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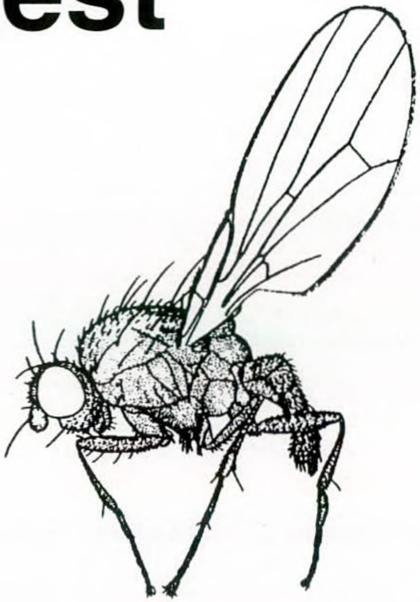
2015 Vol. 22 No. 2

Cover illustration: ***Platypezina connexa*** **(Boheman), (Platypezidae) male. © Dmitry Gavryushin. See article by A.J. Halstead on pp 145-146.**

Dipterists Digest



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Editorial Panel

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. Articles and notes for publication should be sent to the Editor at the above address.

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;
- 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 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. **Contributions should preferably be supplied either as E-mail attachments or on 3.5" computer disc or CD in Word or compatible formats**.

Articles should be supplied in A5 format with text in 9-point and Times New Roman font, title 12 point and author's name 10.5 point, with 1.27cm side margins. Figures should be drawn in clear black ink, about 1.5 times their printed size and lettered clearly. Colour photographs will also be considered. Figures and photographs 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. Descriptions of new species should include a statement of the museum or institution in which type material is being deposited.

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Dipterists Digest 2015 **22,** 111-122

The early stages and development sites of four species of Heleomyzidae (Diptera)

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Summary

The final stage larva and puparium is described of *Oecothea praecox* Loew (Diptera, Heleomyzidae), reared from a puffin burrow. Puparia are also described of three other Heleomyzidae, *Tephrochlaena oraria* Collin reared from decaying seaweed and *Suillia atricornis* (Meigen) and *Suillia bicolor* (Zetterstedt) reared from fruiting bodies of the fly agaric fungus. These early stages are compared with puparia of 10 previously described species and 5 characters were found that may characterise the heleomyzid final larval instar and puparium. Characters identifying subfamilies were also assessed and few were found.

Introduction

Adults of the acalypterate family, the Heleomyzidae (Diptera), are small to medium sized flies, yellow to grey-black in colour with oral vibrissae, convergent postvertical bristles and usually with conspicuous spines along the costa of the wing (Collin 1943, Gill and Peterson 1987). Adults are often found close to larval development sites, typically decaying plants and animals, including those in concealed places, such as caves, burrows and bird nests (Séguy 1934, Skidmore 1962, Rotheray 2012). Some species have, however, phytophagous larvae (Papp 1994, Rotheray and Bland 1996) while others are mycophagous, developing within the fruiting bodies of fungi (Séguy 1934, Buxton 1960, Skidmore 1962, Chandler 2010). A low proportion of species have been reared and an even lower proportion of early stages are described (Ferrar 1987, Papp 1998). Recently, Rotheray (2012) and Rotheray and Ayre (2013) described puparia of ten species and the larva of one.

In this paper we describe the early stages of a further four species obtained opportunistically during fieldwork in Scotland and northern England in 2003 and 2013-14: *Oecothea praecox* Loew reared from a puffin burrow, *Tephrochlaena oraria* Collin from decaying seaweed, and *Suillia atricornis* (Meigen) and *Suillia bicolor* (Zetterstedt) from fruiting bodies of the fly agaric fungus *Amanita muscaria*.

Methods

Larvae and puparia were collected in the field and reared in containers stored at home. Adults were associated with puparia by careful observation or by separating puparia and rearing in separate containers. Adult identifications were made using key works, especially Collin (1943) and Withers (1987) and by comparison with named specimens in the collections of the National Museums, Scotland.

Puparia were cleaned prior to examination by soaking in hot water or in a hot solution of potassium hydroxide (KOH) for about 5 minutes and picking off debris with pins, forceps and a paint brush. Head skeletons were examined by detaching the antero-ventral plate of the puparium loosened by emergence of the adult, and soaking it in a hot solution of KOH for 5-8 minutes. The head skeletons were then removed with pins, washed in acetic acid to prevent further clearing and stored in 70% ethanol.

A Wild M5 stereo microscope and an Olympus BX51 compound microscope were used to examine larvae, puparia and head skeletons. Measurements were made using an eyepiece graticule attached to the stereo microscope. Images were taken using cameras attached to microscopes and in compound microscopy, stacked images were obtained using associated software, AnalySIS docu v5. Terminology follows Rotheray (2012).

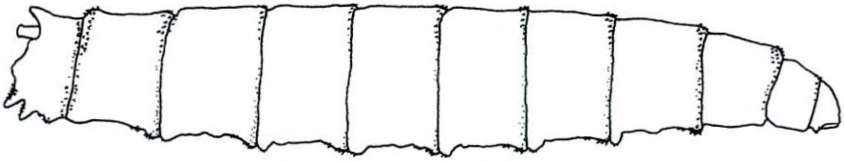

Fig. 1. ***Oecothea praecox*****, whole larva except for the pseudocephalon which is fully retracted into the prothorax, lateral view, head to the right, length 6.5mm.**

Results

Oecothea praecox Loew (Heleomyzinae)

Final stage larva: (pseudocephalon retracted fully and not able to be assessed in the only specimen available for study); length (minus pseudocephalon) 6.5mm (n = 1), width 1mm; abdominal segments 1-8 more or less uniform in size except 7th abdominal and anal segments slightly smaller (Fig. 1); externally, segment boundaries indicated by ridges, impressed lines and by circumventing bands of pale brown to black spicules (Figs 1, 2a); thoracic segments tapered from the meta- to prothorax; locomotory spicules in three main transverse rows, one anterior and two posterior to segment boundaries; spicules pale in colour with apices only sclerotised and these rows bounded on either side by interrupted rows of smaller spicules; integument of anal segment coated in nodules (Fig. 3) and with fleshy lobes (Fig. 1): one pair anterior to the posterior breathing tubes, two pairs of slight lobes postero-lateral to the breathing tubes and 2 pairs of large, tapering fleshy lobes associated with the anus, one pair anterior, the other posterior to the anal opening; projections round the anus coated posteriorly in spicules and spicules surrounding the anus; posterior margin of the anal segment indented like a shelf, on the upper face of which the posterior breathing tubes are sited; **anterior spiracles**: comprising a fan of 6 dark brown spiracular bulbs (Fig. 4a); **posterior spiracular plates**: mounted on short projections (cf Fig. 3), about as long as width of the plate; plates inclined inwards, with three pairs of radially arranged spiracular slits mounted on slight, lozenge-shaped projections, ecdysial scar on the inner margin (Fig. 5a); 4 interspiracular setae, each with a varied number of bifurcating rays, these incomplete, apparently broken off (Fig. 5a); **head skeleton**: (Fig. 6a), length 0.7mm; mandibles separate, not fused with a subrectangular base and prominent apodemes in postero-dorsal and antero-ventral positions, the latter apodeme sharply tapered; mandibular base with a small window; apical hook slightly longer than the base and smoothly curved and hollowed out ventrally; in lateral view, dental sclerite below but not attached to the mandible base; triangular in shape and extending under the base; labial sclerites small and inconspicuous, intermediate sclerite, bar-shaped in lateral view, sclerotised black apically and not fused to the basal sclerite; basal sclerite without sclerotised cibarial ridges and distal valve, ventral cornu slightly longer than dorsal cornu and apex of dorsal cornu fenestrate, with small oval windows; posterior apex of the dorsal cornu with a slight but distinct, linear window; vertical plate and dorsal cornu mostly sclerotised black, ventral cornu little sclerotised and mostly translucent with a serrated dorsal apodeme and tapered apically; parastomal bar not inflated and upturned apically; **puparium**: length 4mm (n = 1); orange to red-brown in colour, except darkened both apically and posteriorly (Fig. 2a); segment boundaries indicated by slight, circumventing indentations lined by striae and originating from inside the puparium, oval pale marks; fleshy bases of the main rows of locomotory spicules lost during pupariation (Fig. 7a); prothorax, mesothorax and 7th abdominal segment with almost complete circumventing striae, metathorax and abdominal segments 1-6 with striae absent on the upper lateral and dorsal margins (Fig. 2a).

Material examined

Scotland, Hebrides, Mingulay, above cave, north beach, 1 larva and 1 puparium, collected 31.vii-3.viii.2013, ex burrow of puffin *Fratercula arctica* (Linnaeus) (Charadriiformes, Alcidae), E.G. Hancock (Hunterian Museum, entry number 1395).

Fig. 2. Heleomyzidae, whole puparia, lateral view, front end to the right: a, *Oecothea praecox*, length 4mm; b, *Suillia atricornis*, length 5mm.

***Tephrochlaena oraria* Collin (Heteromyzinae)**

Puparium: length 3.5-4mm (n = 2); orange to red-brown in colour, pattern of striae, spicules and segment boundaries as those of *O. praecox*, including nodulate anal segment (Fig. 3) and arrangement of locomotory spicules (Fig. 7a); **anterior spiracles**: comprising a fan of 6-7 yellowish spiracular bulbs (Fig. 4b); **puparial spiracles**: length about 0.6mm, present on the outer corners of the dorsal midline of the first abdominal segment, appearing as slight, elongate, yellow-brown projections with most spiracles on the posterior surface (Fig. 8); **posterior spiracular plates**: mounted on short projections, about as long as width of the plate (Fig. 3); plates inclined inwards with three pairs of radially arranged spiracular slits mounted on slight, lozenge-shaped projections, ecdysial scar on the inner margin; four interspiracular setae, each with a varied number of bifurcating rays, these often broken off (Fig. 5b); **head skeleton**: (Fig. 6b), length 0.7mm; mandibles separate, not fused together with a subrectangular base and prominent apodemes in postero-dorsal and antero-ventral positions, the latter markedly tapered; mandibular base with a small window; apical hook longer than the base, smoothly curved and hollowed out ventrally; dental sclerite below but not attached to the mandible base; triangular in shape and extending under the base; labial sclerites small and inconspicuous, intermediate sclerite club-shaped in lateral view, sclerotised black apically and separate to the basal sclerite; basal sclerite lacking sclerotised cibarial ridges and valve, ventral cornu slightly longer than dorsal cornu and apex of dorsal cornu fenestrate with small oval windows; posterior apex of the dorsal cornu with indistinct windows; vertical plate and dorsal cornu mostly sclerotised black, ventral cornu little sclerotised and mostly translucent with a serrated dorsal apodeme and tapered apically; parastomal bar not inflated and upturned apically.

Material examined

England, Durham, Whitburn beach, 2 puparia, collected 18.v.2014 ex a thin line of decaying seaweed deposited along the high water line, K. Ayre (National Museums Scotland).

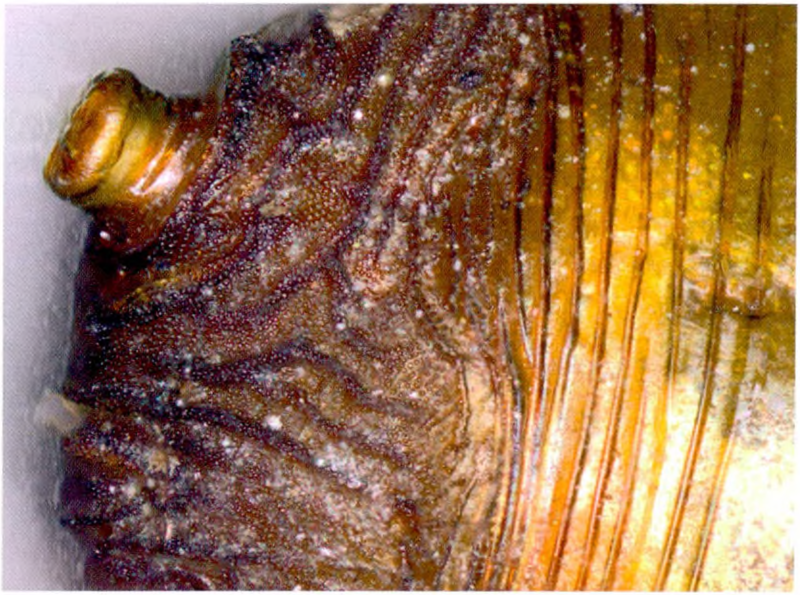

Fig. 3. *Tephrochlaena oraria*, puparium, part of the anal and 7th abdominal segments, dorso-lateral view, posterior spiracular process in the upper, left hand quadrant, anal segment coated in wrinkles and nodules, 7th abdominal segment with circumventing striae and lacking nodules.

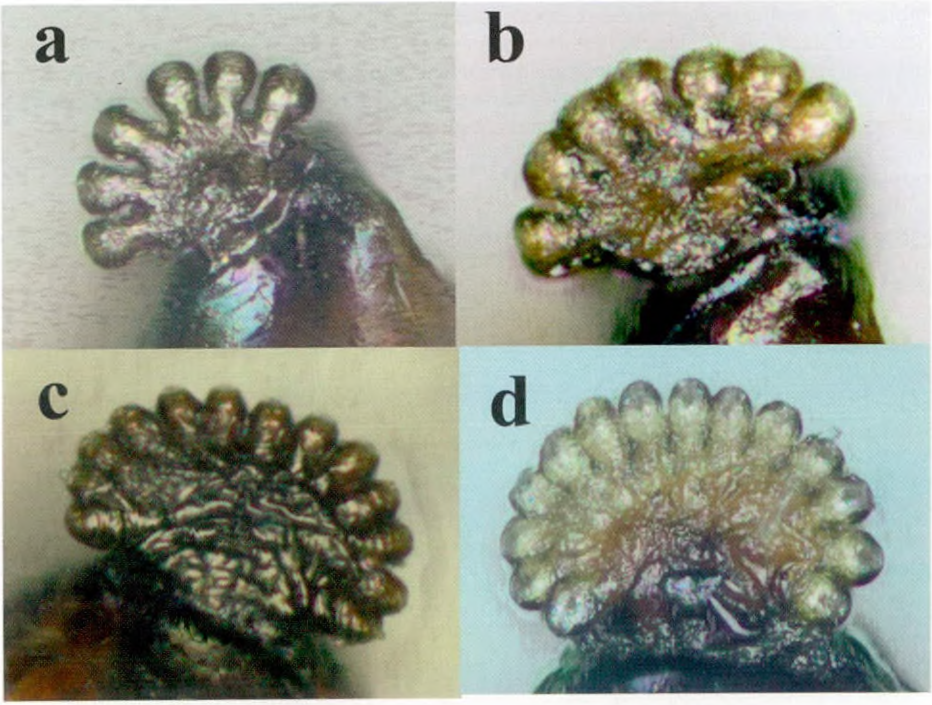

Fig. 4. Heleomyzidae, anterior spiracular processes, posterior face, to scale and maximum width across spiracles in d = 0.1mm: a, *Oecothea praecox*; b, *Tephrochlaena oraria*; c, *Suillia atricornis*; d, *Suillia bicolor*.

***Suillia atricornis* (Meigen) (Suilliinae)**

Puparium: length 5mm (n = 3); red-brown in colour, segment boundaries indicated by circumventing spicules and pale underlying ovals (Fig. 2b); middle of segments with two parallel, circumventing bands of slight ridges coated in approximated striae (Fig. 2b); anal segment wrinkled but lacking nodules; locomotory spicules of variable size and continuing from the ventral to the dorsal surface, bands wide on the lateral margins and narrow dorsally (Figs 2b, 7b); **anterior spiracles**: comprising a fan of 13-14 dark brown spiracular bulbs (Fig. 4c); **posterior spiracular plates**: mounted on short projections, slightly longer than width of the plate; plates inclined inwards with three pairs of radially arranged spiracular slits mounted on lozenge-shaped projections, ecdysial scar on the inner margin (Fig. 5c); four interspiracular setae, each with a varied number of bifurcating rays, these incomplete, apparently broken off (Fig. 4c); **head skeleton**: (Fig. 6c), length 1mm; mandibles separate, not fused together with a subrectangular base and prominent apodemes in postero-dorsal and antero-ventral positions, the latter markedly elongate and tapered sharply; mandibular base with a small window; apical hook longer than the base, smoothly curved and solid, not hollowed out ventrally; in lateral view, dental sclerite extending under the mandible, triangular in shape and attached to the mandible base by narrow sclerotised bars; labial sclerites small and inconspicuous, intermediate sclerite, anvil-shaped in lateral view, sclerotised black and separate from the basal sclerite; basal sclerite lacking sclerotised cibarial ridges and valve, ventral cornu slightly longer than dorsal cornu and apex of dorsal cornu fenestrated by small oval windows; posterior apex of the dorsal cornu with indistinct windows; posterior margin of the vertical plate and ventral side of the dorsal cornu heavily sclerotised black, black sclerotisation not reaching across the vertical plate to the anterior margin; ventral cornu little sclerotised and mostly translucent with a serrated dorsal apodeme and tapered apically; parastomal bar inflated and upturned apically; a narrow, sclerotised bar extending underneath the parastomal bar from about the mid length to the upturned apex.

Material examined

Scotland, Midlothian, Glen Gore, 3 puparia, collected 25.x.2003 ex fruiting bodies of the fly agaric, *Amanita muscaria* (Agaricales, Amanitaceae), D. Horsfield (National Museums Scotland).

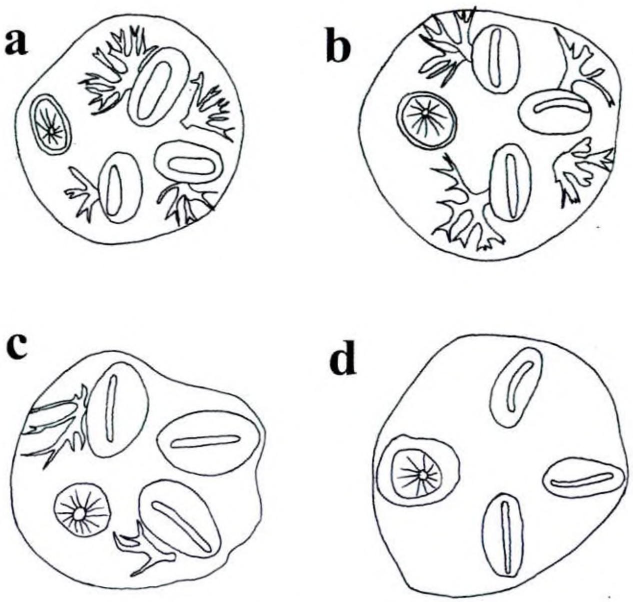

Fig. 5. Heleomyzidae, posterior spiracular plates, apical view, to scale and maximum width across the plate in d = 0.1mm: a, *Oecothea praecox*; b, *Tephrochlaena oraria*; c, *Suillia atricornis*; d, *Suillia bicolor*.

Suillia bicolor **(Zetterstedt) (Suilliinae)**

Puparium: length 4mm (n = 1); red-brown in colour, segment boundaries indicated by circumventing spicules and pale underlying ovals; middle of segments lacking circumventing bands of approximated striae; anal segment wrinkled but lacking nodules; locomotory spicules of variable size and continuing from the ventral to the dorsal surface, bands narrow on both lateral and dorsal margins and between segment, bands wider on abdominal segments 6 and 7; **anterior spiracles**: comprising a fan of 14 pale brown spiracular bulbs (Fig. 4d); **posterior spiracular plates**: mounted on short projections, slightly longer than width of the plate; plates inclined inwards with three pairs of radially arranged spiracular slits mounted on lozenge-shaped projections, ecdysial scar on the inner margin (Fig. 5d); interspiracular setae broken off (Fig. 5d); **head skeleton**: (Fig. 6d), length 1mm; mandibles separate, not fused together with a subrectangular base and prominent apodemes in postero-dorsal and antero-ventral positions, the latter markedly elongate and tapered sharply; mandibular base with a small window; apical hook longer than the base, smoothly curved and solid ventrally, not hollowed out; in lateral view, dental sclerite extending under the mandible, triangular in shape and attached to the mandible base by narrow sclerotised bars; labial sclerites small and inconspicuous, intermediate sclerite, saucepan-shaped in lateral view, sclerotised black and separate from the basal sclerite; basal sclerite lacking sclerotised cibarial ridges and distal valve, ventral cornu slightly longer than dorsal cornu and apex of dorsal cornu fenestrated by small oval windows; posterior apex of the dorsal cornu with indistinct windows; posterior margin of the vertical plate and ventral side of the dorsal cornu heavily sclerotised black, black sclerotisation not reaching across the vertical plate to the anterior margin; ventral cornu little sclerotised and mostly translucent with a serrated dorsal apodeme and tapered apically; parastomal bar inflated and upturned apically; a narrow, sclerotised bar extending underneath the parastomal bar from about the mid length to the upturned apex.

Material examined

Scotland, Midlothian, Glen Gore, 1 puparium, collected 25.x.2003 ex fruiting body of the fly agaric, *Amanita muscaria* (Agaricales, Amanitaceae), D. Horsfield (National Museums Scotland).

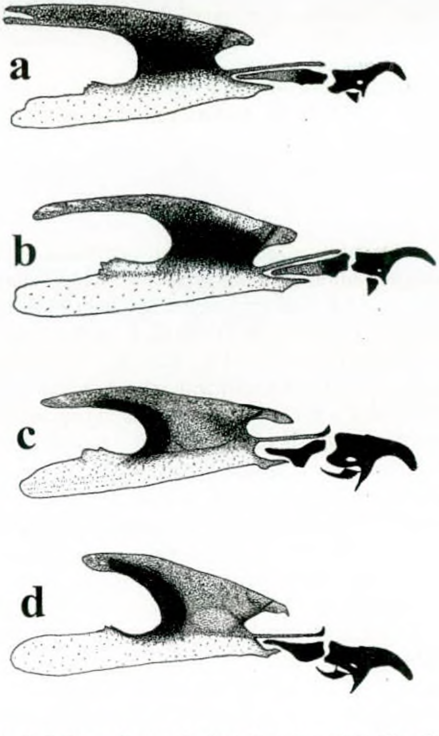

Fig. 6. Heleomyzidae, head skeletons, lateral view, head end to the right, to scale with length in d = 1mm: a, *Oecothea praecox*; b, *Tephrochlaena oraria*; c, *Suillia atricornis*; d, *Suillia bicolor*.

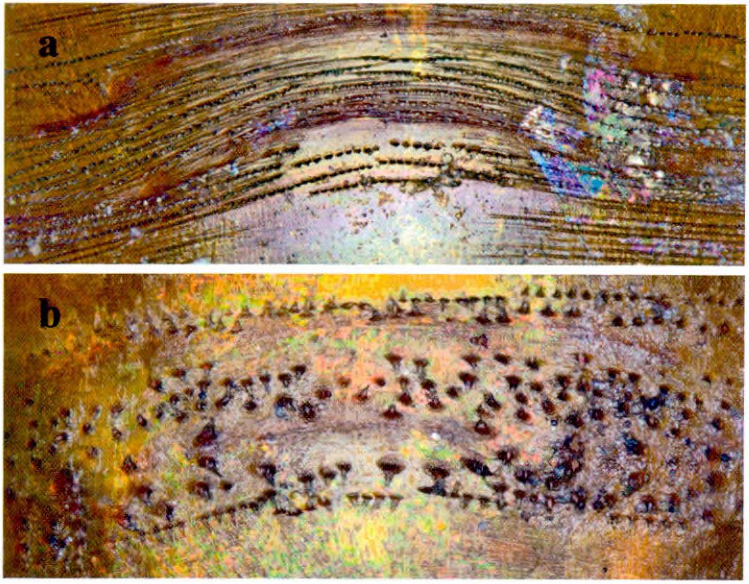

Fig. 7. Heleomyzidae, puparia, locomotory spicules: a, *Oecothea praecox*, 4th abdominal segment, width across image = 1.1mm; b, *Suillia atricornis*, 5th abdominal segment, width across image = 1mm.

Discussion

Rearing records

Adult *Oecothea* Haliday are apparently associated with mammal burrows (Collin 1943, Skidmore 1962, Ferrar 1987), although Skidmore (1962) reported development sites outside burrows for *O. fenestralis* (Fallén): decaying plants and bird nests. Séguy (1934) records adult *O. praecox* from caves and Collin (1943) and Skidmore (1962) reported adults from rabbit burrows, *Oryctolagus cuniculus* Linnaeus from which it was reared by E.B. Basden (Rotheray 2012). We here report *O. praecox* from a puffin burrow on the Hebridean island of Mingulay.

Collin (1943) referred to *T. oraria* as being a coastal species in Britain, but it is also known inland, from dry, grassland heath at Mitcham Common, London (Morris 2003). In Europe, it has been recorded from the Netherlands (van der Weele 2013), Germany (von der Dunk 2006), the Czech Republic (Martinek 2001), Italy (Caoduro *et al.* 1994) and Bulgaria (Beron *et al.* 1967), but these records are probably misidentifications (Andrzej Woźnica *pers comm*). It has also been found on the volcanic Island of Surtsey where it was reared, apparently for the first time, from dead fish (Lindroth *et al.* 1966). Altogether, we obtained from decaying seaweed on Whitburn beach in Durham, 26 puparia of *T. oraria* of which 13 produced adults; *Coelopa pilipes* (Fabricius) (Diptera, Coelopidae) and *Thoracochaeta zosterae* (Haliday) (Diptera, Sphaeroceridae) were also reared.

Most rearing records for species in the genus *Suillia* (Robineau-Desvoidy), are from fruiting bodies of fungi (Séguy 1934, Skidmore 1962, Chandler 2010). A few species, such as *S. ustulata* (Meigen) and *S. variegata* (Loew) have been reared from both fungi and other media, such as decaying plants and bird nests (Rotheray 2012) and a few are phytophagous (Papp 1994, Rotheray and Bland 1996). Both species reared here, *S. atricornis* and *S. bicolor*, are described as polyphagous in agaric and bolete fungi (Chandler 2010). We obtained these suilliine species from the agaric *Amanita muscaria* and available records suggest they are restricted to developing in fungi.

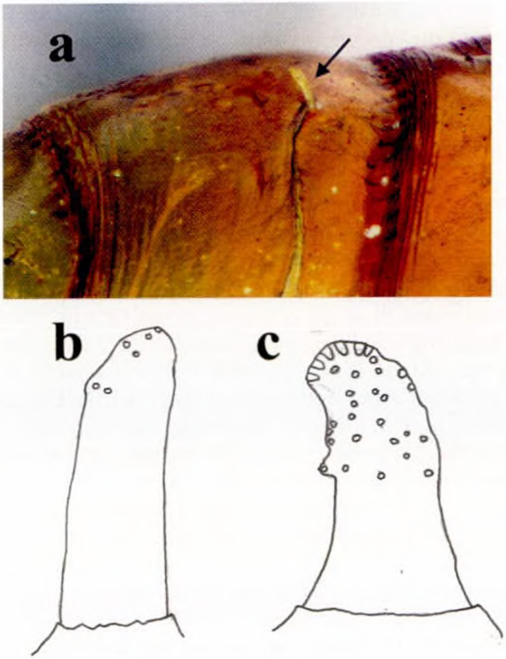

Fig. 8. ***Tephrochlaena oraria*, puparium, puparial spiracle, length about 0.6mm: a, in-situ, 1st abdominal segment, dorso-lateral corner, puparial spiracle indicated by the black arrow, split in the puparium is a line of weakness produced when the adult emerges from the puparium; b, lateral view, posterior margin to the left; c, posterior view.**

Taxonomic characters

On the basis of puparia and larvae of nine species, Rotheray (2012) gave a list of 10 shared characters that in combination, might define heleomyzid larvae and puparia. With the addition of the larva and puparium of *Neoleria maritima* (Villeneuve), this list was modified to six characters by Rotheray and Ayre (2013). With the four species described here, we further refine the shared character list to 5: 1) dorsal apodeme of the ventral cornu in the head skeleton with a serrated margin; 2) posterior spiracular plate on a short projection, usually orientated outwards; 3) posterior spiracular plate sloping inwards and often downwards; 4) ecdysial scar below the spiracular slits and on the inner margin; 5) anterior and posterior margins of the anus with pairs of large, fleshy projections.

Of these 14 species, we were only able to examine preserved larvae of two, *O. praecox* and *N. maritima*. Larvae of both species have a similar form to the anal segment, with up to five pairs of apical fleshy projections and an indented, shelf-like, apex below the spiracles. If fleshy projections and indented anal segments are present in larvae of the 12 species only assessed from puparia, they may also help define heleomyzid early stages. Due, however, to the small size of some of these projections, if present, they are obscured in puparia and their status is unsure until larvae are examined. Another uncertain character is the presence of cibarial ridges (Skidmore 1966, Rotheray 2012). In the species examined here, they are inconspicuous, highly translucent structures, most obvious in *S. atricornis*. In many saprophagous cyclorrhaphan larvae cibarial ridges are coloured by brown sclerotisation and a sclerotised valve exists at the apex of the ventral cornu. This valve is key to the functioning of the cibarial ridges and the head skeleton pump (Dowding 1967). The valve could not, however, be located in any of the 14 species. Translucent cibarial ridges and no obvious valve, suggests that in heleomyzids, if cibarial ridges are present, they are non-functional, vestigial structures. Rotheray and Lyszkowski (2015) discussed this possibility in relation to other cyclorrhaphan saprophages having reduced or lacking cibarial ridges.

Rotheray (2012) also listed three characters each that might characterise the subfamilies Heleomyzinae and Heteromyzinae and four for the Suilliinae. With the addition of *N. maritima* and the four species considered here, and assuming inclusion in their respective subfamilies is correct, these characters have also to be modified. The only character supporting the Heleomyzinae is the relative length of the posterior spiracular slits which appears shorter than those in the other two subfamilies and the only character shared by the heteromyzines is a club-shaped intermediate sclerite, but this is not exclusive to this subfamily, as it is also a character of *N. maritima*, currently a heleomyzine (Rotheray and Ayre 2013). The difficulty of defining the Suilliinae is due to the features of *S. ustulata*, which has, among the species examined, a unique head skeleton differing in size, shape and heavy sclerotisation (Rotheray 2012). Other suilliines, including those described by Papp (1994) have similar head skeletons and are distinguished by the following characters: 1) tall, upright, fan-shaped anterior spiracular process with 10 + spiracular bulbs; 2) heavy, black sclerotisation confined in the vertical plate of the basal sclerite to the posterior margin; 3) apex of the parastomal bar in the head skeleton thickened and upturned. Further work and obtaining the early stages of additional species is clearly required to determine how well subfamilies are supported by early stage characters.

Among the puparia of the 14 species, each of the four examined here can be distinguished by the following characters in combination: *O. praecox*, bar-shaped intermediate sclerite, basal projection supporting the posterior spiracular plate about as long as the diameter of the plate and posterior spiracular plate more or less oval-shaped; *T. oraria*, club-shaped intermediate sclerite, oval-shaped posterior spiracular plate and pupal spiracles present; *S. atricornis*, postero-dorsal margin of the mandible base with a large apodeme to which attaches the mandibular elevator muscle, spicule band on the lateral margins of abdominal segments much wider than on the dorsal margin; *S. bicolor*, postero-dorsal margin of the mandible base with a large apodeme to which attaches the mandibular elevator muscle, spicule band on the lateral and dorsal margins of abdominal segments, more or less the same width.

Puparial spiracles are unusual in the Heleomyzidae. The only other species known to possess them are members of the Australasian, fungal breeding genus, *Tapeigaster* Macquart (Ferrar 1987). No obvious explanation exists for their erratic occurrence. From the numbers of spiracles present and the tracheal tube attached to the base, in *T. oraria* they appear to be functional. The hollowed out mandible hooks of *O. praecox* and *T. oraria* are known in other cyclorrhaphan larvae (Rotheray and Lyszkowski 2015) and appear to represent an adaptation for scooping liquid food into the oral cavity prior to it being sucked up by the pump in the head skeleton. The solid mandibles of the two *Suillia* species suggests a different feeding mechanism. *Suillia atricornis* and *S. bicolor* probably tear and fragment fungal tissue and a solid hook is perhaps more effective for these processes.

Note on identity of *Oecothea* species: our specimens of *O. praecox* were readily identified using Collin (1943). The distinction between this species and *O. fenestralis* may not, however, be valid

(Andrzej Woźnica *pers comm*). The early stages of *O. fenestralis* have been described by Lobanov (1970). The figures and description in this paper, do not agree in every detail with the material we describe here. For example, Lobanov (1970) figures an almost perfectly symmetrical and rounded mandible hook with a proportionately small, square-shaped mandible base. The mandible hook is not symmetrically rounded and the base is larger and rectangular in our material (Fig. 6a). Also, the arrangement of locomotory spicules is wholly different. It is difficult to know whether these differences are species differences, natural variation or due to the manner in which figures have been drawn. Until the taxonomy of this group is better resolved, we retain the taxonomic affiliation based on Collin (1943).

Acknowledgements

We are grateful to Richard Luxmore of the National Trust for Scotland for arranging permission to visit and collect insects on Mingulay. We are also grateful to Andrzej Woźnica for comments on the manuscript and to Peter Chandler for help in various ways.

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Correction: *Chrysopilus laetus* Zetterstedt (Diptera, Rhagionidae) has not been recorded from Devon – Andrew Cunningham's note (2015. *Chrysopilus laetus* Zetterstedt (Diptera, Rhagionidae) in West Cornwall (V.C. 1). *Dipterists Digest (Second Series)* **22,** 10-11) included mention of an earlier record of *Chrysopilus laetus* from Devon, attributed to Keith Alexander, on 6 July 1990 at Knightshayes Park (SS960152). Andrew was correctly quoting information that I had supplied him from the *Soldierflies and Allies Recording Scheme* database, but the record is erroneous. Keith Alexander (*pers. comm.*) was carrying out surveys for the National Trust at Knightshayes Park on the date in question, but he has no record nor recollection of having seen this species. Subsequent cross-checking against the National Trust's species database and in the archives at the Biological Records Centre (BRC) have shed no further light on the origin of the record, and it is assumed to have arisen from a data entry error.

This makes Andrew Cunningham's record from West Cornwall an even more extraordinary outlier, with the nearest prior record having come from Gloucestershire.

I am grateful to Keith for highlighting this error, which has now been corrected in the recording scheme database. Thanks also to Andy Foster for consulting the National Trust database and to Stephanie Rorke for checking the BRC archives – **MARTIN HARVEY,** Evermor, Bridge Street, Great Kimble, Aylesbury, HP17 9TN (kitenetter@googlemail.com)

Dipterists Digest 2015 **22,** 123-125

Observed mating behaviour of *Syritta pipiens* (Linnaeus) (Diptera, Syrphidae)

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Summary

The mating behaviour of *Syritta pipiens* (Linnaeus) is described and illustrated.

Whilst photographing hoverflies at South Hetton (NZ3839845080) on 9 October 2015 I was fortunate to observe mating by *Syritta pipiens* (Linnaeus) and to capture a sequence of photographs that provide detail of this process.

The female was feeding at an oxeye daisy (*Leucanthemum vulgare*) when a male appeared. He initially made what appeared to be a series of "test flights" towards the female, settling into a frantic hover just behind her with his feet barely touching her abdomen. Whether this was to see what her reaction was I'm not certain. Once apparently content that the female was willing to mate, the male wrapped his hind legs under the tip of her abdomen and curled his genitalia towards her whilst still continuing to hover. At this point the female began to extend her genitalia towards him. The male continued to hover behind the female, anchored in place by his hind legs, whilst the female appeared to be the one attaching her genitalia to his. At the end of the process (between 3 and 5 seconds, and repeated a second time) the male, still hovering behind her, released his legs and, already airborne, disappeared.

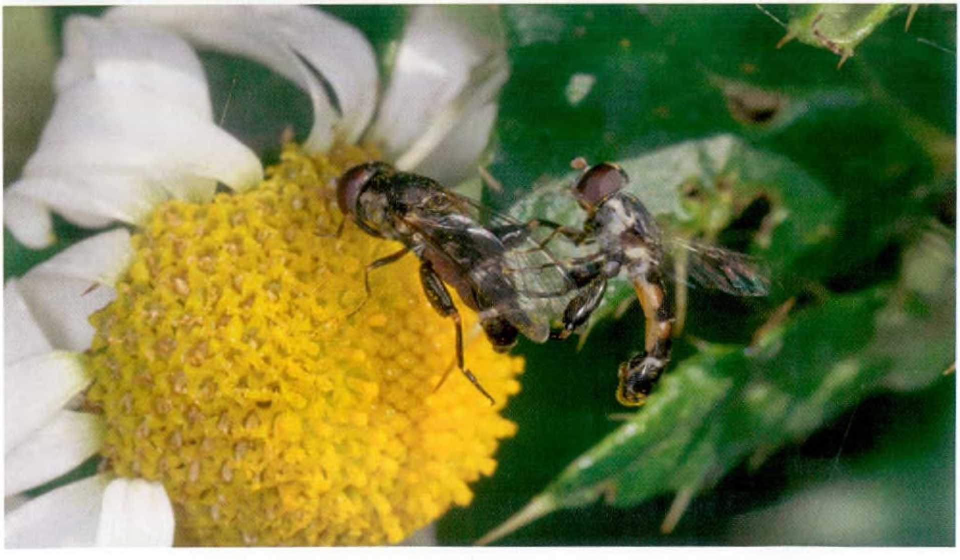


Plate 1. Male *Syritta pipiens* approaching the female.

Plate 2. Female extending her genitalia towards the male.

Plate 3. Coupling completed.

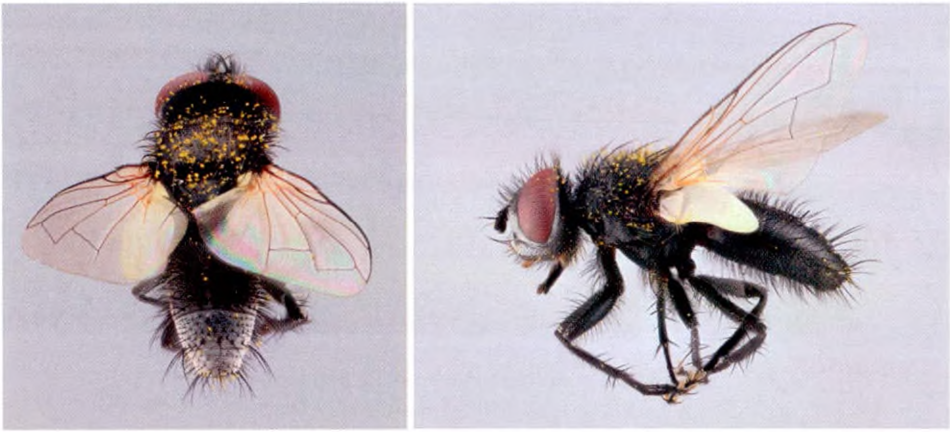
Plate 4. De-coupling prior to male departure.

It is not unusual for photographers to record hoverflies *in copula*, but in my experience it is very rare to encounter the actual coupling process. A database of over 50,000 photographic records compiled by the Hoverfly Recording Scheme contains over 430 records of mating hoverflies but none are as detailed as the sequence of photographs illustrated here (Roger Morris *pers. comm.*). It is also worth noting that *Syritta pipiens* is one of the better represented species in that dataset (Appendix 1).

Appendix 1. Numbers of photographic records of hoverflies *in copula*

Anasimyia sp. 1; *Anasimyia lineata* (Fabricius) 2; *Brachyopa scutellaris* (Robineau-Desvoidy) 1; *Brachypalpoides lentus* (Meigen) 2; *Cheilosia* sp. 1; *Cheilosia albitarsis* sl. 2; *Cheilosia grossa* (Fallén) 1; *Cheilosia pagana* (Meigen) 2; *Chrysotoxum bicinctum* (Linnaeus) 1; *Chrysotoxum cautum* (Harris) 1; *Criorhina asilica* (Fallén) 1; *Criorhina berberina* (Fabricius) 2; *Criorhina ranunculi* (Panzer) 1; *Episyrphus balteatus* (De Geer) 1; *Eristalinus sepulchralis* (Linnaeus) 1; *Eristalis arbustorum* (Linnaeus) 1; *Eristalis horticola* (De Geer) 1; *Eristalis intricaria* (Linnaeus) 3; *Eristalis nemorum* (Linnaeus) 4; *Eristalis pertinax* (Scopoli) 15; *Eristalis tenax* (Linnaeus) 12; *Eumerus* sp. 8; *Eupeodes corollae* (Fabricius) 45; *Helophilus hybridus* Loew 11; *Helophilus pendulus* (Linnaeus) 136; *Leucozona lucorum* (Linnaeus) 1; *Melanostoma scalare* (Fabricius) 1; *Merodon equestris* (Fabricius) 32; *Microdon analis* (Macquart) 2; *Neoascia* sp. 18; *Parhelophilus* sp. 3; *Platycheirus* sp. 1; *Pipizella* sp. 1; *Pocota personata* (Harris) 2; *Rhingia rostrata* (Linnaeus) 1; *Scaeva pyrastri* (Linnaeus) 2; *Sericomyia lappona* (Linnaeus) 1; *Sericomyia silentis* (Harris) 1; *Sphaerophoria* sp. 1; *Sphaerophoria scripta* (Linnaeus) 61; *Syritta pipiens* (Linnaeus) 26; *Syrphus* sp. 1; *Syrphus ribesii* (Linnaeus) 2; *Tropidia scita* (Harris) 2; *Volucella bombylans* (Linnaeus) 13; *Volucella pellucens* (Linnaeus) 3; *Xylota segnis* (Linnaeus) 1.

A London record for *Leucostoma anthracinum* (Meigen) (Diptera, Tachinidae) – On 11 July 2015, on Leyton Marsh (TQ355869) near Hackney, a small black fly was taken from Yarrow (*Achillea*) which grows abundantly on the mown recreational areas of the marsh. The fly appeared to have a very milky-white basal half to the wing. Closer inspection showed that this was an effect produced by unusually large and very pale calypters (see Figures below of this specimen).



The specimen proved to be male and keyed to *Leucostoma anthracinum* (Meigen), using the English Translation of *The Tachinids (Diptera: Tachinidae) of Central Europe: Identification Keys for the Species and Data on Distribution*, available at the Tachinidae Recording Scheme website (http://tachinidae.org.uk). White dusting on the 4th and 5th tergites separates the species from *L. simplex* (Fallén), although this feature only became distinct when viewed from above. The large calypters are a distinctive feature of the genus. *Leucostoma anthracinum* is a mainly Southern European species and was first discovered in Britain in Warwickshire by Steven Falk in 1996, and later found at two sites in South Wales in 2009 by Ivan Perry and Mike Howe (Falk, S.J., Perry, I and Howe, M.A. 2009. *Leucostoma anthracinum* (Meigen, 1824) (Diptera, Tachinidae) new to Britain. *Dipterists Digest* (*Second Series*) **16,** 87-88).

I am grateful to the organisers of the Tachinid Recording Scheme: to Matt Smith for information on records and Chris Raper for verification of the specimen – **JEREMY RICHARDSON,** 12 Martlesham, Adams Road, London N17 6HT

Dipterists Digest 2015 **22,** 127-130

Rhaphium pectinatum (Loew) (Diptera, Dolichopodidae) re-found in Britain

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Summary

The rediscovery in 2015 of *Rhaphium pectinatum* (Loew) in Britain, nearly 150 years since it was last found, is reported. The only other verified British records were made in 1868: these are discussed, together with complexities around nomenclature, the species' distribution in continental Europe and possible habitat preferences.

Introduction

On 25 June 2015 one of us (RJW) swept a single male *Rhaphium pectinatum* (Loew, 1859) at the Devon Wildlife Trust's Old Sludge Beds reserve (national grid reference SX950889), at the head of the Exe Estuary on the outskirts of Exeter, a city in Devon, south-west England. The species not having been seen in Britain for 147 years, it had previously been presumed extinct (Falk and Crossley 2005).

The specimen is shown in Fig. 1. It was readily identified using the key in d'Assis-Fonseca (1978). The specimen will be deposited in the Natural History Museum (London).

Fig.1. ***Rhaphium pectinatum*, male, caught at the Old Sludge Beds reserve, Exeter, Devon, England, on 25 June 2015.**

Previous British records

The only previous verified records for the species in Britain are reported in d'Assis-Fonseca (1978), who refers to one male and one female being caught by G.H. Verrall on 19 July 1868 at Richmond (Surrey), now part of Greater London. Verrall himself records catching a male and female *Porphyrops pectinata* Loew, as the species was then known, near Kew in 1869 (Verrall 1875), while in a later publication he refers to catching the species near Richmond on 19 July 1868 (Verrall 1905). Kew is within the current Borough of Richmond upon Thames, part of Greater London, so there is no real discrepancy there: it would seem that the difference in dates reflects the specimens being caught in 1868 but not identified until 1869, as explained below. Verrall's specimens, actually three in number, now lie within the Hope Entomological Collections, held by the Oxford University Museum of Natural History. The data labels show a male and a female were caught "near Richmond" on 19 July 1868, and a female "near Kew" on 4 August 1868. The first two specimens have a second label bearing, in the same handwriting as the locality labels, the species name and authority ("*Porphyrops pectinata* Lw.") and the date of 16 April 1869 – this was presumably the date on which they were identified by Verrall. The reference in Falk and Crossley (2005) to the specimens having been taken at Tunbridge Wells in Kent is erroneous.

Colonel J.W. Yerbury noted that a dolichopodid caught at Porthcawl, on the south coast of Wales, on 17 June 1906 appeared to be allied to *Porphyrops pectinata* Loew (Yerbury 1918). The paper says the specimen was by then headless and indicates it was deposited in the 'BM', referring to what is now the Natural History Museum (London). That museum currently has four each of *Rhaphium* (*Porphyrops*) *consobrinum* Zetterstedt, 1843 and *R.* (*Porphyrops*) *riparium* (Meigen, 1824) collected by Yerbury at Porthcawl in 1906. One of the *R. riparia* is missing its head, but as with all other seven specimens keys out correctly (Duncan Sivell *pers. comm.*). Colonel Yerbury's diary states that the morning of 17 June 1906 was wet, but the day was fine and bright later; he does not mention anything of particular relevance to the matter in hand (Peter Chandler *pers. comm.*). It seems probable that the specimen tentatively ascribed by Yerbury as *Porphyrops pectinata* was in fact another species. In Verrall's key to male *Porphyrops* (Verrall 1905), *P. consobrina* Zetterstedt and *P. pectinata* Loew come out in the same couplet, so perhaps the confusion arose at this point. Alternatively it may have been a female for which keys are much less certain.

Nomenclature

The name of this species has been a cause of confusion. In 1908 Becker described *Xiphandrium pectinatum* Becker, 1908. He was aware (Becker 1918) that the species was very similar to that described by Curtis as *Rhaphium brevicorne* Curtis, 1835: later they were indeed synonymised, with *X. brevicorne* taking precedence. However, Becker's choice of the specific name for *X. pectinatum* was unfortunate since the same epithet had already been used by Loew for *Porphyrops pectinata*. Apparently in the mid-1920s *Porphyrops* and *Xiphandrium* were brought within *Rhaphium* by Curran (1926, 1927) in the USA, as reported by Negrobov (1979). However, over ten years later Parent (1938), based in France, continued to recognise *Xiphandrium* as a separate genus. This led to the concurrent use of *Rhaphium pectinatum*, *Xiphandrium pectinatum* and *Porphyrops pectinata*. It is probable that early British dipterists would have followed Verrall's (1905) keys and avoided the confusion within continental Europe caused by the keys of Becker (1918) and Parent (1938). In any event, care should be taken to check the genus name referring to *pectinata* or *pectinatum* used in publications before Negrobov's 1979 clarifying keys.

European distribution and habitat information

Rhaphium pectinatum has been recorded from Austria, France, Hungary, Italy, Poland, Romania, Russia and Sweden (Pollet 2013, Soós and Papp 1991). However, it would appear to be a rare species throughout its European range (Oleg Negrobov, Marc Pollet *pers. comm.*).

The Old Sludge Beds is the site of former sediment settlement lagoons linked to a sewage works which lies sandwiched between the Exeter Ship Canal and the head of the Exe estuary. The reserve is just some 400m long and 100m wide. It is now covered with a range of tall-herb fen communities (Rodwell 1995), primarily *Phragmites australis* reedbed, with sallow (*Salix* spp.) patches. The precise area where the fly was caught is uncertain because samples from different parts of the site were not kept separate, but it is thought to have been an area subject to saline inundation at spring high tides due to a recent breach in the seawall. The adjacent part of the Exe estuary, in addition to having tidal mud flats, also has extensive areas of tidal *Phragmites* reedbed. On the other side of the canal lies an extensive grazing marsh system, claimed from former saltmarsh, with a network of drains and ditches separating pasture fields that are floristically moderately species-rich and subject to winter flooding. As a consequence of this variation, the possible habitat origins of the single individual caught at the Old Sludge Beds are many.

Both Richmond, where the 1868 individuals were taken, and the Old Sludge Beds are beside the upper tidal reaches of a river, so it might be assumed that the species is associated with brackish habitats in Britain. However, evidence from Europe suggests otherwise: most obviously, it is found in landlocked countries such as Austria and Hungary. Bańkowska (1989) documents the first records of *R. pectinatum* in Poland. She caught five individuals from moist grasslands in the Mazovian Lowland near Warsaw, far from the sea. Four of these were caught in an intensively mown and heavily fertilized meadow with the plant community *Arrhenatheretum medioeuropaeum*, the fifth was swept from a wet grassland with *Molinietalia* vegetation within a forest. In Romania, Parvu (2001) records finding the fly at Negurini in the middle of the country, the second record for the country, the first being from the banks of the Olt River which feeds the Danube. Igor Negrobov (*pers. comm.*) has found it in habitats near freshwater in the Voronezh region and in the North Caucasus, both in western Russia.

In 2016, the authors plan to search the vicinity of the Old Sludge Beds in the hope of finding further specimens and clarifying the species' habitat requirements. Searches on 29 June and 30 July 2015 were unsuccessful.

Acknowledgements

We are grateful to Peter Chandler and Igor Grichanov for helping to source references, to Zoë Simmons for photographing *R. pectinatum* specimens in the Hope Entomological Collections, to Duncan Sivell and Malcolm Aldridge for researching *Rhaphium* specimens in the Natural History Museum collected by Colonel Yerbury from Porthcawl, to Oleg Negrobov for information on the species in Russia, to Marc Pollet for information on the fly in Europe and comments on the manuscript, and to the Devon Wildlife Trust for permission to collect on their reserve.

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Policheta unicolor **(Fallén) (Diptera, Tachinidae), an inland colony –**

When I visited Martin Down NNR (SU038198), Hampshire on 21 June 2015, I was surprised to find *Policheta unicolor* (Fallén) present. Subsequent visits on 23 and 24 June 2015 revealed a thriving colony; in fact it was the most numerous tachinid on the wing at that time.

In this country *P. unicolor* was thought to be restricted to coastal areas of SW England and Wales. M.A. Howe and E.A. Howe (2001. Recent records of *Cyrtophleba ruricola* (Meigen) and *Policheta unicolor* (Fallén) (Diptera, Tachinidae) from Wales and England. *Dipterists Digest (Second Series)* **8,** 17), gave a summary of recent records from this area. I have visited Martin Down several times in recent years and have not seen it there before, although my visits in the past may have been between its two flight periods. However, it seems likely that this is a recent expansion of its range in response to global warming, something which has been echoed by several other species of Tachinidae in recent years – **IVAN PERRY,** 27 Mill Road, Lode, Cambs CB25 9EN

Dipterists Digest 2015 **22,** 131-134

Records of and notes on Lonchaeidae (Diptera) with particular emphasis on Shropshire, V.C. 40

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Summary

Observations on Lonchaeidae are presented, including records from Shropshire of 20 species; some records of these species and of one other from other counties are also included.

The family Lonchaeidae, colloquially known as lance-flies, is a small family, represented by 47 species in Britain. Lonchaeids are rather cryptic flies, somewhat lacking in prominent morphological characters. MacGowan and Rotheray (2008) devised a key based largely on consistent chaetotactic characters. These characters can be somewhat challenging to discern, but with practice and good lighting they certainly do not present an insurmountable barrier to determination. Since the publication of their key, which contained no records from Shropshire (none being available), I have made a special effort to collect Lonchaeidae with the aim of discovering more about their habits and presence in Shropshire and other parts of Britain. Below I present a summary of my lonchaeid records, and where available, notes on the situations from which they have been collected.

Collecting Lonchaeidae

One of the easiest ways to find lonchaeid flies is to watch recently cut or wind felled timber, particularly stumps. On warm days in spring and early summer, a steady procession of Lonchaeidae can often be seen investigating the tight gap between bark and cambium. It is a simple matter to suck these flies into a pooter. However, this method invariably only gathers females, some of which are difficult or impossible to reliably separate into distinct species. Although I have not encountered males swarming at height, as described by MacGowan and Rotheray (2008), I do find males (and females) by sweeping the leaves of trees, in sunny positions at the edge of woodland, at height, using a long handled insect net.

On four occasions I have watched lonchaeid flies approaching and investigating a split and shattered standing sycamore *Acer pseudoplatanus* bole at Attingham Park, near Shrewsbury. On nearing the shattered edge of the tree, which was out of reach of my pooter, the flies would very often break into a rapidly twirling and oscillating flight pattern just before landing. I was able to catch numerous *Lonchaea* by netting any flies acting in this way. Five species of *Lonchaea* (*L. contigua, L. fugax, L. peregrina, L. scutellaris and L. sylvatica*) were found investigating this sycamore over the period 23 May – 6 August.

On another occasion, at Hollies Wood, Haughmond Hill, near Shrewsbury (SJ5313), on 26 May 2015, I swept a small group of woodland edge trees at 3-4 metres height. A large number of lonchaeids were taken, including some ten species in the genera *Dasiops*, *Protearomyia*, *Lonchaea* and *Silba* (Jones 2015).

I have attempted to find puparia beneath the bark of dead wood, but have had little success, so my records almost exclusively refer to adults.

List of species recorded and further notes

DASIOPINAE:

Dasiops calvus Morge, 1959: 1♀ was swept from woodland edge trees (wild cherry *Prunus avium*, ash *Fraxinus excelsior* and sycamore *Acer pseudoplatanus*) – Hollies Wood, Haughmond Hill, Shropshire, 26.v.2015.

D. hennigi Morge, 1959: 1♀ was swept from lush vegetation fringing the edge of a small pool at Cross Houses, Shropshire (SJ525083) 4 June 2009 and 1♀ was collected from Berry Hill, Stoke (SJ8946), 17.vii.2012.

D. mucronatus Morge, 1959: 1♀ was swept from damp grassland at Cole Mere, Shropshire (SJ437330) 26 June 2011. During a Dipterists Forum field week in Pembrokeshire I swept several ♀♀ from lush wetland vegetation alongside a small stream at Broomhill Burrows (SR887998), 14.vi.2010.

D. spatiosus (Becker, 1895): 1♂ (leg. Phil Brighton, det. I. MacGowan) was found in a small area of mixed broadleaf woodland at Croft, South Lancashire (SJ635934) on 18.iv.2014.

LONCHAEINAE:

Protearomyia nigra McAlpine, 1962: Hollies Wood, Shropshire (SJ5313), 1♂ 21.v.2012; 4♂ 26.v.2015; Shrewsbury suburban garden (SJ4911), 1♂ swept from an ash tree at 4m height 30.v.2015.

P. withersi MacGowan, 2014: Hollies Wood, Shropshire – 1♂ 29.v.2013, 3♂ 30.iv.2014, 4♂ 26.v.2015. On this last date I swept 4♂ each of *P. withersi* and *P. nigra* from the same small group of three trees at the woodland edge at about 3-4 metres height. MacGowan and Rotheray (2008) observed that males and females of *Protearomyia* occur in Museum collections in more or less equal numbers, and interestingly from the same group of trees where I had collected the 8♂, I also collected 8♀ *Protearomyia*, further indicating that in this genus adults of both sexes occur together in situations where they are readily collected.

Lonchaea caucasica Kovalev, 1974: This appears to be a very infrequently recorded species in Britain; 1♂ was swept from broadleaved woodland edge trees – Hollies Wood, Haughmond Hill, Shropshire, 26.v.2015. Hollies Wood is ancient woodland with a high proportion of old trees and dead wood.

L. chorea Fabricius, 1781: This is the *Lonchaea* species that I have taken most frequently, with 29 records from across Shropshire (18 sites) plus additional localities: Feshiebridge, East Inverness-shire (NH849046), 21.vii.2012; Powis Castle, Montgomeryshire (SJ251062), 25.v.2011; Penn Common, Staffordshire (SO9094), 20.v.2011; Berry Hill, Stoke (SJ8946), 17.vii.2012; Wolverley, Worcestershire (SO831782), 2.ix.2011. Flight date range 29.iv–2.ix, peaking in May with 15 records. I find *L. chorea* most frequently basking on tree leaves, but have also taken it from cut birch stumps. On 15.v.2010 at All Stretton, Shropshire I witnessed a mass emergence with large numbers of both sexes basking all along the edge of a damp woodland.

An interesting observation relating to the habits of *L. chorea* comes from 1965 correspondence between Shropshire dipterist Wallace Pugh and Alan Brindle of Manchester University Museum (held in the C.H.W. Pugh archive at Manchester University Museum). Pugh quotes one of his correspondents, A.E. Cragg, who wrote to Pugh principally about his discovery of the haunts of *Neria cibaria* (Micropezidae) and described finding various fly larvae at a sugar beet works, near Admaston, Shropshire: "You may perhaps remember the situation of the mud flats. The part sand-silt was a narrow strip at the bottom of the arable field, that we had filled in with soil and was growing wild chamomile, ragwort, coarse grass etc. Well I found them in hundreds in the dried silt. If you pulled up a grass root, you would find dozens of larvae and pupae. I should think they fed on the grass roots but am by no means certain". Cragg noted that the most numerous species were *N. cibaria*, "dozens of" *Seioptera vibrans* (Ulidiidae) and "to a less extent *Lonchaea chorea*." Although *L. chorea* is a distinctive species, we cannot be absolutely certain that Cragg's determination was correct, and it is unlikely that a lonchaeid fed directly on roots as the larval mouthparts are not suited. This anecdote nonetheless provides an insight into the kind of situation that some *Lonchaea* species can be found in.

L. contigua Collin, 1953: 3♀ Attingham Park, Shropshire (SJ556104), 25.vi, 8 and 15.vii.2008; 5♀ Attingham Park (SJ5410), 16, 23, 30.vi, 1.vii.2009; 1 ♀ Earl's Hill (SJ412149), 26.v.2009 and 1♀ Devil's Dingle (SJ6305), Shropshire, 14.v.2014; Stanmore Park, Shropshire (SO738929), 1♂ 7.v.2008; Shrewsbury (SJ4912), 1♀ 5.vi.2010. I have encountered females investigating a fallen beech *Fagus sylvatica* trunk, a cut bole of horse-chestnut *Aesculus hippocastanum* and a dead sycamore. Also a male flying around a dead poplar *Populus* sp. and a female investigating a log pile in an urban garden, well away from any woodland habitat.

L. corusca Czerny, 1934: 1♀ swept from trees along a river bank at Atcham, Shropshire (SJ539092), 14.v.2008 and 1♀ swept from alder *Alnus glutinosa* trees fringing a pool at Devil's Dingle, Shropshire (SJ6305), 3.vi.2013; Hoar Wood, Shropshire (SO3183), 1♀ 16.vi.2007.

L. fugax Becker, 1895: At Attingham Park, Shropshire, numbers of ♀♀ were regularly attracted to a shattered sycamore bole 23.v, 14 and 18.vii, 6.viii.2008; 1♀ was taken in my suburban garden in Shrewsbury (SJ491113), 15.viii.2010; 1♂ was taken at Whixall Moss, Shropshire (SJ501357), 4.v.2011 and 1♂ was collected at Waun Las NNR, Carmarthenshire (SN524185), 10.vii.2008.

L. iona MacGowan, 2001: Blakeway Coppice, Wenlock Edge (SO592984), 1♀ 20.v.2010; Nant Mawr, Shropshire (SJ255242), 1♀ 13.v.2015.

L. mallochi MacGowan & Rotheray, 2000: In Shropshire I have recorded this fly from Attingham Park, ♂ 20.v.2008; my garden in Shrewsbury ♀ 1.viii.2010 and Hollies Wood, Haughmond Hill 2♂ 26.v.2015. Also Glen Feshie, East Inverness-shire (NH843011), ♀ 24.vii.2012. Regarding females, it is currently not considered possible to definitively separate *L. mallochi* from *L. tenuicornis* Kovalev, 1978, but on the balance of probability these are almost certainly specimens of *L. mallochi*.

L. patens Collin, 1953: Mortimer Forest, Herefordshire (SO492727), 1♀ 12.v.2009; Old Rectory Wood, Shropshire (SO447938), 1♂ 9.v.2011; Stanmore Park, Shropshire (SO740928), 2♀ investigating a dead poplar 28.v.2009. Waun Las NNR, Carmarthenshire (SN524179), 1♀ 10.vi. 2008.

L. peregrina Becker, 1895: 1♀ reared (by Caroline Uff) from a dead poplar from Woolston, Shropshire (SO421874), emerged v.2015; several puparia found under the bark of dead poplars collected from Meole Brace golf course, Shropshire (SJ495107) ii.2015; 4♀ Attingham Park, Shropshire (SJ547104), 14.vii.2008 – investigating dead sycamore. This tends to be a robust *Lonchaea*, being larger on average than other *Lonchaea* species I have collected.

L. postica Collin, 1953: This is quite a common species and I have collected ♂♂ and ♀♀ from 12 sites scattered across Shropshire. Date range: 1.v–22.vii, with nine records during May, one in June and two in July. I most frequently encounter this species basking on leaves in woodland and have not yet found it investigating dead wood.

L. scutellaris Rondani, 1874: at Attingham Park, Shropshire I have collected ♀♀ investigating a dead sycamore – 1♀ 14.vii.2008 and 6♀ 18.vii.2008, whilst on 1.vii.2009 several ♀♀ were investigating a recently cut stump of horse chestnut. Also recorded from Cound, Shropshire (SJ553055), 1♀ 16.vii.2013 and Buildwas, Shropshire (SJ6305), 1♂ 14.v.2014.

L. sylvatica Beling, 1873: This is one of the more frequent species in Shropshire (16 records, 8 sites). I also have records from Breidden Hill, Montgomeryshire (SJ2914) – a ♀ probing a cut birch stump 4.vi.2008; Stackpole, Pembrokeshire (SR978962) a ♀ on *Oenanthe crocata* flowers 16.vi.2010; Stackpole Elidor, Pembrokeshire (SR986972) several ♀♀ flew in to investigate a pile of horse chestnut logs as I watched for about fifteen minutes; Mary Knoll Valley, Herefordshire (SO488729), 1♀ 12.v.2009. I have noted numbers of *L. sylvatica* investigating recently cut oak *Quercus* sp. stumps, fallen oak and beech trunks, standing dead sycamore and flying about a dead fallen poplar. On one occasion (18.vi.2015) I collected seven from dozens of females seen probing the cut stumps of an unidentified conifer on a recently clear felled area of plantation. All seven were *L. sylvatica*. Date range: 7.v–18.viii, with eight records in May, six in June and four in July, indicating a relatively extended main flight season.

L. tarsata Fallén, 1820: There are no rearing records for this species, but at Attingham Park, Shropshire I collected 1♀ that was investigating dead sycamore on 17.viii.2009. Other records are from Hollies Wood, Haughmond Hill, Shropshire 2♂ and 1♀ swept from woodland edge trees, 26.v.2015; Buildwas, Shropshire (SJ6305), 1♂ 1.vii.2013; Waun Las NNR, Carmarthenshire (SN524185), 1♂ 10.vi.2008; Stackpole, Pembrokeshire (SR9775), 1♂ 13.vi.2010.

L. ultima Collin, 1953: 1♀ swept from trees at Hollies Wood, Haughmond Hill (SJ540132) 30.vi.2015.

Silba fumosa (Egger, 1862): This is a frequently encountered lonchaeid. It is usually quite a robust fly with a strong yellow tinge to its wings. Two katepisternal bristles make this a readily identifiable lonchaeid. It has two distinct broods each year, in spring and late summer, predominantly in May and August. More so than for any other lonchaeid, I often find *S. fumosa* feeding on umbelliferous flowers such as *Heracleum*, *Anthriscus*, *Angelica*, and *Foeniculum*. I have records from 21 sites across Shropshire. Surprisingly, I have only recorded it once outside the county, at Silverdale, Staffordshire (SJ8947), 4.vi.2012. Occasionally mass emergences occur, as on 14.v.2008 when I swept very large numbers of ♂♂ and ♀♀ from trees lining the River Severn at Atcham (SJ540092), together with numbers feeding at *Anthriscus* flowers.

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Thecophora cinerascens (Meigen) (Diptera, Conopidae) new to the British Isles from Jersey

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Summary

Thecophora cinerascens (Meigen, 1804) [=*pusilla* (Meigen, 1824)] is reported from the British Isles for the first time based on specimens from Jersey in the Channel Islands. This species has been listed as British at various times up until about the middle of the 20th Century but all of the putative specimens examined to date have subsequently been assigned to *Thecophora atra* (Fabricius, 1775). *Thecophora cinerascens* is, however, a widespread species in Europe and its possible occurrence in the British Isles has been anticipated for some time.

Thecophora is a complex genus containing numerous cryptic and sibling species, some of which exhibit a high degree of variability and many of which are currently only identifiable in the female sex. The capture situations of the present material are described, the known biology and distribution is summarised and details are provided for identification of the species.

Introduction

The genus *Thecophora* comprises about 40 species worldwide, with 8 (or 7) valid species currently recognised in Europe (Chvála and Smith 1988; Stuke and Clements 2005; Stuke 2006; Stuke *in prep.*). Many of the species are extremely similar in appearance and some exhibit a high degree of variability in coloration, which has historically resulted in the naming of many varieties and forms of uncertain taxonomic status. The Palaearctic Catalogue (Chvála and Smith 1988), for example, lists some 18 current synonyms of *Thecophora atra* alone, mostly arising from colour-based taxa described by Robineau-Desvoidy (1853) which cannot pragmatically be interpreted.

'*Thecophora pusilla*' was previously recorded as a British species (or as a distinct variety of *T. atra*) by various authors (e.g. Dale 1878, Curtis 1831, Haliday 1833, Duncan 1838, Gibbs and Barraud 1908, Yerbury 1919, Hobby and Poulton 1937, Audcent 1950, Smith 1952) until work by Smith (1955; 1959) found that all of the available British specimens were in fact assignable to *T. atra*, and that the two species of the genus present in Britain comprised *T. atra* and *T. fulvipes* (Robineau-Desvoidy, 1830).

More recent revisionary work has focused on the morphology of the female theca as a more reliable means of segregating the species. Both *T. atra* and *T. fulvipes*, together with *T. cinerascens*, lie within the '*atra*-group', which was subject to a major revision by Stuke (2006). This revision also established that the name *T. pusilla* (Meigen 1824) is a junior synonym of *T. cinerascens* (Meigen, 1804).

Capture details

We were initially alerted to the presence of this species from a specimen captured by TR on 21 July 2015 while surveying a soft-cliff coastal habitat at Petit Portelet Bay, in the parish of St Martin, on the east coast of Jersey. This specimen, a female collected from the cliff face, was identified as *Thecophora cinerascens* by DKC. Re-examination of a female specimen photographed by TR the previous year on 9 August 2014 at the same site also subsequently proved to be this species.

The Petit Portelet site is located at 49.2009N; 42.1085W and lies approximately 15 miles west of the coast of Normandy in France. The collection site comprises a natural, unmanaged east-facing, soft coastal cliff of loose stone, clay and sand approximately 5-6m in height, situated at the top of a shingle beach. It is partially vegetated, with mainly grasses lower down and denser vegetation higher up comprising a mixture of bramble (*Rubus fruticosus* agg.) and bracken (*Pteridium aquilinum*), together with other species such as wild carrot (*Daucus carota*), creeping thistle (*Cirsium arvense*) and ox-eye daisy (*Leucanthemum vulgare*). The site is shown at Plate 1: F.

The initial specimen was collected at a height of approximately 1m from the base of the cliff on a vegetation-free section of the face where there was a high density of aculeate nesting activity, including various *Lasioglossum*, *Halictus* and *Andrena* species.

SF subsequently confirmed that he had also collected a female and two possible males of *T. cinerascens* from the same site on 11 August 2014, together with two further possible males of this species swept from a nearby site at the Victoria Tower (49.1795N; 42.2066W) on 21 July 2015. This latter site comprises a mosaic of dry neutral grassland, scrub and tall herb vegetation on flat ground behind the sea cliff, with much flowering ragwort (*Senecio jacobaea*), the probable source of the specimens (see Plate 1: G). In addition, SF took a further three females at Beauport Bay (49.2019N; 42.0204W) on the south-west coast of Jersey on 12 August 2014. These were from a south-facing soft coastal cliff 3-4m high, similar to that at Petit Portelet, with plentiful rock samphire (*Crithmum maritimum*) at its base where it meets a shingle beach (see Plate 1: H). The male records above must all be considered unproven at the time of writing, although they resembled the females closely in size and general form, and no other *Thecophora* species were found at these sites at the time.

Known biology

Thecophora cinerascens is a widespread species in the Palaearctic with published records (mostly as *T. pusilla*) from sites in Azerbaijan, Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Iran, Japan, Italy, Kazakhstan, Kyrgyzstan, the Netherlands, Portugal, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey, Turkmenistan and Ukraine, although it should be noted that some of these occurrences may be in error due to confusion with other species, including both *T. atra* and *T. bimaculata* (Preyssler, 1791). Habitus photographs of a living specimen are provided at Plate 1: A-B.

The only published host records are from *Lasioglossum pauxillum* (Schenck, 1853) (Stoeckhert 1933, Hobby and Poulton 1937), but these are old records dating from a time when the taxonomy of the genus was much less well understood, and the latter record from Britain certainly refers to *T. atra*. *Lasioglossum pauxillum* is widespread, if somewhat scarce, in southern and eastern England (http://www.bwars.com/index.php?q=bee/halictidae/lasioglossum-pauxillum, accessed 31 Jul 2015), so if this is a true host of *T. cinerascens* one might have expected the conopid to be present in mainland Britain and to have been confirmed to occur in the British Isles before now.

Possibly *T. cinerascens* requires a host which is either absent or very rare in mainland Britain, or it may have failed to infest the most northerly populations of a host which it uses elsewhere within its range, a situation which applies in some known hymenopterous host-parasite associations such as *Coelioxys brevis* (Eversmann, 1852) which is a cleptoparasite of *Megachile leachella* Curtis, 1828 in Jersey but is absent from mainland Britain despite the presence of its host (Falk and Lewington 2015).

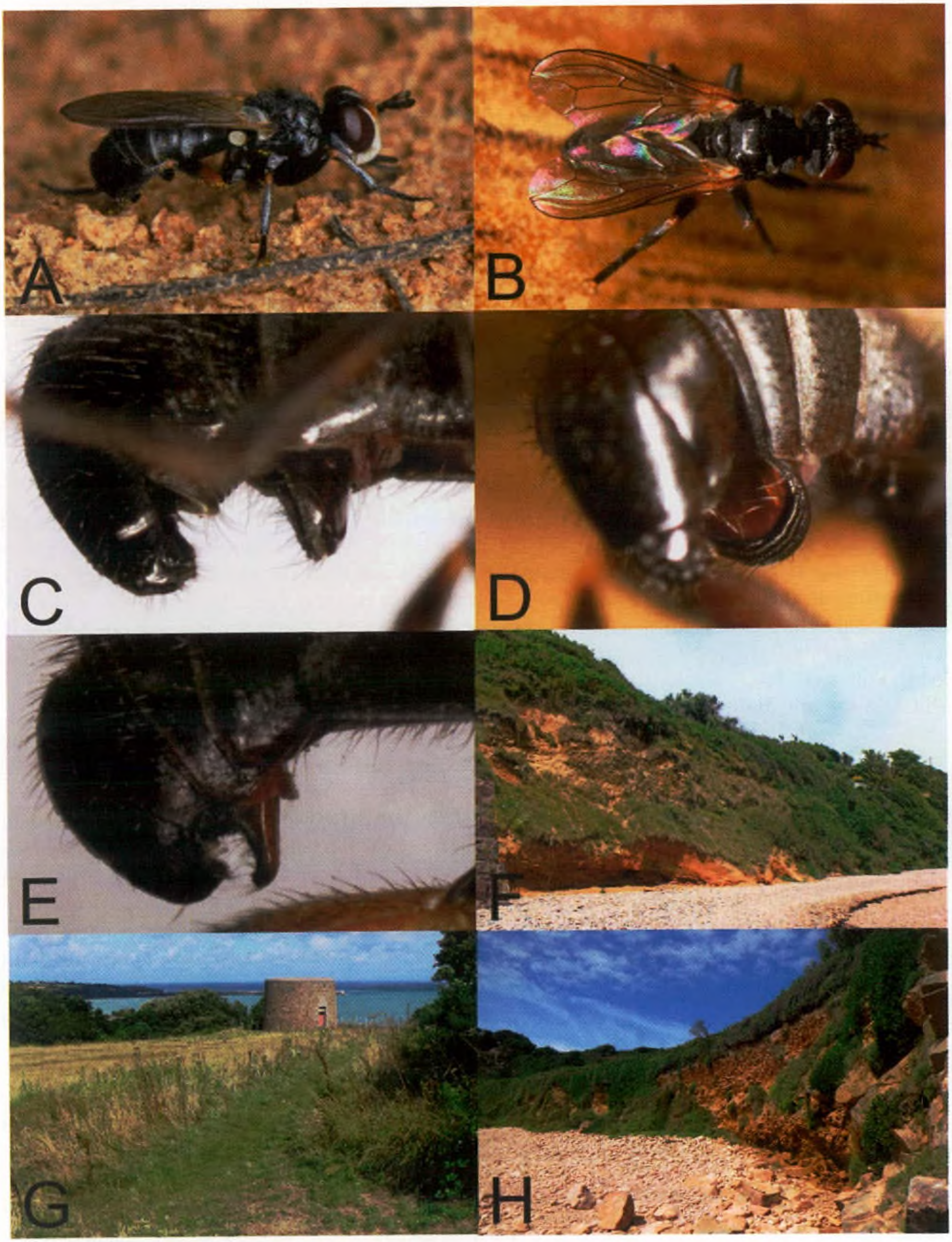


Plate 1. ***Thecophora cinerascens*****: A, habitus of living female; B, female, dorsal view; C, theca, side view; D, theca, rear view; E, *T. atra*, theca in side view; F, Petit Portelet capture site; G, Victoria Tower capture site; H, Beauport Bay capture site.**

Halictines recorded by SF at the three sites on the days that *T. cinerascens* were seen included:

Species	***Petit Portelet***	***Victoria Tower***	***Beauport Bay***
Lasioglossum calceatum (Scopoli, 1763)		X	
L. leucozonium (Schrank, 1781)		X	
L. limbellum (Morawitz, 1876)			X
L. mediterraneum (Blüthgen, 1926)			X
L. minutissimum (Kirby, 1802)	X		X
L. morio (Fabricius, 1793)	X	X	X
L. nitidiusculum (Kirby, 1802)	X	X	
L. parvulum (Schenck, 1853)	X		X
L. pauxillum (Schenck, 1853)		X	
L. smeathmanellum (Kirby, 1802)	X	X	
L. villosulum (Kirby, 1802)	X		X
Halictus rubicundus (Christ, 1791)			X
H. scabiosae (Rossi, 1790)	X	X	X
H. tumulorum (Linnaeus, 1758)		X	X

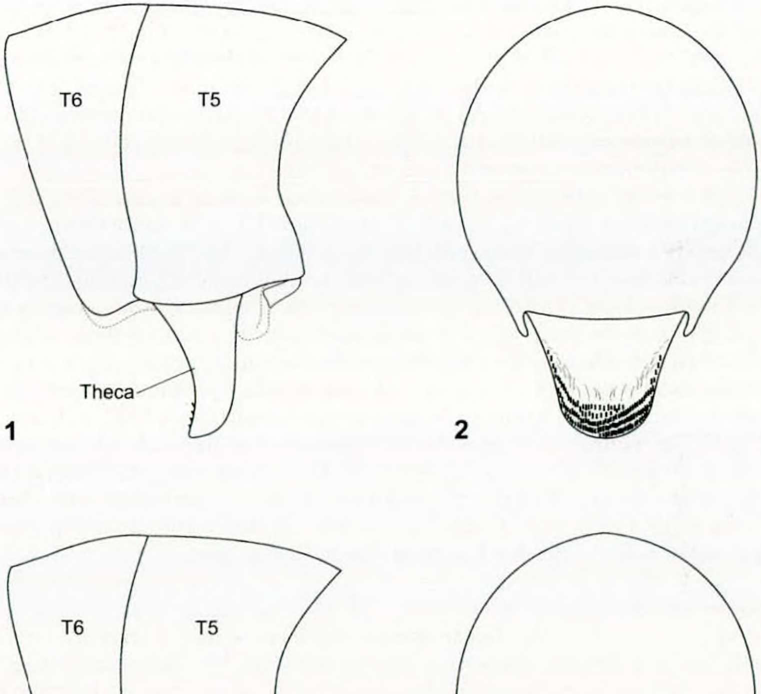
All of these species were recorded as almost-certainly nesting in the soft-cliff areas of Petit Portelet and Beauport Bay, but their nesting status at the Victoria Tower is uncertain. Other *Lasioglossum* species were also present along the cliff top at Petit Portelet in 2015 but these were not nesting in the area where *T. cinerascens* was collected, and there were also other species recorded at both this site and Beauport Bay on other dates when *T. cinerascens* was not collected. *Lasioglossum villosulum* was numerically the most abundant at Petit Portelet and Beauport Bay on the relevant dates, but *L. nitidiusculum* was also abundant and occurred at all three sites, as did *L. morio* and *Halictus scabiosae* in lower numbers.

Thecophora atra and *T. fulvipes* are both also widespread in the Palaearctic Region, the former also extending into the Oriental Region and North Africa. Recorded hosts of both species comprise various *Halictus* and *Lasioglossum* species (Hymenoptera, Halictidae), with the latter also being recorded from *Anoplius viaticus* (Linnaeus, 1758) (Hymenoptera, Pompilidae) (Gapanov 2003). Both species are frequently captured near the colonial nesting sites of *Halictus* and *Lasioglossum* species. There appears to be a preference for calcareous or basi-neutral habitats (typically species-rich grasslands) and both are fairly widespread in the British Isles, with *T. atra* being more common in southern and eastern Britain and *T. fulvipes* tending to occur more in the north and west. Both species also occur widely in Ireland (Conopid Recording Scheme of Britain & Ireland, unpublished data).

Identification

A key to the European species of the *atra*-group is provided by Stuke (2006), whilst Mark van Veen provides an online key to all of the currently recognised western European species (http://home.hccnet.nl/mp.van.veen/conopidae/thecophora.html, accessed 28 Jul 2015), although it should be noted when using the latter that the taxon *T. longirostris* (Lyneborg, 1962) is now assigned to the separate genus *Merziella* (Stuke 2014).

Thecophora fulvipes can usually be identified in Britain in both sexes using the characters given by Smith (1969). This species is typically somewhat larger than either *T. atra* or *T. cinerascens*, with a total length normally within the range of about 6-9mm when measured from the base of the antennae to the outer natural curve of the abdomen. In British specimens the dusting on the blackish or dark greyish head and body is clearly yellowish or golden rather than whitish or silvery, and there are almost invariably two fairly broad and well-defined submedian stripes of dusting on the mesoscutum, separated by an undusted central stripe. The propleuron usually has more than one long ventral seta in addition to a number of shorter setae. The legs are typically quite extensively pale coloured, with the front and mid femur at least orange-brown ventrally and the hind femur yellowish in the basal two-thirds or more. The theca, which is located beneath the 5th segment of the female abdomen, is virtually identical to that of *T. atra*. Whilst *T. fulvipes* can be fairly readily recognised in Britain it should be noted that identification may not be quite so straightforward elsewhere in Europe, where the species is somewhat more variable.



Figs 1-4: *Thecophora* species: female thecae viewed from the side and the rear. Figs 1-2, *T. atra*; Figs 3-4, *T. cinerascens*. Rear views are from transverse section at the junction of abdominal segments 5 and 6.

Thecophora atra and *T. cinerascens* are very similar to each other. Both are typically smaller than *T. fulvipes*, having a total length in the range 4-7mm, with *T. cinerascens* normally lying towards the lower end of the scale. Both are essentially black species with whitish or silvery dusting, which tends to be somewhat heavier and more extensive in the former. *Thecophora atra* can have a pattern of silvery dusted submedian stripes on the mesoscutum similar to that of *T. fulvipes*, although often there is only a single broad dusted stripe or the whole mesoscutum is evenly dusted. Submedian stripes are usually absent in *T. cinerascens* and the mesoscutum may be only very thinly dusted (see Plate 1: B). In both species the propleuron usually has only one long seta, together with a few short setae, and the legs are typically more extensively blackish than in *T. fulvipes*. In *T. atra* the mid femur, and sometimes also the front femur, may be yellowish at the base and/or narrowly at the apex, whilst up to about the basal half of the hind femur may be yellowish in both species (the legs in *T. atra* can be much more extensively pale in parts of its distribution outside of northern Europe). The front and mid femora in *T. cinerascens* are usually almost entirely blackish. All of the above character states are variable, however, and it is possible to encounter many intermediates. The only reliable morphological character for separating these two species is currently therefore the female theca.

The theca of *T. atra* (Figs 1-2; Plate 1: E) is similar in shape to that of *T. fulvipes*, in rear view appearing to narrow markedly from the base towards the apex, and with the sides more or less straight, giving a somewhat attenuated, triangular outline. The width of the theca at the base is usually somewhat less than half the total width of the abdominal segment and the bristle field, comprising about four rather irregular rows of blunt palisade spicules, forms a narrow crescent in about the outer fifth of the theca which extends very narrowly down the theca sides more than halfway to the base. In side view the theca has a somewhat narrow profile which attenuates fairly evenly from the base to the apex. The theca in *T. cinerascens*, by contrast, is much wider in rear view (Figs 3-4; Plate 1: C-D), forming a broader and more rounded crescent with the sides more nearly parallel. The width at the base is usually more than half the total width of the abdominal segment, and the bristle field occupies the outer third or more but does not extend significantly down the theca sides towards the base. In side view the theca has a broader profile which is more nearly of even width for most of its length. The male genitalia offer no useful characters for separating these, or indeed any other European *Thecophora* species.

Further observations

All female specimens of *T. atra* should henceforward be examined critically for possible *T. cinerascens*, and any suspect specimens retained for expert confirmation. Records of *T. cinerascens* will only be accepted by the Recording Scheme where these are based on females in which either the specimen is available for examination or where there are adequately detailed photographs of the theca in rear and side view. Dipterists should also be alert to the possible future occurrence of other *Thecophora* species in the British Isles, particularly *T. bimaculata* (see Stuke 2006).

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***Egle brevicornis* (Zetterstedt, 1838) (Diptera, Anthomyiidae) on Anglesey** – *Egle* species develop in flowers of willows *Salix* species; thus their flight period coincides with the flowering time of willows, early in the year, when newly emerged flies can be found crawling up the stems (Ackland, D.M. 1997. Early spring Anthomyiidae. *Anthomyiidae Newsletter* no. **3,** 1). *Egle brevicornis* (Zetterstedt) is one of Britain's less frequently recorded anthomyiids. J.E. Collin found it at Crowborough, Sussex, 15 May 1932 (OUMNH); there is a single female in DMA's collection taken at Newborough dunes, Anglesey, on 1 May 1966 by R.A. Beaver, and there are a small number of other records from southern England and south Wales that need confirmation.

Egle brevicornis is particularly associated with creeping willow *Salix repens* (Michelsen, V. 2009. Revision of the willow catkin flies, genus *Egle* (Robineau-Desvoidy) (Diptera, Anthomyiidae), in Europe and neighbouring areas *Zootaxa* **2043,** 1-76). *Salix repens* is abundant on the Anglesey dunes, so at flowering time, mid-April in 2015, the island's two largest dune systems were visited by JHB in search of this fly. The identifications from 16 and 21 April are by DMA.

On the first attempt, at Newborough Warren NNR (SH4264) on 15 April in cold drizzle, pooting directly from scattered patches of flowering *S. repens* produced only 11 flies in 90 minutes. These included two *Egle brevicornis* males.

On 16 April, a sunny breezy day, *S. repens* blossom was swept at two places on Tywyn Aberffraw SSSI (SH35616854 and SH35946815) and in both cases *E. brevicornis* was found with *E. minuta* (Meigen) and *E. rhinotmeta* (Pandellé). The other anthomyiids taken were *Anthomyia liturata* (Robineau-Desvoidy), *Delia frontella* (Zetterstedt), *Hylemya variata* (Fallén) and *H. urbica* (van der Wulp).

On 21 April, a day of warm sun and breeze, four patches of flowering *S. repens* were swept on Newborough Warren NNR (SH42246422, SH42306409, SH42266331 and SH42056343) and both sexes of *E. brevicornis* were taken in numbers at all but the last. Females outnumbered males by about 2:1. *Egle rhinotmeta* was caught at all four, *E. minuta* at two, and the other anthomyiids were *Anthomyia liturata*, *Hydrophoria lancifer* (Harris), *Delia frontella*, *D. albula* (Fallén), *Hylemya variata* and *H. urbica*. The detailed records will be made available on the Biological Records Centre's online iRecord database.

It could be significant that all the *Salix* where *E. brevicornis* was caught was growing in turf, whereas the one *S. repens* patch where it was not found was growing in bare sand produced by a dune remobilisation project. This could indicate a requirement for turf, perhaps for pupation, but if so, it suggests either that the flies select willow blossom in situations suitable for pupation, or that they do not disperse far from the willows where they develop as larvae.

Graham Williams, the Newborough Warren manager, is thanked for permission to collect at that site, and Debbie Evans and Ilija Vukomanovic for assistance on the first trip – **J.H. BRATTON**, 18 New Street, Menai Bridge, Anglesey LL59 5HN and **D.M. ACKLAND**, 5 Pond End, Pymore, Bridport, Dorset DT6 5SB

Dipterists Digest 2015 **22,** 143-144

Euphranta toxoneura (Loew) (Diptera, Tephritidae) new to Scotland

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Summary

Euphranta toxoneura (Loew, 1846) is newly recorded for Scotland and the record extends its northern distribution in Britain.

Introduction

Euphranta toxoneura (Loew) is a distinctive fly that has a scattered distribution across England and north Wales extending north to County Durham (Clemons 2014). In continental Europe, the species is known from Austria, Belarus, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Norway, Poland, Slovakia, Sweden, Switzerland, The Netherlands and Ukraine (Pape and Beuk 2013). It was added to the British list on the basis of a female taken on a window at Sutton Coldfield on 22 May 1897 (Bradley 1901).

The fly is unique among British tephritids of known biology in that the larva is a kleptoparasite of immature sawflies *Pontania* species (Hymenoptera, Tenthredinidae) that develop inside galls on the leaf blades of willows *Salix* species (Salicaceae) (White 1988). The female lays an egg inside the newly formed gall, the larva emerges to feed on the sawfly within and completes its development by feeding on gall tissue. The larva then exits the gall and drops to the ground where it remains in the pupal stage until spring (Kopelke 1984). The adult is on the wing during May and June (White 1988).

Recently, the author discovered a specimen of *E. toxoneura* while identifying samples that had been collected while carrying out Site Condition Monitoring of the notified sawfly (Hymenoptera, Tenthredinidae) feature at Cadder Wilderness Site of Special Scientific Interest (SSSI) (NS598718, V.C. 77), East Dunbartonshire, on 6.vi.2013 as part of a Caledonian Conservation Ltd project under contract to Scottish Natural Heritage (SNH) (Cathrine *et al.* 2015). It was swept from willow *Salix* species (Salicaceae) foliage approximately 1 metre above ground level whilst searching for adult sawflies along the woodland's southern margin. Many of the willow leaves that were swept bore the characteristic galls of sawflies from the genus *Pontania* (Hymenoptera, Tenthredinidae).

Euphranta toxoneura is readily distinguished from other British tephritids in having long pale coloured hairs on the anatergite and a distinctive, species-specific wing pattern (White 1988). The specimen has been deposited in the collections of the National Museums Scotland, Edinburgh.

The Scottish Insects Records Index (SIRI) and the collections at the National Museums Scotland were searched for *E. toxoneura* but yielded no records in addition to those in Clemons (2014). The results from this search indicated that the most northerly British record for *E. toxoneura* was from County Durham in northern England (Clemons 2014). Therefore, the present record extends the known British distribution of the species into central Scotland.

Discussion

Cadder Wilderness SSSI is an old, formerly coppiced plantation that has matured to develop features characteristic of semi-natural woodland. The wood is dominated by birch *Betula* spp., oak *Quercus* spp., and beech *Fagus sylvatica* with the southern margin interspersed with willows including *Salix fragilis*, *S. caprea*, *S. cinerea* and their hybrids. Many of these willows had leaves which bore the characteristic galls of *Pontania proxima*, on *S. fragilis*, and the galls of *P. bridgmanii* and *P. pedunculi* on *S. caprea* and *S. cinerea* (Redfern and Shirley 2011). Interestingly, the site has long been known for its diverse sawfly assemblage (Malloch 1914) which forms part of the notified invertebrate feature for the SSSI. Rearing records of *E. toxoneura* from Germany suggest the species is strongly associated with the first generation galls of *Pontania proxima* on *S. fragilis* and to a lesser extent with the galls of *P. bridgmanii* and *P. pedunculi* on *S. cinerea* (Kopelke 1984). Therefore, it is likely that *E. toxoneura* is a resident species at Cadder Wilderness SSSI and that the female specimen was possibly captured while it was investigating leaves affected by *Pontania* sawflies.

The most recent conservation assessment of *E. toxoneura* listed it as 'Nationally Notable' and suggested the species was under-recorded due to its specialised life history and the foliage inhabiting nature of the adult (Falk 1991). The apparent rarity may be due to some secretive diurnal habit (Clemons 1994). It is curious that *E. toxoneura* had not been recorded previously in Scotland given how common and widespread the host species are across the country (Benson 1958, Redfern and Shirley 2011). More targeted fieldwork, and in particular the sweeping of willows populated by *Pontania* sawfly galls, would help to provide a better understanding of the Scottish distribution of *E. toxoneura*.

Acknowledgements

I am grateful to Graham Rotheray, Ashleigh Whiffin and Keith Bland at the National Museums Scotland, and to Chris Cathrine of Caledonian Conservation Ltd for comments and information, and to Ian Andrews for providing the most recent British tephritid atlas. Finally, I wish to thank Scottish Natural Heritage and Caledonian Conservation Ltd for the opportunity to carry out fieldwork at Cadder Wilderness SSSI.

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A flat-footed fly, *Platypezina connexa* (Boheman) (Diptera, Platypezidae), new to Britain

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Summary
Platypezina connexa (Boheman, 1858) is added to the British list on two females from the New Forest, Hampshire.

During the Dipterists Forum autumn field meeting on 17 October 2015, two females of *Platypezina connexa* (Boheman, 1858) were collected by sweeping the vegetation in Burley New Inclosure (SU229043), New Forest, Hampshire. This is a new genus for the British fauna and brings the total number of British platypezid species to 34.

Platypezina is in the subfamily Callomyiinae, agreeing with other members of that subfamily in possession of a uniserial row of acrostichal bristles (absent in Platypezinae), but it differs from other callomyiine genera and resembles members of the subfamily Platypezinae in having the median vein M_{1+2} forked. It differs from the Platypezinae in that the anterior branch of this fork (vein M_1) arises close to or just beyond the posterior crossvein, while the fork is well beyond the crossvein in Platypezinae. It differs from most other British platypezids in having an elongate and slightly darkened stigma near the wing tip beyond the radial vein R_1. Only *Microsania* species also have a stigma, but they lack a crossvein in the apical part of the wing. The two *Platypezina connexa* females examined are 3mm long and grey in colour with greyish yellow legs, the eyes broadly separated by a grey frons and brownish wings. The male has a more humped thorax and is darker coloured, contrasted with the strongly holoptic red eyes as in many platypezid males. The photograph of the male shown here (Fig. 1) was taken in Russia by Dmitry Gavryushin.

Fig. 1. Male of *Platypezina connexa* (Boheman) © Dmitry Gavryushin.

One of the New Forest specimens was exhibited at the November 2015 Exhibition of the British Entomological and Natural History Society and a photograph of this female will appear in the Society's Exhibition Report. The specimens collected have been placed in the collections of the Natural History Museum, London, and the British Entomological and Natural History Society at Dinton Pastures Country Park, Hurst, near Reading, Berks.

Biology

In Scandinavia adults have been found on leaves of birch *Betula* and hazel *Corylus* in conifer forests (Chandler 2001). Burley New Inclosure in the New Forest is mixed deciduous and conifer woodland with open rides. Little is known about the larval biology of *P. connexa*, except that four males were found in an emergence trap set up over a moss covered soft rotten trunk of Norway spruce, *Picea abies*, in Finland during the period 27 July to 26 August 2005 (Ståhls and Kahanpää 2006). Platypezid larvae generally feed in the fruiting bodies of fungi but no fungal growths were seen on the spruce trunk.

European distribution

Chandler (2001) reported that this fly is known from the Czech Republic, Finland, Germany, Norway, Poland, Sweden and Russia. Beuk (2002) included it in the Dutch checklist, based on recent records, of which details are yet to be published. However, a paper including that information is in preparation by Menno Reemer and Herman de Jong. There are a good number of records from a wide area of the Netherlands with most from mixed or coniferous woodland, especially with spruce present; the first Dutch record was only in 1994 but there had been limited recording nationally of Platypezidae previously, so it isn't possible to decide whether it might have appeared as a result of recent expansion in its European range (Menno Reemer *pers. comm.*).

Recently, however, this species has been recorded as new to Denmark on the website *Danmarks Fugle og Natur* (http://www.fugleognatur.dk). Two photographs of a female sitting on a leaf, taken by Per Schlutter on 2 October 2015, were posted on 11 December 2015 and resulted in some discussion between him and Walther Gritsch. This indicated that it was an unexpected find as they believed its preferred habitat in Scandinavia to be taiga bog, although they reflected that its occurrence in the Netherlands argued against that being a requirement.

Acknowledgements

My thanks to Peter Chandler for identifying the fly and providing information on its biology, and to Roger Morris for organising the Dipterists Forum autumn field meeting. Jeremy Richardson alerted Peter Chandler to the Danish record and kindly provided a translation of the Danish discussion. Menno Reemer was helpful in providing information on the status of *P. connexa* in the Netherlands. I also thank Dmitry Gavryushin for making available his photographs of the male, one of which appears on the front cover of this issue.

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Dipterists Digest 2015 **22,** 147-153

Trixoscelis canescens (Loew) (Diptera, Trixoscelididae) in Britain

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Summary

Trixoscelis canescens (Loew, 1865) is formally announced as a British species, from three localities in SE England, and a key is provided for recognition of the British species of the genus. *Trixoscelis similis* Hackman is recorded as new to Ireland.

Introduction

Trixoscelididae is a small family, represented in the British Isles by a single genus *Trixoscelis* Rondani, 1856. They are small grey or brownish flies that resemble the Heleomyzidae, in which they were formerly included, in having a spiny costal margin to the wing. They differ in having vein Sc running parallel to R_1 so that these veins remain close apically, while they are distinctly divergent in Heleomyzidae. There are also differences in the chaetotaxy of the head, in particular the strong proclinate ocellar bristles are inserted external to the front ocellus, rather than on the ocellar triangle as in Heleomyzidae. There are 26 species of *Trixoscelis* in Europe, mostly distributed in the Mediterranean region with a preference for arid habitats.

Only four species have hitherto been known to occur in Britain. When Collin (1943) revised the British Heleomyzidae, including Trixoscelididae, he used the name *Trixoscelis canescens* (Loew) for a common species. However, since a revision of the genus by Hackman (1970), which included keys to the European species then known, this species has been known as *T. frontalis* (Fallén), while the species for which Collin used the name *T. frontalis* is now called *T. similis* Hackman. Hackman considered that *T. canescens* was likely to be synonymous with *T. frontalis* as the commoner of these two species; he had not seen the female type of *T. canescens* and was in any case unable effectively to separate the females of *T. frontalis* and *T. similis*. These species have the wings unmarked in contrast to the other two British species of the genus, *T. obscurella* (Fallén) and *T. marginella* (Fallén), which have distinct wing markings.

It has, however, since become apparent that there is another species in Europe, which is similar to *T. frontalis* and *T. similis* but usually larger and with a distinct brown fore margin to the wing. This species was described from Hungary as *T. fumipennis* by Papp (2005) and from Spain as *T. gigans* by Carles-Tolra (2001), but Woźnica (2008) considered that these species are synonymous with *T. canescens* which he recognised to be a good species distinct from *T. frontalis* when he recorded it from Italy (South Tyrol). He included photographs of Loew's female type of *T. canescens* (described from Silesia, now in the Czech Republic) which he had compared with female paratypes of *T. gigans*, and he considered them to be conspecific.

Woźnica (*op. cit.*) concluded that *T. canescens* was probably widespread in Europe and in addition to the above-mentioned countries he listed Belgium, Great Britain, Lithuania, Macedonia, European Russia, Poland and Switzerland. Apart from a record by Bequaert (1960) from Macedonia, the provenance of these records was not given, but the inclusion of Great Britain was based on the assumption that Collin (1943) had correctly identified *T. canescens*, which as indicated above related to *T. frontalis*. Woźnica (2011) also recorded it from Slovakia and Woźnica (2014) included records from the Czech Republic, Poland and Switzerland. Flinck and Kahanpää (2013) also reported a record from Finland, but it was not confirmed in the Checklist of the Diptera of Finland (Kahanpää 2014), where it was found that the record was based on a male of *T. frontalis* with the costal margin more darkened than usual.

British records of *Trixoscelis canescens*

We first became aware of this as a British species in 2011 when some specimens were found in material examined by CMD from Bushy Park, Middlesex, which had been trapped there during the previous year. Some further specimens were obtained at this site in 2015 by PJC and its occurrence there was noted by Chandler (2015). In the intervening period specimens identified as this species were found during a "Bioblitz" at the garden of Clarence House, Middlesex and during an "Entoblitz" of a site in Berkshire. The two latter occasions were intensive, respectively one and two day, entomological surveys by groups of entomologists with expertise in a range of orders. These are as far as we know the first reliable records of *T. canescens* from the British Isles.

Material examined of *Trixoscelis canescens*

Bushy Park, Middlesex: ground trap at Round Plantation (compartment 19) (TQ1470), 12.vii.2010, 1♀; 26.vii.2010, 1♂; 2.viii.2010, 1♂, 1♀ (all leg. N. Reeve); wooded margin of Longford River (compartment 11h) (TQ1469), 30.vii.2015, 1♀ (leg. P.J. Chandler); central lime avenue (compartment 16d) (TQ1569), swept from lime *Tilia* foliage, 5.viii.2015, 1♂ (leg. P.J. Chandler). Clarence House, garden (TQ2980), Middlesex, 22.vi.2012, 1♀ (leg. P.J. Chandler). Hosehill Lake, Berkshire (SU647696), 15-16.viii.2014, 1♂ (leg. J. Cole).

Recognition of *Trixoscelis canescens*

Like the similar species *T. frontalis* and *T. similis*, *T. canescens* has a light grey dusted thorax with a pair of broad brown stripes dorsally, internal to the rows of strong dorsocentrals and reaching the scutellum. The abdominal tergites have a broad shining dark brown area dorsally, sharply contrasted with light grey dusting laterally.

In leg coloration *T. canescens* resembles *T. frontalis* in having mainly dark fore legs (apart from yellow coxae) and yellow mid and hind legs, with a dark coloured enlarged hind first tarsomere in the male; it may also have dark streaks dorsally on the male mid and hind femora. In *T. similis* the male has the legs yellow apart from the darkened fore femur, but the female has the fore legs coloured as in the other species. All three species have the female mid and hind legs entirely yellow with a slender hind first tarsomere.

The wings in *T. canescens* are mainly clear greyish but differ from these other species in having a distinct brown band bordering the costa, which in the male broadens apically and overlaps vein R_{2+3} to occupy the anterior half of cell r_{2+3}, nearly reaching the tip of vein R_{4+5} apically. This band is narrower and not reaching vein R_{2+3}, except apically, in the female. A faint shade may be present in this position in *T. frontalis* but it is restricted to the costal cells in both sexes. Woźnica (2008) noted that some specimens he had examined of *T. canescens* were slightly darker in wing or body coloration.

Trixoscelis canescens can also be readily picked out as being on average a larger species; the material examined has ♂ wing length 2.7-3.2mm and ♀ wing length 3.2mm. Material examined of the other species is in the range for *T. frontalis* ♂ 1.7-2.2mm and ♀ 2.1-2.5mm and for *T. similis* ♂ 2.2-2.5mm and ♀ 2.6-2.7mm.

The costal character used in the key below (also mentioned in his key by Collin 1943) is considered to reliably separate both sexes of *T. similis* from the other two species, enabling females to be separated from those of *T. frontalis*. The width of the gena has been suggested as a specific distinction between *T. frontalis* and *T. similis*, *T. frontalis* having it broader, more than a sixth of eye width and broader than the width of the fore tibia, while in *T. similis* it is narrower, about an eighth eye width and no broader than the fore tibia, but this is considered too comparative a character to rely on.

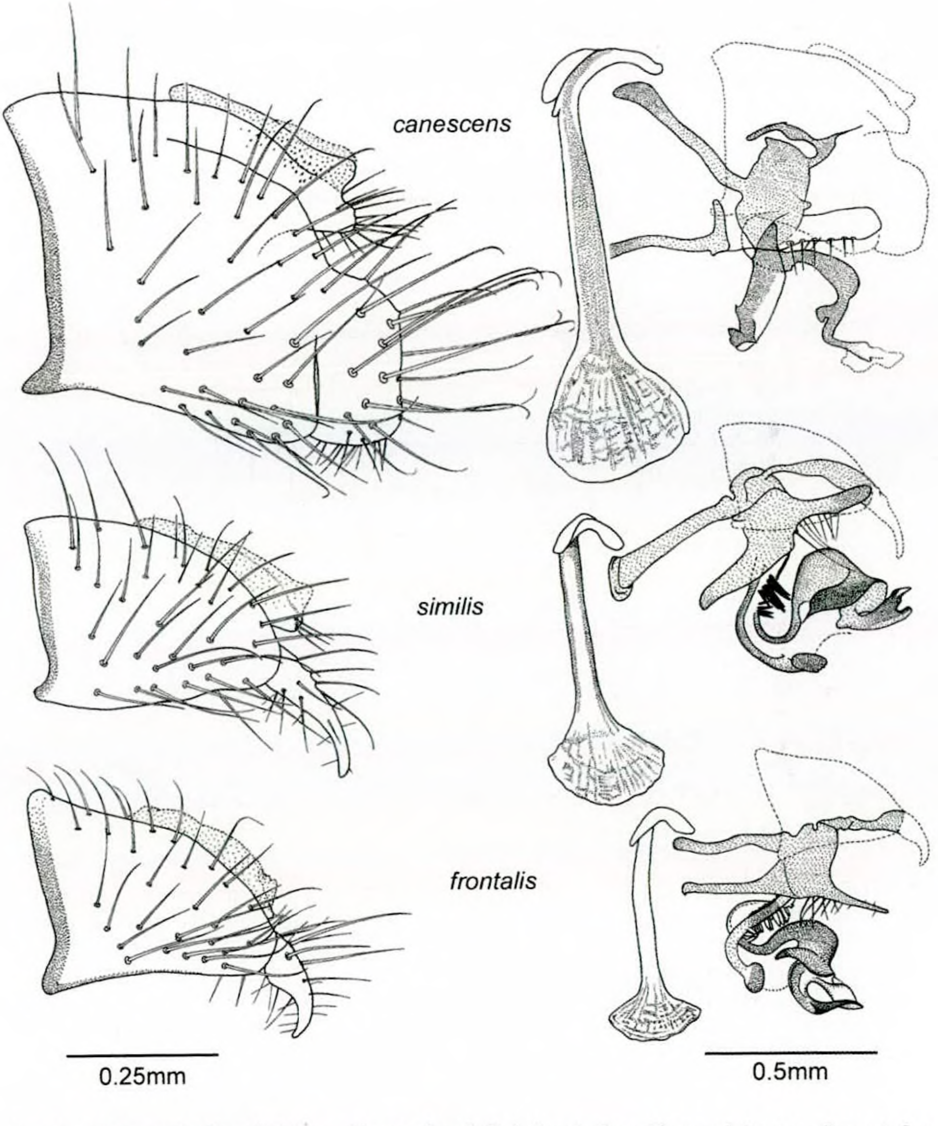

Fig. 1. Male genitalia of *Trixoscelis* species: left, lateral view of epandrium and surstylus; right, lateral view of ejaculatory apodeme and aedeagus.

These species can also be reliably separated on the structure of the male genitalia as indicated in the figures (Fig. 1); the large surstylus, partly fused with the epandrium in *T. canescens* clearly differs from the finger-shaped articulated surstyli of the other two species. The female ovipositors of these three species (Fig. 2) are also illustrated for comparison. All figures are drawn by CMD.

Woźnica (2014) produced a key with photographs to the females of the five species of *Trixoscelis* now known in Britain. We became aware of this work in the final stages of preparation of our paper, so the two studies provide independent corroboration. Characters noted in both studies appearing to be real, rather than possible artefacts of the angle of view or compression of the abdomen, are:

- Sternite VII (last wide sternite, fused with tergite VII) is partly desclerotised in the midline in *T. similis* and *T. frontalis*, in contrast to its completely sclerotised condition in *T. canescens*.
- Sternite VIII (penultimate) in *T. frontalis* and *T. similis* is wider than long and somewhat semicircular in contrast to being nearly round in *T. canescens*.

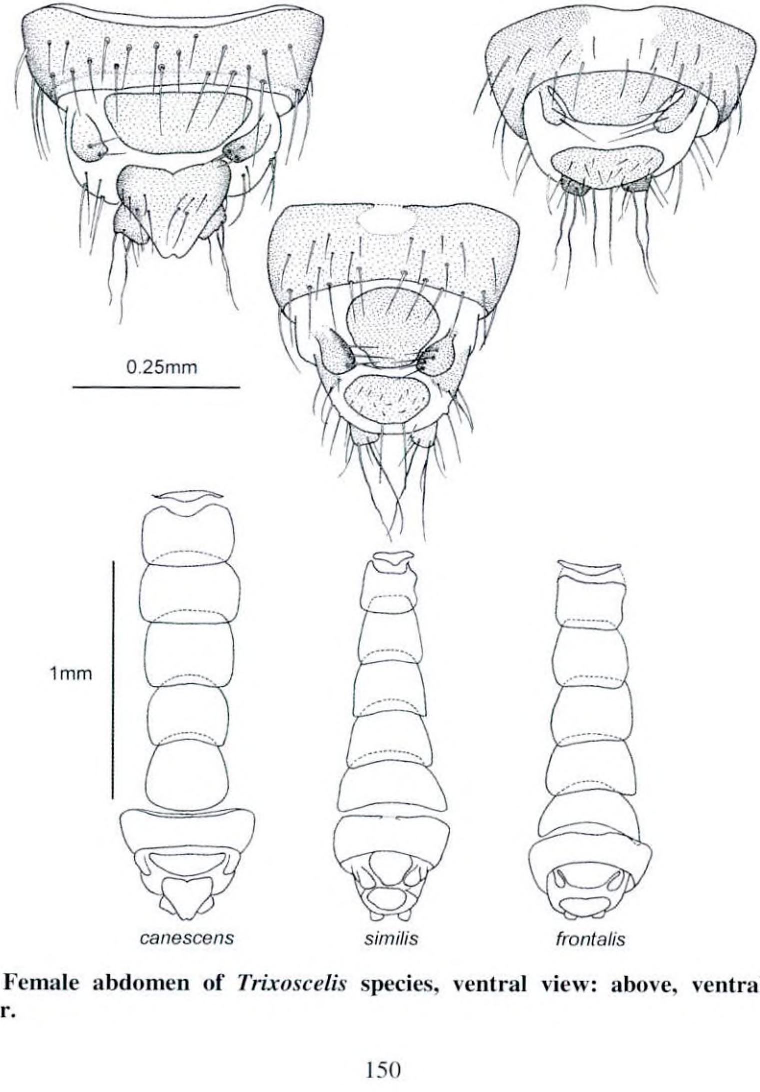

Fig. 2. Female abdomen of *Trixoscelis* species, ventral view: above, ventral view of ovipositor.

In addition, the longer hairs on sternite IX of *T. canescens* may genuinely differ from the short hairs of *T. frontalis* and *T. similis*, and the sternites of *T. similis* may be narrower anteriorly, compared to the more even width in the other two species, although this may be difficult to appreciate as the sternites are curled towards their lateral margins.

Key to British species of *Trixoscelis*

1. Wing with pattern of dark markings including crossveins 2
- Wing with at most a dark fore margin and crossveins unmarked 3

2. Wing strongly marked with a mainly dark brown background including an elongate clear area in the discal cell and two clear patches on the apical half .... ***marginella*** (Fallén)
- Wing mainly clear with light brown costal margin and patches over crossveins .... ***obscurella*** (Fallén)

3. Wing with a distinct dark border to the costa, extending broadly across cell r_{2+3} in male. Costa and the enlarged male hind first tarsomere dark (as in *T. frontalis*) .... ***canescens*** (Loew)
- Wing with at most a slight shaded margin within costal cells, not nearly reaching vein R_{2+3} in either sex 4

4. Male with front tibia and first tarsomere and the enlarged hind first tarsomere dark. Costa in both sexes brown with dense black setulae and appearing black in anterior view. .... ***frontalis*** (Fallén)
- Male with front tibia and first tarsomere and enlarged hind first tarsomere yellow. Costa in both sexes yellow with finer setulae and yellow in anterior view .... ***similis*** Hackman

Habitat associations

The three species considered above occur mainly in woodland or in association with trees, although not exclusively so as *T. frontalis* has been found on coastal dunes (including slacks and scrubby areas) and saltmarsh, and in sallow scrub adjacent to wet grassland together with *T. similis*. Both *T. frontalis* and *T. similis* have been reared from bird nests (Collin 1943, Pugh 1947, Skidmore 1962), though larvae have not been described and there is no precise information on their biology. Since many records of *T. frontalis* and some of those for *T. similis* and *T. canescens* are from tree foliage, it is possible that they occur mainly in the canopy and this may account for the small number of records for *T. canescens*. It is also possible in the absence of any earlier records that it is a recent arrival in Britain.

On the other hand the two species distinguished by having strongly marked wings, the Nationally Scarce *T. marginella* and the common *T. obscurella* (Fallén) prefer open sandy areas such as dunes and heathland and appear more restricted in choice of habitat than are *T. frontalis* and *T. similis*. They have not been reared, but as *T. marginella* has been recorded on short turf grazed by rabbits it has been suggested that it might develop in mammal burrows (Falk *et al.* 2016).

Distribution of the other British species

Trixoscelis frontalis is a common species, probably found throughout Britain and has also been recorded from Ireland. Material has been examined from Devon, Somerset, Berkshire, Buckinghamshire, Middlesex, Suffolk, Norfolk, Lincolnshire, Northumberland, East Lothian and Nairn. At the latter two Scottish coastal sites, respectively Gullane Bay and Culbin Sands, and at

Dawlish Warren, Devon it was found in proximity to the dry dune habitat supporting *T. obscurella* but sometimes in wetter situations.

Trixoscelis similis appears to be a less common and more local species. Although Collin (1943) had seen it only from his garden at Newmarket, Suffolk, recent records suggest that it is as widespread as *T. frontalis*. It has been examined from Sussex, Berkshire, Middlesex, Suffolk, Norfolk, Aberdeenshire, Ross and Co. Cavan (one female, Virginia Woods, N3987, 21.vii.2006, PJC), which is a new record for Ireland. Both *T. frontalis* and *T. similis* were recorded at Buckingham Palace Garden, Middlesex (Smith 2001), while *T. frontalis* was like *T. canescens* found in the garden of Clarence House.

Trixoscelis obscurella is locally common in suitable habitats, both heathland and coastal dunes, throughout the British Isles. Some coastal sites are saltmarsh and by a stream on a sandy beach (CMD). Material has been examined from Cornwall, Devon, Somerset, Dorset, Isle of Wight, Surrey, Kent, Suffolk, Norfolk, Lincolnshire, Cheshire, Yorkshire, Ceredigion, East Lothian and Nairn.

Trixoscelis marginella has a more restricted distribution in similar habitats to *T. obscurella*. It has been examined from Hankley Common, Surrey (Denton 2012), from short rabbit-grazed grassland at RAF Barnham, Suffolk (a site where *T. frontalis* and *T. similis* were also present, though possibly more associated with scrub, PJC) and from Bamburgh dunes, Northumberland (NU187350, 12.vi.1990, in pitfall and water traps on "grey" dune dominated by marram grass *Ammophila arenaria* with lichen and moss in the hollows, CMD). Records also exist for other sites in the Breckland of Suffolk and for Dorset, Berkshire, Norfolk, Yorkshire, Lancashire, Glamorgan, Pembrokeshire and Ayrshire (Falk *et al*. 2016).

Acknowledgements

We are grateful to Andrzej J. Woźnica for helpful discussion on *Trixoscelis canescens*. We also thank Nigel Reeve for the opportunity to examine the 2010 trap samples from Bushy Park, the Royal Parks ecologists for allowing subsequent visits by PJC to Bushy Park to record Diptera, Jon Cole for permitting the inclusion of his record, Cathy McEwen and BBOWT for organising the event at Hosehill Lake, and HRH The Prince of Wales for enabling the successful Bioblitz of Clarence House Garden.

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***Herina lugubris* (Meigen) (Diptera, Ulidiidae) discovered in south-east Scotland –** While recording insects on 13 September 2015 in a long-abandoned railway cutting near Longnewton, in the Scottish Borders (NT5826, V.C. 80) a single male ulidiid fly was swept from tall herb-rich vegetation. Later examination revealed it to be *Herina lugubris* (Meigen, 1826).

The confused taxonomy of this species was clarified by B. Merz (2002. A revision of the *Herina lugubris* species group (Diptera, Ulidiidae, Otitinae), with the description of two new species. *Revue suisse de Zoologie* **109**(2), 407-431), who also illustrated the genitalia of both sexes of all members of the *Herina 'lugubris'* group. *Herina lugubris* (Meigen) can only be distinguished from *Herina rivosecchii* Merz by examination of the genitalia (Merz *loc. cit.*). *Herina rivosecchii*, which has not been recorded in the British Isles, is the *H. lugubris* of W. Hennig (1939. 46./47. Otitidae. pp 1-78. **In** Lindner, E. (Ed.) *Die Fliegen der palaearktischen Region* Band V. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart), but not of Meigen. Merz (*loc. cit.*) also studied the sole remaining paratype (the holotype is apparently lost!) of *Herina longistylata* Rivosecchi, and found it to be conspecific with *H. lugubris* (Meigen), and not with *H. lugubris sensu* Hennig, 1939 (*loc. cit.*). The name *H. longistylata* Rivosecchi had been temporarily used for the British species until Merz's (2002) revision, following D.K. Clements and B. Merz (1997. The identity of '*Herina lugubris*' in Britain and its confusion with *H. longistylata* (Diptera, Ulidiidae). *Dipterists Digest (Second Series)* **4,** 65-67) and D.K. Clements and B. Merz (1998. Key to the genus *Herina* (Diptera, Ulidiidae) in Britain. *Dipterists Digest (Second Series)* **5,** 55-67).

The present specimen appears to be the first confirmed record of *H. lugubris* (Meigen) from Scotland. Examination of the male genitalia of a specimen from Anglesey (Cors Goch, SH5081, 18 July 2006, K.P. Bland) and one from Cornwall (Beagle Pt., 8 July 1983, A.E. Stubbs) showed that they also were *H. lugubris* (Meigen) – **KEITH P. BLAND** and **DAVID HORSFIELD,** National Museums Collection Centre, 242 West Granton Road, Edinburgh EH5 1JA

Telmatogeton japonicus Tokunaga (Diptera, Chironomidae), a first record for Orkney, V.C. 111 – On 2 November 2015 I was examining some fish farming platforms that had been moored on the beach at Widewall Bay (ND435916) (Fig. 1), South Ronaldsay, Orkney, when I observed some flies running about on the barnacles and algae growing on the pontoons. The specimens appeared to be quite weak or reluctant flyers, preferring to dash about, bobbing up and down and mating in the sunlight whilst deftly dodging the splashing waves as the tide came in. I noticed they were also present on the sand and rocks near to the pontoons and were easy to catch due to the apparent reluctance to fly. I photographed them *in situ* and collected one to examine further. The specimen keyed out to a female chironomid but could get no further, so I sent the pictures to Patrick Roper who identified it as a marine splash midge *Telmatogeton* species and recommended I collect a few samples and send them to Peter Langton who has written about this and related genera. Peter identified them as *Telmatogeton japonicus* Tokunaga, 1933.

Fig. 1. Fish farming pontoons moored on the beach at Widewall Bay, South Ronaldsay.

Fig. 2. Pinned specimen of _Telmatogeton japonicus_ Tokunaga, 1933 and a second specimen in situ on the pontoon near barnacles and algae.

Telmatogeton japonicus has previously been recorded in the British Isles from St Kilda (2010) (Langton, P.H. and Hancock, G. 2013. *Telmatogeton murrayi* Saether and *T. japonicus* Tokunaga (Diptera, Chironomidae) new to Britain. *Dipterists Digest* (*Second Series*) **20,** 157-160); Treaddur Bay near Holyhead, Anglesey (1999 and 2000) (Murray. D.A. 2013. Records of some marine Telmatogetoninae and Orthocladiinae (Diptera, Chironomidae) from Wales. *Dipterists Digest* (*Second Series*) **20,** 130); Kilkee in County Clare, Ireland (1999) (Murray, D.A. 2000. First record of *Telmatogeton japonicus* Tokunaga (Dipt., Chironomidae) from the British Isles and additional records of halobiontic Chironomidae from Ireland. *Entomologist's monthly Magazine* **136,** 157-159) and Lamorna Bay, Cornwall (Fenwick, D. 2013. *http://www.aphotomarine.com/marine_fly_telmatogeton_japonicus.html*). It is thought to be an alien species in Europe, introduced from the Pacific Ocean probably by shipping as the location of (mainly offshore) European records might suggest. It has also been found in Madeira, Iceland, Belgium, the Azores and the Baltic Sea (Brodin, Y. and Andersson, M.H. 2009. The marine splash midge *Telmatogeton japonicus* (Diptera; Chironomidae) – extreme and alien? *Biological Invasions* **11,** 1311-1317).

It is able to colonise man-made substrates that are exposed to the elements such as windfarms, buoys, seawalls and the hulls of ships. It is active all year round as it functions in a range of temperatures; hence there is potential for this species to be found all around the shores of the British Isles.

Thanks to Patrick Roper for his help and Peter Langton for identifying the species – **LEE JOHNSON,** Scows, St Margaret's Hope, Orkney, KW17 2TQ

The status and habitat associations of *Hilara medeteriformis* Collin, 1961 (Diptera, Empididae) in Great Britain – *Hilara medeteriformis* was described and added to the British list by J.E. Collin on the basis of three specimens collected by himself and J.J.F.X. King: a single female from Nethy Bridge in July 1906, plus single males from Grantown-on-Spey on 4 August 1935 and Aviemore on 12 July 1938 (Collin J.E. 1961 *British Flies*, Volume VI Empididae pp.617-618). In their review of Empidoidea in Great Britain, S.J. Falk and R. Crossley (2005. *A review of the scarce and threatened flies of Great Britain*. Part 3: Empidoidea. Species Status **3,** 1-134. Joint Nature Conservation Committee, Peterborough) categorised *H. medeteriformis* with LOWER RISK (Near Threatened) status (*i.e*. it is close to qualifying as vulnerable to risk of extinction in the medium term future) on the basis of the above records plus further records from: Grantown-on-Spey (1979/80), Rannoch, Perthshire (P.J. Chandler, 1987) and an isolated record from Chirk Castle, Denbighshire (1996). Consequently, in the review the species was described as known only from the Spey Valley, Rannoch and Chirk Castle.

Falk and Crossley (*op. cit.*) suggested that this is likely to be an under-recorded species with a very restricted distribution. Additional recent records demonstrate that *H. medeteriformis* is indeed more widespread than the JNCC Review recognised. The Empidid and Dolichopodid Recording Scheme holds a further seven records from the period 1991-2015: Culbin Sands, East Inverness-shire, July 1991; Rhayader, Radnorshire, 11 July 2001; Pittance Park, Nottinghamshire, 3 July 2005; Poole Harbour, Dorset, 8 July 2005, Wyre Forest, 27 June 2010 and 3 July 2010; Haughmond Hill, Shropshire, 16 July 2015. Also, M. Chvála (2005. *The Empidoidea (Diptera) of Fennoscandia and Denmark. IV Genus Hilara.* Fauna Entomologica Scandinavica Vol. **40**) includes a record from D.M. Ackland, who found it at Loch Morlich on 11

September 1966, providing an additional record from the Spey Valley area. With records evident from across quite a wide range in Britain, *H. medeteriformis* should perhaps no longer be considered a LOWER RISK (Near Threatened) species, but rather a LOWER RISK (Nationally Scarce) species, particularly as *Hilara* is a cryptic genus of flies that many recorders overlook, and this species must surely go unrecorded in many places.

With the scant evidence that was available to them, Falk and Crossley (*op. cit.*) noted that this is a fly that may be "associated with the margins of rivers, but one record is from Birch *Betula*/Oak *Quercus* woodland on the shore of Loch Rannoch". Chvála however noted that *H. medeteriformis* is one of only a few species that regularly swarm in dry biotopes far from water, in direct contrast to the concept of this being a fly that is associated with rivers. Chvála also related that it swarms under trees in semi-shade and that both sexes have been captured by car-net in numbers in forest regions, throwing further doubt on the suspected association with rivers in Britain.

British records come from a range of habitats including parkland with old-growth trees, coastal saltmarsh, riverbank, a garden in the small rural town of Rhayader, a garden near a small sunken stream in Wyre Forest, mixed coniferous and broadleaved woodland, broadleaved woodland and from near heathy grassland. I have personally swept a single male from a dry, well-drained ancient woodland floor, containing much dead wood (the Shropshire record cited above). No precise habitat association can be deduced from these records, but clearly this is a species that can utilise a wide range of situations, perhaps, in Britain, favouring woodland or at least the presence of trees.

Chvála (*op. cit.*) stated that *H. medeteriformis* is a species "with a very long flight period" on the continent. In Britain records are almost all in June and July with a single September record, so it may have a more restricted flight period in Britain than on the Continent.

Although this is probably a widespread species in Britain, the great paucity of records across a period of more than a century indicate that it is elusive and will probably continue to be recorded only very sporadically. The distribution of *H. medeteriformis* in Britain has a strong northern and western bias with two outlier records from Nottinghamshire and Dorset. The best hope of finding new sites for it would appear to be through intensive collecting in old woodlands in north-west Britain during June and July.

My thanks to Adrian Plant for supplying details of British records held by the Empidid and Dolichopodid Recording Scheme and for background information on *H. medeteriformis* – **NIGEL P. JONES,** 22 Oak Street, Shrewsbury, SY3 7RQ. nipajones@tiscali.co.uk

Dipterists Digest 2015 22, 157-170

Development site, feeding mode and early stages of *Palloptera scutellata* (Macquart) (Diptera, Pallopteridae)

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Summary

Based on rearing 267 males and 235 females in Scotland, the development site of *Palloptera scutellata* (Macquart) (Diptera, Pallopteridae) is confirmed as the stem base of soft or common rush, *Juncus effusus* (Linnaeus) (Juncaceae). Sampled at the beginning of September in 2015, a range of 1-9 larvae or puparia were found per stem, but most had 3 puparia. Feeding track lengths, recognised by dark, discoloured tissue, appear to be positively related to the number of larvae per stem. The larva is adapted to rasping the firm tissue at the base of *Juncus* stems and is provisionally identified as a facultative phytophage. The larva and puparium of *P. scutellata* are described and compared with other pallopterans. The unusual larva and life cycle are discussed.

Introduction

As currently understood, the Pallopteridae is a small family of acalypterate flies (Diptera) with about 60 species worldwide and recognised by combined, rather than, unique characters (Merz 1998). Thirteen species are known from Britain (Chandler 1998) of which *Palloptera scutellata* (Macquart) (Diptera, Pallopteridae) is one of the largest (Colyer and Hammond 1968). It is distinguished from other pallopterans by a grey dusted thorax, yellow to orange legs and abdomen, bare mesopleuron and bristled frons (Collin 1951). The wings, in addition, have a unique pattern of dark marks, with infused stigma and outer two cross veins and a large triangular mark at the apex (Séguy 1934, Collin 1951, Morge 1974, de Jong and van Aartsen 2007).

Palloptera scutellata was first recorded in Britain from females taken in 1950 at Bookham Common, Surrey (Parmenter 1950). It is now known to be a fairly frequent species in the southern half of Britain with occasional records up to Cumbria (P.J. Chandler *pers. comm.*, NBN Gateway, data.nbn.org.uk/Taxa/NBNSYS0000029228, accessed 27.x.2015). Speight (1979) recorded it from Ireland, and in Scotland it was taken for the first time in 2015, near Alloa, Clackmannanshire in the Central Lowlands (D. Horsfield *pers. comm.*).

Collin (1951), Stubbs (1969), Chandler (1991) and de Jong and van Aartsen (2007) discuss what little is known of the biology and habits of *P. scutellata*. Relative to other pallopterans, it has an unusual life cycle. The overwintering stage is not the larva, as is the case of most other British species (Rotheray 2014), but adults, probably mated females. Adults are associated with wetlands (Stubbs 1969, Stuke and Merz 2005). Stubbs (1969) and Chandler (1991) discuss the possibility that the larval development site is the stem base of soft or common rush, *Juncus effusus* (Juncaceae). Males appear scarce and de Jong and van Aartsen (2007) suggest that populations may be parthenogenetic. In this paper, we provide rearing records for *P. scutellata*, describe the third stage larva and puparium, assess the larval feeding mode, i.e. what kind of diet it has, and discuss the life cycle.

Methods

On 2.ix.2015, we visited disused railway sidings just west of Alloa (NS 868933) from where adult *P. scutellata* had been swept (D. Horsfield *pers. comm.*). In an area of damp, mixed herbaceous vegetation, several large tussocks of *Juncus effusus*, were found. On opening stems from these tussocks, pale, acalypterate puparia and white larvae were readily found at the base. Larvae and puparia appeared to be fairly abundant and several stems were collected from different tussocks and one tussock was removed for further analysis. The tussock was cut in half and each half placed in a clear-sided, plastic rearing container. Over the next few weeks, stems were cut from the tussock and opened with a scalpel and forceps and any larvae or puparia present were counted and positions recorded before being removed for rearing. The length of feeding tracks were measured from the base of the stem. Larvae and puparia were reared by wrapping them in damp tissue and placing them in either corked glass tubes or sponge-capped glass bottles. Tubes and bottles were stored in an unheated room and monitored daily.

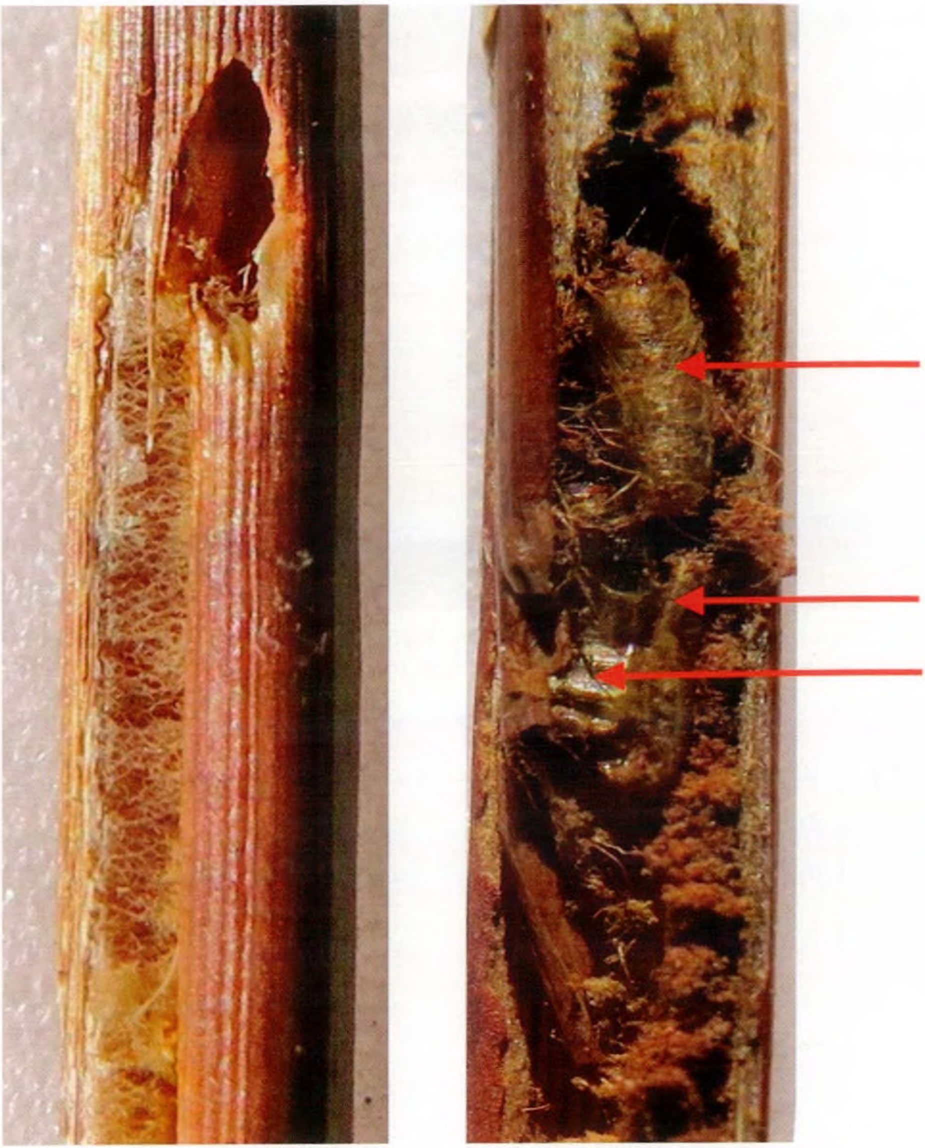
Some larvae were fixed and preserved in Kahle's solution (formula in Ferrar 1987) and with puparia, were used to describe early stages. Details of larval integuments were made visible by dropping a solution of methyl blue on to a preserved larva and allowing it to air dry. After examination, methyl blue was removed by immersing the larva in 70% ethanol. To examine larval head skeletons, the section of a puparium containing a head skeleton was immersed in hot potassium hydroxide (KOH) for about 8 minutes, the head skeleton removed with pins, washed in acetic acid and stored in glycerol or 70% ethanol. Also, the thorax of a preserved larva was cut off, soaked in hot KOH for about 10 minutes, tissue surrounding the head skeleton removed with pins and the preparation washed in acetic acid and stored in 70% ethanol.

Head skeleton preparations, preserved larvae and puparia were examined using a Wild M5 stereo microscope and an Olympus BX51 compound microscope. In stereo microscopy, measurements were made using an eyepiece graticule attached to the microscope and are accurate to 0.1mm. In compound microscopy, measurements were made using Olympus morphometrics software, AnalySIS docu v5. Larval images were acquired using a camera attached to the stereo or compound microscope. Terminology for head skeletons generally follows Courtney *et al.* (2000), with minor modifications from Rotheray and Lyszkowski (2015). Material studied here is deposited in the collections of the National Museums of Scotland.

Results

Development site and rearing records

The tussock consisted of stems of various ages, from old, brown and friable stems to short, fresh, green shoots. Most infested stems appeared to have completed growth and were brown at the base and green above. Due to being hollowed out by larval feeding, the bases were soft to the touch. Hollowed stem bases can also be due to infestation by insects other than *P. scutellata*, such as *Bactra lancealana* (Hübner) (Lepidoptera, Tortricidae) which we also reared and *Loxocera aristata* (Panzer) (Diptera, Psilidae) which we have reared elsewhere in Scotland. Infestation by *P. scutellata* appears to be associated with an oval-shaped hole above the base, often hidden behind a leaf bract (Fig. 1). From the tussock, 332 stems appearing to be of the correct type for *P. scutellata* were dissected. One hundred and eleven or 33.4%, were infested with *P. scutellata* larvae or puparia (Figs 2-3). After 12 September, only puparia were found in stems. Feeding damage was visible as hollow spaces and dark brown material (Figs 4-5). Puparia were often adjacent to each other, not necessarily at the base and usually, with the head end pointing up (Figs 2-3). A range of 1-9 puparia were found per stem, the largest proportion, 33.3%, had 3 puparia (Fig. 6). The lengths of 41 feeding tracks were measured. They had a mean length of 8.5cm, range 5-16.5cm. The length of feeding tracks appears related positively to the number of puparia present (Fig. 7). Empty puparia in stems were often collapsed (Fig. 2). On 14 September the first adult *P. scutellata* emerged, a male, and emergence continued until 11 October 2015; males were more frequent at first, females at the end of the emergence period. A total of 502 adults were obtained, 267 males and 235 females. Males and females varied in size within the range 3.5-6mm (Fig. 8). Also reared from *P. scutellata* puparia were 2 individuals of a parasitoid, *Theroscopus ochrogaster* (Thomson) (Hymenoptera, Ichneumonidae), a widespread species not reared previously (M. Schwarz *pers. comm.*).



Figs 1-2. *Juncus* stems infested by larvae of *Palloptera scutellata*, stem apex from the top of each image: 1, left hand stem, hole at the end of a *P. scutellata* feeding track, hole length = 3.5mm; 2, right hand stem, arrows indicate positions of empty puparia.

Figs 3-5. ***Juncus*** **stems: 3, upper stem with 4 puparia of** ***Palloptera scutellata*****; 4, middle stem with** ***P. scutellata*** **feeding track, 8cm long; 5, lower stem, uninfested.**

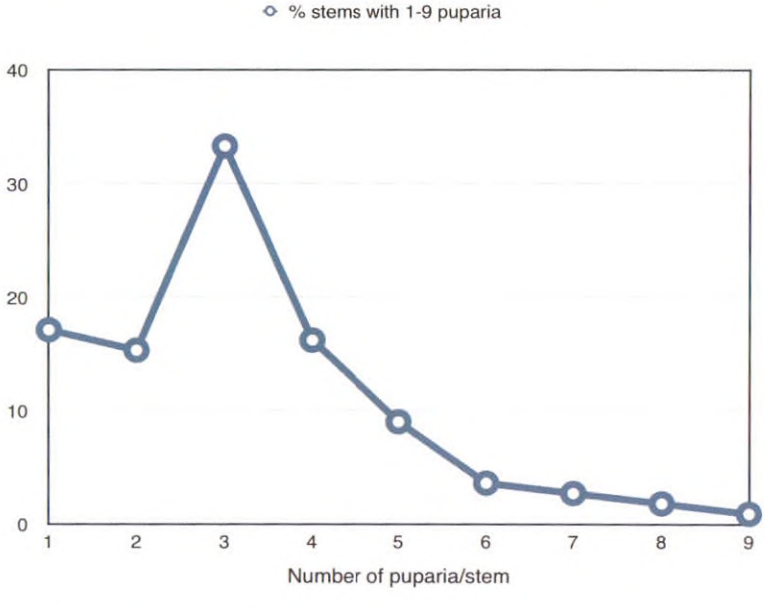


Fig. 6. Numbers of stems with 1 to 9 larvae/puparia per stem, expressed as a % of the total number of stems assessed (n = 111).

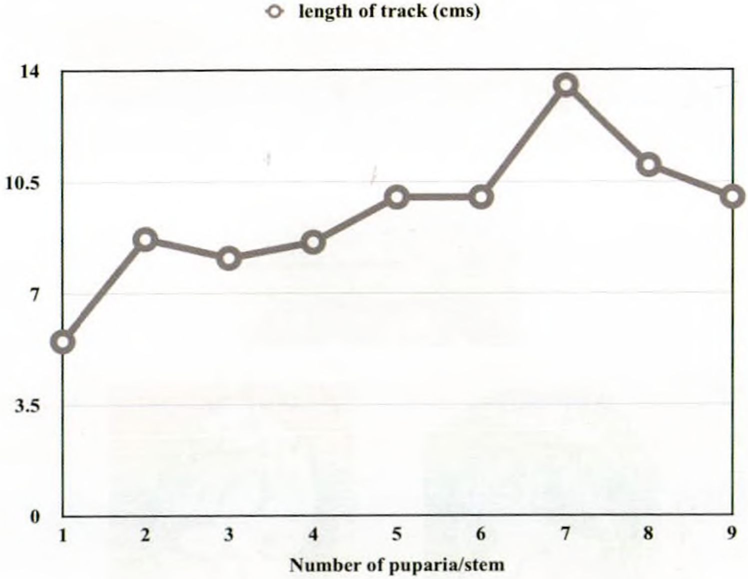
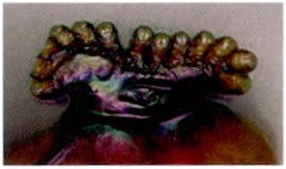
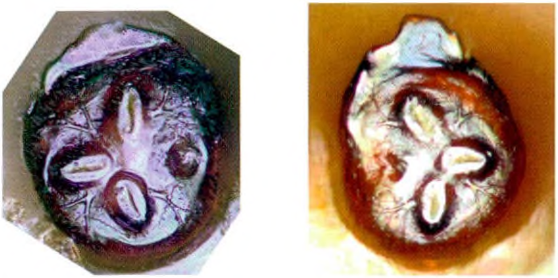


Fig. 7. Relationship between the number of larvae and puparia per stem and the length of feeding tracks, data points are means.

Fig. 8. *Palloptera scutellata*, small (3.5-4mm) and large (5.5-6mm) adults, upper, two flies = males, lower two flies = females.





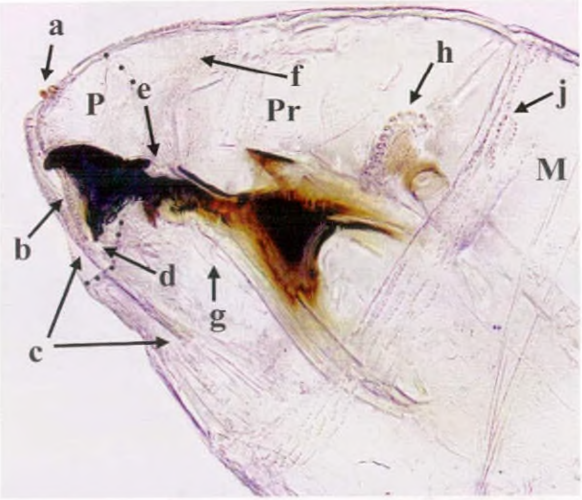
Figs 9-11. Early stages of *Palloptera scutellata*: 9, upper image, whole larva, lateral view, head to the left, length = 7mm; 10, middle image, anterior spiracles from a puparium, posterior view; 11, lower images, posterior spiracular plates, apical views, two examples from different puparia.

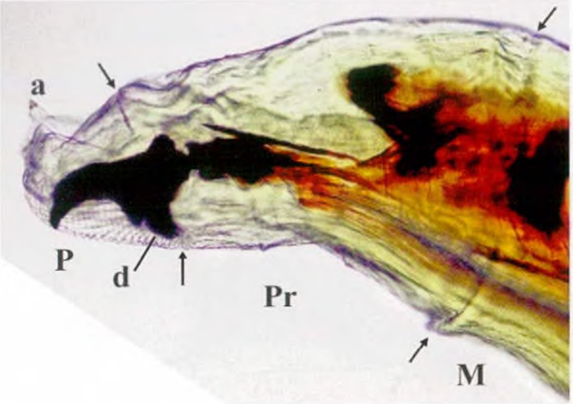
Morphology of *Palloptera scutellata*

Third stage larva and puparium

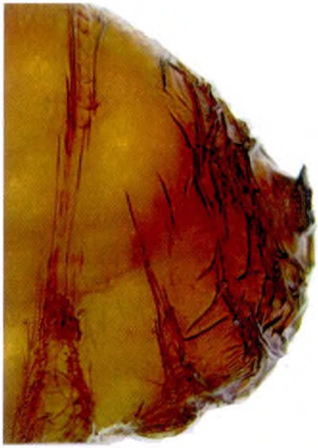
Overall appearance: larva (Fig. 9) and puparium elongate and tapered both anteriorly and posteriorly with anterior spiracles arranged as a transverse rosette (*sensu* Nye 1958) with 12-13 spiracles arranged in a more or less, linear row (Fig. 10) and posterior spiracular plate with a variably shaped but conspicuous, dorsal ridge (Figs 11, 14). Anterior margin of the thoracic segments with vestiture (micro-hooks) (Fig. 12) and locomotory pads with 2 groups of transverse locomotory spicules (Fig. 15).

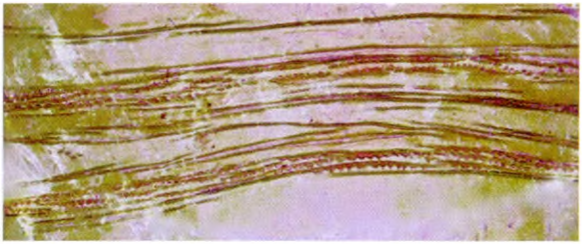
Size and shape: larva: length 6–8mm, width 1.1mm, height 1.1mm, n = 6; head end tapering from the first abdominal segment and more abruptly forward from the anterior spiracles, anal segment also tapered, but less sharply, abdomen subcylindrical in cross sectional shape; Puparium: length 3.8-5mm, n = 17; pale almost translucent to light brown in colour; subcylindrical in cross-sectional shape and with segment boundaries indicated by slight, impressed lines and folded integument; prothorax, mesothorax and anal segment wrinkled lightly, other segments mostly smooth. **Head skeleton:** dorsal and ventral bridges, dental sclerites, parastomal bars and dorsal apodeme on the ventral cornu present (Fig. 12). Cibarial ridges present and ventral cornu sclerotised basally and ventrally and wider than the dorsal cornu. Dorsal cornu with an apical window and upper half poorly sclerotised and inclined inwards. Vertical plate well sclerotised. Intermediate sclerite sclerotised, less so postero-ventrally, and block-shaped in lateral view (Fig. 12). Mandible with a lozenge-shaped base and short, muscle-attachment apodemes at postero-dorsal and antero-ventral positions, almost aligned one above the other (Fig. 16). Mandibular hook curved, wide basally and corrugated on the inside margin (Fig. 16). Labial plate small and inconspicuous, labial sclerites well developed and often appearing below the intermediate sclerite. Relative to the mandible, dental sclerites small and tapered. Dental sclerites present as relatively small and in lateral view, comma-shaped structures, separate, not fused to each other.





Figs 12-13. Pallopteran larval heads and prothoraces cleared in KOH, lateral view, apex to the left: 12, upper preparation, *P. scutellata*, dots indicate the base of the pseudocephalon; 13, lower preparation, *Palloptera trimacula* (Meigen), arrows indicate the base and apex of the prothorax, P = pseudocephalon, Pr = prothorax, M = mesothorax, a = antenna, b = oral cavity, c = oral sclerite; d = dental sclerite, e = elevator muscles leading from the dorsal mandibular muscle apodeme, f = prothoracic vestiture, g = salivary gland, h = anterior spiracular process, j = ring of vestiture circumventing the apex of the mesothorax.





Figs 14-15. Puparium of *Palloptera scutellata*: 14, upper image, anal segment, lateral view; 15, lower image, locomotory pad bordering abdominal segments 3 and 4.

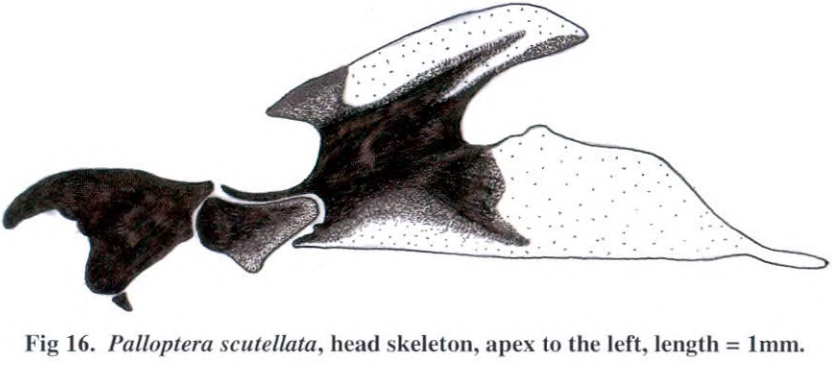


Fig 16. *Palloptera scutellata*, head skeleton, apex to the left, length = 1mm.

Pseudocephalon: dome-shaped in lateral view with an oval-shaped oral cavity, ventral and outer-lateral margins coated in corrugated cirri, cirri almost reaching the maxillary palps (Fig. 12). Brown antennae and translucent maxillary palps, both short, not much longer than basal width (Fig. 12). Posterior margin of the oral cavity with an attached, translucent, oral sclerite (*sensu* Rotheray and Lyszkowski 2015) extending under the head skeleton on the apex of which, muscles insert (Fig. 12). Thorax: apical third of the prothorax with expanded lateral margins coated in tapered vestiture. Anterior spiracular process with 12–13 respiratory bulbs arranged as a transverse rosette, i.e. spiracles in a linear or slightly curved row and yellowish-brown (Fig. 10). Apices of mesothorax and metathorax with a circumventing ring of tapered vestiture (Fig. 12). **Abdomen:** locomotory pads straddling segment boundaries from the metathorax to abdominal segment 7, barely projecting and each coated in two groups of 2-3 interrupted, transverse rows of tapering, spatulate spicules (Fig. 15), spicules extending to the lower, lateral margin of the body. Posterior spicule rows on the anterior margin of the preceding segment and orientated posteriorly, anterior rows on the rear margin of the succeeding segment and orientated anteriorly. Anal lobe surrounding anus with a few spicules. Anal segment with two sections, apical section tapered and retractile into the basal section. When the anal segment is extended fully, the posterior respiratory organs are exposed in a dorso-apical position (Fig. 9) and when retracted, they are pulled in and down towards the middle of the apical section. **Posterior spiracles:** mounted on plates at the apex of a sclerotised, cylindrical projection, projection shorter than basally broad and shorter ventrally than dorsally so that spiracular plates are inclined down (Fig. 11). Dorsal rim of spiracular plate with a narrow, ridge of variable shape (Fig. 11) and appearing as a thorn-like projection in lateral view (Fig. 14). Cuticular scar on the inner margin of the spiracular plate, indented and approximately oval in shape. Three spiracles arranged radially and mounted on slight projections that often slope inwards. Four groups of interspiracular setae, often broken, with 2-3 main branches per group and usually longer than length of a spiracle.

Discussion

Taxonomy

Third stage larvae of the Pallopteridae are provisionally separated from those of other cyclorrhaphan families by the apico-lateral margins of the prothorax which are swollen and coated in vestiture, anal lobe little developed and with few spicules and anal segment consisting of a tapered apical section that is able to retract into a larger basal section (Rotheray 2014). The third stage larva of *P. scutellata* has these characters, although the apico-lateral margins of the prothorax are not as swollen as other species.

Within the Pallopteridae and on early stage characters, two groups were recognised by Rotheray (2014). One group comprised *Palloptera quinquemaculata* (Macquart), which was distinguished by characters such as, a short, wide mandibular hook, absence of cibarial ridges, ventral and dorsal cornua about equal in width, relative lack of locomotory spicules and fused dental sclerites. The other group comprised species with a long, narrow mandibular hook, presence of cibarial ridges, more developed locomotory spicules, ventral cornu wider than the dorsal cornu and separate dental sclerites. The larva of *P. scutellata* is similar to *P. quinquemaculata* in also having a wide mandibular hook and few locomotory spicules, but the dental sclerites are small and separate, cibarial ridges are present and the ventral cornu is wider than the dorsal cornu. Hence, the larva of *P. scutellata* is intermediate between these groups.

The larva and puparium of *P. scutellata* is readily distinguished from all other European species known in their larval stages by the unique characters of a lozenge shaped mandible base, pseudocephalon with an oral sclerite, transverse rosette arrangement of anterior spiracles and dorsal rim of the posterior spiracular plate with a ridge. The only other pallopteran with a projection on the dorsal rim of the posterior spiracular plate is *Palloptera saltuum* (Linnaeus) but in that species, the projection is a thorn-like spike (Rotheray 2014). *Palloptera usta* (Meigen) and *Palloptera venusta* Loew have similar looking projections but they originate from the anal segment, not the spiracular plate (Rotheray 2014).

Larval feeding mode

No other insect larvae were found in *Juncus* stems in sufficient numbers that could act as prey if the larva of *P. scutellata* was a predator. Nor were insect remains found in infested stems that suggest predation had taken place. The dark material associated with *P. scutellata* infestations (Figs. 2,4), is indicative of phytophagy (Rotheray and Lyszkowski 2015). It is the result of microbial decay and a source of food for larvae (Creager and Spruijt 1935, Dowding 1967). Such larvae are referred to as facultative phytophages, to distinguish them from obligatory or strict phytophages that feed on plant tissue alone (Dowding 1967, Ferrar 1987).

Trophic features of more than one feeding mode typify facultative larvae (Ferrar 1987, Rotheray and Lyszkowski 2015). For example, the larva of *P. scutellata* rasps plant tissue, a phytophagous trait, but possesses cibarial ridges, a saprophagous feature (Dowding 1967, Ferrar 1987). Cibarial ridges comprise the filter in a mechanism for separating microbes from a liquid suspension (Dowding 1967). Dark material in feeding tracks and the presence of cibarial ridges suggests that the larva of *P. scutellata* is a facultative phytophage. Until larvae are observed feeding this is a provisional conclusion, it being possible that the dark material is due to larval frass and the cibarial ridges are vestigial.

Functional morphology

Spatial conditions at development sites and the viscosity or solidity of food are significant determinants of morphology in cyclorrhaphan larvae (Rotheray and Lyszkowski 2015). These factors also affect the larva of *P. scutellata*, specifically, the narrow space within *Juncus* stems and the hard tissue on which it feeds. Larvae feeding on hard food usually have a dome-shaped pseudocephalon, presence of an oral sclerite, a short, wide mandible hook with a lozenge-shaped base, a block-shaped intermediate sclerite that is aligned with the basal sclerite and sometimes, windows in the dorsal cornu (Rotheray and Lyszkowski 2015). Correlated movements include a head skeleton that pivots up and down rather than in and out of the thorax, mandibles that do not diverge on food gathering downstrokes and co-ordinated with downstrokes, retraction of the oral sclerite and mandibles held steady instead of lowering continuously.

Short, wide mandible hooks that do not diverge and are held in position on downstrokes are effective solutions for rasping hard food. Holding the mandible in one position is facilitated by the lozenge-shape of the mandible base, which means the muscles lowering and raising the mandible are in near vertical alignment and better able to work together. A short, wide mandible articulating with a block-shaped intermediate sclerite that is aligned with the basal sclerite are states better able to withstand the greater mechanical forces required for rasping.

In larvae with pivoting head skeletons, the shape of the pseudocephalon differs from those of larvae with head skeletons that extend in and out. Instead of an elongate, pseudocephalon (Fig. 13) the pseudocephalon is dome-shaped which provides space for pivoting (Fig. 12). Since the mandibles are ensheathed by the pseudocephalon, on upstrokes and downstrokes, the pseudocephalon alternately folds above the head skeleton and unfolds below it. Ventral folding, however, entails the problem of the oral cavity collapsing. The oral cavity is the upside down, cup-shaped space between the mandibles at the back of which is the opening to the pharynx. Food is gathered into it prior to being sucked in (Rotheray and Lyszkowski 2015). The plate-like, oral sclerite keeps the oral cavity open during food gathering downstrokes via muscles inserted at its apex (Fig. 12) which contract and pull on the rear margin of the oral cavity (Rotheray and Lyszkowski 2015). The deeper the pseudocephalon, the more room there is for pivoting, but there are limits to how deep the thorax can be, such as the need during locomotion for the pseudocephalon to retract into the prothorax. A solution which provides extra space for pivoting, is reducing the height of the head skeleton. This is achieved by the dorsal cornu bending at windows where sclerotisation is reduced (Rotheray and Lyszkowski 2015).

The larva of *P. scutellata* possesses all of the above features, a dome-shaped pseudocephalon, presence of an oral sclerite, mandible with a short, wide hook and a lozenge-shaped base, block-shaped intermediate sclerite aligned with the basal sclerite and windows in the dorsal cornu (Figs 12,16). It also has rings of spicules on the apical margins of the thoracic segments (Fig. 12) and flattened anterior spiracular processes (Fig. 10). Although we did not observe feeding, by comparison with other larvae possessing similar features that have been observed (Rotheray and Lyszkowski 2015), they probably function in the same way. Spicules enable the larva of *P. scutellata* to maintain the position of the thorax during rasping and flattened anterior spiracular processes prevents them being damaged. Finally, the relative lack of locomotory spicules on the underside is typical of larvae living in confined spaces (Rotheray 2014). In other pallopterans, a relationship exists between spicules and degree of confinement in the direction of reduced spicules with greater confinement. This is explained by the lateral and dorsal margins being used to hold on in confined spaces. In more open spaces, these parts of the body are unable to grip substrates and locomotory spicules are more important and hence, more developed.

The larva of *P. quinquemaculata* is the only other pallopteran known with a short, wide mandible hook and aligned intermediate and basal sclerites, indicating that it too feeds on hard food (Rotheray 2014). In this case, tiller bases of *Aira* and *Arrhenatherum* grasses (Poaceae) (Bałachowsky and Mesnil 1935, Nye 1958). The absence of cibarial ridges in this larva, suggests that it is an obligatory phytophage. It represents, however, an alternative solution to that of *P. scutellata* for dealing with hard food. Unlike *P. scutellata*, the mandible has teeth, the base is rectangular and the ventral cornu is narrow and well sclerotised (Rotheray 2014). Furthermore, the dental sclerites are developed and fused together and there is no oral sclerite. Unfortunately, only puparia have been studied and the shape of the pseudocephalon and thorax are unknown in the larva of this species (Rotheray 2014).

Larvae with mandibles having a similar rectangular base and feeding on hard food, such as *Stegana coleoptrata* (Scopoli) (Drosophilidae) and *Lonchaea sylvatica* Beling (Lonchaeidae) have mandibles that pivot over a short distance. This facilitates repeated rasping over the same area, an advantage for fragmenting hard food (Rotheray and Lyszkowski 2015). Pivot distances in *P. quinquemaculata* are probably similar. The former two species have oral sclerites to keep the oral cavity open. The fused dental sclerites of *P. quinquemaculata* may represent an alternative mechanism for the same end, but this requires confirmation.

For such a small family, the Pallopteridae is remarkable for the range of larval development sites, feeding modes and mechanisms (the means employed to transfer food from an external source to the gut) (Rotheray 2014). The larva of *P. scutellata* adds to this trophic diversity and is exceptional among pallopteran larvae for its particular combination of features. For example, its dome-shaped pseudocephalon that might only be shared with *P. quinquemaculata*, the posterior spiracular plate with a dorsal projection shared only with *P. saltuum* and unique features such as anterior spiracular process with a transverse arrangement of spiracles and presence of both dental and oral sclerites. Compared to other pallopteran larvae (Rotheray 2014), the dental sclerites of *P. scutellata* are, however, small relative to the mandible. This suggests they are reduced and vestigial, especially since their role in supporting the oral cavity is replaced by an oral sclerite. *Palloptera scutellata* reinforces the notion that the cyclorrhaphan larva is highly evolvable and capable of developing specialised, diverse solutions to the problems of food gathering (Rotheray and Lyszkowski 2015).

Life cycle and habits

At the time stems were collected, many larvae had pupated and after 12 September, only puparia were found. Most stems (>80%) had more than one puparium, maximum 9. This suggests that either stems are used for oviposition by more than one female or, females oviposit batches of eggs. *Juncus* stems have a hard epidermis and a hard, knotty base and these characteristics raise the question of how larvae enter stems and how adults escape. Indeed, in no stem did we encounter an adult that had apparently failed to escape. Small, oval-shaped holes were usually associated with infested stems, at about the maximum height of feeding tracks (Fig. 1). They may have been made by an ovipositing female. If so, then eggs are inside stems when larvae emerge and they feed downwards, towards the stem base. If emerging adults use these holes to escape, it explains why most puparia were found head up in the stem i.e. facing the direction of the oviposition hole. Often puparia were found grouped together and most puparia from which adults had emerged, were collapsed (Fig. 2). Relative to the puparia of other pallopterans, a noticeable characteristic of the puparium of *P. scutellata* is a lack of sclerotisation and a thin integument. A flimsy puparium may be possible because confined within the relative safety of the stem, there is no need for a firm puparium. Their collapsible nature, however, prevents them blocking the escape of emerging adults.

Holes in stems may have been made by larvae, rather than ovipositing females. If so, then in stems with more than one larva, it is difficult to explain why one hole was only ever found, i.e. what prevents each larva making a hole. A characteristic of holes that supports the idea that they were made by females, is that no scrapings were found within stems near holes and occasionally, the margins of holes were covered by outer epidermal tissue, suggesting that they were made by something pushing in from the outside. Facilitating hole creation, female *P. scutellata* have relatively broad ovipositors, figured in de Jong and van Aartsen (2007), and this may be an adaptation to making a hole of sufficient size for progeny to escape. Often holes were covered over by leaf bracts, presumably, these grow over holes during the summer. Leaf bracts are relatively firm and surround stems tightly, but apart from the base, they are not attached and emerging adults may be able to push their way out from under these bracts to the open. Advantages of holes being covered over are protection from rain and discovery by natural enemies. A natural enemy was found however, the ichneumonid wasp, *Theroscopus ochrogaster*, but only two instances were recorded. Another means of escape that might allow discovery by parasitoids is longitudinal splits that were present at the base of a small proportion of infested stems. These splits may appear because stem bases are weakened by larval feeding.

Although *P. scutellata* is one of the larger species within the genus (Colyer and Hammond 1968), and although few measurements were taken, we found variation in adult size in both males and females (Fig. 8). The amount of food within a stem is limited and size variation may reflect competition for food. Yet an apparent, positive relationship exists between the length of feeding tracks and the number of puparia per stem (Fig. 7). This relationship suggests that if food starts to run out, larvae obtain it from further up the stem, but there is probably a limit of how far they can go due to the gradual change from compact to spongy tissue. Relationships between adult size and numbers of larvae per stem would be rewarding to study.

Male *P. scutellata* are apparently rarely seen (Stubbs 1969), leading de Jong and van Aartsen (2007) to suggest the possibility of parthenogenetic populations, although Peter Chandler (*pers. comm.*) finds them regularly by sweeping low vegetation in suitable habitats in the autumn. Male pallopterans are in general, poorly recorded. For example, in Norway, Greve (1993) recorded female dominated sex ratios for several pallopteran species. When larvae of these species were reared in Scotland, sex ratios were, however, normal (Rotheray 2014). This was the case with *P. scutellata*, we reared 53% males to 46.8% females. Compared to early stages, adult pallopterans are less numerous and males are harder to catch than females (Rotheray 2014). This is because males of most species stay low to the ground and readily drop if disturbed. The latter behaviour was observed in male *P. scutellata* in rearing cages. Furthermore, males are only on the wing late in the year, mainly September and October. These factors probably account for the lack of male records.

Our results suggest that, like other pallopterans, an effective means of survey is to find and rear larvae. Indeed from the single tussock assessed here, over 480 individuals were reared, perhaps as many as have ever been recorded as adults in Britain since it was first captured in 1950. An effective time for surveying *P. scutellata* is the period when larvae have finished feeding and puparia are present, i.e. late August to October. Empty puparia remain in stems for an indeterminate period and given that they can easily be recognised, surveying for them can probably extend into the following year. That *P. scutellata* is under-recorded is obvious from the difficulties of catching adults. For instance, with a minimum of effort, we readily found puparia at two new sites in Cumbria and the species has also been found at several additional sites in Scotland using this method (K. Bland and D. Horsfield *pers. comm.*).

When the rearing results presented here are combined with results from Stubbs (1969) and Chandler (1991), the main features of the life cycle of *P. scutellata* in Britain can be specified. *Palloptera scutellata* is univoltine and males and females are only on the wing together in September and October, perhaps extending into November. By analogy with other species with a similar overwintering strategy, such as *Eristalis tenax* (Linnaeus) (Syrphidae) (Rotheray and Gilbert 2011), following mating in the autumn, *P. scutellata* males die and females seek hibernation sites, perhaps, among other places, in the centre of densely stemmed *Juncus* tussocks. In the spring and early summer, from April to June, females are active and oviposit in *Juncus* stems. Larvae develop until late August when they start pupating and both sexes emerge September to ?November. This life cycle is unlike those of other European pallopteran species, which have winter developing larvae (Rotheray 2014). The significance of such an unusual life cycle remains unexplained.

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Dipterists Day Exhibits 2015
– compiled by Editor from exhibitors' notes

Details are given here only of exhibits that did not also appear at the 2015 Exhibition of the British Entomological and Natural History Society.

DRAKE, C.M. (1) Uncommon Diptera associated with Devon rivers and streams recorded in 2015:

Limoniidae: *Molophilus propinquus* (Egger), R. Teign, Preston (SX848751), 23.v, 1♂ at sandy deposits with willow scrub; Madford Brook, Dunkeswell (ST148082), 30.x, 1♂ from a shaded stony stream. Probably new to Devon, but from two distant sites so likely to have been overlooked.

Molophilus niger Goetghebuer, R. Kit, 1♂ at Chardstock (ST305042), 22.iv, and 1♂, 1♀ at Cotley (ST2950636), 13.v, both from a partly shaded stony stream. Rare in Devon.

Tabanidae: *Tabanus cordiger* Meigen, R. Otter, Tipton St John (SY091930), 3.vi, several reared from pupae in sand deposits close to the water margin where pupae were frequent.

Empididae: *Hilara brevivittata* Macquart, R. Kit at Chardstock (ST305042), 22.iv and at Cotley (ST295063), 13.v, and a tributary at Sycamore (ST295059), 30.iv (all males). Apparently new to Devon.

Chelifera stigmatica Schiner, at three tributaries of the R. Kit at Whitehouse Farm (ST295053), 20.iv; Hook (ST307053), 13.v; Sycamore (ST290058), 30.vi (all males). Not particularly uncommon and with several records from small streams and trickles on Jurassic and Cretaceous soft geology in east Devon and west Dorset.

Kowarzia madicola (Vaillant), Parkhouse Water, Stoodleigh Barton (SS924183), 7.vi, 1♂. This species, first found by Andy Godfrey (2005. **In** Dipterists Day Exhibits 2004 – compiled by Editor from exhibitors' notes. *Dipterists Digest* (*Second Series*) **12,** 69-74), has still to be formally added to the British list. There are four records for Devon, from calcareous trickles and small streams.

Dolichopodidae: *Dolichopus argyrotarsis* Wahlberg, R. Teign, Preston (SX849748), 23.v, 2♂. This riverine species is known in Devon only from the lower sandy reaches of the R. Teign where it was also present in 2004.

Rhaphium penicillatum Loew, R. Culm at Hunkin Wood (ST083135), several males, and at Five Fords Farm (ST077134), 1♂, both 4.ix. It is apparently associated with sand or silt by western rivers, including four in Devon.

Syntormon macula Parent, widespread at east Devon streams and rivers in spring, found frequently in 2015, R. Dart, Thongsleigh Wood (SS908116), 7.vi; R. Culm at Five Fords Farm (ST077134) and at Hunkin Wood (ST083135), both 27.v; Salcombe Mouth by a coastal stream (SY147876), 18.iv; Holyford Brook, Holyford Wood (SY230920), 14.iv; Hook Brook, Burridge Common (ST311059), 21.iv; R. Kit at Cotley (ST295063), 13.v, at Ridge (ST302057), 16.iv and at The Parks (ST305042), 22.iv. These were all females; no males have been found so far in Devon.

Lonchopteridae: *Lonchoptera meijerei* Collin, R. Axe, Weycroft (ST313005), 4.x, 1♂, 1♀ at a *Phalaris* bed on gravelly exposed riverine sediment. Widespread on Devon rivers but rather rarely recorded, and not previously found on the R. Axe.

Ephydridae: *Athyroglossa ordinata* Becker, R. Otter, Tipton St John (SY091930), 3.vi, 1♂, 1♀.

Hecamedoides unispinosus (Collin), R. Otter, Tipton St John (SY091930), 3.vi, 1♂; R. Teign, Preston (SX855739), 23.v, several of both sexes.

Polytrichophora duplosetosa (Becker), R. Teign, Preston (SX855739), 23.v, 1♂, 2♀.

These three ephydrids are known from several Devon rivers where they are associated with sandy to gravelly exposed riverine sediments. The 2015 records show that the populations were still thriving 10 years after their first discovery at the same sites.

Scathophagidae: *Acanthocnema glaucescens* (Loew), Hook Brook, Burridge (ST311059), 21.iv, 1♀.; R. Kit, Cotley (ST295063), 13.v, 1♂. Both sites were shaded stony streams.

(2) Flies either new to Devon or rarely recorded in the county in 2015:

Tipulidae: *Tipula holoptera* Edwards, Creason Wood (SX524796), 17.x, at sheltered acid valley mire where males were frequent.

Limoniidae: *Dicranomyia goritiensis* (Mik), Salcombe Mouth (SY147876), 18.iv; Haven Cliff (SY259896), 11.vi; Starehole Cove (SX726365), 12.ix, all males. All sites were coastal seepages. The species is well known from the south Devon coast.

Dicranota simulans Lackschewitz, Hawns Wood (SX612620), 20.vi, 1♂, a shaded acid upland stony river.

Eloeophila trimacula (Zetterstedt), Linden Park (ST150087), 21.v, 1♀; Sheldon (ST108097), 21.v, 1♂; Sycamore (ST295059), 30.iv, 3♂. These were swept from seepages at acid mire or in wet woodland.

Helius pallirostris Edwards, Starehole Bottom (SX721367), 12.ix, 1♂. This is probably the second Devon record, swept at a cliff seepage at sea level.

Hybotidae: *Syndyas nigripes* (Zetterstedt), Ringdown Common (ST178155), 4.vii, 1♂. Bogs on the Blackdown Hills are a stronghold; this record was yet another site in 2015.

Ulidiidae: *Herina oscillans* (Meigen), Haven Cliff (SY259896), 11.vi. Although apparently known in Devon only from the Axmouth to Lyme Regis Undercliffs NNR, it is one of the commoner *Herina* here on dry sparsely vegetated slumping soft cliff.

Sciomyzidae: *Pherbellia annulipes* (Zetterstedt), Ware Cliff (SY323912), 24.vi, 1♂ swept in deciduous woodland on the Axmouth to Lyme Regis Undercliffs NNR; probably new to Devon.

Chloropidae: *Epichlorops puncticollis* (Zetterstedt), Sourton Common, Dartmoor (SX551899), 15.viii, 3♂ swept from acid mire by a headwater stream on moorland.

Lipara similis Schiner, Old Sludge Beds Reserve (SX953888), 29.vi, 1♂, reedbed; Axmouth (SY256897), 1.vii, 1♀. sparse reeds on soft coastal cliff seepage. These are new records for south-west England.

Dipterists Digest 2015 **22,** 173-178

Dolichopus '*pectinitarsis*' Stenhammar, a parasitised form of *D. plumipes* (Scopoli) (Diptera, Dolichopodidae), found in Britain

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Summary

Dolichopus pectinitarsis, a form of *D. plumipes* that has been demasculinised by a parasitic nematode, is recorded from Britain. The specimen's deformed state was compared with normal *D. plumipes* and *D. simplex* which it closely resembled, and it is suggested that *D. simplex* may represent the recent ancestral condition of this group of species.

Introduction

Checklists are replete with synonyms, usually resulting from poor descriptions or inadequate examination of type material. Less commonly, a specimen may appear to represent a new species when it is deformed by gynandromorphy. Gynandromorphs have a mix of male and female characters that arise from loss or duplication of sex-defining chromosomes at an early stage of cell division, or by parasites inducing deformities that are prevalent in species with male secondary sexual characters.

Ringdahl (1928) long ago gave a good account of several species of *Dolichopus* that he considered to be 'monstrous' or hermaphroditic forms, which he later described as gynandromorphs (Ringdahl 1949). The status of these possibly synonymous species remained unresolved until recently. Kahanpää (2008) showed that eight species of *Dolichopus*, and possibly another five species, are specimens of common species infected by mermithid nematodes that cause the fly to be demasculinised, that is, show poorly developed male secondary and often also weaker primary sexual characters. Nematodes in the family Mermithidae parasitise several families of Diptera but are most frequently reported in aquatic Nematocera (Nickle 1972). They attack the young larva and usually emerge when fully developed as the insect reaches the adult stage. If the remaining five doubtful species of *Dolichopus*, which include the British *D. mediicornis* Verrall, are also shown to be parasitised individuals then the European fauna will have been reduced by nearly 10% from its current 139 species (and a few subspecies) (Pollet 2013). *Dolichopus parvicaudatus* Zetterstedt and *D. pectinitarsis* Stenhammar are among the species that Kahanpää (2008) synonymised with *D. plumipes* (Scopoli). Hedström (1976) appears to be the first to have published the suggestion that the modification found in *D. pectinitarsis* was caused by a nematode; he is unclear whether he actually observed the parasite himself.

I examined single specimens of *Dolichopus* from England and France that to some extent fit the description of *D. pectinitarsis*, and compared their modified morphology with that of *D. plumipes* and *D. simplex*.

Results

At a site in Devon in south-west England, I collected a male *Dolichopus* agreeing largely with *D. pectinitarsis* in the keys and descriptions of Stackelberg (1930) and Parent (1938). The entire sample from which it came had been stored in a freezer for several months before examination, when the specimen, noted as aberrant, was pinned and allowed to dry before being properly examined. Having identified the fly and then becoming aware of the issues surrounding these demasculinised forms, I checked for signs of nematodes. There was no obvious exit hole on the tergites, sternites or intersegmental membranes so I relaxed the specimen and opened up the abdomen from below. There were no nematodes, which are usually large in comparison with the size of the host and may entirely fill the abdomen, as illustrated by German *et al.* (2010a).

Although the abdominal cavity was almost free of content, two 30 year-old specimens of normal *plumipes* in my collection had similarly empty abdominal cavities, so the absence of content did not necessarily imply that it had been eaten by a parasite. Thus there was some uncertainty about whether this was indeed a parasitised individual but it was assumed this was the case. Applying the name '*pectinitarsis*' was avoided, for reasons given below, and the fly is referred to as the 'Devon specimen'.

Ringdahl (1949) listed several features that characterised the species that he considered gynandromorphs, and Kahanpää (2008) examined them in more detail. These were looked for in the Devon specimen by comparing it with 20 normal male specimens of both *D. plumipes* and *D. simplex* collected from widely separated sites in Britain. The lengths of the epandrium and cerci were measured to the nearest 0.025mm. The cercus length was measured from the inflexion at its base to the margin between the bases of the first two terminal 'claws'. The reason for including *D. simplex* was that it is molecularly indistinguishable from *D. plumipes* (German *et al.* 2010b). I also examined a French male identified as *D. pectinitarsis*, possibly by R. Dahl, in the Natural History Museum, London, collected from the Pyrenees at an altitude of perhaps 1500m.

The features included:

- The width of the face, which becomes intermediate between the narrow male and broad female condition. The English specimen's face was indistinguishable from those of male *D. plumipes* or *D. simplex* (Fig. 1).
- Weak development of modified tarsal segments. The fringe of flattened hairs on the first tarsomere of the middle leg was as illustrated by Parent (1938), that is, similar to but less developed than in *D. plumipes* (Fig. 1). While the fringes were reduced, the segment itself was longer, so that its proportion relative to the tibia was more similar to that of *D. simplex* than to *D. plumipes*. In addition to a reduction in the tarsal male secondary sexual characters, the mid tibia's characters were also reduced, with no dark streak on the dorsal face, normal cylindrical cross-section, and no pair of subapical bristles at the distal end of the dark streak that characterises *D. plumipes* (Fig. 1). Instead, the chaetotaxy of the mid tibia included four approximately equally spaced antero-dorsals and two postero-dorsals, as in many other *Dolichopus* including *simplex*. The French specimen identified as *D. pectinitarsis* did have a very weak dorsal streak but the chaetotaxy was as shown for the Devon specimen.
- Hind leg tibial organ. These fields of modified microtrichia on the posterior face of the tibia, usually best developed in the basal half, are present in many species of *Dolichopus*. Both the English and French specimens had a tibial organ on the hind leg resembling that of normal *D. plumipes*, taking the form of a very narrow postero-dorsal strip of pale yellow pubescence in the basal 1/5 to 2/5, and continuing to the tibia tip as an extremely fine dorsal pubescent line behind the large setae. It is completely absent in *D. simplex*, which has only an even covering of short black hairs on the posterior face.
- Shortened epandrium and cerci. The lengths of these two features were marginally longer in the Devon specimen than those of *D. plumipes* and *D. simplex* (Table 1). These features were shorter in the French specimen but within the range of British *D. plumipes* and *D. simplex*.

The surstylar lobes were similarly almost indistinguishable (Fig. 1). Buchman (1961) also illustrated these features for all three species but his figure of *D. pectinitarsis* showed some reduction in the complexity of the internal appendages.

In addition to these features, both the Devon and French specimens had antennal colour differing from normal *D. plumipes*, being darker than described by Parent (1938) and Stackelberg (1930) with an entirely black first flagellomere (third segment) and largely black pedicel (second segment) (Fig. 1).

Table 1. Mean length and range (mm) of the lengths of the epandrium and cercus of the Devon and French specimens of *D. 'pectinitarsis'*, and 20 specimens each of *D. plumipes* and *D. simplex*.

	Epandrium length (mm)	Cercus length (mm)
Devon specimen	1.58	0.55
French specimen	1.35	0.45
D. plumipes	1.44 (1.30-1.55)	0.46 (0.35-0.50)
D. simplex	1.43 (1.33-1.50)	0.47 (0.40-0.55)

Discussion

Kahanpää (2008) concluded that *D. pectinitarsis* and *D. parvicaudatus* are forms of *D. plumipes* on a continuum of deformation caused by nematode infection, from extreme modification caused by more nematodes in *D. parvicaudatus* to the less affected *D. pectinitarsis* form. The relatively slight degree of deformation in the Devon specimen may suggest that it was caused by something other than a nematode but such speculation is beyond the remit of this paper, and the absence of a nematode or its exit hole may be due to my inexperience in looking for the right signs. A nematode could, for instance, have emerged in the period of a few hours between capture and storing it in the freezer. In view of the variability of no taxonomic value, caused by differing degrees of parasitism, it is unsurprising that the Devon specimen did not agree with several of the features listed by Ringdahl and Kahanpää, and consequently could not be identified as *D. pectinitarsis* (or any other species) in the key to the *D. plumipes*-group by Khaghaninia *et al.* (2014).

The type of *D. pectinitarsis* is apparently destroyed (Grichanov 2006), so it is not possible to check how closely the specimen matches this phenotype. Normal specimens of *D. plumipes* can also vary in antennal colour; for instance, Meuffels and Grootaert (1989) state that specimens with a completely or nearly completely dark first flagellomere are erratically found throughout Europe, more often in northern populations, including a form named var. *montanus* by Becker. British *D. plumipes* vary in the extent of dark colour on the first flagellomere, with a small proportion of specimens having more restricted black areas than shown in Fig. 1.

The Devon specimen is one of only two known in Britain of a *Dolichopus* species featuring apparently reduced male secondary sexual characters. Roy Crossley found a specimen that he identified as *D. pectinitarsis* taken by the River Tywi, Llanwrada, Dyfed, (grid reference SN73) on 9 July 1986. It has been recorded from Ireland (Withers 2002). These occurrences may alert recorders to demasculinised specimens in some other common British species, including *D. lepidus* Staeger, *D. longitarsis* Stannius and *D. picipes* Meigen for which Kahanpää (2008) published new synonyms among demasculinised specimens. Other British species with unconfirmed but quite probable synonyms among deformed specimens include *D. campestris* Meigen and *D. popularis* Wiedemann.

Most of the newly synonymised 'species' have distributions entirely or largely restricted to Scandinavia and boreal regions, and this was presumed to reflect the range of the parasitic nematodes, but parasitised *D. plumipes*, in the forms of *D. pectinitarsis* and *D. parvicaudatus*, clearly have a wider range in mid and northern Europe (Pollet 2013). Ringdahl (1949) stated that he had several 'monstrous' specimens in his collection and suggested that they may not be rare, but these forms do seem to be scarcer south of Scandinavia. For instance, in Germany, Meyer and Stark (2015) agree with the synonymy of Kahanpää (2008) and German *et al.* (2010a), but retain the distributional data for the two named demasculinised forms of *D. plumipes* showing that *D. pectinitarsis* is very scarce in Germany, recorded from only two of the 13 federal states, whereas *D. plumipes* has been recorded in all but the tiny state of Saarland. Recently recorded specimens of demasculinised *D. urbanus* Meigen and *subpennatus* d'Assis Fonseca containing nematodes have been found in Belgium (German *et al.* 2010a). It is therefore possible that demasculinised specimens masquerading as one of the newly synonymised species or as little-deformed individuals could occur in Scotland in particular but also elsewhere in Britain.

Of greater interest than merely recording this form in Britain is the possible light it may shed on the evolution of male secondary sexual characters of *D. plumipes*. I have compared the specimen not just with normal *D. plumipes* but also with *D. simplex* since German *et al.* (2010b) showed that these species are molecularly indistinguishable yet morphologically amply distinct. *Dolichopus plumipes* has one of the most ornamented mid legs among British *Dolichopus*, whereas *D. simplex* is aptly named in being characterised by an absence of distinguishing modifications.

Two hypotheses that German *et al.* (2010b) thought may explain why two genetically identical species have such different male secondary sexual characters were allopatric speciation and rapid loss or gain of the male characters through sexual selection. Although both processes may be operating, they considered that sexual selection probably outweighed other mechanisms as an explanation with a sound evolutionary background. But they could not determine from their data whether, from their common ancestor, *D. plumipes* has gained the ornamentation or *D. simplex* lost it. Demasculinisation by parasites provides a natural experiment in disrupting development of male secondary sexual characters. At least in the two specimens examined here, the *D. pectinitarsis* form of *D. plumipes* appeared to closely resemble *D. simplex* in its mid tibial chaetotaxy and shape, and in the darker antennae, even though the hind tibial organ appeared to be unaffected. This is interpreted as a *D. simplex*-like form providing the ground plan of the common ancestor, and that *D. plumipes* had gained its male secondary sexual characters rather than *D. simplex* lost them. This is obviously speculation and it could be considered a misinterpretation of disrupted sexual development.

Material

1 male. Britain, Percy Wakley Reserve, belonging to the Woodland Trust, near Rockbeare, Devon, in south-west England; V.C. 3; SY035953; 3 June 2015; swept. In the author's collection. The site was a new deciduous woodland planted perhaps 20 years ago and of little conservation importance. Other dolichopodids recorded here were unremarkable and comprised a suite of very common and widespread species.

1 male. France, Pyrénées orientales, Porté Puymorens; 20-26 August 1962; Håkan Lindberg; specimen in the Natural History Museum, London.

Acknowledgements

I thank Roy Crossley for early suggestions on the specimen's identity and for permission to quote his record, Jere Kahanpää for providing his publications on the subject, Duncan Sivell, NHM London, for the loan of specimens, and Marc Pollet and Igor Grichanov for reviewing and suggesting improvements to an earlier draft of this paper. Neither reviewer is responsible for the speculation in the discussion.

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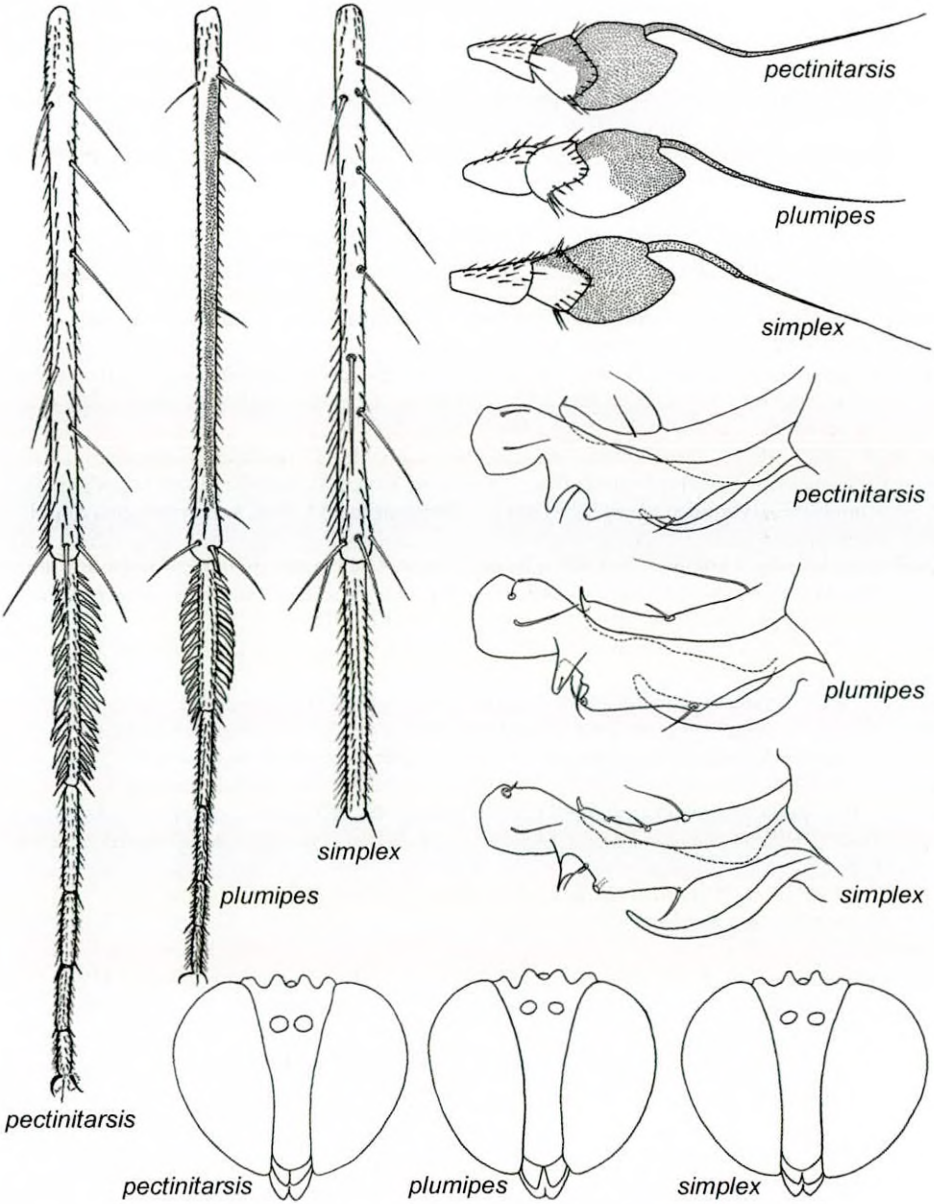

Fig. 1. Mid tibia and tarsus, antennae, ventral and dorsal surstylar lobes and postgonite of the genitalia, and faces of *Dolichopus pectinitarsis*, *D. plumipes* and *D. simplex* from England. Only the first tarsomere is shown for *simplex*. Each character is drawn to the same relative size; their absolute sizes varied slightly.

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Borboropsis puberula (Zetterstedt) (Diptera, Borboropsidae) in Perthshire – On 7 September 2014 a female of *Borboropsis puberula* (Zetterstedt) was swept from woodland by the edge of Loch Rannoch at Camghouran (NN536568), Perthshire. Collecting was concentrated along a small stream edged with alders and sallows, within a much larger area of birch woodland. Although the biology of *B. puberula* is unknown, in this country it is considered to be a species of Caledonian pine forest. However it has been recorded from Malaise traps set in birch woodland in Sweden by Phil Withers (2010. An annotated list of Heleomyzidae and allied families (Diptera) of Sweden. *Dipterists Digest (Second Series)* **17,** 171-179) and so the capture at Camghouran in similar habitat is not so surprising. In this country there are previous records from the Spey Valley and Migdale Wood, Sutherland in 1999 (Chandler, P.J. 2014. *British Journal of Entomology and Natural History* **27,** 117 (Annual Exhibition Report)).

I would like to thank Peter Chandler for confirming my identification of *B. puberula* – **IVAN PERRY,** 27 Mill Road, Lode, Cambridge, CB25 9EN

Platypeza hirticeps Verrall and _Agathomyia lundbecki_ Chandler in Shatalkin (Diptera, Platypezidae) in Perthshire – On 12 September 2000, two males of *Platypeza hirticeps* Verrall were found running around on the leaves of *Rhododendron* at the Birks of Aberfeldy, Perthshire (NN853475). The locality is a wooded ravine, dominated by beech close to the capture site, but also containing a number of exotic tree species. This would appear to be the first record from Scotland, although the significance of the capture was not realised until much later. The host fungus of *P. hirticeps* is apparently unknown, but is thought likely to be *Armillaria* species, as is the case with some other members of the genus (Chandler P.J. 2001. The Flat-footed Flies (Diptera: Opetiidae and Platypezidae) of Europe. *Fauna Entomologica Scandinavica,* Vol **36,** 276 pp).

Whilst collecting by the river Garry at the southern end of Killiecrankie NR, Perthshire (NN911606) on 9 September 2014, I swept a female *Agathomyia lundbecki* Chandler in Shatalkin from beneath an oak. This appears to be the first record for Perthshire, with previous Scottish records from Migdale Wood, Sutherland in 1986 and Logie, Elgin in 1904. Elsewhere it is known from three localities in Wales and one in Surrey (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* No. 2. Joint Nature Conservation Committee, Peterborough) and has also been found by Peter Chandler at Out Wood (SK5115), Leicestershire (one male on 19 October 2007), until the present record the only one of *A. lundbecki* in Britain since 1990.

Larvae of *A. lundbecki* develop in the bracket fungus *Inonotus radiatus*; this association was suggested by Chandler (*op. cit.*) because adults had been found on this fungus, and this has since been confirmed by rearing of many adults of both sexes from *I. radiatus* in Finland (Ståhls, G. and Kahanpää, J. 2006. New data on Platypezidae and Opetiidae (Diptera) of Finland. *Sahlbergia* **11,** 1-6). No fruiting bodies of *I. radiatus*, which grows mainly on alder *Alnus glutinosa*, were noted at Killiecrankie NR, although alders were a frequent component of the woodland at the edge of the river.

I would like to thank the National Trust for Scotland for permission to collect at Killiecrankie – **IVAN PERRY,** 27 Mill Road, Lode, Cambs CB25 9EN

Pollenia vagabunda (Meigen) (Diptera, Calliphoridae) in Highland –

I have been recording *Pollenia* species in the N and W of Scotland since 2011, and have taken all the British species except *P. viatica* Robineau-Desvoidy there. The most interesting find has been *P. vagabunda* (Meigen, 1826) in Highland. I have not been able to locate any other Scottish records.

My first encounter was on 1 November 2012 in NH54 west of Inverness. The following year, Jimmy McKellar took one in Inverness (NH64) on 4 November. On 30 August 2015 I found a single fly at Grantown-on-Spey (NJ02), and on 5 September at a site near Aviemore (NH91) I saw over 20 individuals in a small area, presumably a recent local emergence.

Pollenia vagabunda appears to be a rather scarce fly nationally, but it is clearly well established over a wide area in Highland. Our dates are all rather late, but this may be a consequence of inadequate recording effort.

The fly is surprisingly distinctive in the field, the dark median stripe on the front of the thorax often very obvious. It is also quite long and slender in comparison with its congeners, and this can also attract attention. If suspected, a specimen should always be taken and checked microscopically.

I am grateful to Jeanne Robinson of the Hunterian Museum in Glasgow for checking the collection there – **MURDO MACDONALD** 'Tigh nam Beithe', Strathpeffer, Ross & Cromarty IV14 9ET

The House-fly *Musca domestica* Linnaeus (Diptera, Muscidae) in Scotland –

Since 2008, I and other members of the Highland Biological Recording Group have been looking for the House-fly *Musca domestica* Linnaeus, 1758 in the N and W of Scotland. It has proved remarkably elusive. It is clear that in the past it was present throughout the Scottish mainland and in the Western Isles, though most records I have found are from before 1950. Since 2008, despite extensive searches from Shetland to SW Scotland, we have only six records: two in Inverness (NH64) in 2009 and 2010; a pair on Lismore (NM84) in 2011; and in 2015, three across the Highland region from Raasay (NG53) in the west to Strathpeffer (NH45), and near Tain (NH78) in the east. On occasional visits to England, I have gleaned only two records in N Yorkshire (SE68) in 2012 and one in Lancashire (SD34) in 2014. Almost every source describes *Musca domestica* as abundant and ubiquitous around human habitations. Comments from others confirm my personal experience that it is far from that in Scotland, and possibly not in the rest of Britain either. Observations by E.C.M. d'Assis-Fonseca (1958, Houseflies. *The Bulletin of the Amateur Entomologists' Society* **17**(no. 209), 36) suggest that it has been declining in Britain for several decades at least. While it is suspected that increased hygiene has resulted in a decline in urban areas, it was a surprise to find it so scarce in the rural areas of Scotland. It would be interesting to have targeted recording of the species to establish properly its current status nationally, and to investigate reasons for any decline in numbers and range. Anyone with recent records of *Musca domestica* from anywhere in Scotland can report them to me at records@hbrg.org.uk – **MURDO MACDONALD,** 'Tigh nam Beithe', Strathpeffer, Ross & Cromarty IV14 9ET

An inland record of the soldier fly, *Stratiomys longicornis* (Scopoli) (Diptera, Stratiomyidae) – *Stratiomys longicornis* (Scopoli) in Britain is mainly a coastal species with most records being in south-east England from Norfolk to Hampshire (Stubbs, A. and Drake, M. 2014. *British Soldier Flies and Their Allies*. British Entomological and Natural History Society). On 8 May 2015 a single female was seen resting on the current year's foliage of reeds by the River Mole at Gatwick Airport (TQ26241), Vice County Surrey. This part of the River Mole was diverted into a new channel around the northern perimeter of the airport in 2000 when Gatwick was extended to accommodate the North Terminal. A second visit to the site on 23 June 2015, when water dropwort *Oenanthe crocata* was in flower, did not produce any more sightings.

The specimen found at Gatwick may have been a wanderer from the coast but it is possible that *S. longicornis* might be breeding in a saline pond in the area. Ethylene glycol is used to de-ice the runways at Gatwick because of the corrosive effect of salt. However, salt is widely used on roads during the winter and balancing ponds by the nearby M23 motorway may provide suitable conditions for the aquatic larvae of *S. longicornis* – **A.J. HALSTEAD,** 17 Highclere Gardens, Knaphill, Woking, Surrey GU21 2LP

Recent records of *Fannia collini* d'Assis-Fonseca (Diptera, Fanniidae) – On 25 May 2014, a male *Fannia collini* d'Assis-Fonseca was swept from the edge of a trackway at Linky Down, Aston Rowant NNR (SU722965), Oxfordshire. The exact circumstances of the capture were not noted, but the track passes through areas of deciduous woodland, calcareous grassland and scrub. Diptera were frequent on a flowering buckthorn bush *Rhamnus cathartica* and it is very likely that this is where it was captured.

From the middle of August to the beginning of September 2015, species of *Fannia* were numerous on the flowers of *Bupleurum fruticosum* (Apiaceae) in my garden at Lode (TL531628), Cambridgeshire. Among the seventeen species identified there were single males of *F. collini* on 16 and 17 August. Other species of interest present included *F. aequilineata* Ringdahl, *F. clara* Collin, *F. lucidula* (Zetterstedt), *F. nigra* Malloch and *F. vesparia* (Meade). My garden adjoins the National Trust property of Anglesey Abbey, which contains areas of mature woodland, parkland and herb-rich grassland.

Only three males of *F. collini* were known to d'Assis-Fonseca (1968. Diptera Cyclorrhapha Calyptrata Muscidae. *Handbooks for the Identification of British Insects,* Vol **10** Part 4(b), 119 pp. Royal Entomological Society of London), from Farley Mount and Matley Bog, New Forest, Hampshire. Since then the only record that I am aware of is a male recorded from Chiddingstone Ponds, near Tonbridge, Kent by Laurence Clemons (1994. *Entomologist's Record & Journal of Variation* **106,** 117).

The biology of *F. collini* is unknown and so far it has only been recorded from Great Britain. In the key to males of *Fannia* provided by d'Assis-Fonseca (*op. cit.*) one of the distinguishing features given is the number of frontal bristles present. *Fannia nigra* is said to have 12-15 pairs, whereas *F. collini* is accredited with 8-10 pairs. My specimens of *F. collini* have 11-12 pairs, whilst I have undoubted *F. nigra* with 9 and 10 pairs of frontal bristles. This character is obviously more variable than was first thought and identification of males is best relied upon by comparison of the genitalia, which are very obviously different; the female is undescribed – **IVAN PERRY,** 27 Mill Road, Lode, Cambs CB25 9EN

Eurygnathomyia bicolor (Zetterstedt) (Diptera, Pallopteridae), recorded from Scotland – On 27 May 2015 two females of *Eurygnathomyia bicolor* (Zetterstedt) were swept from ground vegetation in an area of wet alderwood by the edge of the River Garry at Killiecrankie NR, Perthshire (NN917626). In the net they bore an uncanny resemblance to a species of *Opomyza* (Diptera, Opomyzidae), although once examined under the microscope it soon became obvious that they were something out of the ordinary. The females have two erect bristles on the postero-ventral surface of the front basitarsus and this unusual feature helped greatly in their identification.

Eurygnathomyia bicolor was added to the British List by B.H. Cogan and J.P. Dear (1974. Additions and corrections to the List of British Acalypterate Diptera. *Entomologist's monthly Magazine* **110,** 173-181) on a female from Coverdale, Yorkshire collected on 16 June 1922 by C.A. Cheetham. More recently (in 1977, 1979 and 1981) it has been found at Scargill Woods, also in NW Yorkshire, where the habitat is apparently very similar to that at Killiecrankie (Peter Chandler *pers. comm.*).

The larval biology of *E. bicolor* is unknown and with some species of Pallopteridae phytophagous, whilst others are saproxylic, searching for larvae would be difficult. The Killiecrankie site has an abundance of dead wood, some of which is partially submerged in the numerous small streams and seepages present and that may be one area worthy of investigation. It might also be worth mentioning that the River Garry here has several exotic plants growing at its edge, washed down from the gardens at Blair Atholl just upstream.

I would like to thank Peter Chandler for information on Scargill Woods and the National Trust for Scotland for permission to collect at Killiecrankie – **IVAN PERRY,** 27 Mill Road, Lode, Cambs CB25 9EN

A second record of _Eurygnathomyia bicolor_ (Zetterstedt) (Diptera, Pallopteridae) from Scotland – A single male specimen of *Eurygnathomyia bicolor* (Zetterstedt) was found by Keith Bland in a Malaise trap catch collected by David Pryce in Balnaguard Glen SSSI (NN9451, V.C. 88, Mid Perth). The date on the specimen was 15 May 2011, but the Malaise trap had presumably been in operation for at least a few days prior to that date. Balnaguard Glen is on the northerly-facing slopes of Strathtay and consists of juniper and birch woodland with alder present along burnsides. The woodland has a diverse ground flora.

Eurygnathomyia bicolor was introduced as new to Britain by B.H. Cogan and J.P. Dear (1975. Additions and corrections to the list of British Acalypterate Diptera. *Entomologist's monthly Magazine* **110,** 173-181). They reported a single female collected by C.A. Cheetham on 16 June 1922 from Coverdale, Yorkshire. There is another British record by P.J. Chandler (1978. *Eurygnathomyia bicolor* (Zett.) (Dipt: Pallopteridae) rediscovered in Teesside. *Entomologist's Record and Journal of Variation* **90,** 86-87) of a number of specimens taken on 16 June 1977 in an alder wood near Scargill (NZ01) in Teesdale, North Yorkshire.

The first Scottish record was from alderwood at Killiecrankie on 27 May 2015 by I. Perry (2016. *Eurygnathomyia bicolor* (Zetterstedt) (Diptera, Pallopteridae), recorded from Scotland. *Dipterists Digest (Second Series)* **22,** 182). Killiecrankie is about 12km north of Balnaguard Glen – **DAVID HORSFIELD** and **KEITH P. BLAND,** National Museums Collection Centre, 242 West Granton Road, Edinburgh EH5 1JA

Dipterists Digest 2015 **22,** 183-191

Observations of *Bibio* and *Dilophus* species (Diptera, Bibionidae) in north Scotland

MURDO MACDONALD

'Tigh nam Beithe', Strathpeffer, Ross & Cromarty IV14 9ET

Summary

Field observations of Bibionidae in N Scotland, mainly from 2010-2015, describe the distribution and phenology of the three *Dilophus* and ten *Bibio* species recorded there. *Dilophus humeralis* is confirmed as a Scottish species. There is some indication of a change in abundance or range of *D. femoratus* and *B. nigriventris* in recent decades. *Dilophus febrilis* shows two separate flight periods, suggesting the need for genetic investigation of the two cohorts.

Introduction

Museum specimens and literature records of Bibionidae throughout Scotland have recently been reviewed by Skartveit *et al.* (2013). This paper adds further information based on field observations in the north of Scotland, mainly since 2010.

Methods

All my encounters with *Bibio* and *Dilophus* species in Scotland since 2010 were recorded, and all records from the datasets of Highland Biological Recording Group (HBRG), Outer Hebrides Biological Recording (OHBR) and the Lorn Natural History Group (LNHG) on NBN Gateway were used. HBRG has encouraged reporting of the two distinctive flies *B. marci* and *B. pomonae* for a number of years. Apart from a few records from known reliable entomologists, I confirmed the determination of all species except these two from specimens, or in a few exceptional cases from photographs. Identification was confirmed with Freeman and Lane (1985) and Skartveit (1995). Most observations came from Highland (the local authority area covering the vice-counties 96, 97, 104-109 with parts of vice-counties 95 and 98), some from the Western Isles (V.C. 110), and a few from elsewhere in Scotland.

Coverage was not uniform either in space or in time, but my presence as a resident dipterist in the area allowed far more comprehensive recording in spring and autumn, and in remote areas, than we have had before. All records considered are from OS grid squares NL to NO and northwards. Effort was not uniform in time or space (65% of records were from NH, but only 24% from NC, ND and NG, only 3 records were from Orkney and none from Shetland), so phenology may not be entirely representative and distribution maps will contain many false gaps. Most records were from below 400m elevation. The maps include records from Skartveit *et al.* as grey dots, which may in some cases be displaced by one hectad because of lack of precision in the quoted location. Shetland is omitted from the maps, as I have found precise locations there only for *D. femoratus*. A separate map is included. All the records used in this paper, except those cited from the literature, are available in full on NBN Gateway in the datasets managed by HBRG, OHBR, and LNHG.

Results

To allow easy comparison with Skartveit *et al.*, species accounts follow the same alphabetical order and (where relevant) the same structure as in that paper.

***Bibio clavipes* Meigen, 1818**

Remarks. Despite the taxonomic uncertainties around this and *B. longipes*, my experience suggests that, as stated by Skartveit *et al.*, in Britain the two species are clearly separate. Interestingly, on 17 October 2015, I found a male *B. longipes* firmly *in copula* with a female *B. clavipes*, but given that the two species are frequently found together, and may be caught in almost equal numbers in a single sweep, the occasional mistake might be expected.

General description. Apart from the differences in the stigma, *B. clavipes* tends to be noticeably larger than *B. longipes*. This is sufficiently obvious in a mixed collection to allow almost complete separation of the two species. I disagree with the statement by Skartveit *et al.* that the stigma is 'usually quite invisible in the male'. While it is not uncommon to find males with no visible stigma, the overwhelming majority of live males have an obvious grey-black stigma, clearly bounded at the edge of the costal cell.

Biology. This species is the latest flying bibionid, sometimes extending into November. Males swarm in loose groups in autumn sunshine. While most records are from clearings, rides, and forest edge, it has also been found in more open country, and even in a garden in suburban Inverness. Phenology: extreme dates 27 August and 12 November; 95% of records in 77 days; peak month October (50% of 24 records). The flight season is very much longer and less synchronous than that of *B. longipes*, which is otherwise so similar in many ways.

Distribution in N Scotland. Recent field records are confined to the eastern part of Highland (Fig. 1). However, given the inadequacy of coverage in the north and west during the flight season, and the record from the Western Isles cited by Skartveit, albeit from 1882, we should not be surprised if it is present more widely in the north and west mainland.

***Bibio ferruginatus* (Linnaeus, 1767)**

Distribution in N Scotland. We have a single Highland record, which requires confirmation, from Skye, NG51, on 4 June 1998. This lies between Lismore in Argyll, and Tongue, on the far north coast, quoted (with some reservation) by Skartveit *et al.* The species seems to be extremely scarce in N Scotland, but there seems little reason to doubt its presence here (Fig. 1).

***Bibio johannis* (Linnaeus, 1767)**

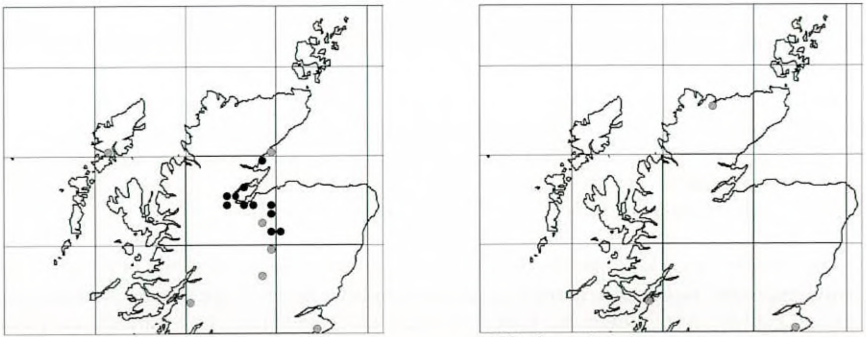
Biology. This is the first *Bibio* to emerge, and as a result it has been seriously overlooked. It is very easy to collect in April by sweeping coastal vegetation, but it extends well inland in wooded areas and moorland, and has been taken in a suburban garden in Inverness. It tends to form dense swarms in low vegetation rather than flying. Phenology: extreme dates 30 March and 2 May (exceptionally late, 15 June); 95% of records in 26 days; peak month April (91% of 34 records).

Distribution in N Scotland. Bibio johannis is common on the east coast of Highland and on the Western Isles. The apparent gaps are probably not real, and it should be expected to be numerous all round the coast, including the Hebrides, and possibly in Orkney as well. It is likely to be more widely present inland than the current map suggests (Fig. 1).

***Bibio lanigerus* Meigen, 1818**

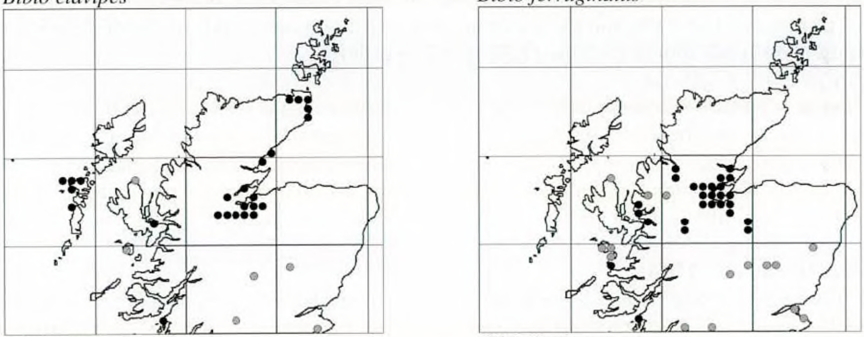
Biology. One of the early-summer fliers, *B. lanigerus* can be abundant on forest edge. Males tend not to fly much, but rather sit on foliage with wings spread. Phenology: extreme dates 20 April and 10 June; 95% of records in 42 days; peak month May (82% of 57 records).

Distribution in N Scotland. Records extend across Highland from east to west (Fig. 1), and it should be expected in suitable habitat anywhere south of a line from Ullapool to the Dornoch Firth. Absence of records from farther north may reflect poor recording effort there.



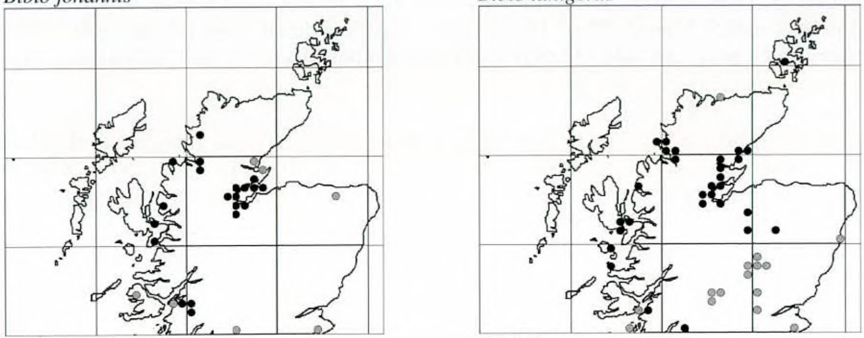
Bibio clavipes

Bibio ferruginatus



Bibio johannis

Bibio lanigerus



Bibio leucopterus

Bibio longipes

Fig. 1. Distribution of records of six *Bibio* species in N Scotland. Black symbols are from this study; grey symbols from Skartveit *et al.* (2014).

***Bibio leucopterus* (Meigen, 1804)**

Biology. Another of the species flying mainly in May, *B. leucopterus* varies hugely in numbers from year to year and place to place. Typically, both sexes sit on leaves of trees like sycamore

Acer pseudoplatanus. In some years and localities their foliage can be covered with a dozen or more flies on each leaf, and on most leaves on a tree. Elsewhere, and in other years, it can be very scarce. Most records are from clearings, rides, and forest edge. Females of this species are far more obvious in the field than those of most *Bibio* species. Phenology: extreme dates 3 May and 12 July; 95% of records in 37 days; peak month May (80% of 41 records).

Distribution in N Scotland. This fly has been found on both the east and west sides of Highland (Fig. 1), and might be expected anywhere in appropriate habitat except perhaps the far north. Again, given the inadequacy of coverage in the north, the apparent absences may not be real.

Bibio longipes Loew, 1864

Remarks, General description. See the comments under *B. clavipes* above.

Biology. The second of our autumn fliers, *B. longipes* is often found with the very similar *B. clavipes*, though it tends to be more numerous and has a much shorter flight season. It has a very wide range of habitat, from dunes to 400m on open moorland, and in suburban Inverness. Sweeping coastal vegetation will reveal it in good numbers in the same places as *B. johannis* is found six months earlier. Phenology: extreme dates 15 September and 30 October; 95% of records in 39 days; peak month October (83% of 41 records).

Distribution in N Scotland. Recent observations have confirmed its presence across the area from east to west, and as far north as S Sutherland (Fig. 1). As with other small bibionids, apparent absence in the far north is almost certainly not real, as a speculative request to an observer in Orkney in 2015 produced unmistakeable images of *B. longipes* from there by return (Derek Mayes *pers. comm.*). It would be reasonable to expect it throughout Highland.

Bibio marci (Linnaeus, 1758)

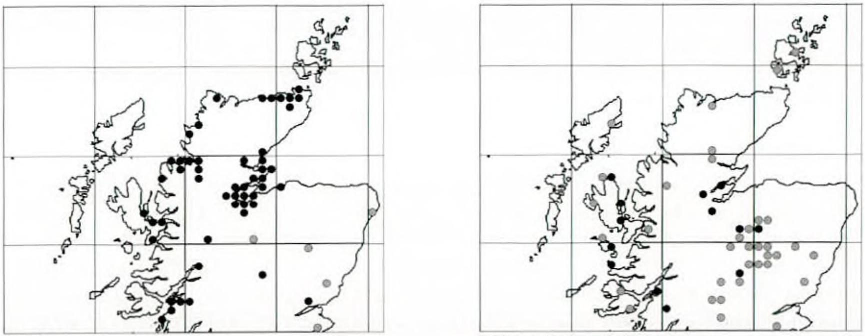
Biology. The large size and conspicuous behaviour of *B. marci* has encouraged more records than of the smaller species. Most are from the coastal fringes, but it is sometimes present quite far inland, and up to 200m altitude. Phenology: extreme dates 19 April and 8 June; 95% of records in 41 days; peak month May (73% of 115 records). For individual years the first dates varied from 19 April to 16 May; last dates 22 May to 8 June; and the observed flight period varied from 18 to 45 days (mean 27 days).

Distribution in N Scotland. It might be expected anywhere in coastal areas of mainland Highland, and on Skye, and less frequently in suitable habitats inland (Fig. 2). Comparison with the distribution of the equally distinctive *B. pomonae* suggests that *B. marci* is indeed less frequent inland, as also found by Skartveit (1995) in Norway.

Bibio nigriventris Haliday, 1833

Biology. Skartveit *et al.* suggested that this might be the commonest *Bibio* species in Scotland, but that is not my experience. I have usually encountered it only a few times each year. Perhaps like *B. leucopterus* it shows wide annual variation in abundance. In 2015 it was unusually common. It has been found in a variety of habitats, and from sea level to open hills at 420m. Phenology: extreme dates 3 May and 13 June; 95% of records in 41 days; peak month May (67% of 18 records).

Distribution in N Scotland. Despite the scarcity of records, *B. nigriventris* might be expected anywhere in north Scotland (Fig. 2). It has been recorded in Shetland (the only *Bibio* known from there), Orkney, Lewis and on Skye and adjacent islands (Skartveit *et al.*). The contrast between the recent and historic records does raise the possibility of a real change in status in the recent decades, but only more observation over a longer time scale will reveal the truth (see also *Dilophus femoratus*).



Bibio marci *Bibio nigriventris*

Bibio pomonae *Bibio varipes*

Fig. 2. Distribution of records of four *Bibio* species in N Scotland. Black symbols are from this study; grey symbols from Skartveit *et al.* (2014).

Bibio pomonae (Fabricius, 1775)

Biology. Bibio pomonae, with its large size (like *B. marci*), red legs and conspicuous swarming behaviour attracts more attention than most of the family and has provided many more records than any other species. It may be found almost anywhere, from sea level to 775m and from open moorland to suburban gardens. Phenology: extreme dates 15 June and 2 October; 95% of records in 87 days; peak month August (69% of 194 records). For individual years the first dates varied from 15 June to 10 August; last dates 2 September to 2 October; and the observed flight period varied from 28 to 79 days (mean 55 days). Despite the extended flight season – the longest of all our *Bibio* species – there is no evidence in the records for two peaks of activity.

Distribution in N Scotland. Bibio pomonae may be found anywhere in Highland, also in Orkney, and is frequent in the southern islands of the Western Isles (Fig. 2). The lack of records from Harris and Lewis is likely to reflect low recording effort.

Bibio varipes Meigen, 1830

General description. The yellow-brown wings on a *Bibio* usually obviously larger than *lanigerus* are a good pointer to this species in the field.

Biology. This rather scarce species shares flight time with several other *Bibio*. Most records are from clearings, rides, and forest edge, and it was once caught in a moth-trap. Phenology: extreme dates 23 April and 2 June; 95% of records in 27 days; peak month May (89% of 18 records).

Distribution in N Scotland. Records range from the west coast to the east coast of Highland (Fig. 2). It should be expected anywhere on the mainland in suitable habitat except perhaps in the far north where specialist recording effort is lacking.

Dilophus febrilis **(Linnaeus, 1758)**

Biology. While most records are from clearings, rides, and forest edge, it has also been found in more open country and in suburban Inverness. Phenology: extreme dates 1 March and 15 September; peak months May (39% of 76 records) and August (29%). Unlike all our other bibionid species, *D. febrilis* shows clear evidence of two peaks in activity, interpreted by Blackshaw and D'Arcy-Burt (1992) as two distinct cohorts with different 12 month cycles rather than a bivoltine breeding system. Under this interpretation, the early cohort peaks in May with 64% of 47 records, and the other in August with 76% of 29 records, numbers comparable with the others in the family.

Distribution in N Scotland. We should expect this fly to occur anywhere in N Scotland except Shetland (Fig. 3).

Dilophus femoratus **Meigen, 1804**

General remarks. This is the bibionid with the widest Scottish range, being present on all the main island groups including the isolated St Kilda archipelago and the Flannans to the west of the main Hebridean chain.

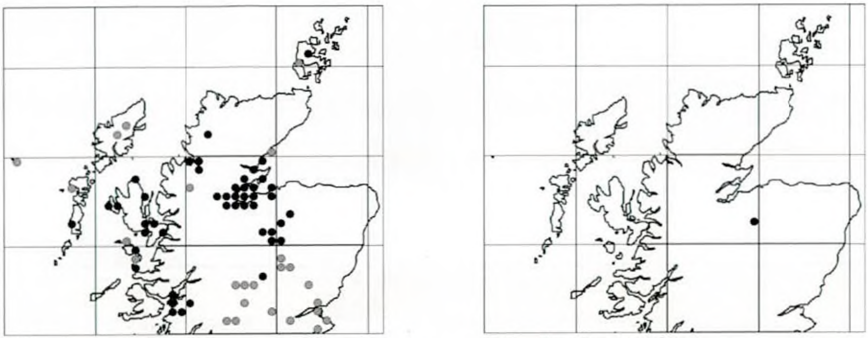
Biology. Phenology: extreme dates 19 May and 20 June; 95% of records in 26 days; peak month June (83% of 42 records).

Distribution in N Scotland. There is a distinct lack of records of this fly on the mainland since 2010 – I have only found it twice – though W.A. Ely recorded it frequently in Highland in the early 1980s. It may be that there has been a change in abundance or distribution in the past 30 years. On the W Isles, on the other hand, it is abundant in May and June, even on Hirta (St Kilda group) where it is present throughout the island. It is easy to find from Lewis down to S Uist and Eriskay. It should be present more widely on the west of the mainland, apparent absence perhaps reflecting lack of recording effort (Fig. 3). It is widespread on Shetland (Skartveit *et al.*).

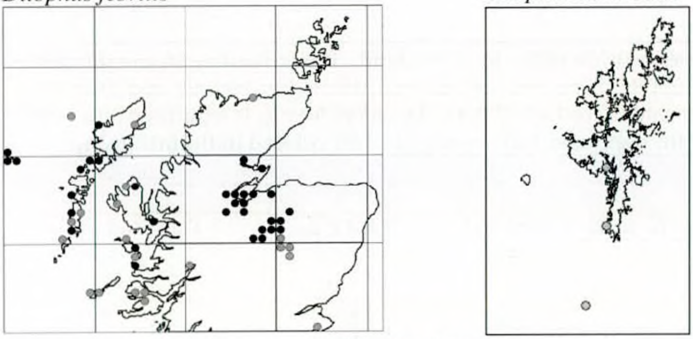
Dilophus humeralis **Zetterstedt, 1850**

Remarks. The single Scottish record quoted by Skartveit *et al.* from the NESBReC database (though it originated with HBRG and was passed to NESBReC) was regarded as unconfirmed. It can now be verified and added to the Scottish list. W.A. Ely took the specimen on 19 June 1982 at Nethy Bridge (NH9922), and the identification was checked by him in November 2015.

Distribution in N Scotland. Though we have only one record (Fig. 3) and it is almost certainly very rare in Scotland, given the poor effort devoted in N Scotland to the family it might be far more widely distributed than is evident.



Dilophus febrilis *Dilophus humeralis*



Dilophus femoratus

Fig. 3. Distribution of records of three *Dilophus* species in N Scotland. Black symbols are from this study; grey symbols from Skartveit *et al.* (2014).

The flight periods of the N Scottish species are shown in Table 1. Unsurprisingly, both apparent abundance and length of flight period varied significantly from year to year, and for the two species with sufficiently large samples, *Bibio pomonae* and *B. marci*, data are presented in Table 2.

Discussion

In general, field observations of bibionids in N Scotland since 2010 confirm the conclusions of Skartveit *et al.* (2014) from museum and literature records. Significant extensions to our knowledge of the family are the confirmation of *Dilophus humeralis* as a Scottish species, and extensions to the previously mapped ranges of *B. johannis*, *B. leucopterus*, *B. longipes*, *B. marci*, and *B. pomonae*. Also, there is a suggestion of change in range and/or abundance over the past few decades for *B. nigriventris* and *Dilophus femoratus*, though that needs confirmation from further and more widespread observation.

The opportunity for frequent observation throughout the year, especially early and late, has contributed to the realisation that *B. johannis* is abundant in April over much of the Highlands and W Isles, and six months later it is replaced by *B. longipes*.

Species	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**
Bibio johannis	1	**31**	1	1					
B. lanigerus		8	**47**	2					
B. marci		17	**84**	14					
B. varipes		1	**16**	1					
B. leucopterus			**33**	7	1				
B. nigriventris			**12**	6					
B. pomonae				3	15	**133**	42	1	
B. longipes							7	**34**	
B. clavipes						3	5	**12**	4
Dilophus febrilis (early)	1	8	**30**	8					
D. femoratus			7	**35**					
D. febrilis (late)					1	**22**	6		
No. of species flying	2	5	8	9	3	3	4	3	1
No. of species peaking	0	1	6	1	0	2	0	2	0

Table 1. Flight times of Bibionidae in N Scotland. Black shading shows the peak month, and the number of records is shown. *Bibio ferruginatus* and *Dilophus humeralis* are not included for lack of data. *Dilophus febrilis* is separated into early and late cohorts, with the single July record (23 July) placed in the late group.

Bibio marci

Year	**No. records**	**First date**	**Last date**	**Duration (days)**
2010	28	19 April*	03 June	45**
2011	30	23 April	01 June	39
2012	11	22 April	22 May*	30
2013	18	16 May**	03 June	18*
2014	10	03 May	27 May	24
2015	15	24 April	08 June**	45**
Extremes		19 April	8 June	50
Mean		27 April	31 May	34
Range (days)		27	17	27

Bibio pomonae

Year	**No. records**	**First date**	**Last date**	**Duration (days)**
2010	14	10 August**	07 September	28*
2011	70	28 July	29 September	63
2012	30	27 July	17 September	52
2013	29	10 August**	02 October**	53
2014	24	15 June*	02 September*	79**
2015	9	26 July	19 September	55
Extremes		15 June	02 October	109
Mean		24 July	12 September	55
Range (days)		56	29	58

Table 2. Annual variation in flight times of *Bibio marci* and *B. pomonae* in N Scotland: *earliest or minimum; ** latest or maximum.

Some conclusions about phenology have also been possible. All but two species of *Bibio* (*B. ferruginatus* omitted for lack of data) have very compressed flight seasons with (overall) 95% of records in 26-42 days (mean 36 days). The exceptions are *B. clavipes* and *B. pomonae* where the overall flight period is much longer at 77 and 87 days respectively. We can assume that dates, and also relative abundance which also varies hugely from year to year, are related to precise local weather conditions. It would also not be surprising if in Highland we have significant differences in phenology dependent on altitude and local climatic conditions which show trends E-W, N-S, and from the coast inland. For *B. pomonae*, the flight period is distinctly later and more synchronised here than in England and Wales. Of 125 records from there on NBN Gateway (accessed on 20 November 2015), the extreme dates were April (date unknown) and 25 September, with 71% of records in July and August.

While these flight periods are for the most part remarkably compressed, it is not unusual to find observations well outside the typical period. We have an unusually late record of *B. johannis* in mid-June, while Skartveit *et al*. quote a number of records of the same fly at altitude up to the end of May, almost a month later than the typical last date at lower altitudes. Similarly, Skartveit (1995) cites records of *B. clavipes* and *B. pomonae* in spring in Norway.

The records for *D. febrilis* show two clear peaks. This has usually been attributed to bivoltine behaviour, but Blackshaw and Darcy-Burt (1992) studying larval age classes in Ireland provided persuasive evidence that there might be two separate cohorts with different flight periods. The data separate into two exclusive periods, the first from March (date unknown) to 18 June, and the second from 23 July to 15 September. This closely matches the position in Essex where the two periods are March to June, and July to October (Anon 2015). This phenology, which must seriously restrict interbreeding between early and late fliers, raises the question of whether '*D. febrilis*' comprises two distinct genetic groups. Perhaps DNA analysis of samples from the two cohorts would be worthwhile.

Acknowledgements

I am grateful to Chris Raper, Graham Rotheray and David Horsfield for help with identification in the early days, and to all the observers who contributed records. Data provided to NBN Gateway by Outer Hebrides Biological Recording and the Lorn Natural History Group were accessed, as were records of *Bibio pomonae* from a range of providers. These groups and the NBN Trust bear no responsibility for any further analysis or interpretation of that material, data and/or information. Carl Farmer of LNHG also provided so far unpublished records of several species from Argyll. Bill Ely, Andrew Whittington and Jimmy McKellar provided helpful information and commented on a draft of this paper.

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Corrections and changes to the Diptera Checklist (34) – 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 asked to inform me of errors or changes and I 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. The notes below refer to addition of 6 species, resulting in a new total of **7116** species (of which 40 are recorded only from Ireland).

An updated version of the checklist, incorporating all corrections and changes that have been reported in *Dipterists Digest*, is now available for download from the Dipterists Forum website. It is intended to update this regularly following the appearance of each issue of *Dipterists Digest*.

Chironomidae. The following species was added from Ireland by D.A. MURRAY, P.H. LANGTON, J.P. O'CONNOR and P.J. ASHE (2015. Distribution records of Irish Chironomidae (Diptera): Part 3 – Chironominae. *Bulletin of the Irish Biogeographical Society* **39,** 7-192):
Tanytarsus ***dibranchius*** Kieffer, 1926 ++

Dolichopodidae. The following changes result from M. POLLET, M. PERSSON, E. BØGGILD and R. CROSSLEY (2015. A long-lasting taxonomic problem in European *Sympycnus* resolved, with the description of a new species and data on habitat preferences. *Zootaxa* 4032(1), 81-102).
Sympycnus ***pulicarius*** (Fallén, 1823 – *Dolichopus*) = *S. desoutteri* Parent, 1925, new synonymy
= *Porphyrops annulipes* Meigen, 1824, new synonymy
Sympycnus ***septentrionalis*** Pollet, Persson, Bøggild & Crossley, 2015

Platypezidae. The following genus and species are added in the present issue:
PLATYPEZINA Wahlgren, 1910
Platypezina ***connexa*** (Boheman, 1858 – *Platypeza*)

Agromyzidae. The following species was added in the previous issue but omitted from the checklist changes (brackets around the author's name were incorrectly applied in that article):
Ophiomyia ***skanensis*** Spencer, 1976

Trixoscelididae. The following species is confirmed as British in the present issue:
Trixoscelis ***canescens*** (Loew, 1865 – *Geomyza*)

Chyromyidae. Subfamilies **APHANIOSOMINAE** (for *Aphaniosioma*) and **CHYROMYINAE** (for other genera) have been proposed by M.J. EBEJER (2009. A revision of Afrotropical Chyromyidae (excluding *Gymnochiromyia* Hendel) (Diptera: Schizophora), with the recognition of two subfamilies and the description of new genera. *African Invertebrates* **50**(2)**,** 321-432.

Tachinidae. The following species was added by R.J. SANDS, J. KITSON, C.M. RAPER, G. JONUSAS and N. STRAW (2015. *Carcelia iliaca* (Diptera: Tachinidae), a specific parasitoid of the oak processionary moth (Lepidoptera: Thaumetopoeidae), new to Great Britain. *British Journal of Entomology & Natural History* **28,** 225-228
Carcelia ***iliaca*** (Ratzeburg, 1840 – *Tachina*)

Dipterists Digest 2015 **22**, 193-196

Xanthandrus comtus (Harris) (Diptera, Syrphidae) a larval predator of alder leaf beetles (Coleoptera, Chrysomelidae)

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Summary

In 2014 and 2015, at a site in Jutland, Denmark larvae of *Xanthandrus comtus* (Harris, 1876) (Diptera, Syrphidae) were found developing on larvae of the *Alnus* leaf beetles, *Agelastica alni* (Linnaeus, 1758) and *Plagiosterna aenea* (Linnaeus, 1758) (Coleoptera, Chrysomelidae). This paper gives the results of feeding on these uncommon prey species.

Introduction

Xanthandrus comtus (Harris) larvae (Diptera, Syrphidae) are most frequently reported to develop on caterpillars of certain Lepidoptera (Santolamazza *et al.* 2011). Less frequently reported is development of *X. comtus* on leaf beetle larvae (Coleoptera, Chrysomelidae). For instance, Krüger (1926) gives records of *X. comtus* larvae attacking larvae of the poplar leaf beetle, *Chrysomela populi* (Linnaeus, 1758), but such prey records have not been repeated.

In 2014 and 2015, I was searching for early stages of *Parasyrphus nigritarsis* (Zetterstedt) (Diptera, Syrphidae) on *Alnus* foliage infested with leaf beetle larvae at a site in central Jutland, Denmark. In addition to *P. nigritarsis*, I also encountered, those of *X. comtus* feeding on the same two species of leaf beetle. In this paper I give the results of finding and rearing *X. comtus* larvae developing on larvae of these leaf beetles. These are the first records of *X. comtus* feeding on these leaf beetles.

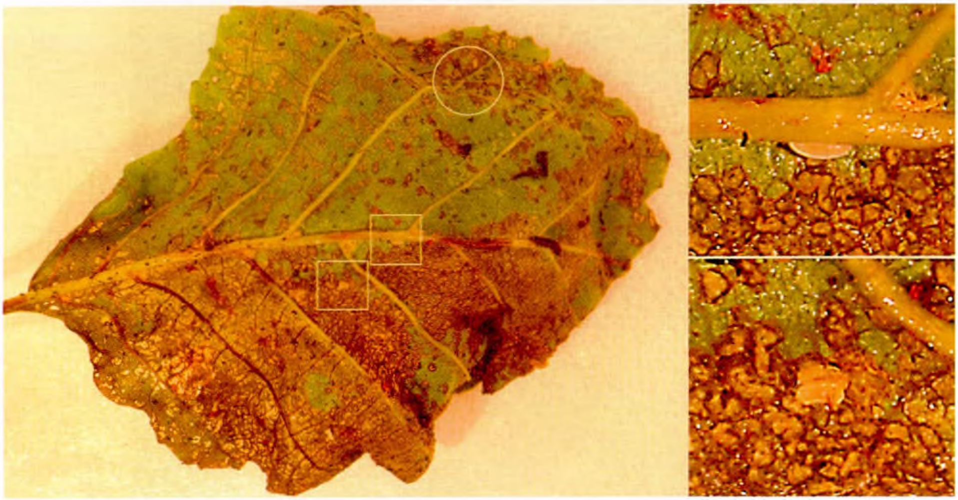

Fig. 1. ***Xanthandrus comtus*** **eggs on alder leaves: an egg close to the mid vein and an empty egg away from the mid vein. The circle shows the area with empty beetle eggs (species not identified).**

Materials and methods

On 9 June 2014 and at various dates in June to 16 August 2015 I visited Vindelsbæk Bro, a site in the centre of Jutland, Denmark (latitude 56,348518, longitude 9,537163). To find syrphid early stages associated with leaf beetles, I hand searched *Alnus* tree foliage infested with *Agelastica alni* (Linnaeus) and *Plagiosterna aenea* (Linnaeus) (Coleoptera, Chrysomelidae). Leaves with syrphid early stages were removed along with leaf beetle larvae and reared at home.

Leaves with syrphid early stages were placed into five small plastic containers (11.5 x 7.5 x 4 cm), one leaf per container plus a few leaves with larvae or eggs of the beetles *Agelastica alni* and *Plagiosterna aenea*. Extra leaves were provided as food for the beetle larvae. The containers were stored in a shady corner of a carport. When replacing leaves and beetle larvae and cleaning containers, the very mobile syrphid larvae were placed in another container, using a soft, moist brush. Puparia were checked for emergence twice a day, at about 7.45 in the morning and 16.45 in the afternoon. Two alder beetle larvae were placed in a container without syrphid larvae. They developed to the adult stage of *Agelastica alni* and *Plagiosterna aenea*, confirming the identity of the prey.

Fig. 2. Third stage larva of *Xanthandrus comtus* attacking a leaf beetle larva *Agelastica alni*.

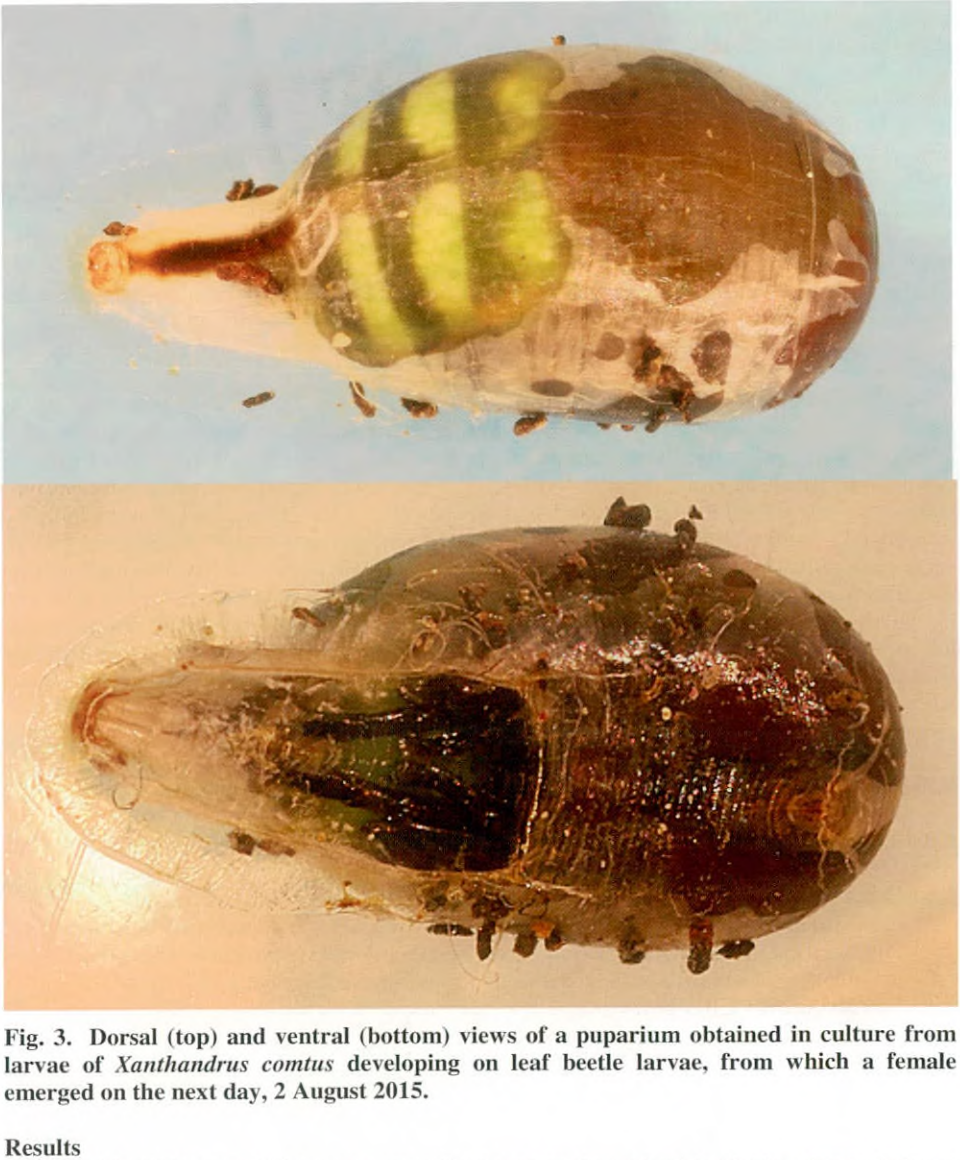

Fig. 3. Dorsal (top) and ventral (bottom) views of a puparium obtained in culture from larvae of *Xanthandrus comtus* developing on leaf beetle larvae, from which a female emerged on the next day, 2 August 2015.

Results

At Vindelsbæk Bro, syrphid eggs were readily found on the underside of *Alnus* leaves infested with leaf beetles. Most leaves with them had one egg, a few leaves had two or three eggs. The majority of eggs were close to the mid vein at a distance of 2 to 5cm from leaf beetle eggs (Fig. 1). Larvae reared from these eggs were *X. comtus* and they fed on leaf beetle larvae (Fig. 2) successfully pupated (Fig. 3) and developed to the adult stage.

On 28 June 2015, two *P. nigritarsis* larvae were found on the trees where I had found the first *X. comtus* eggs in 2014. The number of adult alder leaf beetles was considerably higher than in 2014, as were the number of *X. comtus* eggs. *Agelastica alni* made up the majority. The first eggs were found on 9 June 2014, the last on 9 July 2015. Mature *X. comtus* larvae were present on 16 August 2015. In cultures, *X. comtus* larvae were not observed to feed on leaf beetle eggs, in contrast, *P. nigritarsis* larvae were observed to eat beetle eggs as well as larvae.

Mortality of *X. comtus* was low in cultures. Of 15 larvae collected in 2014 and 2015, one larva was preserved in alcohol, two died in the puparial stage and 12 adults emerged successfully. The average length of pupariation in *X. comtus* was 10 days, range 6-15. Two emerged before 7.45, eleven after 7.45, and one after 17.00. Data apply to 2014 and 2015.

Discussion

At a field site in Denmark, *X. comtus* early stages were associated with infestations of two species of *Alnus* leaf beetle. In cultures successful development of *X. comtus* on leaf beetle larvae confirms the records of Krüger (1926) and further demonstrates that *X. comtus* is able to develop on both beetle as well as lepidopteran larvae.

Xanthandrus comtus larvae were also found at other sites in 2015, but Vindelsbæk Bro is the only site where it also occurred with *P. nigritarsis* together in the same year. The records presented in this paper show that the prey of these species may sometimes overlap, but whether competition effects any interaction between them is unknown. Apart from the greater distance between *X. comtus* and *P. nigritarsis* eggs relative to those of their prey, other differences noted were that *X. comtus* does not, apparently, feed on beetle eggs and is less cannibalistic than *P. nigritarsis*. Finally, in cultures, the mortality rate of *P. nigritarsis* early stages was higher. This was due to problems in keeping alive diapausing larvae, *X. comtus* overwinters as an adult and has no larval diapause. In most years all larvae of *P. nigritarsis* died, often in the spring close to the period of pupariation. For instance, the two larvae collected in 2015 entered diapause in July and died in August. From more than 20 *P. nigritarsis* larvae collected, only two produced adults whereas in 15 *X. comtus* larvae collected, apart from one preserved larva, only two failed to produce an adult.

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Dipterists Digest 2015 **22,** 197-209

Scathophaga stercoraria (Linnaeus) (Diptera, Scathophagidae) pollinator of Hebridean spotted heath orchid, *Dactylorhiza maculata* (Orchidaceae)

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Summary

In July 2013 and 2014 on the Hebridean islands of Canna and Sanday, 535 insects of 45+ species were recorded visiting flower spikes of the orchid, *Dactylorhiza maculata* (Orchidaceae). Only 7 species had *D. maculata* pollinaria on their heads and 95% of individuals with them were yellow dung flies, *Scathophaga stercoraria* (Linnaeus) (Scathophagidae). Adult *S. stercoraria* used *D. maculata* spikes to 'sit and wait' for prey. Most attempts at prey capture failed and following failures and also during movement through the grassland, flies traversed spikes and often inserted their heads into flowers. Pollinaria became attached and probably, pollen from older, attached pollinaria was left behind, thereby pollinating flowers. *Scathophaga stercoraria* adults did not search flowers systematically, as did large empids (Empididae), but the latter were rare in our study. Pollination of *D. maculata* by *S. stercoraria* is probably significant, but coincidental with levels determined by the abundance of *S. stercoraria* relative to that of *D. maculata*.

Introduction

The heath spotted orchid, *Dactylorhiza maculata* (Orchidaceae), is a species complex with a number of possibly hybridising subspecies (Stace 2010). In temperate Europe *D. maculata* sensu lato is widespread, perennial and produces 30 or more sequentially opening flowers in a single spike (Dafni 1987, Buttler 1991). It is a deceit orchid in that lacking a food reward, it is pollinated by insects deceived into visiting flowers by their mass, size and colour (Proctor *et al.* 1996, Koivisto *et al.* 2002). Inside a flower, a visiting insect may trigger the release of a pollinarium which attaches to it by a sticky basal pad or viscidium. Attached to the viscidium are a pair of pollinia, each comprising a stalk and a terminal pollen mass (Johnson and Edwards 2000). When visiting another flower, pollination is completed when the pollinia brush against the viscid stigmatical surface at the back of the flower and leave behind some or all of the pollen mass (Proctor *et al.* 1996).

A range of insects are known to visit and perhaps pollinate *D. maculata*, including Apidae (Hymenoptera), butterflies (Lepidoptera), Empididae, Syrphidae, Scathophagidae (Diptera), Halticidae and Cerambycidae (Coleoptera) (Hagerup 1951, Proctor *et al.* 1996, Nilsson 1981, Koivisto *et al.* 2002, Niiniaho 2011, Vetlesen 2011). A pattern appears to exist in the insects visiting *D. maculata* flowers. In open habitats Diptera are frequent and in closed habitats, such as woodlands, Coleoptera are more important (Vetlesen 2011).

On Hebridean Islands off the west coast of Scotland, *D. maculata* is often abundant in coastal grassland (Bertram 1939). This includes the machair, a Special Area of Conservation under the EU Habitats Directive (Love 2003). In 2012, GER visited the Inner Hebridean Islands of Canna and Sanday and from an area of *D. maculata*, swept an adult each of *Eupeodes corollae* (Fabricius) and *Eristalinus sepulchralis* (Linnaeus) (Diptera, Syrphidae) with more than one pair of orchid pollinia on their heads (Fig. 1). This paper gives the results of a two year investigation into insects visiting *D. maculata* flowers on these islands.

Materials and Methods

Canna (1,330ha) and Sanday (184ha) are about 42 kilometres west of the Scottish mainland and just north-west of Rum (Fig. 2a). They are close together and connected by a bridge at the west end of Sanday (Fig. 2b). They are owned by the National Trust for Scotland and have a population of under 20. In 2013, three *D. maculata* sites around Canna Harbour, each roughly 1200 m^2 in area, were selected: the bridge (NG267049), church (NG276046) and headland (NG278053) sites (Figs 2b, 3). From 7-27 July each site was visited every 3 days, morning or afternoon, and walked over slowly for up to 3 hours and insects on *D. maculata* flower spikes recorded. If they could not be identified, they were tubed or collected into an insect net. To minimise disturbing insects, Pentax Papilio, 8.5x21 binoculars that focus as close as 40cm, were used to locate insects on flower spikes ahead of the direction of walking. In the laboratory insects were identified and the position and number of orchid pollinaria recorded. *Dactylorhiza maculata* pollinaria were recognised from those of other orchids on Canna and Sanday by the size of the pollinia and their pale green colour (Fig. 4). On the heads of insects in this study, pollinaria were often missing a pollinium (Fig. 4). To assess the number of times individual flies acquired pollinaria, the number of viscidia were counted separately from the number of pollinia. To evaluate pollinaria in flowers, every 3 days per site, 10 spikes were randomly selected by throwing an insect net and choosing the spike closest to the tip of the handle. These spikes were removed and the number of open flowers counted and the state of the pollinaria in each open flower recorded as present or absent. If present then whether the pollinia were intact or collapsed was also noted. Collapsed pollinia transfer pollen to the stigmatical surface and are an indicator of self pollination (Vallius 2000). Unexpectedly, sciarid midges (Sciaridae) were often found trapped in the spur at the back of the flower. They were recorded as present or absent and intact or fragmented.

Fig. 1. Orchid pollinaria on heads of Syrphidae swept from grassland on Sanday, July 2012, left hand image: a female, *Eupeodes corollae* (Fabricius), older pollinaria without apical pollen mass; right hand image: a female *Eristalinus sepulchralis* (Linnaeus), older pollinaria without apical pollen mass.

In 2014, *D. maculata* was abundant at bridge and church sites but not at the headland site. Another site was selected where *D. maculata* was abundant, A'Chill (NG268053) (Fig. 2b). From 29 June to 21 July, except in wet and very windy weather, each of these sites was visited every 3 days for up to 3 hours in the morning or afternoon. Morning visits usually started after 9 a.m.

when the dew had evaporated, preliminary observations having shown that few insects visit flowers when dew is present. From the point individual *S. stercoraria* were first seen on spikes to the point they were lost by flying away, their behaviour was monitored using Papilo binoculars and noting events using the voice recorder option on a mobile phone or an iPod. Night visits were occasionally made to the A'Chill and bridge sites. At the end of each day, voice recordings were downloaded or transcribed into written notes on a computer.

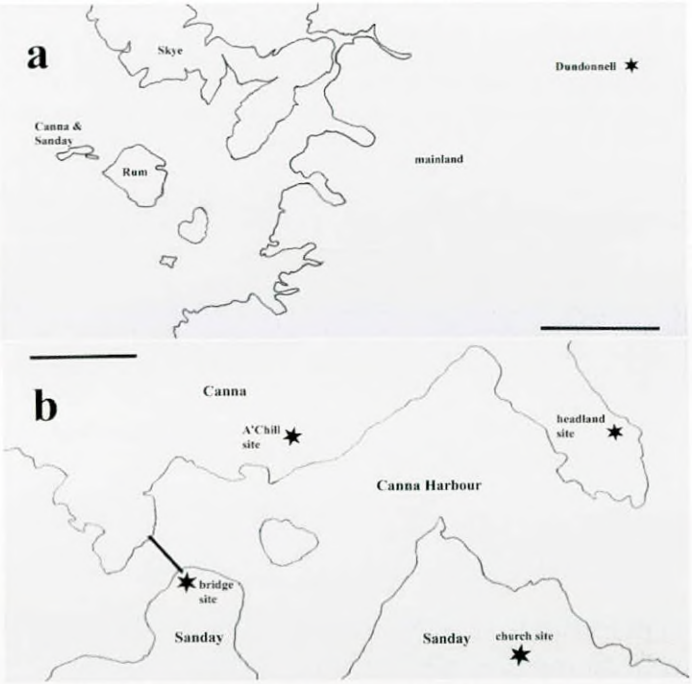

Fig. 2a-b. Geographical location of the Hebridean islands of Canna and Sanday and study sites: (a) position of Canna and Sanday relative to the mainland and the islands of Rum and Skye and the Dundonnell study site (star), scale line = 25 kilometres; (b) position of A'Chill, bridge, church and headland study sites (stars) around Canna harbour, line connecting Canna with Sanday is the bridge, scale line = 275 metres.

Results

Insect visitors to *Dactylorhiza maculata* flower spikes

In both years, monitoring began after most spikes had some open flowers (Fig. 5a) and ended when the sepals and petals of the majority of flowers had shrivelled and turned brown (Fig. 5b). From *D. maculata* flower spikes a total of 535 insects of 45+ species were recorded and all except 7 sawflies (Hymenoptera, Tenthredinidae) were Diptera (Table 1). The most frequent dipteran, comprising 82% of the total sample, was the yellow dung fly, *Scathophaga stercoraria* (Linnaeus) (Scathophagidae) (Table 1). Male and female *S. stercoraria* were equally frequent, ratio of males to females 0.51 to 0.49, n = 284.

Only 7 species had orchid viscidia on their heads and *S. stercoraria* comprised 95% of individual insects with viscidia (Table 1). Male and female *S. stercoraria* were equally frequent in having them, ratio of males to females 0.52 to 0.48, n = 137. 60% had more than one viscidium, maximum eight (Table 2). Attachment sites of 108 visicidia on 43 flies were assessed and the most frequent site was the cheeks 75%, n = 82 (Fig. 6a-c). Only 3 flies had viscidia on their faces, i.e. between the antennae and the mouth (Fig. 6c). Two flies had a viscidium draped over the antennae (Fig. 6d), 10 had viscidia partly on the eye (Fig. 6c) and 2 had viscidia entirely on the eye (Fig. 6b). 42% of viscidia had only one pollinium (Fig. 4).

Flies probably too small to trigger release of pollinaria are included in Table 1, such as Sciaridae and small Dolichopodidae and Empididae (Diptera). The former were particularly abundant on spikes and 63% of 110 spikes whose open flowers were examined, had trapped sciarids, mean number trapped per spike 4.2, range 0-22. In 58% of spikes with trapped midges, at least one, maximum 6, the sciarids had been reduced to fragments. Six syrphid species (Syrphidae) were recorded on orchid spikes, but only a single, *Melanogaster hirtella* (Loew) had a viscidium on its head (Table 1). Of 2,533 open flowers examined 1,180 (46.5%) were without pollinaria, mean number removed per spike 10.8, range 0-42.

Not included in Table 1 were unidentified moths (Lepidoptera) that were observed to do no more than land briefly on spikes. Bumblebees (Hymenoptera, Apidae) were locally common on both Canna and Sanday, but were not observed visiting *D. maculata* flowers. Workers of *Bombus muscorum* (Linnaeus), for instance, often flew close to but did not land on *D. maculata* spikes. The only insects seen to land on spikes and probe flowers one after the other, both on the islands and a mainland *D. maculata* site we visited, Dundonnell near Fort Augustus on the north side of Loch Ness (Fig. 2a), were large empids, for example *Empis livida* Linnaeus (Empididae), but few species and individuals were recorded (Table 1).

Fig. 3. Sanday, 7.vii.2013, looking west across the church study site, white to dark pink flower spikes of the heath spotted orchid, *Dactylorhiza maculata* s.l. (Orchidaceae) carpeting grassland.

Table 1. Insects found on *Dactylorhiza maculata* flowers 2013-2014 on Canna and Sanday.
x = number not counted

	species	family	number	with pollinaria
1	sciarid spp	Sciaridae	x	
2	chironomid sp.	Chironomidae	1	
3	*Chrysopilus cristatus* (Fabricius)	Rhagionidae	1	
4	*Haematopota bigoti* Gobert	Tabanidae	1	
5	*Hybos femoratus* Müller	Hybotidae	1	
6	*Empis grisea* Fallén	Empididae	1	
7	*Empis aemula* Loew	Empididae	1	
8	*Hilara* sp.	Empididae	1	
9	*Empis livida* Linnaeus	Empididae	2	
10	*Dolichopus mediicornis* Verrall	Dolichopodidae	1	
11	*Dolichopus phaeopus* Haliday	Dolichopodidae	1	
12	*Dolichopus plumipes* (Scopoli)	Dolichopodidae	1	
13	*Dolichopus atratus* Meigen	Dolichopodidae	1	
14	*Dolichopus trivialis* Haliday	Dolichopodidae	4	
15	*Dolichopus vitripennis* Meigen	Dolichopodidae	3	
16	*Hercostomus nigripennis* (Fallén)	Dolichopodidae	2	
17	*Cheilosia illustrata* (Harris)	Syrphidae	1	
18	*Platycheirus clypeatus* (Meigen)	Syrphidae	2	
19	*Platycheirus manicatus* (Meigen)	Syrphidae	6	
20	*Melanogaster hirtella* (Loew)	Syrphidae	4	1
21	*Eristalinus sepulchralis* (Linnaeus)	Syrphidae	5	
22	*Helophilus pendulus* (Linnaeus)	Syrphidae	1	
23	*Limnia* sp.	Sciomyzidae	1	

24	*Tetanocera robusta* Loew	Sciomyzidae	1	
25	*Tetanocera* sp.	Sciomyzidae	1	
26	*Loxocera aristata* (Panzer)	Psilidae	2	
27	*Scathophaga litorea* (Fallén)	Scathophagidae	1	1
28	*Scathophaga stercoraria* (Linnaeus)	Scathophagidae	438	221
29	*Botanophila brunneilinea* (Zetterstedt)	Anthomyiidae	1	
30	*Pegoplata aestiva* (Meigen)	Anthomyiidae	2	
31	*Hylemya variata* (Fallén)	Anthomyiidae	1	
32	*Pegoplata infirma* (Meigen)	Anthomyiidae	1	
33	*Hydrotaea irritans* (Fallén)	Muscidae	2	
34	*Helina evecta* (Harris)	Muscidae	1	
35	*Phaonia incana* (Weidemann)	Muscidae	2	
36	*Drymeia hamata* (Fallén)	Muscidae	18	2
37	*Coenosia tigrina* (Fabricius)	Muscidae	2	
38	*Coenosia intermedia* (Fallén)	Muscidae	1	
39	*Coenosia pedella* (Fallén)	Muscidae	1	
40	*Neomyia cornicina* (Fabricius)	Muscidae	5	1
41	*Thricops semicinereus* (Wiedemann)	Muscidae	2	
42	*Pollenia rudis* (Fabricius)	Muscidae	1	1
43	*Calliphora vicina* (Robineau-Desvoidy)	Calliphoridae	3	
44	*Tenthredo arcuata* Förster	Tenthredinidae	4	4
45	*Tenthredopsis nassata* (Linnaeus)	Tenthredinidae	3	
totals	45+	15	535	231

Fig. 4. Sanday, bridge site, 11.vii.2013, female yellow dung fly, *Scathophaga stercoraria*, on a *Dactylorhiza maculata* flower spike, minutes after having entered the flower in the lower left of the image and acquired a viscidium with one pollinium; black arrow points to the second pollinium that had broken and fallen off when the fly withdrew from the flower.

Behaviour of *Scathophaga stercoraria* on *Dactylorhiza maculata* flower spikes

Scathophaga stercoraria adults appeared on spikes soon after the dew evaporated and could be found on them up to dusk. In hot conditions, strong winds and heavy rain they were not found on spikes. Male visits lasted a mean of 17.3mins, range 0-62mins, n = 36 and female visits lasted a mean of 21mins, range 0-118, n = 44. Log-transforming these data and using a Welch two sample t-test revealed no significant difference between male and female time on spikes, t = 0.8417, P = 0.4026. These are minimum times because monitoring only started after a *S. stercoraria* individual was seen on a spike. How long it had been there before noticing it, is unknown. Usually only one *S. stercoraria* was found on a spike. On the rare occasions when another landed on an occupied spike and was noticed, one or other was chased off by walking or flitting towards it.

The most frequent *S. stercoraria* behaviour on spikes was remaining stationary, usually low on one side with the head facing into the surrounding vegetation. The front legs were together in front of the body, and the abdomen lifted to a more or less parallel position relative to the substrate (Fig. 7). From this position they attempted to capture flies smaller than themselves, either on the spike itself or on surrounding plants up to a distance of about 6cm in front of the head. Captures were made by pouncing on prey. Based on films of two prey capture sequences that each took about 3 seconds, pouncing consisted of: visual orientation towards the prey; flight or walking towards it; landing on and holding it down; backwards movement while bending the front legs to gather and grip the prey between the tibiae and femora. Often large flies were released without feeding. Feeding was observed on sciarids, *Dolichopus* species and small anthomyiids and muscids. Handling times for anthomyiids, and muscids were 17-31 minutes, n = 6, and for sciarids 3-6 minutes, n = 13. Small and soft-bodied prey, such as dolichopodids and sciarids, were fragmented by dung fly feeding. Larger flies were sucked dry from a wound made in the soft membrane of the neck and the empty husk dropped at the end of feeding. Following feeding, flies groomed repeatedly before resuming a prey capture stance or they rested, flitted off the spike or flew away. Resting was assumed from the stationary position flies assumed, usually with the tip of the abdomen lowered and the front legs not necessarily parallel in front.

Fig. 5a-b. Sanday, the church site, *Dactylorhiza maculata* flowers at different times, (a) 7.vii.2013; (b) 23.vii.2013.

Many more attempts at prey capture were made than were successful and following an unsuccessful attempt, flies became active. They traversed the spike lowering their heads and extending their short mouthparts to the substrate. If they pounced off the spike, they usually flitted back and traversed it. It was during these movements that flies entered flowers. They also entered flowers during movement across the grassland when, as opposed to more continuous flight, movement consisted of short, flitting hops combined with walking. Flies often came out of orchid flowers with pollinaria on their heads, n = 17. *Scathophaga stercoraria* adults sometimes groomed after pollinaria became attached, i.e. they rubbed their front legs over their heads and the pollinaria repeatedly. In two instances grooming loosened pollinaria and they fell from the head. Both instances occurred when the viscidium was incompletely stuck down, once when draped across the antennae and once when it was hanging off one side of the head. Otherwise grooming was unsuccessful in removing pollinaria or individual pollinia.

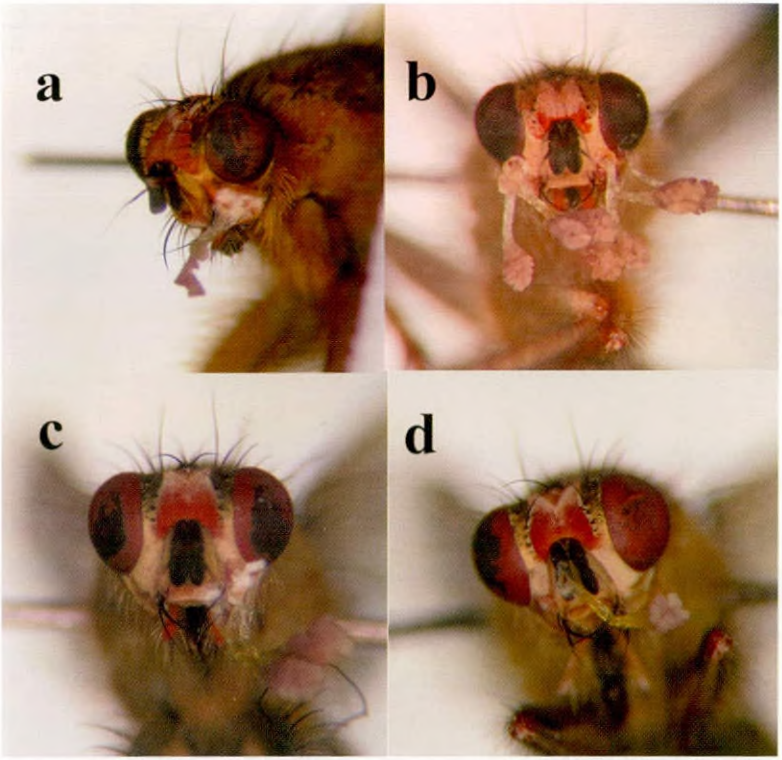

Fig. 6a-d. ***Dactylorhiza maculata*** **pollinaria on the heads of** ***Scathophaga stercoraria*** **collected on Canna and Sanday, July 2013 : (a) 3 viscidia on the right cheek, pollen masses absent; (b) left cheek with 2 viscidia, single pollinium each; right cheek, 2 viscidia with 2 pollinaria and right lower eye margin, single viscidium with a single pollinium, pollen masses all present; (c) eye margin and right cheek, single viscidium, right cheek, 2 viscidia, face (clypeus), single viscidium; (d) left antenna, single viscidium, one pollinium.**

Discussion

Over two consecutive years on the Hebridean islands of Canna and Sanday, we recorded insects visiting flower spikes of the heath spotted orchid, *D. maculata*. Diptera were the most frequent visitors and the yellow dung fly, *S. stercoraria*, comprised 82% of all insects recorded. These results fit the pattern pointed out by Vetlesen (2011) that in open habitats, such as those on Canna and Sanday, Diptera are the most frequent visitors to spikes of *D. maculata*. On the Faroe Islands Hagerup (1951) recorded the syrphid, *E. sepulchralis*, as a significant *D. maculata* visitor. We also recorded this species, but rarely (Table 1). Many more flies visit *D. maculata* spikes than gain pollinaria (Table 1). *Scathophaga stercoraria* was by far the most frequent species to enter flowers and acquire them.

Fig. 7. Canna, 1 July 2014, female *Scathophaga stercoraria* in a predatory stance and in a typical position on a *Dactylorhiza maculata* flower spike, pollinarium on the head.

Male and female *S. stercoraria* visited spikes in equal proportions and used them primarily as perches for their 'sit and wait' predation strategy. Compared to other grassland flowers, the spikes of *D. maculata* are large and do not bend in the wind as much as other plants. These features plus their colours probably make them attractive to *S. stercoraria* and other grassland Diptera. We did, however, sometimes record *S. stercoraria* in a predatory stance on other plants, such as leaves of grass (Poaceae) and flowers of *Ranunculus* (Ranunculaceae) and *Trifolium* (Fabaceae). Prey were caught by pouncing, i.e. springing forward rapidly either in flight or walking, and using the front legs to hold prey. Most attempts at capture failed. Observation suggested that large flies released without feeding was because the predator could not reach the neck. *Scathophaga stercoraria* adults typically walked over spikes following failures to catch and feed on prey. On these occasions, they frequently entered flowers and triggered the release of pollinaria and they may have deposited pollen from pollinia already attached to them.

Table 2. Numbers of male and female *Scathophaga stercoraria* from Canna and Sanday 2013 and 2014 with 0 to 8 *Dactylorhiza maculata* viscidia on their heads.

no. of viscidia / sex	0	1	2	3	4	5	6	7	8	total 1-8	total 2-8	total 0-8
males	72	26	23	17	3	2	1	0	1	73	47	145
females	75	25	20	10	5	2	1	1	0	64	39	139

The presence on the majority of *S. stercoraria* heads of more than one viscidium (Table 2, Fig. 6), demonstrates that most individuals enter more than one flower. Suggesting relatively high levels of removal, just under half (46.5%) of open flowers examined were without pollinaria. Nearly all viscidia were on the cheeks of *S. stercoraria* heads. The viscidium projects mid-dorsally from an oval-shaped space that tapers into the spur at the back of the flower. To account for the position of viscidia on the cheeks, the head is probably off centre in this space when the fly moves towards the spur. Furthermore, when the fly triggers the release of the viscidium and withdraws, a pollinium may break off (Fig. 4), perhaps due to the fly brushing or jerking suddenly against the side of the flower. Pollinia were often recorded without their apical pollen mass (Figs 6a & c), which if pollen doesn't age and drop off, suggests deposition in a flower and pollination.

If, as seems likely, that *S. stercoraria* pollinates *D. maculata* it is a coincidental effect of its behaviour, and levels of pollination are likely to be determined by *S. stercoraria* abundance relative to that of *D. maculata*. A further indicator of the coincidental nature of *S. stercoraria* visits to *D. maculata* spikes is the switch we observed them make at the end of July 2014, to catching prey on the flowerheads of grassland apiates (Apiaceae). Apiates came into flower just when the flowers of *D. maculata* were fading and turning brown.

On emerging from the puparium, adult *S. stercoraria* require nutrients from prey to mature eggs and sperm (Hammer 1941, Blanckenhorn et al. 2008). According to Parker (1970) and Gibbons (1980) immature female *S. stercoraria* spend most time foraging for prey (and nectar) in vegetation surrounding fields. Males similarly forage for prey and when mature, spend most time waiting on or around fresh dung to mate with females. Gibbons (1980) also states that after females oviposit, they seek prey to mature more eggs. If males stay near dung after becoming mature and females continue to search for prey, then at *D. maculata* flower spikes, females should be more frequent than males. We did not, however, record greater numbers of females. Accounting for this, emergence from puparia may have been continuous during the period of our fieldwork and it is recruits to the population that account for equal numbers of each sex. New recruits would also explain why half the adults recorded were without pollinaria: it was too soon for them to have been acquired. Furthermore, movement of *S. stercoraria* to vegetation outside the coastal grassland was not a feature in our study. This is probably because in the coastal grasslands we monitored, *S. stercoraria* requirements were present and within easy reach: *D. maculata* flower spikes on which to perch and catch prey; nectar from a wide range of associated flowers and, dung from cattle and sheep. In support of this, we saw males and females on dung with pollinia on their heads and occasionally, males jumping on to females at spikes and apparently copulating.

A potential influence on visits to *D. maculata* by predatory flies, such as *S. stercoraria* and large empids, could be sciarids trapped at the back of the flower. They might constitute a food reward. Outside those trapped, live sciarids were observed shortly after the dew had evaporated or after rain, when they ascended from low in the vegetation and on *D. maculata*, ran about the spike and often into flowers. If they became stuck as much from the viscidity of the stigmatical surface as the narrowness of the tubular spur, this was unclear, but they remained stuck and alive for 24+ hours. Suggesting feeding on trapped sciarids, some had been reduced to fragments. These fragments were similar to those seen when an adult *S. stercoraria* fed on a sciarid outside a flower. The lack of systematic flower searching in *S. stercoraria* suggests, however, that they do not learn nor are adapted to take advantage of trapped sciarids as a source of food and probably, their presence has little influence. If trapped sciarids are a food reward that explains systematic flower probing in empids, this requires investigation.

The success of *Dactylorhiza maculata* on Hebridean islands like Canna and Sanday may not be a result of insect but self pollination. Insect pollinators can be scarce in isolated places such as islands, and in response plants often develop a reliance on self pollination (Barrett 1996). Self pollination appears, however, to be insignificant on Canna and Sanday. We found just 10 flowers with collapsed pollinaria indicative of self pollination. Levels of selfing may be low because rates of pollinaria removal and pollination by *S. stercoraria* are high.

Relative to the mainland *D. maculata* site at Dundonnell, *D. maculata* and *S. stercoraria* were abundant on Canna and Sanday which is probably explained in part if not mainly by the extent and proximity of stock grazing. On Hebridean islands such as Canna and Sanday, over hundreds of years grasslands for stock grazing have been encouraged and maintained. This favours probably *D. maculata* and grassland Diptera and with dung from stock, *S. stercoraria* are also favoured. With abundant *S. stercoraria*, levels of *D. maculata* pollination are probably maintained at high levels. Grassland managed for stock and having coincidental knock-on benefits for *D. maculata*, *S. stercoraria* and their prey, probably explains the extraordinary abundance of Hebridean populations of *D. maculata*. Although *S. stercoraria* is a known visitor to *D. maculata* flower spikes in mainland Britain (Proctor *et al*. 1996), our study on Canna and Sanday suggests that its significance as a pollinator will depend on the proximity of stock grazing.

Acknowledgements

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Corrections to: Chandler, P.J. 2015. Diptera recording at Bushy Park, Middlesex. *Dipterists Digest (Second Series)* 23, 69-110.

The following species were listed under erroneous names (3 wrong genus, 7 junior synonym, 2 wrong gender of specific name) in the species list:

Limoniidae
Dicranophragma adjunctum [as *Neolimnomyia adjuncta*, also in text, p. 85]
Psychodidae
Panimerus goetghebueri [as *Telmatoscopus goetghebueri*]
Hybotidae
Platypalpus pseudofulvipes [as *P. coarctatus*]
Platypalpus nigritarsis [as *P. nigricornis*]
Empididae
Empis longipes [as *Rhamphomyia longipes*]
Dolichopodidae
Chrysotus obscuripes [as *C. kowarzi*]
Syntormon denticulatus [as *S. denticulatum*]
Syrphidae
Eristalis intricaria [as *E. intricarius*]
Ephydridae
Philygria interstincta [as *P. sexmaculata*]
Anthomyiidae
Pegoplata annulata [as *P. juvenilis*]
Muscidae
Helina confinis [as *H. anceps*]
Polietes domitor [as *P. albolineatus*]

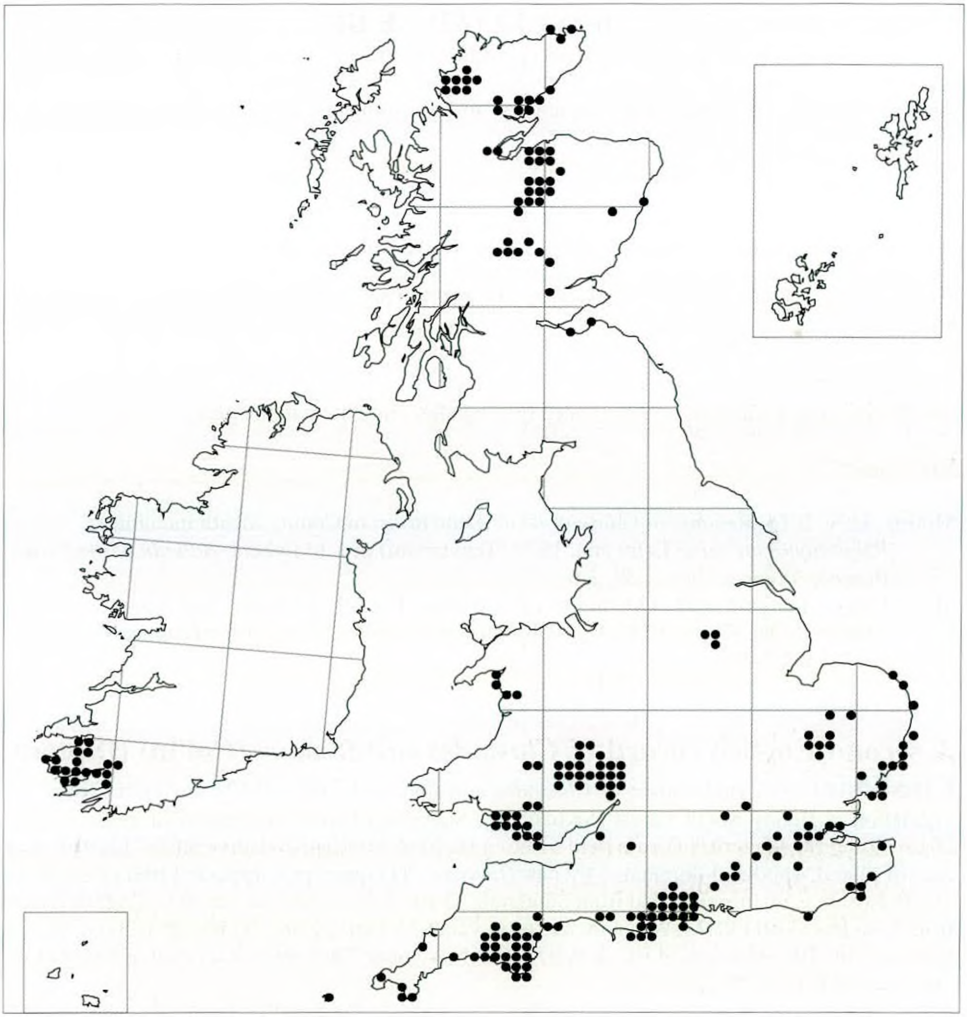
Corrections to: Chandler, P.J. 2015. Dr John Henry Wood and Colonel John William Yerbury – their different lives as Dipterists. *Dipterists Digest (Second Series)* 21(2014) Supplement, 1-118.

Erroneous grid references were given for two sites listed in Appendix 4, for which the correct hectads are as follows:

SO23 Vagar Hill (1899) [in error as SO29]
SO61 Forest of Dean (1897) [given as Herefordshire by Verrall 1901] [in error as SO16 and listed under Gloucestershire]

John Phillips (*pers. comm.*) points out that, although SO61 is nearly all in Gloucestershire, it also includes part of Herefordshire, some of which could be described as being part of the Forest of Dean, so it is possible that Yerbury's visit to SO61 was to the Herefordshire part and Verrall (1901) might have been correct in so describing it.

Some other hectads not listed in Appendix 4 appeared in error on the map (Fig. 13), i.e. NN31, N075 (instead of NN75), SS29, ST56 and SX43. A replacement map with these corrections was kindly supplied by Stephanie Rorke of BRC and is included here.



Replacement for Fig. 13. Hectads in which Diptera were collected by J.W. Yerbury.

Changes to the Irish Diptera List (22) – 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 latest checklist of Irish Diptera (Chandler *et al.* 2008). Species are listed under families, but with references listed separately (unless within the present issue). The additions cited here bring the total Irish list to 3397.

Chironomidae

Chironomus lacunarius Wülker, 1973 (added by Murray *et al.* 2015)
Parachironomus danicus Lehmann, 1970 (added by Murray *et al.* 2015)
Rheotanytarsus reissi Lehmann, 1970 (added by Murray 2015)
Tanytarsus dibranchius Kieffer, 1926 (added by Murray *et al.* 2015) [also new to British Isles]
Tanytarsus nemorosus Edwards, 1929 (added by Murray *et al.* 2015)

Trixoscelididae

Trixoscelis similis Hackman, 1970 (added by Chandler and Drake in the present issue)

References

Murray, D.A. 2015. Records of Chironomidae (Diptera) from County Meath including *Rheotanytarsus reissi* Lehmann, 1970 (Tanytarsini) new to Ireland. *Bulletin of the Irish Biogeographical Society* **39,** 3-6.

Murray, D.A., Langton, P.H., O'Connor, J.P and Ashe, P.J. 2015. Distribution records of Irish Chironomidae (Diptera): Part 3 – Chironominae. *Bulletin of the Irish Biogeographical Society* **39,** 7-192.

A second English record of *Clusiodes caledonicus* (Collin) (Diptera, Clusiidae)

– A single male of *Clusiodes caledonicus* (Collin, 1912) was swept from low vegetation at Budby South Forest (SK626683), Sherwood Forest, Nottinghamshire on 15 July 2015, during the Dipterists Forum field meeting based at Nottingham University. This was in an area of mixed woodland dominated by oak *Quercus*. This was an unexpected find of a species that in Britain is mainly recorded from Scotland. There is, however, one previous English record from Longleat Center Parcs, Wiltshire on 16 July 2008 by David Gibbs (Gibbs, D.J. 2009. Diptera section of the BENHS Annual Exhibition, held 8 November 2008. *British Journal of Entomology and Natural History* **22,** 175-176).

This species is widely distributed but very local in the Scottish Highlands with records from Sutherland, the Spey and Dee valleys of the Central Highlands, and the islands of Rum and Eigg; it is considered to warrant Nationally Scarce status in the latest and soon to be published assessment of conservation statuses in acalyptrates. It has been reared from larvae found under decayed pine *Pinus* bark, and the Wiltshire record had been considered to result from an introduction in view of its association with conifer woodland at most Scottish sites. It was, however, found in hazel *Corylus* woodland on Eigg (Skidmore, P. 2009. A review of the Diptera of the Western Isles of Scotland. *Dipterists Digest* (*Second Series*) **15,** 99-194). That and the occurrence at Sherwood Forest suggest that it is also able to develop in wood of broad-leaved species. Whether it is a recent arrival in Nottinghamshire, or a previously overlooked endemic of this poorly recorded district, cannot be determined from this isolated find – **PETER J. CHANDLER,** 606B Berryfield Lane, Melksham, Wilts SN12 6EL

Dipterists Digest 2015 **22**, 213-216

Corrections to: Langton, P.H. 2015. *Metriocnemus ephemerus* sp. nov. (Diptera, Chironomidae) from Northern Ireland. *Dipterists Digest* (*Second Series*) 22, 35-42.

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In this paper a figure was missing from Fig. 3, in which the remaining figures were mislabelled and this also affected the key; here the corrected Key and figures are provided. Also in the Key and References the authorship of the following was cited in error as Langton (2015).

Langton, P.H. and Armitage, P.D. 2015. *Metriocnemus albipunctatus* sp. nov. (Diptera, Chironomidae) from England. *Dipterists Digest* (*Second Series*) **22,** 5-10.

Revised Key to the British species of *Metriocnemus*

1. Preepisternum bearing many long setae (50 or more). Hypopygium Fig. 2a ……………… ……………..…… **Metriocnemus (Inermipupa) carmencitabertarum** Langton & Cobo
\- Preepisternum bare …………………………………………………………………… 2

2. Entire wing rather densely clothed with macrotrichia (base of cell m proximal to cross vein RM may be bare or nearly so) ……………………………………………………..….. 3
\- Basal half of wing bare or with a few scattered macrotrichia, apical half more densely covered …………………………………………………………………………… 14

3. Gonocoxite with a pronounced lobe in the basal half …………………………………… 4
\- Gonocoxite lobe less pronounced ……………………………………………………... 7

4. Antennal ratio about 1.0. Hypopygium Fig. 2b ……………………………………………… ………………………………………... **Metriocnemus (Metriocnemus) cavicola** Kieffer
\- Antennal ratio at least 1.5 ……………………………………………………………... 5

5. Halteres blackened. Hypopygium Fig. 2c ….. **Metriocnemus (M.) eurynotus** Holmgren
\- Halteres pale …………………………………………………………………………... 6

6. Abdomen black. Hypopygium Fig. 2d ………………………….. **Metriocnemus (M.) sp.**
\- Posterior segments of abdomen with postero-lateral pale corners. Hypopygium: Langton and Armitage 2015, Fig. 2d …. **Metriocnemus (M.) albipunctatus** Langton & Armitage

7. Anal tergite without an anal point or with a very small point (<15µm long). Hypopygium Fig. 2e ……………………….….. **Metriocnemus (M.) beringensis** (Cranston & Oliver)
\- Anal point well-developed, but may be transparent and difficult to see ………………… 8

8. Antennal ratio 2.5-3.0. Hypopygium Fig. 2f …..…. **Metriocnemus (M.) picipes** (Meigen)

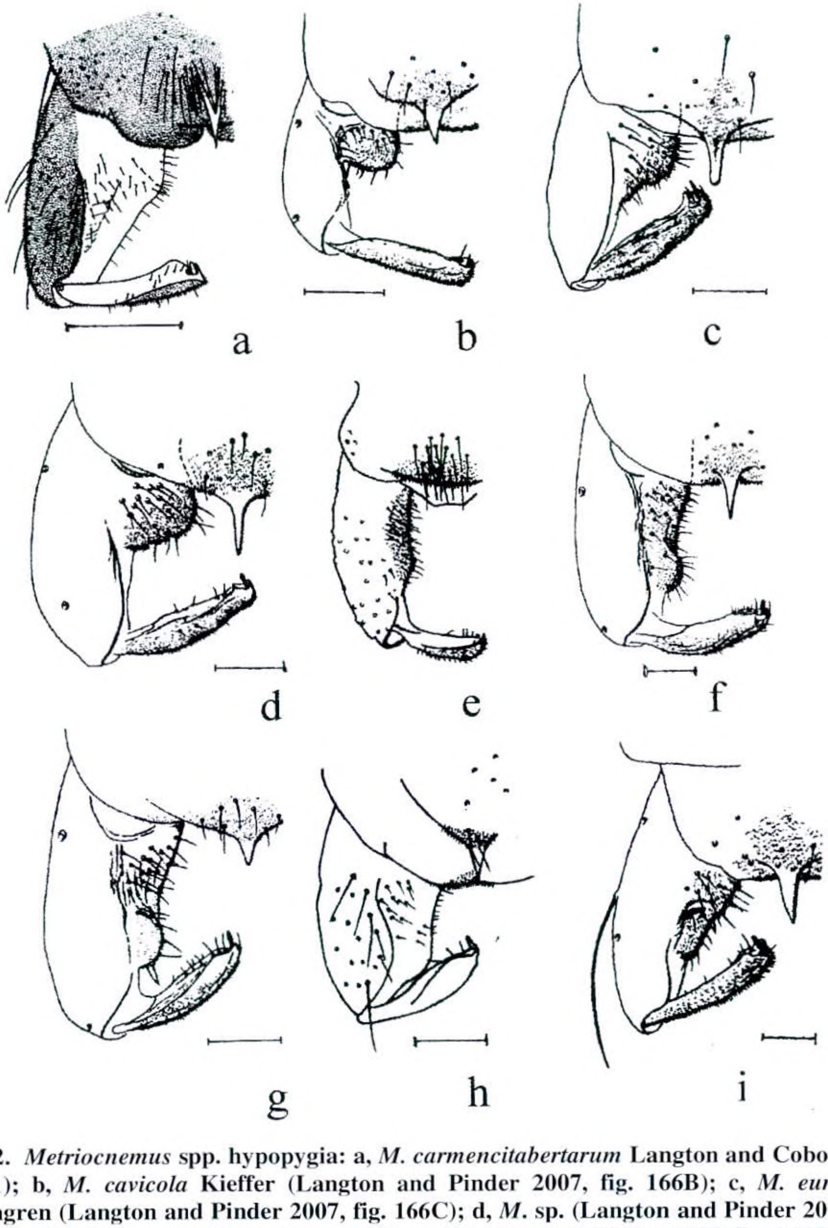

Fig. 2. *Metriocnemus* **spp. hypopygia: a,** *M. carmencitabertarum* **Langton and Cobo (1997, fig. 1); b,** *M. cavicola* **Kieffer (Langton and Pinder 2007, fig. 166B); c,** *M. eurynotus* **Holmgren (Langton and Pinder 2007, fig. 166C); d,** *M.* **sp. (Langton and Pinder 2007, fig. 166D); e,** *M. beringensis* **(Cranston and Oliver) (Langton and Pinder 2007, fig. 167C); f,** *M. picipes* **(Meigen) (Langton and Pinder 2007, fig. 167A); g,** *M. atriclava* **Kieffer (Langton and Pinder 2007, fig. 167B); h,** *M. terrester* **Pagast; i,** *M. albolineatus* **(Meigen) (Langton and Pinder 2007, fig. 167D). Scale lines = 0.1mm.**

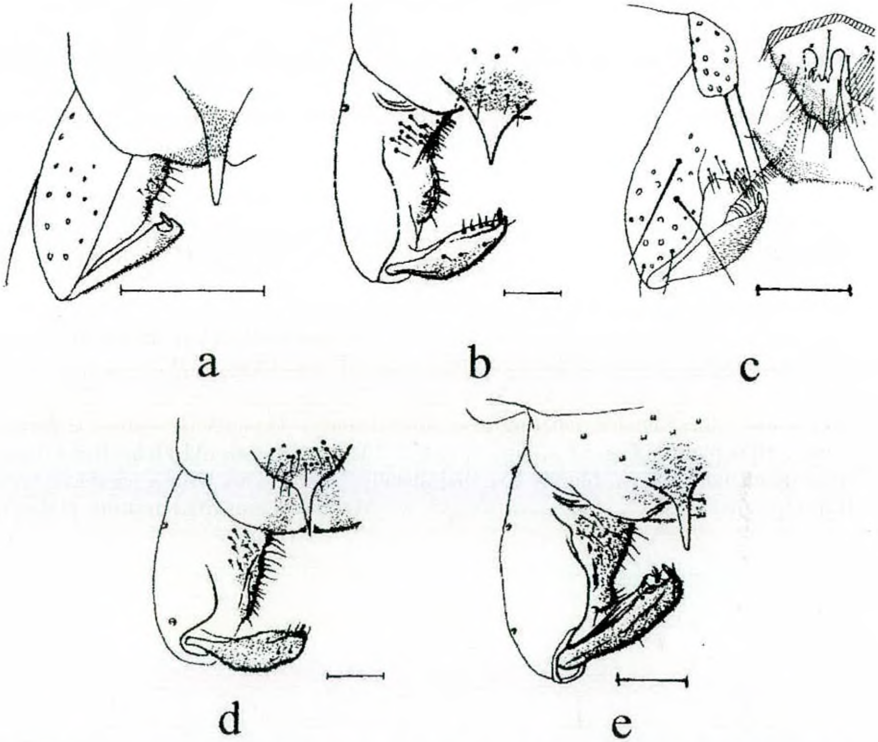

Fig. 3. ***Metriocnemus*** **spp. hypopygia: a,** ***M. inopinatus*** **Strenzke; b,** ***M. fuscipes*** **(Meigen) (Langton and Pinder 2007, fig. 168A); c,** ***M. alisonae*** **Langton (2013, fig. 1d); d,** ***M. tristellus*** **Edwards (Langton and Pinder 2007, fig. 168B); e,** ***M. ursinus*** **(Holmgren) (Langton and Pinder 2007, fig. 168C). Scale lines = 0.1mm.**

\- Antennal ratio 2.0 or less 9

9. Antennal ratio approaching 1.5-2.0 10
\- Antennal ratio only about 1.0-1.5 11

10. Gonocoxite lobe swollen hemispherically at apex. Hypopygium Fig. 2g ....
.... **Metriocnemus (M.) atriclava** Kieffer
\- Gonocoxite apically with a less projecting, longer rounded lobe. Hypopygium Fig. 2h ......
.... **Metriocnemus (M.) terrester** Pagast

11. First tarsomere of hind leg about half as long as the tibia 12
\- First tarsomere of hind leg about one third as long as the tibia 13

12 Wing macrotrichia black. Setae on gonocoxite long, those on mid coxite extending well past the tip of the coxite. Dorsal edge of gonocoxite excavated. Hypopygium Fig. 2i .... **Metriocnemus (M.) albolineatus** (Meigen)

\- Wing macrotrichia pale and difficult to see. Setae on gonocoxite shorter, those on mid coxite hardly exceeding tip of coxite. Dorsal edge of gonocoxite straight from apex to base. Hypopygium Fig. 3a .... **Metriocnemus (M.) inopinatus** Strenzke

13\. Anal point triangular, broad at base and narrowed to the sharp tip. Hypopygium Fig. 3b .... **Metriocnemus (M.) fuscipes** (Meigen)

\- Anal point needle-like, narrow and more or less parallel-sided for most of its length. Hypopygium Fig. 3c .... **Metriocnemus (M.) alisonae** Langton

14\. Antennae reduced, with short and flattened plume; AR 0.78-1.0. Hypopygium Fig. 1d .... **Metriocnemus (M.) ephemerus** sp. nov.

\- Antennae normal, with erect plume of long setae; AR greater than 2.0 15

15\. Anal point rather slender, tapering to a point distally. Gonostylus without a preapical 'tooth'. Hypopygium Fig. 3d .... **Metriocnemus (M.) tristellus** Edwards

\- Anal point more robust, bluntly rounded distally. Gonostylus with a preapical ‘tooth’. Hypopygium Fig. 3e .... **Metriocnemus (M.) ursinus** (Holmgren)

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continued inside back cover

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