and Hungary, this species is a surprising find on Gibraltar. New for Iberia.

Note on taxonomy: Martin Speight (Dublin, Ireland) informed MJE (*pers. comm.*) that he examined the type of *Eumerus elaverensis* Ségué, 1961 and was unable to recognize differences from *E. hungaricus* on the basis of descriptions, but had not seen material of *E. hungaricus*. It is possible that these two taxa refer to one species, in which case the distribution of the species in Europe is much wider. One of the authors (MJE) compared the specimens cited in this article with specimens identified as *E. hungaricus* in the NHM, London.

***Eumerus nudus* Loew, 1848**

1♀, Upper Rock, Mediterranean Steps, 1.iv.2010, KB.

This species is widespread in the western half of the Mediterranean and North Africa.

***Eumerus pulchellus* Loew, 1848**

1♀, Botanic Gardens -x.2009 KB; 1♂, The Mount, 23.iii.2010, MJE; 1♂, Botanic Gardens, 25.iii.2010, MJE.

A fairly widespread species in countries around the Mediterranean.

***Eumerus pusillus* Loew, 1848**

1♂, East Coast Sand Slopes, 1.x.2008, MJE; 2♂, Upper Rock, Mediterranean Steps, 2.x.2008, MJE; 1♂, Botanic Gardens, 14.viii.2009, KB; 1♂, The Mount, regenerating woodland, 23.iii.2010, MJE; 1♂1♀, Windmill Hill Flats, 26.iii.2010, MJE.

This species can be numerous where it occurs. It is widespread species in some countries of the Mediterranean, particularly the islands.

***Eumerus strigatus* (Fallén 1817)**

1♂, Upper Rock, Mediterranean Steps, 1.iv.2010, KB.

There are several closely related species, but *E. strigatus* appears to be widespread in North Africa, all around the Mediterranean and much of Europe.

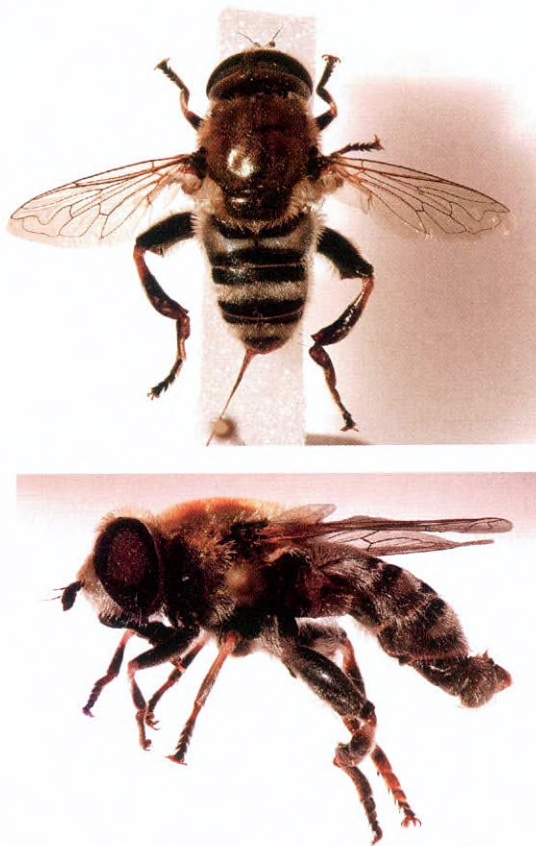


Fig. 3. *Merodon eques* Fabricius, dorsal and lateral views.

***Merodon eques* Fabricius, 1805** Fig. 3, habitus; Fig. 4, hind leg; Fig. 5, male postabdomen. 1♂1♀, Botanic Gardens, on *Urginea maritima*, 29.ix.2008, KB; 1♂, Upper Rock, Mediterranean Steps, 2.x.2008, MJE; 1♂1♀, Windmill Hill Flats, 25.ix.2010, KB; 1♂,

Windmill Hill Flats, 27.ix.2010, KB; 1♂, East Coast Sand Slopes, on *Urginea maritima*, 30.ix.2010, KB; 1♂, Windmill Hill Flats, 02.x.2010, KB; 2♂, Little Bay, on *Urginea maritima*, 2.x.2010, KB.

This species is known from France, Morocco, Algeria and Sardinia. New for Iberia. Its emergence coincides with that of *Merodon luteihumerus* (see below), but the species seem to show a preference for different habitats, in spite of being attracted to the same species of Asparagaceae. *Merodon eques* is fairly frequent in rocky, open habitats with garigue. It is attracted to *Urginea maritima* but will visit a wider variety of flowers, having been observed frequently on *Foeniculum vulgare* (Apiaceae) and *Dittrichia viscosa* (Asteraceae).

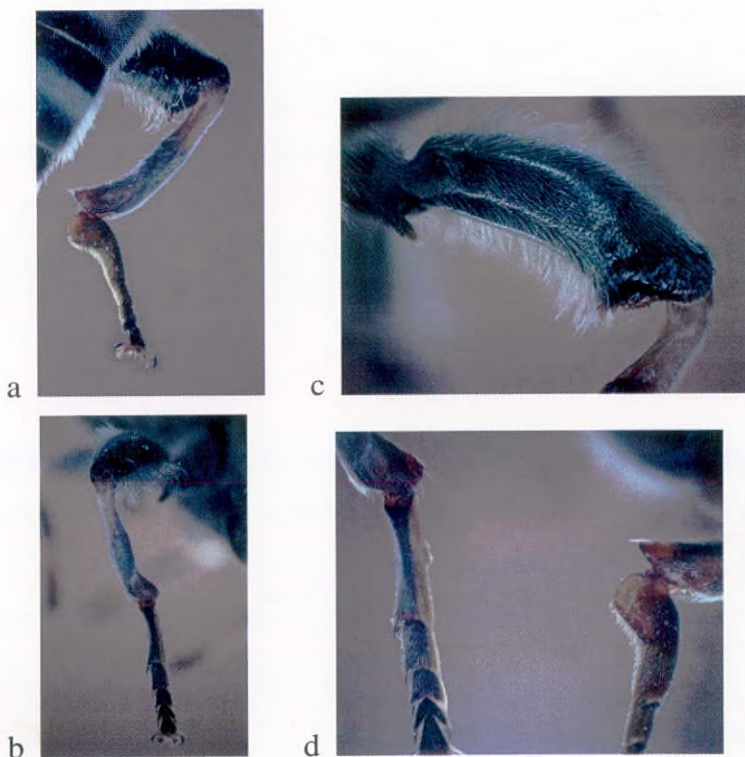


Fig. 4. *Merodon eques* Fabricius, hind leg; a, tibia and tarsus, posterior; b, same, lateral; c, femur, posterior; d, metatarsus, left- lateral and right- posterior.

Note on taxonomy: our identification of *M. eques* carries some uncertainty. Our specimens fit the descriptions of both *M. eques* and *M. arrasus* Becker, 1921 except for minor chromatic characters of the legs and abdomen. Our specimens also have the hind leg in the male matching the figure of the same given in Sack (1932). This is the only structure that is illustrated. It is unlikely that both species have an identical hind leg. Two experienced syrphidologists, W. Hurkmans (Amsterdam) and A. Vujić (Novi Sad, Serbia), independently identified a specimen in the Natural History Museum, London as *M. eques*. One of us (MJE)

examined this specimen and made direct comparisons with the material cited in this article, noting the extreme similarities. This raises the possibility that the two taxa *M. eques* and *M. arrasus* are one and the same species. We have opted to use the older name as we cannot see reliable differences between these two taxa, but we accept that future work may resolve this point and may yet show that our species is in fact *M. arrasus*. Martin Speight (Dublin), in correspondence with one of the authors (MJE), stated that there remain no Fabrician types of *M. eques* according to Zimsen's list. We have not seen the type of *M. arrasus*. Thus, uncertainty as to the identity of both *M. eques* and *M. arrasus* remains. We have illustrated the hind leg (Fig. 4) and male postabdomen (Fig. 5) of our species.

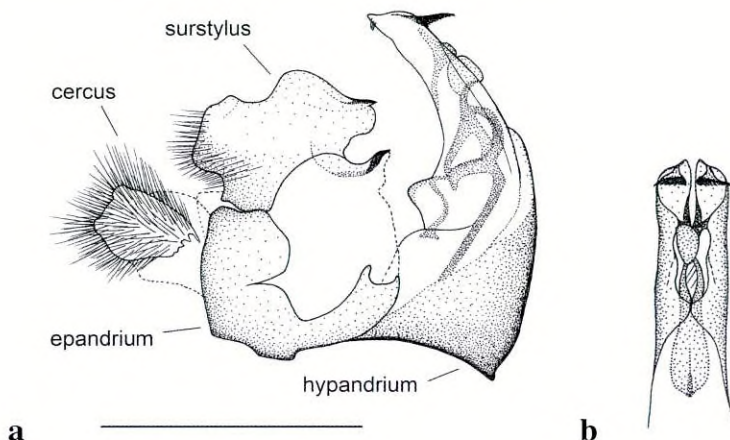


Fig. 5. *Merodon eques* Fabricius, male postabdomen: a, right lateral; b, apical part of hypandrium, ventral.

***Merodon luteihumerus* Marcos-Garcia, Vujic & Mengual, 2007**

3♂, East Coast Sand Slopes, on *Urginea maritima*, 1.x.2008, MJE; 1♂1♀, same data, KB; 6♂2♀, East Coast Sand Slopes, on *Urginea maritima*, 30.ix.2010, KB.

Fig. 6, habitus.

This is a little known species that was only recently described from Spain (Marcos-Garcia *et al.* 2007). It is unusual for *Merodon* in that its peak flight period is in the autumn. On Gibraltar, it was found to be strongly attracted to the flowers of *Urginea maritima*, which is known to be its host plant (Marcos-Garcia *et al.* 2007). It can be common in sandy habitats where *U. maritima* is present during late September and early October, but has not been recorded away from the East Sand Slopes.

***Merodon natans* (Fabricius, 1794)**

1♂, East Coast Sand Slopes, 1.x.2008, MJE; 1♀, East Coast Sand Slopes, on *Urginea maritima*, 30.ix.2010, KB.

Not a common species, but found in several countries around the northern Mediterranean.



Fig. 6. *Merodon luteihumerus* Marcos-Garcia, Vujic & Mengual, dorsal and lateral.

***Merodon segetum* (Fabricius, 1794)**

3♂, Windmill Hill Flats, 26.iii.2010, MJE; 2♂, KB; 1♂, Upper Rock, Jew's Gate, 26.iii.2010, MJE; 1♂, Upper Rock, Mediterranean Steps, 31.iii.2010, KB.

An uncommon species known from Algeria, Crete and the Balkans, it has been recorded only recently from Spain (Marcos-Garcia *et al.* 2007). On Gibraltar, this species was strongly attracted to the flowers of the giant squill *Scilla peruviana*. Adults frequently alighted on paths and low-lying vegetation. The flight was fast and noisy with a loud buzz as is common with most species in this genus.

***Milesia crabroniformis* (Fabricius, 1775)**

Fig. 7, habitus.

1♀, Botanic Gardens, 29.ix.2008, CP; 1♂, Botanic Gardens 9.ix.2009 KB; 1♂, Botanic Gardens 20.vii.2010 KB; 1♂, Botanic Gardens 2.viii.2010 KB.

Relatively uncommon but widespread in southern Europe and the Mediterranean.

***Myathropa florea* (Linnaeus, 1758)**

1♂, Upper Rock, Mediterranean Steps, 6.viii.2009, KB; 1♀, Upper Rock, Mediterranean Steps, 12.viii.2009, KB; 3♂, Camp Bay, SW Coast, 30.viii.2009, KB.

This is a common species that develops in tree rot holes. Frequent on Gibraltar and common throughout Europe and the Mediterranean.

***Syritta flaviventris* Macquart, 1842**

1♂, Europa Foreshore, 30.ix.2008, MJE.

A frequent species in southern Europe, the Mediterranean and the Middle East.

***Syritta pipiens* (Linnaeus, 1758)**

1♂, Botanic Gardens, 17.vi.2008, RG; 1♂, Botanic Gardens, 29.ix.2008, MJE; 2♂, Botanic Gardens, 10.viii.2009, KB; 3♂1♀, Botanic Gardens, 14.viii.2009, KB; 1♂, Botanic Gardens, - .x.2009, light trap, in alcohol, KB.

Almost cosmopolitan, this species is often numerous wherever it occurs and flies almost throughout the year.



Fig. 7. Top: *Mylesia crabroniformis* (Fabricius); bottom: *Xanthogramma marginale* (Loew).

***Volucella zonaria* (Poda, 1761)**

1 ex., Windmill Hill Flats, 24.ix.2010, KB.

This unmistakable species was seen but not taken. It is widespread in Europe and the Mediterranean and extends to Mongolia.

Discussion

Gibraltar is very much like an island very close to the Iberian mainland rather than a peninsula. To some extent, its airport and the border town of La Linea in Spain form a barrier to dispersal of non-migrant species. Gibraltar is tiny when compared to other Mediterranean islands and the Atlantic Macaronesian islands, but its proximity to the mainland allows it a relatively rich hoverfly fauna. The species composition of hoverflies in Gibraltar has much in common with the fauna of the Balearics and the Macaronesian islands, but then common and widespread species would be expected to occur on all islands. Remoteness from the mainland, ecological pressures of climate, plant diversity and competing faunas contribute to the evolution of endemics and this is seen in the fauna of Macaronesia as compared to the islands in the Mediterranean. The Balearic Islands with their diverse habitats and availability of wetland are known to have 66 species of Syrphidae, one of which is endemic (Riddiford and Ebejer 2006); Malta with limited wetland and woodland, but no mountains has 46 species, with no endemics (Ssymank and Ebejer in press); Madeira has 25 species with 4 endemics (Smit *et al.* 2004); the Canary Islands have 33 species, 12 of which appear to be endemic (Marcos-Garcia *et al.* 2002). However, the African mainland opposite the Canaries is poorly studied, so some of the endemic species of the Canaries may not be so, as it is possible that they occur on mainland Africa.

Given some closer geological and floral affinities to Morocco than to Spain, it would not be surprising to find a species or two to occur on Gibraltar and Morocco, but not in Spain. However, although two species found on Gibraltar had not yet been recorded from Iberia, both were known from Europe. The presence of *Eumerus hungaricus*, a species which to date was known only from Italy and Hungary, is perhaps surprising. *Merodon eques* was known from the Maghreb and France. Its presence between the two ends of this apparently disjunct distribution is not surprising and there can be little doubt that the species must occur elsewhere on the Iberian Peninsula as well.

Several species encountered on Gibraltar are well-known migrants, but most of these are aphid feeders in their larval stages, as indeed are most migrant hoverfly species. There is no reason why these would not be breeding on Gibraltar. The presence of an often high abundance of *Eristalis tenax* and *E. similis* may, however, be due to migration as freshwater habitats may not be sufficient on the Rock to sustain large populations of their aquatic larvae.

Species of the genera *Eumerus* and *Merodon*, whose larvae are plant feeding, seem to be thriving, even though one would have thought the very small habitats might not sustain viable populations. However, there are many bulb-forming plant species of the families Amaryllidaceae (= Alliaceae), Asparagaceae and Iridaceae – likely hosts for these hoverfly genera and generally these plants are very common on the Rock (Linares *et al.* 1996). Of the four *Merodon* species recorded so far, three have been recorded only in the autumn and the fourth only in the spring.

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Changes to the Irish Diptera List (14) – Editor

This section appears as necessary to keep up to date the initial update of the Irish list in Vol. 10, 135-146 and the recent checklist of Irish Diptera (Chandler *et al.* 2008). Species are listed under families, but with references listed separately. This section in the previous issue should have been numbered (13). The addition cited below brings the total Irish list to 3326 species.

Corrections

The following errors have been noted in Chironomidae in the Irish checklist:

- p. 51. *Polypedilum aegyptium* should be included in subgenus *Tripodura*
- p. 61. *Pseudosmittia scotica* should have been listed on p. 55 under the additional genus CAMPTOCLADIUS van der Wulp, 1874 as *C. stercorarius* of which *scotica* is a synonym

Changes

Mycetophilidae. The correction of *Exechia frigida* to *E. borealis* (see p. 162 below) also applies to the Irish list.

Syrphidae. The addition of *Dasysyrphus hilaris* (Zetterstedt, 1843 – *Scaeva*) (see p. 163 below) was also overlooked in the Irish checklist.

Rare old growth Diptera (Clusiidae, Milichiidae, Mycetophilidae, Sciaridae, Tipulidae) from Dunham Park, Cheshire – KNAA was

contracted by the North West Region of the National Trust to carry out a survey and assessment of the wood decay invertebrates of Dunham Park (SJ740870) during 2008. In addition to standard hand-searching techniques, two flight interception traps were operated on ancient beech trees. The traps comprised groups of four 2 litre plastic drinks bottles attached to a wooden base and with windows cut in the outer sides to give access to a mixture of antifreeze and soapy water held in the caps. One trap was hung from a large bracket of the fungus *Ganoderma australe* on the outside of a massive beech snag, while the other was hung on the inside of a standing hollow trunk. Both beech trees are deep in the centre of this ancient wood pasture site, within unshaded, sun-lit areas, standing amongst bracken. The traps were operated from 22 May to 17 September; they were emptied and the preservative renewed in late June and again in mid July. The trap on the beech bracket captured 69 species of Diptera including the fungus gnat *Sciophila interrupta* (Winnertz) (Mycetophilidae) and *Madiza britannica* Hennig (Milichiidae). The hollow beech trap captured 37 species including further *Sciophila interrupta*, *Scythropochroa quercicola* (Winnertz) (Sciaridae) and *Dictenidia bimaculata* (Linnaeus) (Tipulidae).

The rarest of these is *Scythropochroa quercicola*, a species that has only previously been found in Britain within Brampton Wood, Huntingdonshire (Freeman, P. 1990, *Entomologist's monthly Magazine* **126**, 52), from where it was reared from a rotten log by J.H. Cole in 1975. *Madiza britannica* has only previously been reported from three sites in Cambridgeshire (Cambridge, Snailwell, Wicken Fen), one in Huntingdonshire (Woodwalton Fen) and one in Somerset (Failand), and has Red Data Book (Vulnerable) status in Britain (Falk, Ismay and Chandler in press); it has been reared from detritus in a hollow elm and from a rot hole in poplar. *Sciophila interrupta* has Lower Risk (Nationally Scarce) status (Falk, S.J. and Chandler, P.J. 2005. A review of the scarce and threatened flies of Great Britain. Part 2: Nematocera and Aschiza not dealt with by Falk (1991). *Species Status* **2**, 1-189. Joint Nature Conservation Committee, Peterborough). It is known from sites across southern and eastern England, including the New Forest, Savernake Forest and Burnham Beeches, but has not previously been reported as far north as Cheshire. The nearest previously known site appears to be Wychwood Forest NNR in Oxfordshire. *Dictenidia bimaculata* is a particular feature of historic parklands (Alexander, K.N.A. 2003. *Dipterists Digest (Second Series)* **10**, 106), but surprisingly has not been reported from this site before – it is usually relatively easy to detect as larvae or pupae and the spectacular adults are difficult to overlook. However, none were found by hand searching, perhaps suggesting a small very localised population.

The hand searching work also revealed a great rarity, *Heteromeria nigrimana* (Loew) (Clusiidae). One was knocked from an aerial dead branch on a large open-grown oak on 23.vi.2008; this specimen was exhibited at the subsequent BENHS Annual Exhibition, held on 8 November 2008 (Alexander, K.N.A. 2009. *British Journal of Entomology and Natural History* **22**, 174). This species has Red Data Book (Endangered) status in Britain and has only previously been found at six sites across southern and eastern England (Falk, Ismay and Chandler in press). The nearest known site is Moccas Park NNR, Herefordshire, where it was found in 1912 and the most recent previous record was from Nunney's Wood, Isle of Wight in 1980.

KNAA would like to thank John Hooson of the National Trust North West Region for setting up the contract – **K.N.A. ALEXANDER**, 59 Sweetbrier Lane, Heavitree, Exeter EX1 3AQ and **P.J. CHANDLER**, 606B Berryfield Lane, Melksham, Wilts SN12 6EL

Stratiomys chamaeleon (Linnaeus) (Diptera, Stratiomyidae) at Cothill, Oxfordshire

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Summary

Recent records for the soldierfly *Stratiomys chamaeleon* (Linnaeus) from the Cothill area of Oxfordshire are presented together with some notes on the possible conditions required for development by this fly.

The Cothill area in Oxfordshire contains a suite of calcareous valley fens [Ruskin Reserve (NNR) Parsonage Moor and Lashford Lane Fen – these three together being known also as Cothill Fen SSSI] linked by the Sandford Brook. Whilst not yet a fen, a fourth site, Dry Sandford Pit SSSI, is less than a mile away and is an ex-quarry with a small area of pools and calcareous springs and seeps in the floor, representing perhaps the very earliest stage in a calcareous fen formation. The three first mentioned ancient fen sites form Cothill Special Area of Conservation (SAC) and all sites are managed either by the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT), Natural England or several private owners.

Stratiomys chamaeleon is a spectacular, large, black and yellow, rare soldierfly assessed as RDB 1, Endangered (Falk 1991) that has been found in recent years in only three areas in Britain, the Anglesey Fens in Wales and the Black Isle, Easter Ross in Scotland (Howe and Howe 1995), and the Cothill Fens with Dry Sandford Pit in Oxfordshire (Ismay 1979, 1981).

On 5.vii.2010 whilst on hands and knees searching for vegetative rosettes of butterwort in sedge and rush tussocks on the edge of the shallow stream that runs through Parsonage Moor at SU4605599872, JW noticed a black and yellow fly scrambling through the short vegetation. It seemed reluctant to fly and was easily netted. It proved to be a male *Stratiomys chamaeleon*. Fig. 1 is one of the photographs taken on that occasion. Investigation of a square shallow pond at SU4605999842 nearby revealed numerous active larvae of *Stratiomys* type in the shallow warm water over whitish calcareous mud with a *Chara* algal mat. The white mud is tufa, a form of calcium carbonate/phosphate created as cold spring water, supersaturated with CO₂, that emerges under pressure and leads to a mineral coating on twigs, leaves and soil particles. This process ‘locks up’ any phosphate in the water, hence the spring provides a source of low nutrient feed that creates the short, herb-rich fens downstream of the spring. The source of the water and this geochemical process is believed to be the driver for the uniqueness of places like Cothill and springheads can be detected by following the tufa coated twigs and debris up stream and Dry Sandford is a very early successional form of this. Some reed colonisation of this pond had occurred but the reed was sparse and short, possibly dwarfed by the low nutrient status of the water, meaning that there was still plenty of light and warmth reaching the *Chara* mat. *Stratiomys* type exuviae were seen here and in other open,

sunny *Chara* pools nearby. Sweeping round the edge of this square shallow pond on the same day produced one male of *Stratiomys singularior* (Harris), a soldierfly species not previously recorded for this site, but with records from three other Oxfordshire sites, the most recent of which is that of KP on 27.vi.1989 from tall fen/marsh at Otmoor, SP57251301.

Historic records for *S. chamaeleon* in Oxfordshire indicate a wider range of sites including Lye Valley Fen (otherwise known as Bullingdon Bog, Hogley Bog or Ogley Bog) in Oxford City, Tubney and Shotover, near Oxford, reported by Ismay (1979) from specimens in the Hope Department of Entomology at the Oxford University Museum of Natural History. These areas may now be unsuitable for *S. chamaeleon* as the only *Stratiomys* species recorded by JW after intensive fly collecting in the Lye Valley fens over the past 7 years is the commoner species, *S. potamida* Meigen.



Fig. 1. Male *Stratiomys chamaeleon* (Linnaeus) captured whilst reluctant to fly at Parsonage Moor, Cothill Fen SSSI, July 2010. Photograph Judy Webb.

Stratiomys chamaeleon was first recorded in the Cothill area in the period 1912-1929 (specimens in the Hope entomological collections seen by John Ismay). Following the 1979 and 1981 records of this species (Ismay 1979, 1981), KP made further records of this species in 1990 and 1991 when he caught one male on 21.vii.1990 in Cothill Fen (Ruskin Reserve) at SU46029966 by water trapping and reared from a larva, collected at Dry Sandford Pit from shallow tufa-rich pools SU46829958, one adult which emerged on 18.vii.1991. He reared a further two males from larvae collected from *Chara* pools at Cothill in 1990, one from Parsonage Moor (SU46039978) that emerged on 27.vi.1992 and the second from the Ruskin Reserve (SU46029966) that emerged on 27.vii.1992. A male (determined by M. and L

Howe) was also recorded from Cothill on 23.vii.1990 by Mark Crick, who had found *S. potamida* there on 21.vii.1990.

Bryophyte and *Chara* material collected from these same shallow pools by KP subsequently also produced adults of the almost equally rare *Odontomyia angulata* (Panzer) as well as *S. potamida*, *Oxycera pygmaea* (Fallén), *O. trilineata* (Linnaeus), *Oplodontha viridula* (Fabricius) (all Stratiomyidae), *Chrysops viduatus* (Fabricius) (Tabanidae) and the chalcid parasitoid of *Stratiomys*, *Chalcis sispes* (Linnaeus). The presence of a parasitoid usually means a healthy population of the host. John Ismay (*pers. comm.*) had found *C. sispes* here several times in the past.

In more recent years, CR photographed a male *S. chamaeleon* on a hogweed (*Heracleum sphondylium*) flower at Dry Sandford Pit on 19.vii.2003 and *S. potamida* was seen on the same day. MS recorded a male *S. chamaeleon* from the same site on 23.viii.2000 and on 18.vi.2004 photographed another male, which had settled on bare ground in the open area in front of the cliff faces occupied by many solitary bees in the south-east part of the site (Fig. 2).



Fig. 2. Male *Stratiomys chamaeleon* (Linnaeus) found settled on bare ground at Dry Sandford Pit on 18.vi.2004. Photograph Matt Smith.

These records indicate that there is still a viable population of *S. chamaeleon* in the Cothill area. JW hopes to carry out larval searches and rearing next summer at each site to elucidate which pools/runnels are the key development sites in order to better inform the site management to the benefit of this rare fly. Currently at Parsonage Moor there is very light

grazing by 2-3 ponies for part of each year, some rotational reed cutting and cutting short of the vegetation on the edges of the shallow stream that flows across the site for the benefit of the southern damselfly (*Coenagrion mercuriale* (Charpentier)) population present. The site is, however, in general, becoming far more reed-dominated than in the 1970s (J. Ismay *pers. comm.*) and this may present problems for the *S. chamaeleon* population in the future if reed expansion is allowed to continue and shade important pools.

At Dry Sandford Pit there has been some regular reed cutting and scrub clearance to benefit the southern damselfly population but the open calcareous runnels there are still becoming colonised by tall vegetation and scrub, so there are plans to introduce light grazing by cows.

At Parsonage Moor one new shallow pool has already been dug in the peat and a further shallow excavation is planned in 2011. These pools may present excellent further breeding opportunities for *S. chamaeleon*, helping to safeguard the population for the future.

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Syrphus nitidifrons Becker (Diptera, Syrphidae) new to Great Britain

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Summary

Syrphus nitidifrons Becker, 1921 is added to the British List.

Introduction

On 10 May 2010, whilst recording in the Delcombe Wood (ST7805) area of central Dorset (V.C. 9), my attention was drawn to a syrphid hovering several feet above the ramsons *Allium ursinum* and wood spurge *Euphorbia amygdaloides*, which dominated this clearing. As it hovered there, I noticed that the markings on the tergites looked rather unfamiliar. I had momentarily assumed that it was a *Eupeodes* species, probably *E. nielsenii*, and I at once decided to net it. However, on inspecting my net all I could see was an apparent *Parasyrphus* species, which I pooted with an air of disappointment, having assumed that my original target specimen had eluded me!

I continued recording for the rest of that afternoon, little realising that I had a species new to Great Britain amongst my catch. After arriving home, I started to identify my catch and whilst checking through the *Parasyrphus* species, which comprised several *P. malinellus* and *P. punctulatus* specimens, I noticed that among the apparent *P. punctulatus* catch, there was one specimen that did not look like the others; the tergite markings looked slightly different, and in the case of the third tergite, the markings, although not "hooked" did appear to be more bulbous towards the centre of the tergite. On closer inspection I noticed that the frons was entirely black and shining, without any sign of dusting. This was very different from *P. punctulatus*, which it superficially resembled, and I was then struck by the fact that this was the specimen that I thought I had missed!

On consulting *British Hoverflies* (Stubbs and Falk 2002) this female specimen keyed out as *Syrphus nitidifrons* Becker, a species not yet on the British list, but it was included in the key because of the possibility of its arrival in Britain. Since the squamal hairs are pale and sparse it was keyed out by them in *Parasyrphus* where the shining black frons distinguished it from other species. It differs from other British *Syrphus* species in this respect and in having the markings on abdominal tergites 2 and 3 separated into a pair of lunulate spots as in rare varieties of some other species, and is also among those species with bare eyes. Other characters are that the face is yellow down to the facial prominence but then black from there down to the mouth edge, the genae black with black hairs and the fore femora, and fore tibiae partly, are black haired.

I further checked it by using *Hoverflies of Northwest Europe* (van Veen 2004) and here, once again, it also keyed out as *Syrphus nitidifrons*. This specimen was then shown to Alan Stubbs and Roger Morris during the Dipterists Forum Annual summer field meeting at Stackpole, Pembrokeshire in June 2010, and they both agreed with my identification.

The literature relevant to this species states that, unlike the other British *Syrphus* species, *S. nitidifrons* is known only to occur as an adult in the spring from April to June. With this in mind, I made a number of repeat visits between 11 May and 2 June but, unfortunately, no

further sightings or captures where made. Although the larval biology is unknown, it is generally considered to be a conifer associated species, so might have been expected to spread westwards in Europe with the increased plantation of conifers over the past century, as has happened with a number of other conifer associated syrphids. However, *S. nitidifrons* is an enigmatic species, seemingly only usually encountered as solitary specimens, and then rarely, even using Malaise traps, from which it might be concluded that it is arboreal and rarely descends to levels where it can conveniently be captured (Martin Speight *pers. comm.*). My experience of being unable to recapture the species in the same locality, despite repeated visits looking for it, would seem to be rather typical.

Delcombe Wood is a fairly dry woodland, with no natural water source; most of the soil is thin, with large areas consisting of loose flints and it is situated quite high up as part of a range of Chalk hills. The nearby car park and view point are at over 800 ft above sea level and the site where *S. nitidifrons* was taken is at an altitude of 775 ft; the woodland continues to descend, with the lower slopes descending into a valley which is south east facing and fairly sheltered despite its relative altitude. Delcombe Wood is easily defined as mixed woodland, with deciduous and coniferous trees roughly occurring in equal numbers, with most situated in separate woodland "blocks." The conifer "blocks" mostly comprise Norway spruce *Picea abies* and many of the conifers on this site are quite large, mature and are well spaced, allowing many native woodland plants to survive. Large swathes of bluebell *Hyacinthoides non-scripta* are characteristic of Delcombe in spring; these are usually followed by ramsons *Allium ursinum*, which becomes almost as dominant as the bluebells. The deciduous areas contain oak *Quercus robur*, ash *Fraxinus excelsior* and beech *Fagus sylvatica*; some of the latter are very large and there is also an additional beech *Fagus* species (believed to be American beech *F. grandifolia*), which has also been block planted.

Speight (1988) made a contribution towards the biology of *S. nitidifrons*, indicating that it principally uses flowers of trees as nectar sources, confirming its arboreal habits. However, most of the flowers quoted as visited in his article (including *Prunus* and *Sorbus* species) do not occur at this locality, *Salix* being the exception, represented by *S. cinerea*. Unfortunately those bushes are fairly few.

In view of the difficulty of finding this species it is quite possible that it has been in England for some time but has been overlooked. This view is reinforced by its first being found in Dorset, while it is most likely, as it occurs in nearby parts of western Europe but is absent from Fennoscandia, that it would have first colonised the south-east of England. It should therefore be sought at other woodlands in the south of England.

Acknowledgements

I thank Alan Stubbs and Roger Morris for confirming my identification. I am also grateful to Martin Speight and Graham Rotheray for comments on the manuscript.

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Microclimatic factors and the diurnal swarming pattern of *Hydrotaea cyrtoneurina* (Zetterstedt) (Diptera, Muscidae)

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Summary

Observations of the swarming behaviour of male *Hydrotaea cyrtoneurina* (Muscidae) (Zetterstedt) were undertaken in a 15ha wood in Northamptonshire (V.C. 32) during July and August 2010. Only four swarming sites were located in the wood, three of which supported small swarms of less than five flies. The fourth site supported a swarm of 30-40 males at 1-3m above ground level, close to a cherry tree (*Prunus avium*) marker. Microclimatic conditions at the main swarming site were monitored. Constructional details of the monitoring station are given. The overall conclusion was that swarming in *H. cyrtoneurina* is triggered when light intensity rises above 110-190lux and ceases when it falls below 160-170lux, but is inhibited when the air temperature is below 15-16°C. Relative humidity between 44-74% was not found to have any effect on swarming behaviour.

Introduction

Behaviour in insects takes the form of a set of preset responses that are triggered by a wide range and combination of both internal and external stimuli (Matthews and Matthews 2010). All members of a particular species exhibit a common set of responses to the same set of stimuli. Taking advantage of this characteristic to link stimuli to responses for a number of individuals enables behavioural predictions, such as winter survival strategies (Arrignon *et al.* 2007) and habitat-related distributions (Ulrichs and Hopper 2008), to be made for the species as a whole. Groups of behavioural responses are associated with wider behavioural umbrellas. Swarming in Diptera is one such, which although considered to be triggered primarily by the urge to reproduce, nevertheless includes a number of easily observable behaviours. Examples include the orientation of swarms of male *Fannia armata* (Meigen) (Fanniidae) (Alderman 2009) and the different responses of swarming *Episyrphus balteatus* (Linnaeus) (Syrphidae) to conspecific and heterospecific approaches (Alderman 2008 and 2010a).

One set of external stimuli that have a major effect on swarming are the principal microclimatic factors: air temperature, light intensity, relative humidity and wind speed (Gilbert 1985, Unwin and Corbet 1991). Wind speed has a major influence on dipteran flight activity. Swarming tends to take place in calm conditions, with the swarm often turning to face the wind as the speed increases and dispersing when its strength is too great to maintain position (Syrjamaki 1968). Light intensity has been shown to both initiate and inhibit swarming in Diptera (Nielsen and Greve 1951, Koskinen 1969), although air temperature usually has to be within certain ranges for swarming to occur (Heinrich and Pantle 1975). Humidity can also influence dipteran flight activities, with swarming in high humidity being suggested as a method of reducing desiccation (Dahl 1969).

The Muscidae, a family of calyptate Diptera, consists of small to medium sized, 2-12mm, sometimes reaching 18mm, mostly grey to black bodied flies (Oosterbroek 2006). They are represented by approximately 572 species in Europe (Fauna Europaea, www.faunaeur.org) of which 285 have been recorded in the British Isles (Chandler 2010).

Muscidae are mostly woodland and forest dwellers and are found less often in open, exposed or dry habitats; many species have also adapted to anthropogenic environments, with the housefly *Musca domestica* (Linnaeus) being a familiar example. The few blood-sucking and secretophagous species are largely disease vectors and are of medical and veterinary importance. Publications on the family are therefore understandably biased in this direction, with topics covered including larval development in dung (Broche and Haas 1999), as a disease vector (Cafarchia *et al.* 2009), their occurrence in domestic environments (Reddy 1981) and how to trap them (Hanley *et al.* 2009). In contrast, other behavioural aspects have rarely been covered.

Swarming is perhaps not strongly associated with Muscidae, but one common British species that does undertake this behaviour is *Hydrotaea cyrtoneurina* (Zetterstedt). Often found swarming in woodland from July to September, little seems to have been published on this species. With the overall aim of increasing knowledge of Muscidae, this paper describes an ethological investigation into the effects of microclimate on the swarming behaviour of *H. cyrtoneurina*. Emphasis was placed on those conditions under which swarming commenced and ceased.

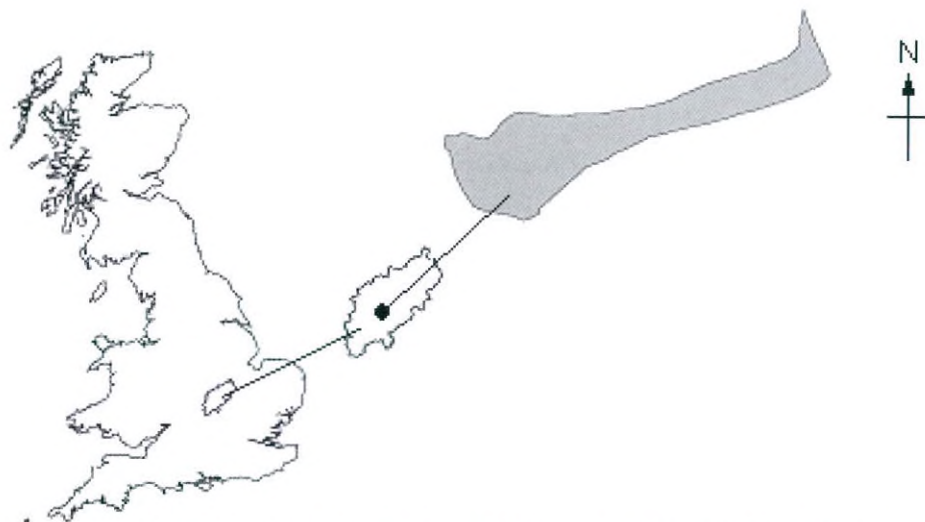


Fig. 1. The orientation of Delapre Woods and its location within V.C. 32 and Britain.

Methods

Study Area

The study took place in Delapre Woods (SP755582), a 15ha mixed woodland located on the southern boundary of Northampton (V.C. 32) (Fig. 1). The wood contains oak (*Quercus* sp.), sweet chestnut (*Castanea sativa*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*) and various conifers, together with significant amounts of standing and fallen dead wood.

Recording Microclimate and Behaviour

A Tecpel 316 dial-input K-type digital thermometer, CEM DT-1308 light meter, CEM DT-8820 environment meter, CEM DT-880B infra-red spot thermometer and a Lutron LM-8000

anemometer were used to record microclimatic conditions. A Sanyo ICT-B29X digital voice recorder was used as an electronic notebook.

To standardise the readings, a microclimate monitoring station was constructed (Fig. 2). The thermometer, light and environment meters were all attached to a rectangular (190 x 500mm) piece of plywood via their tripod mounts. The light, temperature and humidity sensors were mounted with the light sensor pointing downwards, underneath a (570mm) strip of wood, which was in turn extended from the centre of the long side of the plywood. To form a shaded area and to prevent extraneous light affecting the readings, two rectangular (150 x 400mm) panels, painted black underneath and white on top, were mounted above the sensor-mounting strip to form an inverted 'vee'. In this manner, the sensors measured reflected light intensity and air temperature and humidity in the shade. Although not used during this study, the second thermometer probe can be mounted above the panels to measure direct non-shaded air temperature, or inserted in a black globe etc. A threaded bush attached to the plywood enabled the complete assembly to be mounted on a tripod and for the tripod's adjusting mechanisms to be used for levelling and setting to the required height. A de-mountable cover was added to shade the instruments and to protect them during transit. For this study, the monitoring station was adjusted to set the sensors at 1m above, and parallel with, the spot at ground level over which either swarming was either taking place or normally took place.



Fig. 2. The microclimate monitoring station in action.

To start the study, initial visits were made to Delapre Woods to locate *H. cyrtoneurina* swarming sties. Once located, additional visits were made to determine the approximate swarming commencement and cessation times and whether swarming was continuous

between these times. The initial and confirmatory visits were undertaken during late July and early August 2010.

Three visits were made on 3, 6 and 22 August to record the changes in microclimate that occurred before, during and immediately after the commencement of swarming. Air temperature, humidity and the light intensity were recorded at 10-minute intervals during each visit. Similar visits were made on 7 and 8 August to record the cessation of swarming. In addition to the microclimatic measurements, general behavioural notes were also made. On 6-8 August, the sun rose at 0434h and set at 1944h, giving a daylength of just over 15 hours. All times in this study are in GMT.

Results

Swarming Sites

Despite being noted as a common species by both d'Assis-Fonseca (1968) and Gregor *et al.* (2002), just four swarming sites were found in the wood (Fig. 3). Sites B, C and D hosted only 3-4 individuals and were not studied further. Site A hosted a large swarm of up to 30-40 individuals and formed the main subject of this study. Swarming at this site took place over nettles (*Urtica dioica*) and low-lying brambles (*Rubus* species), below the overhanging branches of a cherry tree (*Prunus avium*) and silver birch (*Betula pendula*). Elder (*Sambucus nigra*) was present at the edge of the site. The swarm ranged in height from 1-3 m above ground level and used the cherry tree branches as the swarm marker. Providing there were no clouds, the site received direct sunlight from approximately 0630h until approximately 0900h, after which the canopy filtering effect produced transient sunflecks. Several rabbit burrows were present in the immediate vicinity of each site.

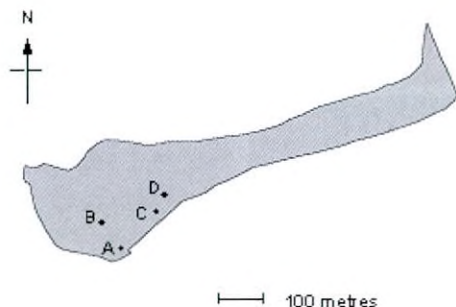


Fig. 3. *Hydrotaea cyrtoneurina* swarming sites in Delapre Woods. Site A formed the main subject of this study.

General Swarming Behaviour

Providing that the wind speed was not too great and the air temperature was above approximately 16°C, swarming was continuous at all four sites between initial commencement in the morning and final cessation during early evening. When the air temperature dropped below 16°C, flies were observed to start basking and to undertake intermittent bouts of hovering. Swarms dispersed when the wind speed rose above 1.5-2m/s. As far as could be

determined, all members of the swarms were male. No females were recorded at any of the sites.

Individuals at site A hovered in a steady position at least 150mm from each other and periodically changed orientation. If their position was maintained, individual flies occasionally chased their neighbours, but for the most part appeared to tolerate them. Other flies and flying insects, whether *H. cyrtoneurina* or not, which approached within approximately 300mm were chased. Flies were often observed to both leave and join the swarm. Whether this included the same flies could not be confirmed, but the result was a swarm population varying from 1 to 40+. It was also noted that the swarm moved upwards and away when the author approached within 1-2m.

Swarming Commencement

On the three visit days, full swarming commenced between 0720 and 0830h. Full swarming is defined here as the state in which more than 50% of the flies at the site were hovering at any one time. In all cases, full swarming was preceded by a period of intermittent swarming, whereby more than 50% of the flies were basking on the marker leaves in between bouts of hovering. The mean difference between the basking leaf surface and air temperature was 4.57°C (n=10). The 6 and 22 August visit data are given here in detail, but the 3 April visit gave similar results.

On 6 August it was cloudy, but not overcast. As air temperature at the site increased above 15.1°C, flies appeared on the marker leaves and intermittent swarming commenced (Fig. 4). Air temperature continued to rise, with full swarming commencing at 16.3°C. Light intensity fluctuated over this period due to the cloudy conditions, but generally rose, with intermittent swarming starting at 395lux, following a peak of 498lux and full swarming starting at 575lux, following an earlier peak of 808lux.

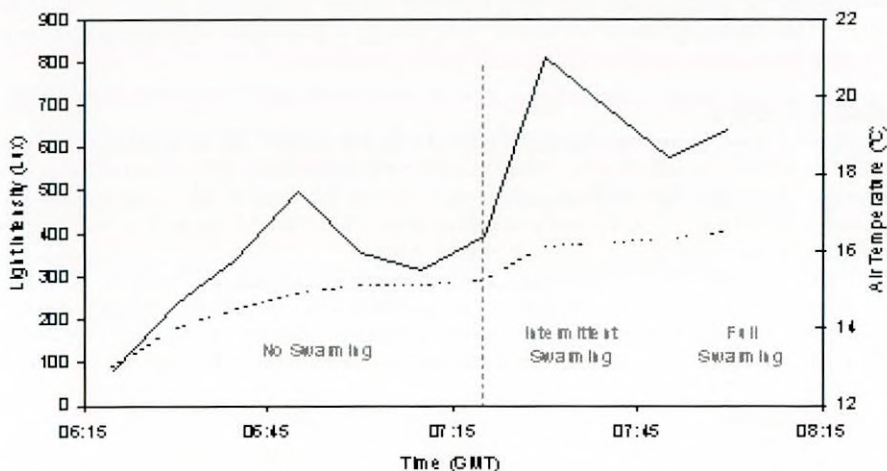


Fig. 4. Air temperature (dotted trace) and light intensity (solid trace) recorded at swarming site A on 6 August, before and immediately after the commencement of swarming.

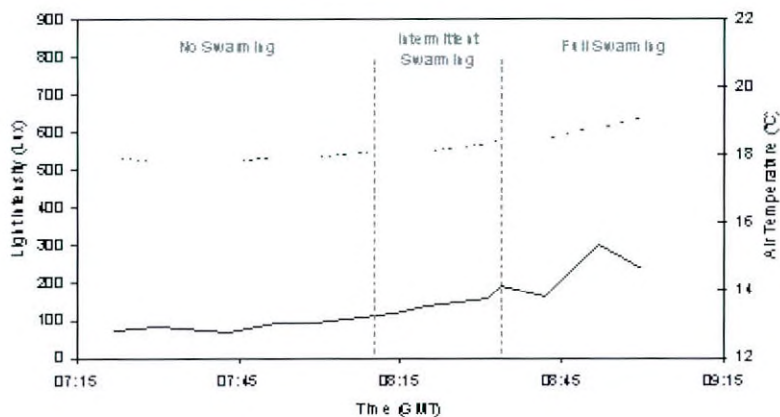


Fig. 5. Air temperature (dotted trace) and light intensity (solid trace) recorded at swarming site A on 22 August, before and immediately after the commencement of swarming.

It was largely overcast on 22 August and hence the site experienced lower light intensities than on 6 August. As air temperature increased to 18.1°C, flies appeared on the marker leaves and intermittent swarming commenced (Fig. 5). Full swarming took place above 18.4°C. Light intensity rose over this period, with intermittent swarming starting at 114lux. Full swarming started at 190lux, followed by a general increase in light intensity, with some fluctuations resulting from breaks in the cloud cover.

Swarming Cessation

On both visit days, swarming ceased between 1550 and 1630h. As swarming ceased, flies were seen to leave the site directly. They did not bask beforehand, or bask and re-commence hovering. Departing flies did not appear to settle on the marker leaves or ground layer vegetation; where they went was not possible to determine. The 7 August visit data are given here in detail, but the 8 August visit gave similar results.

On 7 August, the air temperature at site A remained between 19.5 and 21.2°C prior to and immediately following the cessation of swarming (Fig. 6). Light intensity generally declined, but with some initial large fluctuations brought about by the filtering effect of the canopy. The numbers hovering decreased rapidly from more than 30 to less than 12 at 20.2°C and a drop to 160lux, followed by some fluctuations in light intensity. Swarming ceased at 20.2°C and 173lux.

Relative Humidity

The relative humidity recorded at site A before, during and immediately after the commencement of swarming on 3 and 6 August and immediately before and after the cessation of swarming on 7 and 8 August is given in tables 1 and 2 respectively. During the initial visits, relative humidity during full swarming ranged from 43.9% to 70.4%.

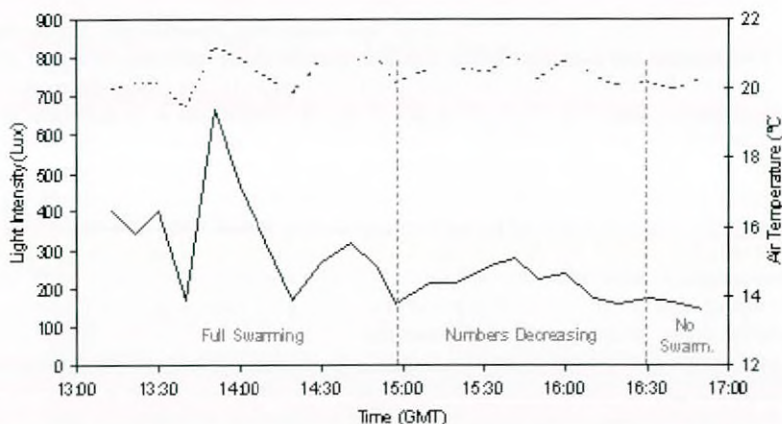


Fig. 6. Air temperature (dotted trace) and light intensity (solid trace) recorded at the swarming site on 7 August, before, during and immediately after the cessation of swarming.

Discussion

There was no obvious correlation between recorded relative humidity and swarming activity (Tables 1 and 2). The conclusion here is that a relative humidity of between 44% and 74% does not influence the swarming activity of *H. cyrtoneurina*. A similar conclusion was reached during a behavioural study on *F. armata*, but over a wider range of 35-90% (Alderman unpublished data).

Table 1: The relative humidity ranges at site A recorded on 3 and 6 August, prior to, during and immediately after swarming commenced.

Visit date	No swarming	Intermittent swarming	Full swarming
3 August	57.3-74.1%	74.1-73.7%	73.7-72.5%
6 August	80-77.6%	77.6-69.6%	69.6-69%

Table 2: The relative humidity ranges at site A recorded on 7 and 8 August, prior to and immediately after swarming ceased.

Visit date	Swarming	No swarming
7 August	52-64.7%	64.7-66.2%
8 August	51.4-42.5%	42.5-39.8%

Discounting relative humidity left air temperature and/or light intensity as a swarming trigger, but determining their relative influences was not straightforward. On 6 August, air temperature rose more or less steadily until full swarming commenced. Although light intensity rose overall, the two large peaks failed to initiate either intermittent or full swarming (Fig. 4). An hour before full swarming started on 22 August, the air temperature was already some two degrees higher than that when full swarming started on 6 August and rose only 0.3°C before full swarming commenced. Light intensity, however, rose steadily over this period (Fig. 5). When considering both results, it would appear that a minimum temperature is required before swarming can take place, but once that minimum air temperature is reached, a minimum light intensity is also required for swarming to actually take place.

Towards the end of the day, the air temperature remained essentially steady at some two to four degrees above that required for swarming to start (Figs 4 and 5), with swarming ceasing only as light intensity fell below 173lux (Fig. 6). This suggested that a decline in light intensity triggered the cessation of swarming.

The overall conclusion from this study was that swarming in *H. cyrtoneurina* is triggered when light intensity rises above 110-190lux and ceases when it falls below 160-170lux, but that swarming is inhibited when the air temperature is below 15-16°C, regardless of light intensity.

That many Diptera only swarm during certain parts of the day is well known and has been suggested, in part, as an adaptation to avoiding predators or microclimatic factors such as low humidity (Sullivan 1981). One extreme example is perhaps the mosquito *Anopheles funestus* (Giles) (Culicidae), which was recorded swarming for only 23 minutes after sunset (Charlwood *et al.* 2003). Predation by dragonflies (Odonata), which rest as dusk, was noted at the start of the swarming period and may be part of the reason why *A. funestus* swarms when it does. In this study, *H. cyrtoneurina* had a fairly long swarming period of some 9 hours, or 60% of the diurnal period. This can be compared with *F. armata*, also a woodland species, in which swarming spanned some 12 hours, or 75% of the diurnal period (Alderman in press). A similar swarming duration, of at least 10 hours, has been reported for the hoverfly *Syrphus ribesii* (Linnaeus) (Syrphidae), another woodland dipteran (Gilbert 1984). The long swarming period of these three woodland species may be due to the fact that predation is not a major factor for them; humidity has already been noted as not being a limiting factor for *F. armata* and *H. cyrtoneurina*. Either way, these three species appear to be making the most of available daylight hours, presumably to maximise the chances of mating, although as no females were observed visiting a swarm this has not been confirmed as the purpose of this behaviour.

The obvious drawback with this study is that the data was collected mainly from one site. Behaviour may vary at different sites and in different woods, but even so, similar behaviour was exhibited on different days under different climatic conditions and is comparable with the swarming commencement and cessation behaviour recorded for *Fannia armata* (Alderman 2010b). The conclusions should therefore be considered tentative, with more observations from different sites needed for confirmation.

This study is therefore a start and leaves plenty of scope for further work. In addition to repeating the observations carried out here, there are plenty of other behavioural activities to study and discover. These include determining where individual flies go when they leave the swarm and do the same ones return, behaviour within the swarm, where the species spends the night and much more. One particular example lies with d'Assis-Fonseca (1968) and Gregor *et al.* (2002), who give *H. cyrtoneurina* as being strongly associated with badger (Mustelidae) setts and this is certainly a regular association (Adrian Pont *pers. comm.*,

Sleeman *et al.* 2003), whereas only rabbit burrows were present in the immediate vicinity of any of the sites in this study. Is *H. cyrtoneurina* actually, or also, associated with rabbits (*Oryctolagus cuniculus* (Linnaeus), Leporidae) or is this a 'red herring'?

Acknowledgements

The author thanks Paul Chambers, Core Operations Manager, Parks and Open Spaces, Northampton Borough Council for granting the necessary permission to undertake research work in Delapre Woods.

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The fourth Scottish record for *Keroplatus testaceus* Dalman (Diptera, Keroplatidae) from Lanarkshire – *Keroplatus testaceus* Dalman, 1818 is a large and distinctive fungus gnat, which has been expanding northwards in Britain. Three Scottish records are detailed in the recent British review (Falk, S.J. and Chandler, P.J. 2005. A review of the scarce and threatened flies of Great Britain Part 2: Nematocera and Aschiza. *Species Status* **2**, 1-189. Joint Nature Conservation Committee, Peterborough) and Peter Chandler (*pers. comm.*) has confirmed that this was still the case until 2010. A single adult was swept from dense shady ash coppice woodland at Milton Lockhart Wood SSSI (NS811488) on 14.viii.2010. The particular area where the gnat was found has wet seepage lines and the whole wood is full of decaying old wych elm stems and stumps following the arrival locally of Dutch Elm Disease. The three previous records are from Perthshire, Skye and West Ross, so this is the first from southern Scotland. The record arose during the course of Site Condition Monitoring commissioned by Scottish Natural Heritage – **KEITH N.A. ALEXANDER**, 59 Sweetbrier Lane, Heavitree, Exeter EX1 3AQ

Dasysyrphus pauxillus (Williston) (Diptera, Syrphidae) new to Britain in Breckland

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Summary

Dasysyrphus pauxillus (Williston, 1887) (Diptera, Syrphidae) is reported as new to Britain on the basis of two males discovered at Cranwich and at Lynford, West Norfolk in April 2010. Features to distinguish *D. pauxillus* from similar British species are given, together with notes on its biology and distribution.

Introduction

A male *Dasysyrphus* resembling a small, aberrant *D. pinastri* (De Geer, 1776) with partly orange antennae, taken at sloe *Prunus spinosa* blossom on 20 April 2010 at Cranwich, West Norfolk (TL782949), failed to key out satisfactorily in Stubbs and Falk (2002) at couplet 4 (with *D. nigricornis* (Verrall, 1873) as the option). This latter species is larger, has black antennae and darkened hind tibiae (clear orange in the specimen) and has now been removed from the British list (Chandler 1998). The specimen keyed out to *D. pauxillus*, and differed from *D. pinastri* in: (1) Bartsch (2009) on the basis, in the male, of a blunt frons angle, eye contiguity distinctly shorter than the frons and the aedeagus being short-waisted; (2) van Veen (2004) on the basis of the 3rd antennal segment being orange below (both sexes) and in the male the hairs on the side margin of tergite 2 being entirely black, and tarsus 1 with black bristles; (3) Vockeroth (1992) on the basis of the male terminalia with the aedeagus strongly waisted. The observed congruity between the specimen and the key diagnostic features, and the distinctive shape of the male terminalia in particular, demonstrate its conspecificity with this North American species. A second male was also taken on 28 April 2010 in Thetford Forest at Lynford (TL813934), hovering 1.5m above the ground in shade at the edge of a ride within a *Pinus nigra* plantation.

Identification

The plain, shining black thorax and the presence of abdominal markings that do not reach the side margins separates *D. pauxillus* from all other British species of *Dasysyrphus* apart from *D. pinastri*. It is readily distinguished in the field by size, abdominal markings and coloration of the hind tibiae and antennae. It should, however, be noted that the original description by De Geer (1776) gave the antennae of *D. pinastri* as yellowish brown ("brun jaunâtre"), so it is unclear how reliable antennal coloration is as a distinguishing character. Under the microscope the distinctive genitalia of the male with the strongly waisted aedeagus separates it readily from *D. pinastri*, which has an elongate aedeagus with virtually no waist (both are illustrated in Vockeroth 1992 and Bartsch 2009). The key identifying features are summarised in Tables 1 and 2 and illustrated in Figs 1-5.

Body length, dried	7mm and 6.8mm	} respectively
Wing lengths, dried, left/right	6.6/6.6mm and 6.0/6.1mm	} in the two Norfolk
Male eye apposition angle, θ	125° and 125°	} males of <i>D. pauxillus</i>

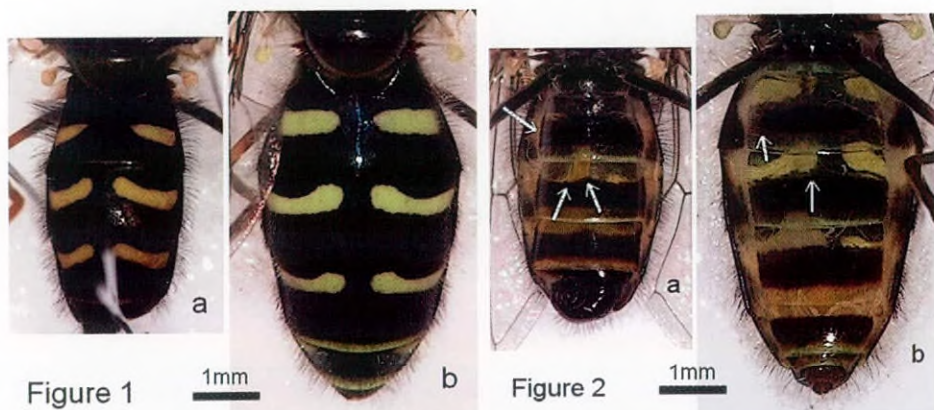
Doczkal (1996) and van Veen (2004) gave distinguishing characters for the similar central European species *D. lenensis* Bagatshanova, 1980, which has recently been reported to have reached Germany (Doczkal 1996) and Holland (Reemer 2009).

GENERAL features, both sexes	<i>Dasysyrphus pauxillus</i>	<i>Dasysyrphus pinastri</i>
Body length	6 - 7 ¹ - 8 ⁸ mm	7 ⁸ - 11 ⁸ mm
Wing length	6 - 6.5 mm	6.57 ⁷ - 8.57 ⁷ mm
Antennal segment 3	brownish black with reddish tinge below ¹	entirely brown to black ²
Facial hairs	all black ³	mostly yellow ²
Scutellar hairs	yellow ⁸	black ²
Hind tibiae	plain orange (+ dark ring ³)	darkened apically ²
Hind tarsi first 2 segments	yellow ⁴	dark ⁵
Abdominal markings on tergites 3, 4 not reaching lateral margin ¹	straplike, no medial expansion ¹ barely hooked laterally set somewhat oblique ¹ yellow ¹ or orange-yellow in colour	expanded medially ² obviously hooked ⁷ nearly square to abdominal axis ⁷ pale lemon yellow in life, darkening on drying (or orange ²)
Tergites 3-4 Anterolateral hairs	dark	pale ²
Posterolateral hairs	dark	dark ²
Sternite 2 median black band	reaches side margins ⁸	central oval only ⁸
Sternites 3-4 median black band	doubly emarginate on anterior border, forming a median point	anterior and posterior borders straight

Table 1. General key diagnostic characters distinguishing between *Dasysyrphus pauxillus* and *D. pinastri*. Superscripts indicate first authorities as follows: (1) Williston 1887, as *Syrphus pauxillus*; (2) Verrall 1901, as *Syrphus lunulatus* Meigen, misidentified; (3) Osburn 1904, as *Syrphus pauxillus*; (4) Torp 1994, as *D. nigricornis*, misidentified; (5) Torp 1994; (7) Stubbs and Falk 2002; (8) van Veen 2004.

Variation

In a species with such a wide distribution it would be unusual not to find some minor variations. Williston (1887) wrote "Antennae black; the third joint brown, on the underside near the base reddish." while Bartsch (2009) described them as "orange-gula eller mörkbruna" [amber or dark brown, my italics], van Veen (2004) as "3rd segment orange below" and Reemer (2009) as "tweekleurige" [bicoloured]. The Norfolk specimens are reddish below on both the 2nd and 3rd antennal segments (Fig. 3a). Osburn (1904) noted that in the female from Grouse Mountain the yellow spots of the 3rd and 4th abdominal segments are very slightly connected by narrow bands across the middle, while in the male the legs are red rather than yellow in ground colour (orange in the present Norfolk specimens. The general overall colouring is also somewhat paler in the second specimen).

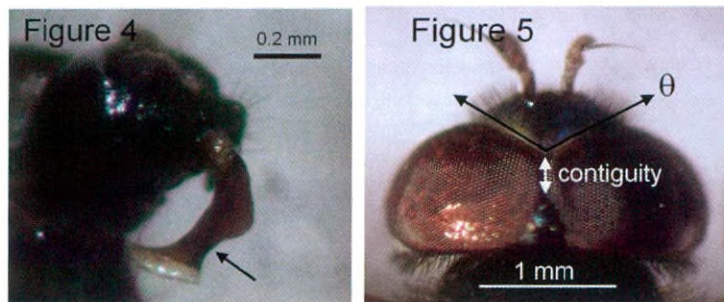


Figs 1–3. Comparative morphology of fresh (naturally coloured) *Dasysyrphus* specimens from Norfolk: a = *D. pauxillus* male, b = *D. pinastri* female. 1, abdomen, dorsal view; 2, abdomen, ventral view; 3, lateral view [inset: enlarged ventral view of antennae].

Biology and distribution

The adult is univoltine, on the wing in late April–May and is associated with coniferous forest or its margins (Bartsch 2009, Reemer 2009). *Dasysyrphus* species feed on aphids on shrubs

and trees and are distinctive in possessing a pair of long projections at the tip of the anal segment (Rotheray 1993). However, the larva of *D. pauxillus* remains undescribed; there is an early unconfirmed record (Maxon 1916) of it being found on *Beta vulgaris*, feeding on a colony of *Pemphigus betae* Doane (Hemiptera, Pemphigidae), a root aphid with alternating generations on Amaranthaceae (formerly Chenopodiaceae) and over-wintering in galls on *Populus*.



Figs 4–5. *D. pauxillus* male, set specimen. 4, terminalia, left lateral view: the aedeagus is short waisted (arrow) with an unpigmented rim to the posterior funnel; 5, head: eye contiguity < length of frons; frons angle at the eye apposition is obtuse, $\theta = \sim 125^\circ$.

MALES only	<i>Dasysyrphus pauxillus</i>	<i>Dasysyrphus pinastri</i>
Eye contiguity	< length of frons ⁹	= length of frons ⁹
Eye apposition frons angle	$\sim 125^\circ$ (blunt ⁹)	$\sim 90^\circ$ (acute ⁹)
Tergite 2 all lateral hairs	black ⁸	
Tarsus 1 bristles	black ⁴	yellow ⁵
Terminalia aedeagus	deep base, short waist ⁶	narrower base, long waist ⁶
FEMALES only		
Frons dust patch	narrow, may extend to middle ⁸	broad band (dull yellow ² or grey ⁹)

Table 2. Sex-specific diagnostic characters distinguishing *Dasysyrphus pauxillus* and *D. pinastri*. Superscripts indicate first authorities as follows: (4) Torp 1994, as *D. nigricornis*, misidentified; (5) Torp 1994; (6) Vockeroth 1994; (8) van Veen 2004; (9) Bartsch 2009.

Formerly only known to be a Nearctic species, *Dasysyrphus pauxillus* has migrated westwards and is now distributed throughout the Holarctic region, being widespread in

Canada and North America and extending through Eastern Siberia to Western Europe, where it was first reported in the 1970s (Doczkal 1996), reaching Macedonia in 1991 (Krupač *et al.* 2009). It is widespread in Scandinavia (Bartsch 2009) but rare in north-west (Reemer 2009) and central Europe. Originally described from the Rocky Mountains in New Mexico, USA, this cool temperate species has also extended its range southwards within Europe by assuming a montane habit in the warmer areas.

Acknowledgements

My grateful thanks to Roger Morris for kindly confirming the specimens' identity, to Martin Speight for help with some scarce literature, and to two anonymous reviewers for very constructive comments on an early draft of this paper.

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Corrections and changes to the Diptera Checklist (24) – Editor

It is intended to publish here any corrections to the text of the latest 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. Changes are listed under families; names new to the British Isles list are in bold type. This section in the previous issue should have been numbered (23) rather than (22). The notes below refer to addition of 13 species and deletion of two, one of them due to synonymy, resulting in a new total of **7033** species.

Corrections

p 17 NEOEMPHERIA Osten Sacken [delete hyphen]

p 147 and p. 148 Note 8. *Melanochaeta pubescens* author spelling should be Thalhammer

Changes

Mycetophilidae. The following species were added in the Spring 2010 Dipterists Bulletin (*Fungus Gnats Recording Scheme Newsletter* **4**, 1-7):

Exechia spinigera Winnertz, 1863 (also added formally in the present issue)

Phronia forcipula Winnertz, 1863 (also added formally in the present issue)

The following species are added in the present issue:

Exechiopsis (Xenexechia) davatchii (Matile, 1969 – *Rymosia*)

Simulium exclusa (Dziedzicki, 1910 – *Rymosia*)

The following correction is also made in the present issue:

Exechia borealis Lundström, 1912 = *E. frigida*: authors, misident., not (Boheman, 1865)

The following synonymy with a North American species was accepted by P.J. CHANDLER (2004. *Fauna Europaea*, www.faunaeur.org) but has not previously been noted here:

Palaeodocosia vittata (Coquillett, 1901 – *Docosia*) = *P. janickii* (Dziedzicki, 1923)

Trichoceridae. E. KRZEMIŃSKA, W. KRZEMIŃSKI and C. DAHL (2009. *Monograph of fossil Trichoceridae (Diptera). Over 180 million years of evolution*. Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, 171 pp.) proposed the following synonymy of *Diazosma* with a fossil genus:

CLADONEURA Scudder, 1894 = **DIAZOSMA** Bergroth, 1913

Simuliidae. It has been proposed by J.C. DAY, T.I GOODALL and R.J. POST (2008. Confirmation of the species status of the blackfly *Simulium galeratum* in Britain using molecular taxonomy. *Medical & Veterinary Entomology* **22**, 55-61) that the following species should be raised from synonymy with *Simulium reptans*:

Simulium galeratum Edwards, 1920

Chironomidae. The following species and the genus HYDROBAENUS are added in the present issue:

Chaetocladius sp. Dorset [not yet identifiable with a named species]

Cladotanytarsus donmcbeari Langton & McBean, 2011

HYDROBAENUS Fries, 1830 (Subfamily Orthoclaadiinae)

Hydrobaenus distylus (Potthast, 1914 – *Dactylocladius*)

The following species is deleted in the present issue:

Pseudosmittia holsata Thienemann & Strenzke, 1940

Syrphidae. It was previously overlooked here that A.E. STUBBS and S.J. FALK (2002. *British hoverflies, an illustrated identification guide*. Second edition. British Entomological and Natural History Society, Reading) had recognised as distinct the following species that was included as a supposed misidentification of *Dasysyrphus venustus* in the checklist. It had also been recorded from Ireland by Speight (2000, 2008), on the basis of a manuscript key by D. Doczkal, with the comment that *D. venustus* of authors comprised several species of which the distribution had yet to be clarified:

Dasysyrphus hilaris (Zetterstedt, 1843 – *Scaeva*)

The following species are added in the present issue:

Dasysyrphus pauxillus (Williston, 1887 – *Syrphus*)

Syrphus nitidifrons Becker, 1921

Clusiidae. O. LONSDALE and S.A. MARSHALL (2008. Synonymy within *Clusia* and description of the new genus *Melanoclusia* (Diptera: Clusiidae: Clusiinae). *Annals of the Entomological Society of America* **101**(2), 327-330) are responsible for the following synonymy and new combination:

CLUSIA Haliday, 1838 = PARACLUSIA Czerny, 1903

Clusia tigrina (Fallén, 1820 – *Helomyza*)

Also following D.C. CALOREN and S.A. MARSHALL (1998. A revision of the New World species of *Clusiodes* Coquillett (Diptera: Clusiidae). *Studia dipterologica* **5**, 261-321) the subgenera of *Clusiodes* are not recognised but treated only as synonyms

Agromyzidae. A phylogenetic revision by I.S. WINKLER, S.J. SCHEFFER and L. MITTER (2009. Molecular phylogeny and systematics of leaf mining flies (Diptera: Agromyzidae): delimitation of *Phytomyza* Fallén sensu lato and included species groups with new insights on morphological and host-use evolution. *Systematic Entomology* **34**(2), 260-292) has proposed that *Chromatomyia* and *Napomyza* should be regarded as synonymous with *Phytomyza*, within which *Chromatomyia* is treated as synonymous with *Phytomyza* sensu stricto while *Napomyza* has the revised rank of subgenus. One of the new names proposed for homonyms also affects the British list:

PHYTOMYZA Fallén, 1810 = NAPOMYZA Haliday in Westwood, 1840 = CHROMATOMYIA Hardy, 1849

Phytomyza asteroides Winkler in Winkler, Scheffer & Mitter, 2009 = *Napomyza tripolii* Spencer, 1966 [not *Phytomyza tripolii* de Meijere, 1924]

Anthomyzidae. The following changes result from J. ROHÁČEK (2009b. A monograph of Palaearctic Anthomyzidae (Diptera) Part 2. *Časopis slezského zemského muzea, Série A, vedy přírodní* **58** (supplement 1), 180 pp):

Anthomyza anderssoni Roháček, 1984 is added

ARGANTHOMYZA Roháček, 2009

Arganthomyza socculata (Zetterstedt, 1857 – *Geomyza*) [transferred from *Anthomyza*]

CAREXOMYZA Roháček, 2009

Carexomyza caricis (Roháček, 1999 – *Paranthomyza*) [transferred from *Paranthomyza*]

Scathophagidae. The following new synonymy was proposed by F. ŠIFNER (2008. A catalogue of the Scathophagidae (Diptera) of the Palaearctic region, with notes on their taxonomy and faunistics. *Acta entomologica Musei nationalis Pragae* **48**, 111-186), on the basis that all distinguishing characters were within the range of variation. This catalogue also treated subgenera of *Cordilura* as of generic status:

Scoliaphleps ustulata Zetterstedt, 1838 = *S. hyalinipennis* (Ringdahl, 1936)

The following new synonymy, confirming one queried in the checklist, was also established by ŠIFNER (*op. cit.*):

Scathophaga inquinata Meigen, 1826 = *S. analis* Meigen, 1826

Scathophaga taeniopa Rondani, 1856 is recognised as a distinct species from *S. suilla* (they had previously been synonymised by ŠIFNER in 1975 as reported in the checklist) following M.V. BERNASCONI, C. VALSANGIACOMO, J.-C. PIEFARETTI and P.I. WARD (2001. Phylogeny of the genus *Scathophaga* (Diptera: Scathophagidae) conferred from mitochondrial DNA sequences. *Canadian Journal of Zoology* **79**, 517-524).

The names *Americina*, *Coniosternum* and *Amaurosoma* are used by ŠIFNER (*op. cit.*) for the genera *Parallelomma*, *Conisternum* and *Nanna* of the 1998 checklist, without explanation and he did not cite the work of V. MICHELSEN (2001. Nomenclatorial notes on Scathophagidae (Diptera): the status of genus- and species-group names first proposed in "Die Dipteren von Steiermark. II. Theil." by P. Gabriel Strobl, 1894. *Studia dipterologica* **8**, 323-326), in which the validity of the latter names as senior synonyms of names proposed by Becker in the same year was established.

As in previous works by this author the name *Parallelomma* is consequently used for *Cordilurina*, raised to generic level from subgenus of *Cordilura*. Subgenera were also not recognised in *Acanthocnema*, with *Clinocerooides* treated as a synonym.

Other differences from the British checklist are the treatment of *Parallelomma paridis* as a synonym of *P. vittatum* (as *Americina vittata*), *Nanna multisetosa* as a synonym of *N. flavipes* (as *Amaurosoma flavipes*) and different nomenclature of species of *Norellisoma* (use of *flavicornis* as the name for *opacum* of the British list). These changes are not accepted here pending further work to test their validity.

Cordilura similis is also treated as a separate species from *C. picticornis* and both are listed from Britain. *C. similis* on its usage by J.M. NELSON (1998. *Cordilura similis* Siebke (Diptera: Scathophagidae) a problematic species associated with *Carex aquatilis*. *Entomologist's Gazette* **49**, 199-201). The checklist used the name *picticornis* for *C. similis* following the Palaearctic Catalogue, but if these species are different it needs to be clarified which of them occurs in Britain.

Anthomyiidae. The following new name was proposed in the previous issue, but was omitted from the checklist changes section:

Delia penicilliventris Ackland, 2010 [= *Aricia criniventris* Zetterstedt, 1860; *Delia penicillaris*: authors, misident., not Rondani, 1866].

Cheilosia psilophthalma Becker and *Brachypalpus laphriformis* (Fallén) (Diptera, Syrphidae) new to Scotland

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Summary

Cheilosia psilophthalma Becker, 1894 and *Brachypalpus laphriformis* (Fallén, 1816) are newly recorded for Scotland. For both species these records extend their northern distributions in Britain.

Introduction

The two syrphids *Cheilosia psilophthalma* Becker, 1894 and *Cheilosia urbana* Meigen, 1822 were only adequately distinguished by the recent work of Claussen and Kassebeer (1993). This clarification of the identification features subsequently led to the discovery of *C. psilophthalma* in the British Isles, first in Ireland (Speight 1996) and then across southern and central England extending to North Yorkshire (Falk 2002, Ball and Morris 2010). In continental Europe *C. psilophthalma* is known from southern Norway, Sweden, southern Finland, France (Vosges, Alps), Poland, Switzerland, Greece, the Balkans region (Montenegro, Serbia) and European Russia

Brachypalpus laphriformis (Fallén, 1816) is widespread in southern England, especially Hampshire, occurring sporadically through Wales and as far north as Cumbria (Ball and Morris 2010). There was a reputed sighting from Argyllshire, Scotland in 1982 (Falk 1991). In Europe *B. laphriformis* is known from southern Fennoscandia south to the Pyrenees, including The Netherlands, Belgium, Germany, France, much of central Europe (and northern Italy) to the former Yugoslavia and European parts of Russia.

Both these species have been discovered in Scotland and the records are reported here. All specimens have been deposited in the collections of the National Museums of Scotland, Edinburgh.

Cheilosia psilophthalma

In April 2010 during fieldwork in Dunblane, Stirlingshire, a female *Cheilosia* was swept from the catkins of a willow *Salix* species (Salicaceae) in a damp amenity grassland area. In the keys of Stubbs and Falk (2002) and van Veen (2004), it came out as *C. psilophthalma*. Then in May 2010 a male of this species was swept from the blossom of sloe *Prunus spinosa* (Rosaceae) at the car park of Insh Marshes RSPB Reserve, Highland Region. Both specimens were checked by G.E Rotheray at the National Museums of Scotland and the initial identification was supported. The collection of *Cheilosia* at the National Museums of Scotland was searched but no additional specimens of *C. psilophthalma* were discovered.

Scotland: 1♀, Stirlingshire, Dunblane, swept from Salicaceae near River Allan, NN785025, 26.iv.2010, G. Wilkinson; 1♂, Highland Region, Insh Marshes RSPB Reserve, swept from *Prunus spinosa* in car park, Invertromie, NN775998, 19.v.2010, G. Wilkinson.

Brachypalpus laphriformis

During fieldwork in 2010 at Methven Wood, Perthshire a male xylofine was found sitting 1.5 metres above the ground by a sap run on the trunk of a mature oak *Quercus* species, where a large branch had split away from the tree leaving a deep and inaccessible cavity. The specimen was captured and identified using the keys of Stubbs and Falk (2002) and van Veen (2004).

Scotland: 1♂, Perthshire, Methven Wood, taken from sap run near cavity on oak *Quercus* species, NO046275, 30.vi.2010, G. Wilkinson.

Discussion

In Britain, *C. psilophthalma* is known from eleven 10km squares (Ball and Morris 2010) and as a recent addition to the British list does not yet have an official national status. Though it has been known in Europe since the 19th century it has only been adequately described for the last seventeen years (Claussen and Kassebeer 1993). Coupled with the difficulty of identification and the recent clarification of key features, *C. psilophthalma* is certainly under-recorded both in Europe and in the British Isles. The record from Strathspey indicates that the species can tolerate cooler temperatures and is likely to occur further north in the warmer basins of the Moray Firth.

Work undertaken in Switzerland found that females of *C. psilophthalma* oviposit onto the leaf axils of *Pilosella officinarum* during April and May. Unlike the sympatric *C. urbana*, of which freshly hatched larvae move into the soil and feed externally on the roots, *C. psilophthalma* larvae remain on the aerial plant parts to feed in leaf axils, rosette centres, stolon tips and leaves. Mature *C. urbana* larvae pupate in the soil just below the surface whereas *C. psilophthalma* remain on the soil surface (Grosskopf 2005). Whether this is the case in Britain also has yet to be confirmed.

The foodplant *P. officinarum* is often found in short turf grassy areas, and often on calcareous soils, whilst adults of *C. psilophthalma* are often found at flowers of early flowering shrubs such as *Salix* species and *Prunus* species (Stubbs and Falk 2002). These conditions were found at both Scottish sites which serve amenity purposes and thus maintain a short sward of grass in which *P. officinarum* thrives.

In Britain *B. laphriformis* is a species of ancient forests with the larvae found in pockets of wet decay in deciduous trees, particularly rot-holes in *Quercus* species that accumulate prodigious amounts of sap (Rotheray 1991). The distribution correlates with large tracts of deciduous woodland with a long history of tree cover. Although less extensive than English examples there are relicts in Scotland of ancient deciduous woodland particularly along the Clyde and Tay Valleys. Methven Wood conforms to the typical habitat elsewhere across the range of this elegant hoverfly.

As demonstrated by the record of *B. laphriformis* and the earlier discovery of another southern saproxylic hoverfly, *Mallota cimbiciformis* (Fallén), in Lanarkshire (Barr 1996) these relic woodlands have the potential to host a saproxylic fauna hitherto associated with warmer southern regions in England, although it cannot be confirmed whether this is a result of a recent extension in range or that they have been previously undetected by the level of recording. An examination of the Netherlands Syrphidae Recording Scheme database revealed that *B. laphriformis* and other saproxylic syrphids have extended their range northward over the last twenty years (Reemer *et al* 2001). It is possible that the same trend

could be seen in Britain. The likely explanation espoused for this trend is a combination of favourable changes in woodland management and climate change (Reemer 2005).

An evaluation of other saproxylic syrphids shows the distribution of several to extend as far north as Yorkshire or Cumbria: *Myolepta dubia* (Fabricius), *Pocota personata* (Harris), *X. abiens* Meigen, *X. florum* (Fabricius) and *X. xanthocnema* Collin. It is probable that further fieldwork may show that some of these species also occur in southern and central Scotland.

Acknowledgements

I am grateful to Scottish Natural Heritage for funding the fieldwork that led to these discoveries at Methven Wood and Insh Marshes RSPB Reserve. I am also grateful to Graham Rotheray, Ellen Rotheray, Martin Speight and Peter Chandler for helpful discussion and comments.

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Exechia spinigera Winnertz (Diptera, Mycetophilidae) new to Britain

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Summary

The fungus gnat *Exechia spinigera* Winnertz, 1863 was found in a yellow pan-trap along a reed in the Gwent Levels, Glamorgan, South Wales. Its identification is discussed and an illustration of the male genitalia provided.

Introduction

As part of an ongoing monitoring program of reeds in the Gwent Levels, Glamorgan, South Wales, yellow pan-traps were used to sample the riparian fauna. In such grazing marshes fungus gnats are scarce, and usually just a few specimens of one or two species will be recorded in any one year. 2009 was no exception with just a single male specimen being caught, a small, delicate species of *Exechia*. Comparison with the illustrations provided by Zaitzev (2003) strongly suggested that the specimen was closest to *E. spinigera* Winnertz, 1863. When compared with males of the closely similar *E. spinuligera* Lundström, 1912 it could be seen that the differences in Zaitzev's illustrations were quite apparent in my specimens. The specimen was then passed to Peter Chandler who confirmed that this was the most likely identification. The type material is lost but fortunately Dziedzicki (1915) prepared and figured the male genitalia of Winnertz' types and subsequent identification was dependent on his figures. Although these show some small differences from those of Zaitzev, most obviously in the shorter blunter prongs shown for the forked tip of the lateral (dorsal) lobe of the gonostylus, it is probable that they represent the same species. Application of the name *E. spinigera* has differed in earlier works, due to Dziedzicki's figures being misinterpreted, and Zaitzev's interpretation is accepted here.

Identification

This is a small, dark brown *Exechia* with pale yellow legs and is very similar to *E. spinuligera*, which was confused with it by some earlier authors. The use of the key by Zaitzev (2003) key is difficult and very soon depends entirely on characters of the male genitalia, so it is far more productive to make direct comparisons with the illustrations. In most cases these allow reasonably confident identification. The genitalia of the Gwent Levels specimen differs in minor details from the specimen figured by Zaitzev (2003) so it seems worthwhile providing a detailed illustration here (Fig. 1).

The most readily recognised feature of *E. spinigera* is the deeply forked tip of the lateral lobe of the gonostylus, with the unbristled internal prong almost as thick as the bristly outer prong. This forked tip is approximately a third the length of the lateral lobe as a whole. In *E. spinuligera* the forked tip is much more asymmetrical, with the internal prong much more slender and also shorter than the external prong. The closely related *E. frigida* (Boheman, 1865) and *E. borealis* Lundström, 1912 have this forked tip much shorter, appearing as little more an apical notch. Another species of this group *E. similis* Laštovka &

Matile, 1973, described from Mongolia but also recorded from Russian Karelia by Zaitzev (2003), has like *E. spinigera* a thick internal branch to the lateral lobe but differs in having the bristly ventral lobe of the gonostylus relatively much longer. The latter lobe is rounded apically in *E. spinigera* and in the figure below is shown directly ventral to the median lobe while it is deflected to the left in Zaitzev's figure. As in other species of this group, the median lobe (shown stippled in the figure), which is tapered apically in this view, is mainly bare with in this case only two long bristles on a basal external flange. A broadly bilobed dorsal internal lobe has a row of strong bristles on the distal margin of its outer lobe.



Fig. 1. Male genitalia of *Exechia spinigera* from the Gwent levels (ventral view).

Zaitzev used the form of the small setose medioventral appendage between the gonocoxites as a key character for distinguishing *E. spinigera* from allied species, describing it as narrow with only 2 bristles, while in *E. spinuligera* it is broader with several bristles. The Welsh specimen has this lobe narrow with two long bristles, but there are also two shorter bristles basal to them. The form and bristling of this process is variable in some species of this difficult group of *Exechia*, of which some other species await description (Jostein Kjærandsen *pers. comm.*).

Biology

This is unknown, but from the limited records it would appear to be a boreal species so its occurrence on the Gwent Levels is surprising, although comparable to the occurrence of the also mainly boreal species *Allodia embla* Hackman, 1971 at wetland sites in Britain, including several in Wales (Chandler 2001). Some species of *Anatella* and *Rymosia* found on wetlands in Britain may have a similar distribution.

The single male specimen was taken in a yellow pan-trap set along a brackish ditch close behind the sea wall, the most brackish of all the sample sites. This reed is heavily dominated by *Phragmites australis* with some bramble and scrub encroachment and rough grassland on either side.

Distribution and status in Britain

Confirmed records are few; in Russia it is known from the Moscow region, Siberia and the Far East (Zaitzev 2003); in Western Europe it is known from Finland and Sweden with unconfirmed records elsewhere (Chandler 2004, Kjærandsen *et al.* 2007). The single male specimen was found at Newton, Glamorgan, South Wales (ST2377), 4-6 August 2009, in a yellow pan-trap.

Acknowledgements

I am grateful to Peter Chandler for his help in confirming the identity of this specimen and for other advice, and to Jostein Kjærandsen for useful comments on the manuscript. I also thank Neal Soils Suppliers Ltd. who commissioned the work and facilitated access to the sampling sites.

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An annotated list of Heleomyzidae and allied families (Diptera) of Sweden

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Summary

Malaise trap material of Borboropsidae, Chiropteromyzidae, Heleomyzidae and Trixoscelididae from Sweden was identified and an annotated list of species is provided, with an indication of those species new to the fauna of Sweden.

Introduction

The Swedish Malaise Trap Project (SMTP) is an ambitious attempt to inventory the fauna of Sweden, especially that of little-known groups such as Diptera. As the name suggests SMTP has used more than 70 Malaise traps in a variety of localities throughout the year over at least three years. It is calculated that 189 trap-years of effort were involved, with approximately 40 million insects captured.

The author has identified all the material of Borboropsidae, Chiropteromyzidae, Heleomyzidae and Trixoscelididae, i.e. families formerly included in Heleomyzidae, a total of over 5000 specimens from 62 sites. An annotated list of these is given below. The arrangement of taxa follows that of Papp (1998), who used Heleomyzoidea as their superfamily name. This splitting of Heleomyzidae was accepted by Chandler (2010), who followed the British checklist (Chandler 1998) in using Sphaeroceroidea as the name for the higher grouping also including Chyromyidae and Sphaeroceridae. Species with * are new to Sweden according to Fauna Europaea (Woźnicá 2010) and details of localities and capture dates are given in full for these; for other species only the provinces are cited in most cases. Full capture details are to be found on the SMTP database at the Swedish Museum of Natural History in Stockholm.

CHIROPTEROMYZIDAE

**Chiropteromyza wegelii* Frey

The exact relationships of the Chiropteromyzidae remain unclear; *C. wegelii* is a very rarely encountered fly, which seems closely associated with bats: rearing records from bat guano represent almost the only capture records published (e.g. Haenni, 1988).

Material. Södermanland: Huddinge Kommun, cadaver dump.

BORBOROPSIDAE

Borboropsis puberula (Zetterstedt)

One of the few genera not to exhibit the characteristic spinose costa, *Borboropsis* will not be immediately recognised as belonging to this group of flies. As a small nondescript dark fly, it may easily be overlooked, but it is more likely that this is a genuinely rare fly. Hackman and Andersson (1969) recorded only one male from Sweden.

Material. Västerbotten: Vindelns Kommun, birch wood; Lycksele lappmark: Sarsele Kommun, alpine birch wood; Lule lappmark: Gällivare Kommun, cowberry *Vaccinium vitis-idaea* dominated pinewood.

HELEOMYZIDAE

Heleomyzinae

Heleomyzini

Gymnomus amplicornis (Czerny)

Females of either this species or *G. caesius* were also seen from Uppland.

Material. Halland; Småland; Värmland; Härjedalen; Lule lappmark..

G. caesius (Meigen)

The capture dates of this species suggest a preference for the colder months.

Material. Skåne; Södermanland.

**G. sabroskyi* (Gill)

Papp and Wožnicá (1993) revised the species of *Gymnomus*, defining this genus as distinct from other segregates of *Scoliocentra sensu lato*. They were the first to recognise that the North American species *G. sabroskyi* is Holarctic, recording it as new to the Palaearctic from the Czech Republic, Romania and Poland, to which Sweden may now be added. The male genitalia are distinctively different from other *Gymnomus* even without dissection.

Material. Härjedalen: Härejdalens Kommun, alpine birch/spruce wood; Lule lappmark: Gällivare Kommun, *Vaccinium vitis-idaea* dominated pinewood.

Heleomyza (Heleomyza) serrata (Linnaeus)

Material. Skåne; Halland; Småland; Gotland; Östergötland; Södermanland; Uppland; Västmanland; Värmland; Västerbotten; Torne lappmark.

**H. (Anypotacta) setulosa* (Czerny)

There are very few recent records of this enigmatic heleomyzid, only one specimen of which was taken during the survey.

Material. Härjedalen: Härejdalens Kommun, alpine birch/spruce wood.

**Morpholeria dudai* (Czerny)

Material. Västerbotten: Vindelns Kommun, 40-50 year-old pine forest with bilberry *Vaccinium myrtillus* understorey

**M. (Spanoparea) kerteszi* Czerny

Material. Gotland: Rembs, lichen pine forest; Södermanland: Huddinge Kommun, garbage dump.

**M. (S.) ruficornis* (Meigen)

Material. Småland: Gränna Kommun, Norway spruce forest with large felled ash; Småland: Nybro Kommun, mixed forest; Öland: Gamla Skogsby, meadow; Uppland: Alvkarleby Kommun, dry meadow in birch; Dalarna: Säterdalen, alderwood ravine; Härjedalen: Härejdalens Kommun, alpine birch/spruce wood.

Neoleria inscripta (Meigen)

Material. Södermanland; Värmland; Härjedalen; Västerbotten; Lule lappmark.

N. prominens (Becker)

Material. Småland; Södermanland.

N. ruficeps (Zetterstedt)

Material. Småland; Öland; Värmland; Hälsingland; Västerbotten.

Schroederella iners (Meigen)

The revision of Papp and Carles-Tolrá (1994) has clarified the taxonomy of western Palaearctic *Schroederella*, although it is still not possible to identify females with certainty. Species of this genus appear to be among the cold-adapted Diptera, with almost all records occurring in the winter (October – March). Almost all of the Swedish specimens were similarly collected over this period, many of them near cadavers, which may be a potential breeding medium worthy of further investigation.

Material. Småland; Öland; Östergötland; Södermanland; Uppland.

Scolioecentra (Chaetomus) confusa (Wahlberg)

Material. Småland; Uppland; Härjedalen; Västerbotten; Lycksele lappmark; Lule lappmark.

S. (C.) flavotestacea (Zetterstedt)

Material. Uppland; Västerbotten; Lycksele lappmark; Lule lappmark.

S. (Leriola) brachypterna (Loew)

Many of the capture dates suggest this is a species active early in the year.

Material. Småland; Gotland; Bohuslän; Södermanland; Uppland; Värmland.

**S. (Scolioecentra) dupliciseta* (Strobl)

Material. Uppland: Alvkarleby Kommun, dry meadow with birch.

S. (S.) nigrinervis (Wahlberg)

Active only in the winter, but often frequent.

Material. Uppland; Västerbotten; Lule lappmark; Torne lappmark.

S. (S.) scutellaris (Zetterstedt)

Material. Härjedalen; Lule lappmark.

S. (S.) villosa (Meigen)

Material. Skåne; Gotland; Uppland; Värmland.

Oecotheini

**Eccoptomera emarginata* Loew

Material. Öland: Skogsby, Ecological Research Station garden.

E. infuscata Wahlberg

The sole capture of this species hints at autumnal activity.

Material. Uppland.

E. longiseta (Meigen)

Material. Småland; Bohuslän; Uppland; Västmanland; Värmland.

E. microps (Meigen)

Material. Småland.

**E. nigricornis* Strobl

Material. Västmanland: Sala Kommun, hay meadow.

E. obscura (Meigen)

Material. Skåne; Halland; Småland; Öland; Södermanland; Uppland; Värmland.

E. ornata Loew

This also appears to be a species mostly active in autumn.

Material. Värmland; Härjedalen; Västerbotten; Lycksele lappmark.

E. pallescens (Meigen)

Capture dates are in spring and winter.

Material. Småland; Bohuslän; Södermanland; Uppland; Västmanland.

**Oecothoa praecox* Loew.

Material. Småland: Torsås Kommun, Malaise trap in garden; Öland: Ölands Skogsby, Ecological Research Station garden; Gotland: Rembs, lichen pine forest; Södermanland: Huddinge Kommun, garbage dump; Södermanland: Huddinge Kommun, cadaver dump; Uppland: Älvkarleby Kommun, dry meadow with birch; Västmanland: Sala Kommun, hay meadow; Värmland: Munkfors Kommun, old mixed deciduous forest in stream ravine.

Orbelliini

Oldenbergiella brumalis Czerny

Specimens of *Oldenbergiella* are very distinctive, with narrow bodies and wings that are much longer than the body. Papp (1980) and Carles-Tolrá (1992, 1995) have enabled identification of the species involved. Although none of the species has been recorded as active before October, and it might therefore be presumed that this is another of the winter heleomyzids, data from SMTP reveals two peaks of activity, in April and November, arguing strongly for a bivoltine life cycle. One species at least (*O. blascoi* Carles-Tolrá) has been recorded from decayed pig liver, so the genus may well be an associate of cadavers.

Material. Skåne; Halland; Småland; Södermanland; Uppland; Härjedalen; Lycksele lappmark; Lule lappmark

**O. calcarifera* Papp

Females of *Oldenbergiella* are more difficult to identify than males, but one specimen from SMTP was quite clearly not *O. brumalis* – it has tentatively been assigned to *O. calcarifera*, but males would be needed for a certain determination.

Material. Gotland: Rembs, lichen pine forest.

**Orbellia myopiformis* Robineau-Desvoidy

The value of trapping at unseasonable times is ably demonstrated by this species, which has not previously been recorded in Sweden, but is demonstrably abundant throughout the colder months (over 50 specimens seen), seemingly peaking during December/January. There seems to be no special ecological requirement for the species, and it was captured almost everywhere a Malaise trap was left to run through winter. It was frequent around a cadaver

dump, and extremely numerous in a maritime deciduous wood – it may be that this species is another of those attracted to carrion in the colder periods.

Material. Skåne; Öland; Gotland; Östergötland; Södermanland; Uppland; Värmland; Ångermanland; Västerbotten.

Heteromyzinae

**Heteromyza commixta* Collin

Material. Skåne: Tomelilla Kommun, *Agrostis capillaris* heath; Småland: Nybro Kommun, old moist hay meadow.

H. oculata Fallén

Material. Halland; Småland; Östergötland; Uppland; Värmland; Hälsingland; Härjedalen; Ångermanland; Västerbotten; Lule lappmark.

H. rotundicornis (Zetterstedt)

Material. Skåne; Småland; Östergötland; Värmland.

Tephrochlamys flavipes (Zetterstedt)

Material. Skåne; Halland; Småland; Öland; Gotland; Södermanland; Uppland; Västmanland; Värmland; Dalarna; Härjedalen; Ångermanland; Västerbotten.

T. laeta (Meigen)

Material. Lule lappmark.

T. rufiventris (Meigen)

Material. Skåne; Småland; Öland; Gotland; Bohuslän; Uppland; Värmland; Härjedalen; Ångermanland; Lycksele lappmark; Lule lappmark; Torne lappmark.

T. tarsalis (Zetterstedt)

Peaks of activity in April and October imply a double-brooded species.

Material. Östergötland; Bohuslän; Södermanland.

Suilliinae

Suillia affinis (Meigen)

Widespread, one of the commoner species in SMTP.

Material. Skåne; Halland; Småland; Öland; Gotland; Östergötland; Södermanland; Uppland; Värmland.

S. atricornis (Meigen)

Material. Småland; Östergötland; Uppland; Värmland; Dalarna; Hälsingland; Härjedalen; Ångermanland; Västerbotten; Lycksele lappmark; Lule lappmark.

S. bicolor (Zetterstedt)

Undoubtedly the commonest *Suillia* in Sweden on the basis of this survey, with material in well over 60% of the samples.

Material. Skåne; Småland; Öland; Gotland; Östergötland; Bohuslän; Södermanland; Uppland; Västmanland; Värmland; Dalarna; Härjedalen; Ångermanland; Västerbotten; Lycksele lappmark; Lule lappmark.

**S. dawnae* Withers

Despite no previous Swedish records of this species, it is evidently common in a variety of habitat types.

Material. Småland: Nybro Kommun, mixed forest; Öland: Frösslunda alvar, limestone pasture; Öland: Mörbylånga Kommun, Skogsby Ecological Research Station garden; Södermanland: Huddinge Kommun, garbage dump; Uppland: Älvkarleby Kommun, pine forest with bilberry; Uppland: Norrtälje Kommun, maritime deciduous wood; Värmland: Munkfors Kommun, sandy railway embankment and old mixed deciduous forest in stream ravine; Västerbotten: Vindelns Kommun, 40-50 year-old pine forest with bilberry and 20-25 year-old dense mixed coniferous forest.

**S. dunicola* (Collin)

Only three males could be definitely attributed to this species. As detailed by Withers (1987) this is a species distinct from *S. mikii* (Pokorny) which many authors have considered synonymous, and true *S. mikii* also occurred in the one locality where *S. dunicola* was found. Females, which may be either of these two species (of which females cannot be separated at present), occurred in other localities without associated males.

Material. Västerbotten: Vindelns Kommun, 40-50 year-old pine with bilberry understorey.

S. flava (Meigen)

This species, and the following two, were very common, being represented in half of the samples.

Material. Skåne; Halland; Småland; Öland; Gotland; Södermanland; Uppland; Västmanland; Värmland; Dalarna; Hälsingland; Västerbotten.

S. flavifrons (Zetterstedt)

Material. Småland; Öland; Gotland; Östergötland; Uppland; Värmland; Hälsingland; Härjedalen; Ångermanland; Västerbotten; Lycksele lappmark; Lule lappmark; Torne lappmark.

S. fuscicornis (Zetterstedt)

Material. Skåne; Småland; Öland; Östergötland; Södermanland; Uppland; Värmland; Dalarna; Härjedalen; Ångermanland; Västerbotten; Lycksele lappmark; Lule lappmark.

S. humilis (Meigen)

Another very common species, found in 60% of the samples.

Material. Skåne; Småland; Öland; Gotland; Östergötland; Södermanland; Uppland; Värmland; Dalarna; Hälsingland; Härjedalen; Ångermanland; Västerbotten; Lule lappmark.

**S. igori* Martinek

Several specimens of *S. igori* were captured, but from only two sites, one a spruce forest with bilberry understorey, the other a pine wood with cowberry understorey. This species is quite distinct, not only in the male genitalia, but also by virtue of the arrangement of the mesopleural bristles, which are aligned with the mesopleural furrow. Martinek (1985) hypothesised two generations per year on the basis of the capture dates of material at his disposal; this is borne out by the material recorded here, which is from April/May and October/November. Hitherto recorded only from Romania.

Material. Lule lappmark: Jokkmokks Kommun, bilberry spruce forest; Lule lappmark: Gällivare Kommun, *Vaccinium vitis-idaea* dominated pinewood.

S. laevifrons (Loew)

Material. Skåne; Småland; Öland; Gotland; Södermanland; Uppland; Västmanland; Värmland; Härjedalen; Ångermanland; Västerbotten.

S. mikii (Pokorny)

Material. Härjedalen; Ångermanland; Västerbotten; Lycksele lappmark; Lule lappmark.

S. notata (Meigen)

Normally a widespread European species, this was very rare in SMTP collections: it may be significant that one of the sites in which it was captured was a forest on sandhill dunes.

Material. Skåne: Ystad Kommun, border between forest and sandhill dunes; Västerbotten: Vindelns Kommun, spruce/larch 10-15 years after felling.

S. pallida (Fallén)

Only 1 male and 1 female of this species were represented in the material, from just one locality.

Material. Södermanland: Tyresö Kommun, mixed coastal oak forest.

S. parva (Loew)

Specimens were found in samples from very late in the year to early spring.

Material. Skåne; Bohuslän; Uppland; Västmanland; Värmland.

S. quadrilineata Czerny

Not a species frequently encountered in Europe, *S. quadrilineata* was present in 5 sites, always in large numbers.

Material. Skåne: Klippans Kommun, beech forest; Östergötland: Omberg, Norway spruce wood; Uppland: Uppsala Kommun, mixed deciduous forest along brook; Västerbotten: Vindelns Kommun, 40-50 year-old pine forest with bilberry; Lule lappmark: Gällivare Kommun, *Vaccinium vitis-idaea* dominated pinewood.

S. vaginata (Loew)

Material. Småland; Öland; Gotland; Östergötland; Södermanland; Uppland; Värmland; Hälsingland; Västerbotten; Lycksele lappmark.

S. variegata (Loew)

Considering how widespread this species is in temperate Europe, often the commonest early *Suillia* to be found, the fact that just one female was present in the SMTP material is remarkable.

Material. Skåne: Tomellila Kommun, *Agrestis capillaris* heath, 15-23.vi.04.

TRIXOSCELIDIDAE

All the specimens of Trixoscelididae were captured in drier habitats. Females of *Trixoscelis frontalis* and *T. similis* are not separable: positive records of these two species are therefore based on males only.

Trixoscelis frontalis (Fallén)

Material. Småland Öland; Uppland.

T. marginella (Fallén)

Material. Skåne; Småland; Öland; Gotland.

T. obscurella (Fallén)

Material. Småland; Värmland.

**T. similis* Hackman

Although not hitherto recorded from Sweden, this species was found in a number of suitable habitats.

Material. Småland: Nybro Kommun, old moist haymaking meadow; Småland: Torsås Kommun, Malaise trap in garden; Öland: Gamla Skogsby, meadow with bushes; Öland: Mörbylånga Kommun, Ecological Research Station garden; Södermanland: Åva, mixed coastal oak forest; Södermanland: Huddinge Kommun, garbage dump; Södermanland: Tullgarns näs, mixed forest next to pasture; Uppland: Älvkarleby Kommun, dry meadow with birch.

Discussion

The activities of SMTP have enabled 55 species of Heleomyzidae and 6 of three allied families to be recorded as definitely present in Sweden, with the likely presence of a further tentative species of *Oldenbergiella*. Some of these would certainly not have been detected if the project had not had the foresight to operate some traps throughout the entire year. As I have reported (Withers 2007) a small, but significant proportion of Diptera appear to be active only in the winter months; these are seriously under-recorded and many are classed as rare, which may not, in reality, be the case. Some, at least, seem to be attracted to dead animals, so putting out baited traps at appropriate times may give more clues as to the true phenology and distribution of some of the more elusive species.

There are some surprises in the above list: *Suillia variegata* seems to be genuinely rare in Sweden, although this is far from the case elsewhere in Europe, and *S. oxyphora* was not found at all, which may add credence to my belief that this is a species shrinking alarmingly in distribution since earlier times. It has not been re-found in Great Britain, for example, since the early years of the twentieth century and the only modern material I have seen is in the National Museum in Hungary (all of which was reared from fungi). *Suillia ustulata* was unexpectedly missing from this material, although listed from Sweden by Woźnicá (2010).

Several species of this group, it is becoming clear, are Holarctic in distribution, and before recording species as new to the Palaearctic region, some thought should be given to what is known from North America too, where the taxonomy of the family is also well-established and there are workable keys.

Acknowledgements

The members of the Swedish Malaise Trap Project are to be congratulated on their initiative and their willingness to entrust the resultant material to specialists for identification. In this way they hope to build up a comprehensive database of all Swedish invertebrates, however unpopular. The unsung heroes of the project are those who sorted the material: there were very few specimens in the material which were not representatives of Heleomyzidae and allied families, and this is all the more remarkable considering that not all members of this group obviously belong here.

Andrzej Woźnicá was very helpful in confirming identities of two rare species, which had me confused for some while, as I had no material in my collection.

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More fungus gnats (Diptera, Mycetophilidae) new to Britain

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Summary

Records are provided of recent additions to the British fauna of fungus gnats: *Exechiopsis* (*Xenexechia*) *davatchii* (Matile, 1969), *Phronia forcipula* Winnertz, 1863; *Synplasta exclusa* (Dziedzicki, 1910). The recent addition of *Pseudexechia tuomikoskii* Kjørandsen, 2009 is discussed, in comparison with *P. trisignata* (Edwards, 1913). A second British record of *Exechiopsis* (*Xenexechia*) *seducta* (Plassmann, 1976) is noted. The identity of the British species previously recorded as *E. frigida* (Boheman, 1865) is revised and confirmed to be *E. borealis* Lundström, 1912. New records of *S. exclusa* from France and Croatia are also included.

Introduction

These notes are towards bringing up to date the composition and nomenclature of the British Mycetophilinae, in preparation for a handbook to the species of this subfamily. The two species reported from Britain for the first time here are both recorded from single specimens. Both are widespread species in Europe and as is the case with several other recent additions to the British fungus gnat fauna it is open to speculation whether they are recent introductions or native species that have been previously undetected by the level of recording

Exechia borealis Lundström, 1912

As indicated in the discussion of the group of species related to *Exechia spinigera* Winnertz, 1863 (Gibbs 2011), two species *E. frigida* (Boheman, 1865) and *E. borealis* Lundström, 1912 have the forked tip of the lateral lobe of the gonostylus rather short, reduced to an apical notch, only obvious at high magnification. The separation of *E. borealis* as a distinct species from *E. frigida* was only recently recognised by Kjørandsen *et al.* (2007a), when it was found that both species are common in Iceland. The application of the name was based on examination of Lundström's types of *E. borealis* which he had described as a variety of *E. spinuligera* Lundström, 1912 and which had not been recognised by subsequent authors. They figured the male genitalia and noted the differences from *E. frigida* as figured by Zaitzev (2003). These included the ventral lobe of the gonostylus being longer and unbristled on the apical half, while *E. frigida* has it shorter and bristly apically as in *E. spinigera* and *E. spinuligera*. The small setose medioventral appendage between the gonocoxites is short, 1- or 2-lobed with few bristles, while *E. frigida* has it longer with more bristles. The median hypandrial lobe situated dorsal to this process is shorter and broader than in *E. frigida*, with an apical excavation not found in that species.

All British Isles material previously identified as *E. frigida* that has been re-examined has proved to belong to *E. borealis*. According to Kjørandsen *et al.* (2007b) *E. borealis* is the commoner species in Sweden where *E. frigida* has an apparently more boreal distribution, but it is possible that it may be found in Scotland. *Exechia borealis* is a frequent species in Scotland, Wales and northern England, with only a few scattered records from southern England. There is a single Irish record, from Glendalough in the Wicklow mountains in 1986 (Chandler 1987), which is confirmed to be *E. borealis*.

The only rearing record for *E. frigida*, from a soft agaric *Hypholoma* species in Finland (Hackman and Meinander 1979) now requires confirmation as it may refer to *E. borealis*.

Exechiopsis (Xenexechia) davatchii (Matile, 1969)

This species was first described (as *Rymosia davatchii*) from Iran, but has since been found to be widespread in the Palaearctic Region. Zaitzev (2003) gave records for the Far East (Primorsky region and the island of Sakhalin) as well as from European Russia. Kjærandsen *et al.* (2007b) listed occurrence in Finland, Sweden, Poland, Austria, Switzerland, the Czech Republic, Romania and Bulgaria. It is possible that it is one of the species that has spread westward in Europe in recent years. It may be significant that two males of the related species *E. seducta*, itself only recently recorded as new to Britain (Gibbs 2009), were found at the same site (see below), but although it is a country park it mainly comprises mature woodland and we are not aware that there has been recent introduction of trees or other plants from abroad.

This brings to six the number of species of the subgenus *Xenexechia* recorded from the British Isles, out of eleven found in Europe. They are distinguished primarily by characters of the male genitalia; in *E. davatchii* the ventral lobe of the gonostylus is uniformly narrow and tapered apically, in contrast to the laterally emarginate condition of *E. leptura* (Meigen, 1830) and *E. membranacea* (Lundström, 1912). These three species and *E. seducta* are distinguished from other *Exechiopsis* species by having two (instead of one) propleural bristles.

The biology of this subgenus is apparently unknown, although they might be expected to develop in terrestrial agarics and boletes, like members of the subgenus *Exechiopsis*.

Material examined. 1 ♂, SUFFOLK, Brandon Country Park (TL788850), 21.x.2010, beech and conifer woodland, leg. I. Perry.

Exechiopsis (Xenexechia) seducta (Plassmann, 1976)

This species was added to the British list on a single male, swept on 30 August 2008 from a conifer plantation with some deciduous trees at Elveden Centerparc, Suffolk by Gibbs (2009), who figured the gonostylus. The additional site reported here is nearly 6km north of that locality. Both sites adjoin Thetford Forest, a largely coniferised area of former Breckland, suggesting that *E. seducta* may be established elsewhere in the intervening area.

Material examined. 1 ♂, SUFFOLK, Brandon Country Park (TL788850), 2.xi.2010, beech and conifer woodland, leg. I. Perry; 1 ♂, same data, 4.xi.2010, leg. I. Perry.

Pseudexechia tuomikoskii Kjærandsen, 2009

It was reported by Chandler (2009) that a revision of the genus *Pseudexechia* Tuomikoski by Kjærandsen (2009) had established that there are four species in Europe that have been previously confused under *P. trisignata* (Edwards, 1913) by various authors. Edwards (1913) described this species (in *Exechia*) from British material and figured the male genitalia. When Chandler (1978) described *P. aurivernica* as new and provided a key to the British species of this genus, the genitalia figured for *P. trisignata* showed some differences from Edwards' figures. It was found by Kjærandsen (*op. cit.*) that this was because the species

figured was his newly described species *P. tuomikoskii* Kjørandsen, which he thus recorded as present in Britain. Chandler (2009) reproduced the figures of male and female genitalia provided by Kjørandsen (2009). In the male the gonostylus has an angle to the dorsal edge of the ventral lobe (that bearing thickened blunt setae) in *P. trisignata* while this is smoothly sloping in *P. tuomikoskii*. In the female of *P. trisignata* tergite 7 has a slightly scalloped apical margin with longer marginal hairs, while this margin is smoother in *P. tuomikoskii*.

Re-examination of available British specimens has shown that both *P. trisignata* and *P. tuomikoskii* are widespread, with the latter more numerous among specimens examined. Both species have been examined from sites scattered throughout Britain north to Easter Ross. The identity of Irish records of *P. trisignata* has yet to be confirmed. It is not yet possible to assign most of the earlier records to either species and any records for which specimens have not been retained can only be placed to *P. trisignata* agg. No evidence has yet been found that the other members of this complex, *P. canalicula* (Johannsen, 1912) and *P. pectinacea* (Ostroverkhova, 1979) occur in Britain, although both are found in Scandinavia and *P. canalicula* has a Holarctic distribution.

The rearing records cited by Chandler (1993) for *P. trisignata* from *Kuehneromyces* (as *Galerina*) *mutabilis* and *Hebeloma* (as *Naucoria*) *pseudoamarescens* now require confirmation.

Synplasta exclusa (Dziedzicki, 1910)

This is best separated from allied species by characters of the male genitalia, figured by Zaitzev (2003) under the name *S. sintenisi* (Lackschewitz, 1937), which was placed in synonymy with *S. exclusa* by Ševčík (2009). It belongs to the group of the genus with an awl-shaped projection on the inner margin of the ventral lobe of the gonostylus, which includes two other British species, *S. gracilis* (Winnertz, 1863) and *S. rufilatera* (Edwards, 1941). In *S. gracilis* the awl is long and the basal part of this lobe is straight-edged, while in the other species the awl is shorter relative to the basal portion, which is produced into a rounded lobe. The dorsal lobe of the gonostylus in *S. rufilatera* is narrow and blunt ended, while in *S. exclusa* and *S. gracilis* this lobe is broad with a shallowly concave sclerotised apical margin. Zaitzev (2003) used the form of the medioventral appendage between the gonocoxites as a key character; in *S. gracilis* it is short, with an apical emargination between two short projections, in *S. rufilatera* it has a rounded apical projection between lateral flanges, while in *S. exclusa* it is elongate and shining black with a digitate apical projection and a short lateral projection on each side of this. It is apparent from the citation of figures that the alternatives in couplet 4 of Zaitzev's key have been reversed and should apply respectively to *S. bayardi* (Matile, 1971) and *S. exclusa* (as *S. sintenisi*) rather than the reverse.

It should also be noted that British specimens of *S. rufilatera* agree with the figures by Edwards (1941) in the form of the gonostylus; the differences apparent in the figures by Zaitzev (2003) suggest that his material belongs to a different undescribed species (David Gibbs *pers. comm.*).

The coloration of the male abdomen may also be a guide to recognition. As in *S. gracilis* and *S. rufilatera* tergites 2-5 in *S. exclusa* are yellow laterally with basal dark markings more or less developed, with tergite 6 all dark brown and the genitalia yellow. In the common species *S. gracilis* the dark markings are triangular in lateral view and extend more laterally so that the yellow coloration only narrowly reaches the anterior margin of each tergite. In *S. rufilatera* and *S. exclusa* about half of the anterior margin is yellow in lateral view; in *S. rufilatera* the dark markings extend more behind so that the apical margin is only

narrowly if at all yellow medially, while in *S. exclusa* the dark marking only extends to about the middle of each tergite, which is therefore mainly yellow.

This is another widespread species in Europe, though according to Zaitzev (2003) restricted in Russia to the European part. The British specimen has been compared with males from France, Spain and Croatia. Chandler (2004) cited it as new to France and Croatia and those records, for which data has not been published previously, are also given here; the Spanish record had already been published by Chandler and Báez (2002). Following the identification of the Welsh specimen the authors visited the site together on 6.vii.2009 but no further examples of this species were detected.

This increases to four the number of *Synplasta* species known from Britain; there are about a dozen species in Europe but most are rare and little known. The biology is only known for *S. gracilis*, which appears to be polyphagous with records from agarics, boletes, a soft polypore and an ascomycete.

Material examined. 1♂, WALES, Glamorgan, Cillibion Plantation (SS5391), 21.v.2008, broad-leaved woodland, leg. I. Perry; 1♂, FRANCE, Forêt de Compiègne, St Jean aux Bois, 14.v.1989, mixed woodland, leg. P.J. Chandler; 1♂, SPAIN, Santander, Desfilado de la Hermida, Coto Arenal, riverside woods, 17.vi.1980, leg. P.J. Chandler; 3♂, CROATIA, Plitvice Lakes, 24-27.ix.1987, leg. A.E. Stubbs.

Phronia forcipula Winnertz, 1963

This species was first recognised as British in 2009 from Yorkshire by John Coldwell and confirmed by PC from one of his specimens. Soon after examining this specimen, PC identified it from flight interception trap samples obtained in 2007 at Langley Park, Buckinghamshire, referred to him by John and Barbara Ismay. Chandler (2010) announced the presence of this species in Britain and noted its distinguishing characters with reference to the keys to Russian Mycetophilinae by Zaitzev (2003).

It has male genitalia rather similar to the common species *P. humeralis* but among other small differences, the ventral bristly lobe of the gonostylus is more or less rounded apically while it comes to a blunt point in *P. humeralis*, and the median excavation of the gonocoxites is a little narrower and deeper in *P. forcipula*. Also *P. forcipula* has clear wings while there is usually a brownish patch behind the posterior fork in both sexes of *P. humeralis*. Some probable females were also present in the Langley Park material.

This is a Holarctic species that is widespread in Europe, while *P. humeralis* is restricted to the Palaearctic Region. These species were confused in earlier literature and Edwards (1925) recorded *P. humeralis* from Britain under the name *P. forcipula*, so the rearing record from the encrusting fungus *Corticium* cited by him relates to *P. humeralis*. No reliable rearing record of *P. forcipula* has been published but it might be expected to develop on fungi encrusting rotten wood like other species of this genus.

Material examined. 1♂, SOUTH YORKSHIRE, Wortley Top Forge (SK2999), 22.viii.2009, broad-leaved woodland, leg. J. Coldwell; 1♂, same data except 12.ix.2009; 5♂, BUCKINGHAMSHIRE, Langley Park, TQ010823, 22-31.x.2007, aerial trap at 5-6m height on veteran oak *Quercus robur*, c4m diameter in shade; 1♂, same data except TQ011824, aerial trap on almost dead veteran beech *Fagus sylvatica*, with bracket fungi and rot holes; 1♂, same data except TQ012820, aerial trap on old beech in shaded woodland (all leg. A. McVeigh, received via J.W. & B. Ismay).

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